Mental State Talk: A Developmental Perspective

by

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A thesis submitted in conformity with the requirements for the degree of Master of Arts
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ABSTRACT

We investigated the developmental trajectories of mental state talk (cognitive, desire and feeling) in children, and influences on mental state talk. Thirty-seven Caucasian families, each with two parents and two children, participated in this study over a two-year period. Data were collected during six 90-minute sessions in the participants’ homes. Each speaker turn was coded for the presence of mental state terms and the referent (e.g., self, other).

Results indicated that cognitive state talk increases in children and parents as the children get older. Mothers and older girls talked more than fathers and older boys about the mental states of others. Finally, children with an older sibling, when compared to those without older siblings are advantaged in their cognitive state talk at age 4 after controlling for MLU. Children with an older sibling are not however advantaged in their talk about desires and feelings.
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CHAPTER 1: INTRODUCTION

Developmental changes in children’s talk about the mind have become a topic of interest for investigators over recent years. To understand why people do what they do requires that we understand the events of the mind which provoke behaviour. As adults, our beliefs, desires, motivations and feelings drive our actions. An examination of children’s production of mental state terms allows us to explore how children’s understanding and talk of mental events develops over time. Existing studies point to important trends in children’s changing abilities to discuss various types of mental states, however, there is still much to discover. For example, little is known about developmental changes after four years of age. Furthermore, the literature provides only a glimpse into the changes in parents’ mental state talk as their children grow and develop. The present study seeks to uncover new information, which will extend what is already known. We examine not only children’s developmental changes in mental state talk, but also that of their parents, as well as factors that may be associated with the production of mental state terms.

The Development of Children’s Mental State Talk

Previous research has provided us with trends in the developmental changes in belief, desire and feeling state talk. These studies are described below in some detail. As Astington and Pelletier (1996) pointed out, talk about mental states can be divided into many categories, such as perception, cognition, volition, morality, affect and physiology. However, talk about beliefs (e.g., think, know), desires (e.g., want, hope), and feelings (e.g., sad, happy) are reported to be common components of all linguistic
taxonomies and are therefore, the focus of the present study. It is important to note that there is little consistency in the way that the frequency of mental state terms is presented in previous research. For example, some studies calculate the frequency as a proportion of all utterances, while others calculate mental state terms as a proportion of only those utterances containing mental state terms. The method employed by each researcher will be described.

Talk about Beliefs

Talk about beliefs or cognitions (these terms will be used interchangeably) generally does not appear in children's vocabulary until the middle of the third year (Furrow, Moore, Davidge & Patriquin, 1992; Hughes & Dunn, 1998; Shatz, Wellman & Silber, 1983). For example, Shatz et al. focused on the development of cognitive speech in one child over a two-year period. Findings revealed that cognitive state talk first appeared between 2 years, 4 months and 2 years, 11 months. This result was corroborated when the same authors studied 30 2-year old children over a six-month period, and found that cognitive terms did not appear until the middle of the third year.

Once talk about cognitive states has been established, it continues to increase in frequency (Furrow et al., 1992; Hughes & Dunn, 1998). Furrow et al., for example, observed nineteen mother-child dyads when the children were between 2 and 3 years old. Results indicated a significant increase in the production of cognitive terms between 2 and 3 years of age, as a percentage of all utterances produced at each time period.
Hughes and Dunn (1998) found that the frequency of cognitive terms increased in a sample of 50 older children who were observed from the time they were 3 years, 11 months to 5 years of age. Results indicated that children used cognitive state terms at the initial observation period, and that the frequency increased until the final observation period. The authors presented the quantity of mental state talk as the number of terms produced per hour of observation. These studies provided important information about the developmental changes in cognitive talk from its onset until age five, but what do we know about children's talk about other mental states and their respective developmental changes?

Talk about Beliefs and Desires

Desire terms have been found in children's speech prior to cognitive terms and are more frequent until the third year. In an investigation of cognitive and desire state talk in fourteen mother-child dyads, Moore, Furrow, Chiasson and Patriquin (1994) reported that desire terms were the most common type of mental state talk until the third year. Between the third and fourth year, desire terms leveled off while cognitive terms increased and were more frequent than desire terms. Moore et al. presented the frequency of mental state talk as a proportion of participants' total number of utterances.

Other studies that have examined concomitant developmental changes in belief and desire state talk have found that around the age of three, children increase their production of belief terms, however, desire terms remain the most frequent type of mental state talk (Bartsch & Wellman, 1995). Bartsch and Wellman studied cognitive
and desire talk in ten children from the time they were 1 ½ to 6 years old. When the frequency of belief and desire terms were compared to each other, it was reported that the onset of desire talk preceded belief talk, and was the most common type of talk between 18 and 72 months of age. This pattern emerged whether belief and desire terms were expressed as a percentage of all utterances containing references to beliefs and desires, or as a percentage of the child's total utterances. While the developmental changes in this study appear to contradict those of Moore et al. (1994), it is important to bear in mind that Bartsch and Wellman reported only on genuine references to psychological states, whereas Moore and his colleagues did not distinguish between various functions of mental state terms. The differences in the inclusion criteria may have affected the frequency of mental state terms for example, by decreasing the frequency of cognitive terms in Bartsch and Wellman's study. Desires and cognitions are two distinct types of mental state and, taken together, these results indicate that children use desire talk before they talk of beliefs. Moreover, the production of cognitive terms increases from the age of three, both as a percentage of all utterances and as a percentage of all mental state talk.

Talk about Feelings

Feeling talk has been found to appear as early as 18 months of age and to increase in frequency from that time (Dunn, Bretherton & Munn, 1987). This was examined in two longitudinal studies. The first study included 43 mother-child dyads, when the second-born children were 18 and 24 months of age. The second study consisted of 16 mother-child dyads when the first-born children were 25 and 32 months of age. Both studies yielded similar results, with children speaking more about feelings as they
got older. The results offered similar developmental trends whether the frequency of feeling talk was presented as the number of utterances or the number of conversation turns that contained a feeling term. However, Dunn et al. only examined feeling talk in children until the age of three and so could not provide details of developmental changes after that time. Additionally, because only feeling terms were attended to, no information was provided about changes in feeling talk in combination with changes in cognitive and desire state talk.

Talk about Beliefs, Desires and Feelings

In studies that have examined concomitant changes in cognitive, desire and feeling talk, results have indicated a preponderance of desire terms, with both cognitive and feeling terms being less frequent, but increasing with time, when each category of speech was reported relative to the remaining categories (Bretherton & Beeghly, 1982). Bretherton and Beeghly obtained their results by training 30 mothers to record their children's use of six categories of internal state language in the home. The study was longitudinal, beginning when children were 10 months of age and ending at 28 months of age. Bretherton and Beeghly assessed children's language production during four situations (e.g., 5-minute snack and 5-minute play sessions) and found that these scores were highly correlated with mothers' reports of their children's mental state talk.

Brown and Dunn (1991) extended the work of Bretherton and Beeghly by studying slightly older children aged 24-36 months. The authors reported that cognitive terms first appeared at 30 months of age, while feeling terms were present from 24 months. Both types of mental state talk increased in frequency from the time they appeared.
The results were expressed as mental state terms per 100 conversation turns and supported the findings of studies that have examined changes in either cognitive or feeling talk (Bartsch & Wellman, 1995; Dunn et al., 1987; Furrow et al., 1992; Hughes & Dunn, 1998; Moore et al., 1994). This study provided important new information about the interplay between various types of mental state talk.

Summary

To summarize, references to cognitive states have been rare until the third year and have increased from that time (Bartsch & Wellman, 1995; Furrow et al., 1992; Hughes & Dunn, 1998; Moore et al., 1994). Talk about desires appeared earlier than that of cognitions and continued to be the most common type of mental state talk until 36 months of age (Brown & Dunn, 1991; Moore et al., 1994) and beyond (Bartsch & Wellman, 1995). Finally, talk about feelings began as young as 18 months and continued to increase in frequency; however, it remained less common than talk about desires (Brown & Dunn, 1991). The aforementioned developmental changes have been reliably reported despite methodological differences.

Remaining Questions

While the previously reviewed studies addressed important contemporaneous changes in cognitive, desire and feeling talk, there are several developmental questions that have been left unaddressed. First, we know little about the development of mental state talk beyond 36 months of age. Many studies began measuring mental state talk when children were as young as two years of age. With only two exceptions
however, (Bartsch & Wellman, 1995; Hughes & Dunn, 1998), developmental changes have not been examined in children beyond four years of age.

Some researchers have observed mental state talk as it occurs in a school context (Hughes & Dunn, 1998), while others have created contrived situations in children's homes (Furrow et al., 1992; Moore et al., 1994). Mental state discourse in contrived environments may be falsely elevated or reduced, as children are asked to participate in conversations that may or may not be relevant to them, and with people they may not know. Some studies have, however, observed children in their own homes (Bartsch & Wellman, 1995; Shatz et al., 1983). The home environment is where children can interact with familiar people, in a familiar and comfortable place. Children may be more likely to talk about things that interest them and engage in play situations that better demonstrate their understanding of the mind when in their own homes.

Fathers have been consistently ignored both as a recipient of talk and as a generator of talk in the study of children's talk about the mind. Children's mental state talk has been examined, almost exclusively, as it occurs with mothers (Furrow et al., 1992) or peers (Hughes & Dunn, 1998). These studies have provided converging evidence of developmental changes in mental state talk. They leave unanswered, however, the influence of fathers.

The present study was designed to address the previous methodological gaps in several ways: 1) by studying the concomitant changes in cognitive, desire and feeling talk, 2) by utilizing data collected in the home 3) by observing conversations occurring
between the target child, their sibling, mother and father. 4) by including children who are 2 and 4 years old at time 1, and following them up after 2 years.

The Development of Parents’ Mental State Talk

To more fully comprehend the changes in children’s understanding of the mind, attention must be paid to the mental state terms that children are exposed to in their daily environments. Existing research has found that maternal talk about mental states benefits children in a variety of ways. Specifically, positive correlations have been found between maternal mental state talk, children’s use of mental state terms and children’s performance on measures of language production and comprehension (Beeghly, Bretherton & Mervis, 1986). Additionally, Moore et al. (1994) showed that mothers’ production of cognitive terms when children were two years old correlated with children’s language comprehension scores at age four. Given the apparent influence that maternal mental state talk has on children’s understanding of the mind, it is important to map such developmental changes.

Talk about Beliefs

The results of earlier studies indicate that mothers tend to produce more cognitive terms, as a proportion of all utterances, as their children approach 3 years of age. Furrow et al. (1992) reported this trend after studying patterns of maternal cognitive state talk in nineteen mother-child dyads when the children were two and three years of age.
Talk about Desires

When desire and cognitive state talk were examined simultaneously, desire talk was reported to decrease and cognitive to increase, as children approached three years of age. The changes in the frequency of mental state terms were presented as a percentage of total utterances. Moore et al. (1994) explored the cognitive and desire terms produced by 14 mothers when their children were 2, 3, and 4 years old. It may be that mothers increased the frequency and therefore, the saliency, of cognitive terms, just prior to children's' increased production of such terms.

The issue of directionality is both important and complex, and in its entirety, is beyond the scope of this paper. However, one must consider that children may be better able to understand cognitive terms as they get older. As a result, children may use more cognitive terms, which mothers may be mirroring in their own speech, or the opposite may be true. Regardless of the position one favors, it does look as though mothers exert an important influence on their children's developing knowledge about the mind. The influence of mothers' speech on their children's speech must be considered in light of the fact that mothers' production of cognitive terms, when children were two years old correlated with children's production of cognitive terms at age three (Moore et al., 1994).

Talk about Feelings

Changes in maternal production of feeling terms were examined in one study, which found that mothers increased their use of feeling words over time (Dunn et al., 1987). Dunn et al. observed the naturally occurring speech of 43 mothers and their second-
born children when their children were 18 and 24 months of age. Observations were also conducted with 16 mothers and their first-born children, when the children were 25 and 32 months of age. As children approached 32 months of age, mothers increased their production of feeling state talk, represented by the number of utterances and the number of conversation turns containing a reference to feeling states.

Talk about Beliefs, Desires and Feelings

Investigators have found that maternal references to cognitive states increased, while the patterns for desire and feeling talk were less clear, when cognitive, desire and feeling state talk were observed simultaneously. Beeghly et al. (1986) researched the perception, physiologic, affect, desire, cognition and moral judgement terms used in conversations between 26 mother-child dyads. Observations were conducted when the children were 13, 20 and 28 months of age. Results suggested that cognitive state talk increased, as a proportion of all mental state talk, as children neared 28 months of age. The patterns for desire and feeling state talk were less obvious and did not change significantly over time.

Brown and Dunn (1991) observed six mother-child dyads in order to identify changes in maternal references to cognitive, desire and feeling states. Observations were conducted when children were 24-26, 28-30 and 33-36 months of age. As others have reported (Beeghly et al., 1986; Furrow et al., 1992), mothers increased their production of talk about cognitions as children approached 36 months of age. In addition, the frequency of talk about desires decreased after children reached 30 months of age, and this supported the findings of Moore et al. (1994), who found desire
terms to be most frequent when children were two years old. It is important to note that these results were consistent with previously established patterns, despite the fact that Brown and Dunn presented mental state terms per 100 conversation turns, a method dissimilar to other investigators. Finally, there was a non-significant increase in feeling state talk as children approached 36 months of age. These results extended the findings of Beeghly et al. (1986) by providing a glimpse into the developmental changes that occurred in maternal mental state talk as children went beyond 28 months of age.

Summary

In summary, maternal references to cognitive states have been found to increase as children approach three years of age, while references to desires decreased (Furrow et al., 1992; Moore et al., 1994). The pattern of change for feeling state talk is less well established (Dunn et al., 1987). These patterns have emerged despite the fact that some researchers have presented changes as a proportion of all utterances (Brown & Dunn, 1991; Furrow et al., 1992; Moore et al., 1994) while others have expressed changes relative to all mental state talk (Beeghly et al., 1986).

Remaining Questions

There are a small number of studies that have examined developmental changes in maternal mental state talk. Many questions remain to be answered and we shall address two of them in the present study. First, existing studies have not addressed maternal changes in mental state talk after children are four years of age. The present study includes children from age two to six in the hopes of extending what we know
about the developmental changes in mothers' mental state talk. Second, we have included fathers, as none of the previously described studies have done so, leaving unexplored fathers' influence on children's developing understanding of the mind.

**Gender Differences in Talk about the Mind**

In a review of emotional development, Brody (1985) described emotional development according to social-cognitive theory, in which it is suggested that one's social environment can exert a significant influence over emotional development. In adherence with this theory, Brody suggested that girls and boys would speak differently about feelings and that this difference would stem from mothers and fathers gender-specific socialization of their children's emotional expression. The study of the relationship between gender and the development of talk about mental states has produced conflicting results.

**Gender Differences between Girls and Boys**

Some studies that have examined gender differences in how boys and girls talk about the mind have found no evidence of gender effects. Kuebli and Fivush (1992) involved both mothers and fathers, as they observed conversations about past events with each parent and their child. The study involved 24 children and their parents when the children were 40 months of age. With regard to children's talk about emotions, no gender differences were found; however, the authors reported that the children produced few feeling words overall, which may have prevented such a finding.
Cervantes and Callanan (1998) examined feeling terms in 84 children at age 2, 3 and 4 in conversations with their mothers. Girls were found to speak more about emotions than boys did, but only at age 2. The authors suggested that the lack of gender difference may have resulted from the fact that girls started off using higher rates of emotion talk than boys and did not show an increase in the frequency of feeling words over time. Furthermore, Cervantes and Callanan postulated that the gender differences in 'starting points' of emotion words might have been due to differences in language ability, and no such measures were included in the study.

Other studies of mental state talk have found that girls used more emotion words than boys did. Kuebli, Butler and Fivush (1995) investigated gender differences in 18 children with their mothers, speaking of past events. Children were 3 years, 4 months, 4 years, 10 months and 5 years, 10 months at the time of the observations. Results indicated that girls used more emotion words and a greater variety of emotion words than boys did, and that this difference was most pronounced at the third observation time.

Dunn et al. (1987) examined feeling state talk, naturally, in children aged 18, 24, 25 and 32 months. Gender differences were not examined when children were 32 months of age as only 16 children in that age group participated. At 24 months of age, however, girls referred more often to feeling states than did boys.

There is some evidence that girls used more cognitive terms than boys did. Hughes and Dunn (1998) investigated gender differences in cognitive state talk in 50 children
as they interacted with a peer. Observations were conducted when the target child was 3 years, 11 months, 4 years, 6 months, and 5 years of age. Results indicated that girls produced more references to cognitive states than did boys and used a greater variety of cognitive state terms. Gender differences in cognitive state talk persisted even after vocabulary scores (British Picture Vocabulary Scale) were covaried out of mental state talk. This pattern of results is similar to those reported for gender differences in feeling state talk (Dunn et al., 1987; Kuebli et al., 1995).

Studies have revealed that mothers talk to daughters more than to sons about emotions and this may contribute to gender differences in how children talk about mental states. For example, Kuebli et al. (1994) observed the way in which mothers spoke to their children, who were between 3 years, 4 months and 5 years, 10 months. Results indicated that mothers used more feeling terms with daughters than with sons and that mothers who used more emotion words in the first phase had children who used more emotion words during the final phase. Cervantes and Callanan (1998) confirmed the findings of Kuebli et al., as they reported mothers spoke more to daughters than to sons about feelings when children were 2, 3, and 4 years old.

Summary

Analyses of gender differences in children's talk about the mind have produced unclear results, with some reporting gender differences in emotion talk (Cervantes & Callanan, 1998; Dunn et al., 1987; Kuebli et al., 1995) and cognitive talk (Hughes & Dunn, 1998), while others have not (Kuebli & Fivush, 1992).
Remaining Questions

The mixed pattern of gender differences in children's emotion talk may be a result of the low frequency of feeling terms used by children in some studies (Kuebli & Fivush, 1992), or the context in which children's speech was examined. For example, Kuebli and Fivush found gender differences when asking children to speak of past events.

With the exception of Kuebli and Fivush, studies of gender differences in mental state talk have not included fathers. The present study hopes to address these methodological differences by: 1) examining gender differences in naturally occurring speech, 2) including siblings, mothers and fathers 3) observing children over an extended period of time to offset the concerns expressed by previous investigators, that the lack of gender differences in emotion talk may be a result of the low frequency of such terms.

Gender Differences between Mothers and Fathers

It has been reported that mothers and fathers do not talk differently about emotions. Kuebli and Fivush (1992) reported on gender differences between mothers and fathers involved in conversations about past events with their children, aged 40 months.

Results indicated no difference in the number of emotion words used by mothers and fathers. These results are confusing, given the prevalent view that women are more emotionally expressive than men are (Brody, 1985). However, the specific context used in this study may have contributed to the lack of gender difference in emotion talk.
Summary

There is very little research that has investigated gender differences in parents' talk about mental states. Kuebli and Fivush (1992) conducted one such study and reported that mothers and fathers did not differ in their talk about emotions when interacting with their children.

Remaining Questions

The present study will add new information to what is known about gender differences in mental state talk. First, we will contrast mothers and fathers on their production of cognitive, desire and feeling talk.

Second, we will explore the possibility of gender differences in parents' speech as it occurs naturalistically. This context will allow us to determine if parents are differently socializing an understanding of the mind during routine, daily interactions with their children.

Finally, because we have a sample of children age two to six, we can begin to address the issue of gender differences over a broad developmental period.

The Referent of Mental State Talk

Gender differences have been examined not only in terms of the frequency of mental state talk, but also in how children talk about the mental states of other people. Gilligan (1982) proposed that men and women differ in the way in which they define
themselves and others. She suggested that women define who they are in terms of their relationships and connectedness with others, and that women are more likely to act out of concern for others. In contrast, men are more likely to act in a way that is consistent with laws and rules.

It has been reported that the conversations between girls are markedly different than those between boys. Tannen (1990) examined videotapes of girls and boys in grade 2, 6 and 10, conversing with a best friend. In summarizing her observations, Tannen noted that girls of all ages engaged in conversations that were relationship oriented, while boys tended to tease each other, and discuss recent events and sports. Furthermore, girls tended to share issues relevant to one girl at a time, while boys tended to talk about their own issues. Given the importance of relationships for girls and women, it is thought that girls and women may refer more to the internal states of others when compared to boys and men.

Referent of Belief Talk

Gender differences have not been reported in studies that have examined children's talk about the mental states of 'others'. Hughes and Dunn (1998) recently examined the cognitive state talk of 25 target children, in conversation with a friend. Three categories of referent were used: 'self' (the speaker / child), 'other' (usually the child’s friend) and 'child plus friend'. The authors collapsed the latter two groups together to obtain a measure of cognitive terms that included a reference to 'other' (other than the child). The results did not support Gilligan's theory, as no significant gender differences were found in references to 'other'. It would be interesting to determine if
the results persisted if the categories of ‘other’ and ‘child plus friend’ had not been collapsed, providing an indication of how often boys and girls referred to someone other than themselves, without being contaminated by shared references.

Referent of Feeling Talk

Gender differences have not been found in either children’s talk or parents’ talk about the feeling states of ‘others’ (other than child). Kuebli and Fivush (1992) studied the referent of feeling state talk in 24 mothers, fathers, and their children, during conversations about past events. The children, half girls and half boys, were 3 years, 4 months of age. Referent was coded as ‘child’ (child or parent referring to child), ‘other’ (child or parent referring to other than child) or ‘group’ (shared by child and other). Results did not indicate that one gender spoke more about the feeling states of ‘others’.

Summary

The results of the previously described studies, while consistent, should be considered inconclusive because of their low number and methodological differences. Previous research has observed children while talking about past events (Kuebli & Fivush, 1992). We know very little about gender differences between girls and boys and between mothers and fathers in how they talk about the mental states of others during naturally occurring conversations in their home environment. In addition, the conversation partners have differed between studies. Kuebli and Fivush (1992) observed children with their parents, while Hughes and Dunn (1998) observed children interacting with a friend. Furthermore, ‘other’ was categorized differently in each study.
Hughes and Dunn collapsed the categories of 'child plus friend' and 'other', while Kuebli and Fivush did not include shared references in their 'other' category.

Remaining Questions

The present study hopes to complement previous work and provide new information about gender-specific patterns of talk about others' mental states by: 1) examining the proportion of cognitive, desire and feeling state talk that refers to 'other than the child', 2) observing families during naturalistic observation periods, 3) by involving both siblings and parents.

The Effect of Siblings on Mental State Talk

In previous work, investigators have concluded that being the oldest sibling is advantageous in terms of intellectual abilities. Belmont and Marolla (1973) conducted a retrospective examination of family size, birth order and intelligence, using the Raven Progressive Matrices as a measure of intellectual ability. Results indicated that as family size and birth order position increased scores on the Raven decreased, suggesting a disadvantage of larger family size and of being the youngest child.

Zajonc and Markus (1975) described the optimal birth position in terms of intellectual ability, as being the firstborn of two, with the younger sibling appearing closely in time to the older sibling. In particular, it was suggested that the younger sibling should be born, optimally, when the older sibling has reached sufficient cognitive maturity to play the role of a teacher, which will, in turn, be advantageous for
the older child's intellectual abilities. However, a specific gap in time between sibling births has not been identified.

siblings and Theory of Mind

It has recently been reported that children from large families do better on theory of mind tasks. Perner, Ruffman and Leekam (1994) investigated the effects of family size and age on performance on false belief tasks. Results indicated that older children and those from larger families demonstrated superior performance on false belief tasks. The relationship was further investigated by discerning the role of younger verses older siblings in false belief understanding. Analyses failed to reveal an advantage of younger verses older siblings.

Additional studies have revealed that children with an older sibling are advantaged in their false belief understanding. The data in Perner et al.'s study (1994) was re-examined by Ruffman, Perner, Naito, Parkin and Clements (1998) for two parts of a four-part study. Family size was divided into two variables, the number of younger and number of older siblings. The number of older siblings predicted performance on false belief tasks. Moreover, Ruffman et al. tested a sample of children who had comparable numbers of younger and older siblings. Analyses of this data indicated a significant effect for older siblings, but not for younger. The authors concluded that older, but not younger, siblings exerted a facilitative role in false belief understanding.

Other researchers have revealed that it was not simply having an older sibling that was advantageous, but rather the number of older children one interacted with. Lewis,
Freeman, Kyriakidou, Maridaki-Kassotaki and Berridge (1996) examined how the number of kin and the number of daily interactions with those kin contributed to false belief understanding. Performance on false belief tasks favored those children who interacted with a greater number of older siblings the day prior to testing. When birth order was considered, there proved to be an advantage to being the third-born as opposed to the second-born, and of being a younger sibling verses being a first born. So, contrary to studies that addressed the relationship between family size, birth order and intelligence, there appeared to be an advantage of being the younger sibling in terms of false belief understanding.

It has been reported by some that the advantage of having a sibling only applies to children with lower language ability. Jenkins and Astington (1996) sampled 32 girls and 36 boys between the ages of 2 years 11 months and 5 years 5 months, to determine the relationship between false belief understanding and a variety of cognitive and family structure measures. Results were consistent with that of Perner et al. (1994), in that family size was a significant predictor of false belief understanding. The authors suggested that the presence of siblings in the home might advance false belief understanding by providing a greater number of interactions during which false belief understanding may be facilitated. In addition, language ability was also associated with false belief understanding, in that false belief understanding was more strongly associated with the presence of siblings for children with lower language ability, than it was for children with greater language ability. Furthermore, the results failed to demonstrate a superior effect for older verses younger siblings when false belief
understanding was compared in children with one older sibling verses one younger sibling.

Summary

Earlier studies have found that being the younger sibling is not advantageous in terms of intellectual ability (Belmont & Marolla, 1973; Zajonc & Markus, 1975), whereas discrepant trends have been identified for the development of theory of mind. Some investigators have reported an advantage in being the younger sibling (Lewis et al., 1996; Ruffman et al., 1998), while others have not (Jenkins & Astington, 1996).

Remaining Questions

There were several methodological differences in the studies of sibling status and theory of mind task performance, which impede a definitive conclusion. First, Ruffman et al. (1998) and Lewis et al. (1996) did not include a measure of language ability, so we do not know whether task performance was influenced by an interaction between language ability and sibling status. Secondly, Ruffman et al. found that the advantage of an older sibling was evident only for children over three years of age. Jenkins and Astington did not provide specific ages of the children with either one older or one younger sibling. Finally, cultural influences on false belief understanding must be considered. Lewis et al. used a sample of children living in the Greek communities of Cyprus and Crete, while Jenkins and Astington used a sample from Toronto, Canada. It is as yet unclear as to how different cultures may affect family cohesion, interaction and kin networks, and how these factors may in turn influence false belief understanding.
The Relationship between Older Siblings and Mental State Talk

It has been found that children with an older sibling tend to outperform those without on measures of false belief (Lewis et al., 1996; Ruffman et al., 1998). Furthermore, passing false belief tasks has been associated with the frequency of mental state talk (Brown et al., 1996; Hughes & Dunn, 1998). A natural extension of these associations would be to study the relationship between having an older sibling and the frequency of different types of mental state talk.

Remaining Questions

To date, there are no studies of which we are aware that have examined the relationship between having an older sibling and mental state talk. The present study aims to address the methodological issues that have been identified in past studies of sibling order and theory of mind tasks. First, we have included a correlate of language ability, the Mean Length of Utterance (MLU) in order to determine whether the advantage of an older sibling is related to language ability. Second, all of the children we compare are over four years of age, thus taking into account Ruffman et al.'s (1998) finding that older siblings only benefit younger siblings over the age of three.
Aims of Present Study

The design of the present study complements that of other studies and may provide answers to questions that have not previously been asked. First, this study is longitudinal, spanning a two-year period and including children from 2 to 6 years of age. We focused on the naturally occurring use of concomitant cognitive, desire and feeling state talk. The context of the observations was consistent among families, in that all observations were made in the family’s home, during naturally occurring periods of both play and conflict. Unlike previous research, the present study examined interactions between mothers, fathers, and sibling pairs, providing a comprehensive examination of internal state talk in families.

This study had three goals. The first was to map the relative changes in children’s cognitive, desire and feeling state talk between the ages of two and six. The data set was such that the onset of talk about mental states could not be examined. Instead, developmental trajectories were examined using measures of frequency. This particular methodology does not allow us to map the beginning of children’s understanding of mind. However, it does allow us to identify developmental changes at an age when children’s production of mental state terms might be more frequent. Given the findings from previous research, we expected to find an increase in cognitive talk over time for both younger and older siblings. In light of the contradictory findings of Bartsch and Wellman (1995) and Moore et al. (1994), we expected only that desire terms would be the most common type of mental state talk when children were two...
years old. We predicted that feeling talk would increase over time, but remain less common than talk about cognitions or desires.

Changes in parental cognitive, desire and feeling talk are also examined in this study. Previous research has examined only maternal mental state talk, and found that cognitive talk increased as children’s age increased, while talk about desires decreased from the time children were two years old. We predicted a similar trend for cognitive and desire talk. Studies of feeling talk have been less conclusive and so we made no particular prediction. Furthermore, previous studies have not involved fathers. However, we predicted that fathers would demonstrate changes in mental state talk similar to that of mothers.

Our second goal was to examine gender differences in talk about others’ mental states. Given the differences in how males and females define themselves and others, we predicted that girls would talk more about the mental states of other people than would boys. We also predicted that mothers, more so than fathers, when talking to a child, would talk more about the mental states of someone other than the child. Furthermore, given the trend for talk about desires to begin earlier than that of cognitions, we predicted that talk about the desires of others would be greater than talk about the cognitions of others, at least when children were two years of age.

The third goal was to examine the effect of having an older sibling on mental state talk. At time 2, the mean age of the younger children who had an older sibling was 4.4 years. At time 1, the mean age of the older siblings, who themselves, did not have an
older sibling, was 4.4 years. This similarity in age allowed us to examine the relationship between the presence of an older sibling and mental state talk. Given the trend for children with an older sibling to be advantaged in false belief understanding (Lewis et al., 1996; Ruffman et al., 1998), we predicted that those with an older sibling would produce more cognitive terms than those without. We predicted a specific advantage for cognitive state talk over other types of mental state talk based on the proposal that cognitive talk requires more advanced representational skills than talk about desires (Bartsch & Wellman, 1995).
CHAPTER 2: METHODS

Participants

Forty Caucasian families, each consisting of two parents and two children living together, participated in this study. Families were recruited based on birth announcements in the local newspaper. The data were originally collected to examine the concept of moral orientation (Lollis, Ross & Leroux, 1996). In the initial interview, parents were told that investigators were interested in the relationship between their two children, as well as in how children learn family rules and expectations for interpersonal behavior. The children were told that the observers were coming into their homes and would watch how they played together. They were asked not to interact with the observer.

At time 1, the older children were between 3.6 and 4.9 years of age (M = 4.4 years) and the younger children were between 1.9 and 2.6 (M = 2.4 years). At time 2, the older children were between 5.4 and 7.0 years (M = 6.3 years) and the younger children were between 3.8 and 4.8 years (M = 4.4 years). The gender of older and younger children was balanced for an equal number of all possible brother/sister combinations. Families lived in a medium-sized industrial city in southwestern Ontario, Canada. All fathers were employed outside the home on a full-time basis, and 29 mothers were employed outside the home on a full or part-time basis. Fathers or other family members generally cared for the children in the mothers’ absence. Parents’ educational backgrounds varied widely in the sample: 29% had completed a university degree, 15% had completed a college program, 41% had completed high school and
15% had not graduated from high school. At time 1, parents' ages ranged between 23 and 48 years of age (M = 30.8 for mothers; M = 32.6 for fathers). At time 2, three families were unavailable to participate, as one family had moved away and two others were in the process of divorce or separation. Therefore, all analyses were conducted with the remaining 37 families.

Procedure

The data used in this study was originally collected for an investigation of moral orientation carried out by Susan Lollis and Hildy Ross. The majority of the procedure that follows is taken directly (with permission) from a publication pertaining to the original data collection (Lollis, Ross & Leroux, 1996). The section titled coding mental state talk marks the beginning of the procedures carried out for the present study.

Behavioral observations.

Data were collected during six 90-min observational sessions in the homes of the participants, at each of the two time periods. During half the sessions both parents were present (mother-father sessions) and during the remaining sessions the mother and children were observed without the father (mother-only sessions). These two situations were used as they were thought to represent the most common constellations in the family.

During the sessions, an observer followed the children and dictated onto one track of a stereo audiotape a descriptive account of all interactions between the children and
of all parental behaviors that related to the children's interaction. On the second track of the tape, a recording was made of the speech that occurred in the home. Observers did not participate in family interaction and responded as little as possible to comments of family members. For observations to proceed the children had to be in the same room and parents had to be either in the same or an adjacent room, although in both cases allowances were made for brief absences of up to 2 min. Televisions, video games, or other major distractions were not allowed. Whenever these requirements were not met, observers stopped recording and either waited until the participants complied with these provisions or arranged to observe again at a time that was more convenient for the families. To maintain stability and rapport, two observers were assigned to each family. To limit the intrusiveness of the observations, only one observer was present during each observation session. These procedures were repeated two years later. The content of the speech that family members directed to one another and a description of each person's actions were accounted for in coding the transcripts.

There is some research suggesting that girls use more feeling words than boys (Kuebli et al., 1995) and that mothers use more feeling words than fathers (Kuebli & Fivush, 1992). In addition, Condry and Condry (1976) demonstrated that when observers know a child's gender, they differently attribute emotions. To prevent biased coding of transcripts, coders were blind to the gender of parents and the gender of children. For example, if a child indicated gender when referring to their sibling (e.g., he, she), the reference was replaced by a code for sibling, with no indication of gender.
Coding Mental State Talk

Mental state talk was divided into three categories; cognitive, desire and feeling talk. What follows is a description of terms included in each category.

Cognitive talk included terms used to denote the thoughts, memories or knowledge of the speaker, listener or a third person. The terms included in this category were the terms think, know, believe, wonder, remember, forget, guess, pretend, understand and expect, and all variations. Shatz et al. (1983) found these to be the most common cognitive state terms uttered by young children, and these terms have been included as examples of cognitive talk by later researchers (Bartsch & Wellman, 1995; Hughes & Dunn, 1998; Moore et al., 1994).

There is some variation in the coding schemes of past research, with respect to which terms to include and which to exclude. Bartsch and Wellman (1995) were concerned with the onset of references to genuine mental states, and so used a conservative coding scheme that included only mentalistic uses of terms and excluded conversational uses (e.g., “Do you know...”). Conversely, other researchers have included conversational uses (Brown, Donelan-McCall & Dunn, 1996; Furrow et al., 1992; Hughes & Dunn, 1998; Perner, 1991). Much of the support for the inclusion of conversational uses arises from work by Moore and his colleagues (Moore, Bryant & Furrow, 1989), who established that children as young as four were able to distinguish between varying levels of certainty in cognitive terms, and used this knowledge to modulate assertions. Furthermore, as Brown et al. pointed out, it would be erroneous to assume that statements such as “I don’t know” are nothing more than idiomatic expressions, when used by adults or children. We included conversational uses of
cognitive terms based on these arguments and the recent finding of Hughes and Dunn
that both 'genuine' and 'conversational' uses of cognitive terms were associated with

Consistent with Shatz et al. (1983), we included "know what" if it was used to direct
an interaction by introducing information (e.g., "know what, I have a...") and references
to "I know" and "I don't know" if a descriptive statement is made implicitly, not only
explicitly, such as "the big snake is dangerous," "I know." Consistent with Bartsch and
Wellman (1995), "I know" and "I don't know" were included if they were linked with a
description of ignorance. Consistent with Pemer (1991), we included know as it refers
to an ability (e.g., "I know how to tie my shoes"), or to facts (e.g., "I know my socks are
in the drawer") or to access information.

Instances of cognitive state terms which were excluded were unclear meanings of a
term or sentence fragment, repetitions of own or others' utterance and terms used in
direct response to a question (e.g., "Where do you think the sock is?" "I think the sock
is in the drawer") and "I know Bob" if it can be paraphrased to mean "I met Bob"
(Bartsch & Wellman, 1995; Shatz et al., 1983).

Desire terms included want, hope, wish and care, and all variations of these terms
used to capture children's desires or goals (Bartsch & Wellman, 1995; Shatz et al.,
1983). Specifically, want was included as a reference to a goal directed behavior (e.g.,
"I want to sit down"), hope as it referred to a wish or want (e.g., "I hope Santa comes
soon"), and care as it referred to a preference or lack of preference (e.g., "I don't care
which crayon I use”) (Bartsch & Wellman, 1995). As in Bartsch and Wellman and Shatz et al., unclear meanings of a term or sentence fragment and repetitions of own or others’ utterances were excluded, as were idiomatic phrases such as “taking care” or “wish upon a star.”

Feeling terms included those that referred to an emotional state. Consistent with previous coding criteria, we included all variations of sad, hurt, angry, happy, excited, love, dislike, afraid, enjoy, fun, glad, mad, scared, upset, surprise and fear (Dunn et al., 1987). In addition, disgust was included, consistent with Dunn, Brown and Beardsall (1991). The term like was included when it referred to a state of enjoyment or dislike, and good was included only if it denoted a feeling state (Dunn et al., 1987). Phrases that connote a feeling state were also included, such as “make a fuss” (Dunn et al., 1987). Excluded feeling terms consisted of non-verbal expressions (e.g., crying or laughing), specific and non-specific expletives (e.g., “yuck”), like when it indicated volition and good if used in a moral sense (Dunn et al., 1991). As in Bartsch and Wellman (1995), unclear meanings of a term or sentence fragment and repetitions of own or others’ utterances were excluded.

Coding Referent

The category of referent of the mental state talk described whose mental state the speaker was referring to. Speech was divided into three categories, consistent with Kuebli and Fivush (1992); (1) other (other than the child), when the parent speaking referred to him / her self; or to a third person; (2) child, when the child who was the conversation partner was being referred to; (3) group, indicating that the mental state of
the speaker and another were being referred to. The category of 'group' was also used when the mental state of the listener and the speaker were combined in an embedded construction. For example, "I know that you want to go" is a linguistic structure known as an embedded sentence. Such utterances would be coded as a cognitive term (with an embedded desire proposition) referring to a group (deVilliers, 1995).

As we were interested only in references to people other than the target child, references to 'child' and 'group' were not included in analyses. To examine parental references to 'other' (other than the child) for cognitive talk, we divided references to 'other' by the total number of references to cognitive states to create a proportional score. The same procedure was carried out for desire and feeling talk and for fathers. All variables were transformed using a square root transformation to account for positive skews.

Based on gender differences in the way that males and females define themselves, we predicted that mothers, more than fathers, would model for children how to talk about the mental states of another person. As such, we are interested in comparing mothers and fathers in their production of mental state terms addressed to 'other,' meaning other than the child. It may be that by talking to children about the mental states of someone other than the child, parents will promote their child's interest in the mental states of other people.

Consistent with the coding scheme of Keubli and Fivush (1992), three categories of referent were used for children's speech: (1) self, when the child referred to him or her
self (2) other, when the child referred to their conversation partner (2nd person), or made a 3rd person reference (e.g., other parent, sib) (3) group, when child referred to self and another.

To examine differences between boys and girls in their references to somebody other than themselves, cognitive talk directed at 'other' (second / third person) was divided by the total amount of cognitive talk to create a proportional score. This procedure was repeated for desire and feeling speech and was performed separately for younger and older siblings. All variables were positively skewed and so a square root transformation was performed.

Based on the literature, we predicted that girls would talk more than boys would about the mental states of people other than themselves. Therefore, we are interested in comparing gender differences in the frequency of mental state talk for the category of 'other.'

Inter-rater reliability was calculated for the type of mental state talk and the referent, using 15 per cent of the families, each at time 1 and time 2. For time 1, the per cent agreement for cognitive state talk was 97%, for desire talk, 98% and for feeling talk 88%. For time 2, the per cent agreement was 98% for cognitive talk and desire talk, and 97% for feeling state talk. Kappa values for the referent at time 1 and time 2 were 0.91 and 0.93, respectively.
Conversational Turns

The original transcripts were divided into conversational turns, which were defined as all of one speaker’s utterances bounded by the utterances of another speaker (Shatz & Gelman, 1973). Sentence fragments and repetitions were not included. A conversation turn may have contained more than 1 utterance.

Utterances

As in Shatz and Gelman (1973) an utterance was defined as a complete clause. For the purposes of this study, an utterance was considered to be a group of words bounded by a period or question mark on the transcripts, and included both formed sentences and conversational phrases. Utterances that were sentence fragments or exact repetitions of previous utterances were not included. If non-words/behaviour was all that occurred, it was not counted as an utterance or as a conversation turn. Singing was not counted as an utterance, a conversation turn, or a word.

Mean Length of Utterance (MLU)

The number of words in the 100 utterances following the first ten conversation turns was averaged and constituted the MLU (Shatz & Gelman, 1973). This was calculated for each child at time 1 and time 2.

When counting the number of words in an utterance, the criteria set by Shatz and Gelman (1973) were followed: (1) contractions (e.g., can't, wanna) and proper names (e.g., Julia Webster) were counted as two words; (2) hyphenated words (e.g., beep-beep) were counted as one word. Expletives and sounds "giggle", "Ah hah" were not
counted as words. The inter-rater reliability for MLU calculations was .97 at time 1 and .74 at time 2, for the younger sibling. For the older sibling, the reliability was .97 at time 1 and .85 at time 2.

As all of our main questions involved differences between mothers’ and fathers’ mental state talk, only data from mother-father sessions were used in analyses. In order to account for the significant differences in conversation turns between family members, proportional scores were used for all variables. In accordance with Brown et al. (1996), we created proportional scores by dividing the number of cognitive state terms by the number of conversation turns. This process was repeated for desire and feeling terms and for each family member. As all variables were positively skewed, they were transformed using a square root transformation.

In order to examine differences between mothers and fathers in the mental state talk that they directed to their younger and older children, summed scores of mothers’ cognitive, desire and feeling talk to either the younger or older child was created and divided by her total number of conversation turns. The same procedure was carried out for fathers’ speech. As all variables were positively skewed, they were transformed using a square root transformation. In one family, the father, at time 2, used more cognitive and feeling terms than he had speaker turns (multiple uses per turn). Although scores for all parents were less than 1 (ranged from 0 through .82), scores for this father were over 1. In order to reduce the effect of this outlier, it was recoded to ‘1’. Parents also directed remarks to both of their children simultaneously. At time 1, the proportion of speech directed to both children was .4% of the mental state talk. At time
2, it had risen to 16.5%. Because the proportion of talk was so low at time 1, it was not possible to maintain this as a separate category of talk in subsequent analyses. Consequently, we dropped speech directed at both children from the analyses that are reported below. In order to ensure that this did not lead to erroneous conclusions, we always ran subsequent analyses for time 2 separately, in which speech directed to both children was included as a third level of our age of child variable.
CHAPTER 3: RESULTS

Conversation Turns

Over time, the number of mother conversation turns increased significantly, \( t (36) = -4.24, p < .001 \), as did fathers, \( t (36) = -3.99, p < .001 \). The means and standard deviations for these variables can be found in Table 1. Mothers engaged in more conversation turns than fathers at time 1, \( t (36) = -2.76, p < .01 \). There was a trend for fathers to engage in more conversation turns than mothers at time 2, \( t (36) = 2.01, p < .06 \). It is important to note that one father at time 2 was an outlier in the very large number of conversation turns that he produced. Rather than changing the value of this outlier, the t-test was conducted both with and without this father. As the results of the t-test did not change substantively, he remains in the analyses. Moreover, all subsequent analyses were conducted both with and without this father. As none of the results reported below change substantively, he remains in all analyses.

Over time younger and older children increased the number of conversation turns in which they engaged, \( t (36) = -7.56, p < .001 \) and \( t (36) = -7.48, p < .001 \), respectively. The means and standard deviations for these variables can also be found in Table 1. Furthermore, older children produced more conversation turns than younger children at time 1, \( t (36) = -5.25, p < .001 \), and time 2, \( t (36) = -3.07, p < .005 \).
### Table 1.

**Mean (M) and Standard Deviation (SD) of the number of conversation turns at time 1 and 2.**

<table>
<thead>
<tr>
<th>Family Member</th>
<th>Time 1</th>
<th>Time 2</th>
<th>t (36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger Child</td>
<td></td>
<td></td>
<td>7.56**</td>
</tr>
<tr>
<td>M</td>
<td>106.43</td>
<td>339.65</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>61.91</td>
<td>181.71</td>
<td></td>
</tr>
<tr>
<td>Older Child</td>
<td></td>
<td></td>
<td>7.48**</td>
</tr>
<tr>
<td>M</td>
<td>121.27</td>
<td>362.46</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>62.17</td>
<td>192.21</td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td>4.24**</td>
</tr>
<tr>
<td>M</td>
<td>40.48</td>
<td>89.46</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>26.83</td>
<td>74.14</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td>3.99**</td>
</tr>
<tr>
<td>M</td>
<td>25.97</td>
<td>159.22*</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>19.60</td>
<td>209.61</td>
<td></td>
</tr>
</tbody>
</table>

**p < .001.**

*Note:* One father was an outlier, producing a very large number of conversation turns, and remains in the analysis. If he were excluded, the M would be 130.59, and the SD 119.67.

### Mean Length of Utterance (MLU)

The MLU for younger children was significantly greater at time 2 than at time 1, $t$ (36) = -8.31, $p < .001$. For older children, MLU did not change significantly over time. The means and standard deviations for these variables can be found in Table 2. Older children had a higher MLU than their younger sibling at time 1, $t$ (36) = -7.55, $p < .001$, and again at time 2, $t$ (36) = -2.3, $p < .03$. When the MLU of younger siblings at time 2 (when they were 4 years old) and older siblings at time 1 (when they were 4 years old) were compared, there was no significant difference.
The Relationship between MLU and Mental State Talk

In order to examine the relationship between children's use of cognitive, desire and feeling terms and their more general use of language, we conducted bivariate correlations between MLU and each type of speech, for younger and older children separately. The only significant correlations were between the younger child's desire state talk and MLU at time 1, and cognitive state talk and MLU at time 2, as can be seen in Tables 3 and 4. So, as the younger children are becoming more verbally fluent, the strength of the relationship between MLU and cognitive state talk increases, while the relationship between MLU and desires and feelings decreases. For the older children, as they become more verbally fluent, the strength of the relationship between MLU and cognitive state talk decreases, while the relationship between MLU and desire and feeling state talk increases.
Table 3. Correlations between MLU and speech of younger siblings.

<table>
<thead>
<tr>
<th>Speech</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.29</td>
</tr>
<tr>
<td>Desire</td>
<td>0.50*</td>
</tr>
<tr>
<td>Feeling</td>
<td>0.19</td>
</tr>
<tr>
<td>Time 2</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.35*</td>
</tr>
<tr>
<td>Desire</td>
<td>-0.23</td>
</tr>
<tr>
<td>Feeling</td>
<td>-0.13</td>
</tr>
</tbody>
</table>

*p < .05

Table 4. Correlations between MLU and speech of older siblings.

<table>
<thead>
<tr>
<th>Speech</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.26</td>
</tr>
<tr>
<td>Desire</td>
<td>0.20</td>
</tr>
<tr>
<td>Feeling</td>
<td>-0.06</td>
</tr>
<tr>
<td>Time 2</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.07</td>
</tr>
<tr>
<td>Desire</td>
<td>0.24</td>
</tr>
<tr>
<td>Feeling</td>
<td>0.06</td>
</tr>
</tbody>
</table>
According to Cozby (1997), the strength of a correlation will increase if a broad range of scores is involved. So, to better understand the correlations between mental state talk and MLU, the range of the different types of mental state talk was examined.

Upon closer inspection, the correlations that decreased in strength do in fact have a reduction in the range of mental state talk at time 2. For example, the range of desire and feeling talk for younger siblings narrowed over time, as a result of individual differences in development. For those correlations that are stronger at time 2, such as the younger siblings' cognitive talk, there was an increase in the range of cognitive state talk.

**Question #1:** How does the balance between different types of mental state talk in children and in parent's change with children's age? Outcome variables were the proportion of conversation turns that involved cognitive, desire and feeling state terms.

**Younger Children**

A 2(time) x 3(type of speech) x 2(gender) repeated measures analysis of variance (ANOVA) for the younger children revealed a significant main effect of time, $F(1, 35) = 52.96$, $p < .001$, with children using more mental state talk at time 2 than at time 1. Type of speech was also significant as a main effect, $F(2, 34) = 52.81$, $p < .001$, with children talking most about desires at both time periods. Gender was significant as a main effect, $F(1, 35) = 6.54$, $p < .02$. There were no significant interactions between gender and time or type of speech, so girls spoke more than boys did about cognitions, desires and feelings at time 1 and time 2.
There was a significant interaction between time and type of speech, $F(2, 34) = 27.50, p < .001$. A doubly multivariate ANOVA was used as a post-hoc test, to determine which type(s) of speech changed over time. The doubly multivariate ANOVA revealed that the proportion of cognitive speech (as a proportion of the number of conversation turns) increased significantly, $F(1, 35) = 141.51, p < .001$, as did feeling speech, $F(1, 35) = 8.94, p < .006$. The proportion of speech about desires did not change significantly over time, $F(1, 35) = 0.73, n.s$. By time 2, cognitive talk is occurring almost as frequently as desire talk. The data are presented graphically in Figure 1 to enable the patterns to be seen more clearly. See Table 5 for means and standard errors.

To further explore gender differences in mental state talk, the MLU of boys and girls was compared at time 1 and time 2. Results of t-tests indicated that at time 1, the verbal fluency of girls was significantly greater than that of boys, $t(35) = 2.55, p < .02$. At time 2, although girls spoke more than boys did, the difference was no longer significant. Overall, the magnitude of the gender differences was greater at time 1, when children were 2 years of age, than at time 2, when they were 4 years of age. These results suggest that the gender difference in mental state talk may be best explained by girls' general competence in language when compared to boys rather than a competence that is specific to mental state talk.

**Older Children**

A $2(\text{time}) \times 3(\text{type of speech}) \times 2(\text{gender})$ repeated measures ANOVA for older children revealed a significant main effect of type of speech, $F(2, 34) = 87.79, p < .001$,
with children speaking most about desires, followed by cognitions and then feelings. 
Time was not significant, $F(1, 35) = 1.63$, n.s., nor was gender, $F(1, 35) = .6$, n.s.

The interaction between time and type of speech was significant, $F(2, 34) = 28.37$, $p < .001$ (refer to Table 4 for means and standard deviations). The post-hoc doubly multivariate ANOVA revealed a significant increase in talk about cognitions, $F(1, 35) = 15.69$, $p < .001$, and a significant decrease in talk about desires, $F(1, 35) = 20.54$, $p < .001$ and feelings, $F(1, 35) = 6.26$, $p < .02$ (as a proportion of the total number of conversation turns). As can be seen in Figure 2, older children spoke proportionately more about cognitions over time, whereas they spoke proportionately less about feelings and desires. At time 2, although older children spoke marginally more about desires than cognitions, the difference between the two was slight. The means and standard errors for these variables can be found in Table 5.

Although there are no gender differences in mental state talk, a t-test was conducted to compare the MLU of older boys and girls at each time period. There was no significant difference in MLU between boys and girls at either time. So, the older girls did not demonstrate greater competence in verbal fluency or frequency of mental state talk than the older boys.
<table>
<thead>
<tr>
<th>Table 5.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (M) and Standard Error (SE) for changes in children’s mental state talk at time 1 and time 2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time 1</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Younger</strong></td>
<td></td>
</tr>
<tr>
<td>cognitive</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.04</td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
</tr>
<tr>
<td>desire</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.21</td>
</tr>
<tr>
<td>SE</td>
<td>0.02</td>
</tr>
<tr>
<td>feeling</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.07</td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Older</strong></td>
<td></td>
</tr>
<tr>
<td>cognitive</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>0.02</td>
</tr>
<tr>
<td>desire</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.31</td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
</tr>
<tr>
<td>feeling</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>0.02</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .001.
Figure 1.
Mean proportion of younger children's cognitive, desire and feeling speech at time 1 and time 2.

Figure 2.
Mean proportion of older children's cognitive, desire and feeling speech at time 1 and time 2.

Parents
A 2(time) x 3(type of speech) x 2(age of child) x 2(parent) repeated measures ANOVA revealed a significant main effect of type, $F(2, 35) = 19.43, p < .001$, with parents speaking most about cognitions and desires, and least about feelings. Parent was significant as a main effect, with mothers speaking more about mental states than fathers, $F(1, 36) = 7.13, p < .02$. There were no significant interactions between parent and time, type or age of child, so mothers spoke more than fathers did about
cognitions, desires and feelings under all conditions. Time was not significant as a main effect, \( F(1, 36) = .26, \text{n.s.} \), nor was age of child, \( F(1, 36) = .92, \text{n.s.} \).

The type by time interaction revealed a trend for talk about cognitions, desires and feelings to change from time 1 to time 2, \( F(2, 35) = 2.87, p < .08 \). The doubly multivariate ANOVA revealed that the proportion of cognitive state talk increased significantly over time, \( F(1, 33) = 5.6, p < .03 \), while speech about desires, \( F(1, 33) = .37, \text{n.s.} \) and feelings, \( F(1, 33) = .53, \text{n.s.} \) did not change significantly. At time 1, parents spoke proportionately more about desires, followed by cognitions and feelings. At time 2, parents spoke proportionately more of cognitions, followed by desires and feelings. Refer to Table 6 for means and standard error and to Figure 3 for a graphical representation.
Table 6.

Mean (M) and Standard Error (SE) of parents' mental state talk to children at time 1 and 2.

<table>
<thead>
<tr>
<th>State Talk</th>
<th>Time 1</th>
<th>Time 2</th>
<th>F (1, 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td></td>
<td></td>
<td>5.60*</td>
</tr>
<tr>
<td>M</td>
<td>0.08</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Desire</td>
<td></td>
<td></td>
<td>0.37</td>
</tr>
<tr>
<td>M</td>
<td>0.11</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Feeling</td>
<td></td>
<td></td>
<td>0.53</td>
</tr>
<tr>
<td>M</td>
<td>0.06</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.01</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

Figure 3.

Mean proportion of parents' cognitive, desire, and feeling speech at time 1 and time 2.
Cognitive, desire and feeling talk as a percentage of mental state talk

The frequency of cognitive, desire and feeling talk was also calculated as a percentage of the frequency of mental state talk, separately for each family member at each time.

For younger children, cognitive talk represented <1% of all mental state talk, desires 81% and feelings 18% at time 1. At time 2, cognitive talk represented 39%, desires 48% and feelings 13%.

These results indicate that desire and feeling talk, as a proportion of mental state talk decreased over time, as cognitive talk increased with age.

For older children, the pattern was similar to that seen for younger children. The percentage of cognitive, desire and feeling talk at time 1 was 18%, 66% and 16%, respectively. At time 2, the percentages were 40%, 49% and 11%, respectively.

As children get older their mental state talk is increasingly about cognitions. These patterns are consistent with those produced when mental state terms were expressed as a proportion of the total number of conversation turns.

The cognitive, desire and feeling state talk of mothers and fathers was summed together and then calculated as a percentage of mental state terms. At time 1, the percentage of mental state talk that was cognitive talk was 38%, desire talk was 42% and feeling talk was 20%. At time 2, the percentage of cognitive talk increased to 49%, with a decrease in desire talk to 33% and feeling talk to 18%.
Question 2: We are interested in answering two questions. First, do mothers and fathers differently socialize their children to speak of the mental states of people other than the child? Second, are there differences in how boys and girls refer to the mental states of people other than themselves?

Parents

A repeated measures 2(time) x 3(type of speech) x 2(parent) x 2(age of child) ANOVA revealed a significant main effect of age, \( F (1, 36) = 7.16, p < .02 \), with parents talking more to older children about the mental states of someone other than the child. Type of speech was also significant, \( F (2, 35) = 7.88, p < .002 \), with parents talking most about others' cognitions, followed by desires and feelings. Parent was significant, \( F (1, 36) = 13.16, p < .002 \). As can be seen in Figure 4, mothers talked more about the others' mental state than fathers did. Time was not significant, \( F (1, 36) = .15, \) n.s., and there were no significant interactions, so mothers spoke more about the mental states of people other than the target child, at both time 1 and time 2, irrespective of the type of mental state that was being referred to or age of child. The means and standard error can be found in Table 7.

Children

Younger Children

A 2(time) x 3(type of speech) x 2(gender) repeated measures ANOVA on younger children's talk about the other revealed a significant main effect of time, \( F (1, 35) = 7.36, p < .02 \), with children showing higher levels of talk about someone other than themselves at time 2 than at time 1. Type of speech was not significant, \( F (2, 34) = .69 \),
n.s., nor was gender, $F(1, 35) = .41$, n.s. There was a significant interaction between type of speech and gender, $F(1, 35) = 4.18, p < .03$, with younger girls speaking more about others' cognitions and desires. Means and standard error can be found in Table 7.

Older Children

A $2($time$) \times 3($type of speech$) \times 2($gender$)$ repeated measures ANOVA on older children's talk about the mental states of someone other than themselves revealed no effect of type of speech, $F(2, 34) = .47$, n.s. Gender was significant as a main effect, $F(1, 35) = 4.03, p = .05$, with girls speaking more about the mental states of others' than boys (see Figure 5). There was no significant main effect of time, $F(1, 35) = 1.75$, n.s. There were no significant interactions, so girls spoke more of others' mental states regardless of time and type of speech. Means and standard error can be found in Table 7.
### Table 7.

Mean (M) and Standard Error (SE) of talk about the 'other' (other than the child) for parents and children at time 1 and time 2, as a function of gender.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.22</td>
<td>0.21</td>
<td>13.16*</td>
</tr>
<tr>
<td>SE</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.11</td>
<td>0.14</td>
<td>4.03*</td>
</tr>
<tr>
<td>SE</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td><strong>Older Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.19</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.23</td>
<td>0.20</td>
<td>0.41</td>
</tr>
<tr>
<td>SE</td>
<td>0.03</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td><strong>Younger Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.06</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.03</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.09</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.03</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
Figure 4.

Mean differences in the proportion of parents' talk about 'other' (other than target child).

Figure 5.

Mean differences in the proportion of older siblings' talk about 'other' (other than themselves).

**Question 3:** Are 4-year old children with an older sibling advantaged in their cognitive state talk, relative to other types of mental state talk?

Children's talk when they were 4 years old was examined. At time 2, the mean age of the younger children who had an older sibling was 4.4 years. At time 1, the mean age of the older siblings, who themselves did not have an older sibling, was 4.4 years. This meant that talk at time 1 for children without an older sibling and talk at time 2 for
children with an older sibling was the dependent variable. A mixed within and between
3 (type of speech) x 2(position) ANOVA revealed a significant main effect of type of
speech, F (2, 71) = 73.62, p < .001, with children talking most about desires, then
cognitions and then feelings. Position was not significant as a main effect, F (1, 72) =
1.77, n.s.

There was a significant interaction between type of speech and position, F (2, 71) =
12.52, p < .001. As can be seen in Figure 6, children with an older sibling spoke more
about cognitions and less about desires and feelings. Means and standard error can
be found in Table 8.

In order to ensure that the results of position were not explained by differences
between groups in MLU or age, a 3(type of speech) x 2(position) x 3(MLU) x3(age)
ANOVA was conducted, with MLU and age each recoded to trichotomized variables.
The position by type of speech interaction remained significant, F (2, 55) = 9.32, p <
.001, demonstrating that the position effect was not explained by differences between
groups on MLU or on age.
Table 8.
Mean (M) and Standard Error (SE) of Mental State Talk, With and Without an Older Sibling.

<table>
<thead>
<tr>
<th>State Talk</th>
<th>With an Older Sibling</th>
<th>Without Older Sibling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
</tr>
<tr>
<td>cognitive</td>
<td>0.20</td>
<td>0.02</td>
</tr>
<tr>
<td>desire</td>
<td>0.23</td>
<td>0.01</td>
</tr>
<tr>
<td>feeling</td>
<td>0.12</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Figure 6.
Mean proportion of cognitive, desire and feeling talk in children with and without an older sibling.
CHAPTER 4: Discussion

Many important developmental changes in children and mothers' talk about mental states have been identified in the literature. The present study sought to elucidate previous findings and provide new information about mental state talk by addressing several significant gaps in our understanding. First, little is known about changes in children's or parents' talk about mental states after children reach four years of age, and so we included children until age six. Second, we examined concomitant changes in belief, desire and feeling talk to augment what is known about the balance between different types of talk as children get older. Throughout this discussion, when changes in children's talk is discussed, we refer to the type of mental state talk as a proportion of total conversation turns. Third, many studies have addressed mental state talk in contrived, time limited contexts. By studying families naturalistically and over an extended period, we hoped to uncover patterns of mental state talk as it occurs in everyday conversations. Finally, fathers have been largely ignored in studies of mental state talk. For this study, we have included only dual-parent families so that we may begin to identify changes in fathers' mental state talk as a function of children's developmental stage.

The Relationship Between MLU and Mental State Talk

There are two factors to consider when interpreting the correlations between MLU and mental state talk. First, the relationship between MLU and mental state talk is affected by the range, which decreases in cases where correlation strength decreases (e.g., desire talk for younger siblings) and increases in cases where correlation strength increases (e.g., cognitive talk for younger siblings).
Second, as children are growing older, the proportion of the different types of mental state talk is changing. In some cases, individual children use proportionately less desire talk while using proportionately more cognitive talk.

The Development of Children’s Mental State Talk

The first aim of this study was to examine, simultaneously, the developmental changes in children’s cognitive, desire and feeling state talk. The present results indicate that cognitive talk, expressed as a proportion of conversation turns, burgeons at age four and continues to increase until age six. These results provide converging evidence with previous studies, with cognitive talk presented either as a proportion of all utterances (Bartsch & Wellman, 1995; Moore et al., 1994) or as the number of terms per hour (Hughes & Dunn, 1998).

Despite the methodological differences, the results of the present study do agree with the pattern reported by Bartsch and Wellman, that talk about desires is the most frequent type of mental state talk between ages 2 and 6. With few exceptions, the majority of past research has studied children only until the age of four. This study not only supports previously established trends, but also offers new information about changes in cognitive talk beyond four years of age.

These latest results also indicate that feeling talk, as a proportion of conversation turns, increases until the age of four, and then begins to decline. Our results are consistent with those of Dunn et al. (1987), who found that children’s production of feeling terms increased between 18 and 32 months of age, when represented as the
number of conversation turns containing a reference to feelings. That we found references to feeling talk decreasing after the age of four suggests that feeling state talk reaches a peak by 4 years of age, and decreases as cognitive state talk increases.

By the age of four, the children in our sample were able to discuss the events of the mind in terms of beliefs, desires and feelings. It is important to map the developmental changes in a normative sample of children so that in the future, developmental deviations might be identified and remediated.

The Development of Parents’ Mental State Talk

The mental state talk of parents was examined for changes over time. The results of the current study find that parents increase their use of cognitive state talk over time, as a proportion of conversation turns. This finding is consistent with those of other researchers who expressed cognitive terms differently, as a percentage of utterances (Furrow et al., 1992). While the current study does not address the issue of directionality between children and parents’ speech, it is worthwhile noting that such changes are synchronous and may be indicative of modeling.

The present results indicate that mothers and fathers do not change their frequency of talk about desires over time, as a proportion of their conversation turns. Earlier studies have reported that mothers decrease their proportion of desire talk, albeit with younger children (Brown & Dunn, 1991; Moore et al., 1994), and with speech presented in number of terms per 100 conversation turns (Brown & Dunn, 1991) or as a proportion of total utterances (Moore et al., 1994).
Our data indicate that parents do not change the frequency with which they engage in feeling talk as a proportion of their conversation turns. Feeling talk is the least frequent type of talk produced by parents at each time period. A previous longitudinal study of feeling state talk indicated that the number of conversation turns in which mothers referred to feeling states increased between the time children were 18 and 32 months of age (Dunn et al., 1987). The present results, with older participants than Dunn et al. extend what is known about developmental changes in feeling talk up to the time when children are six years of age.

The present study not only supports past results, but also provides distinct information about the changes in fathers' mental state talk over time. Fathers' developmental changes in cognitive, desire or feeling state talk were not significantly different from mothers'. For the current study, all analyses were based on observation sessions during which both parents were present. A natural extension would be to observe and compare the mental state talk of parents separately, with their children, to examine their patterns of change.

Gender Differences in Mental State Talk

Although it was not a specific aim of this study, we did examine the data for gender differences between boys and girls and mothers and fathers, in their production of mental state talk. The present results provide converging evidence that gender differences are apparent in the speech of young children and are consistent with previously reported findings (Cervantes & Callanan, 1998; Dunn, Bretherton & Munn, 1987; Hughes & Dunn, 1998; Keubli, Butler & Fivush, 1995). These previous studies
have reported that girls spoke more than boys did about feelings and cognitions. For the present study, gender differences were found only for the younger sibling and may represent gender differences in verbal fluency, suggesting that girls and boys may have different baselines for mental state talk. Interestingly, at time 2, there was no significant difference in the verbal fluency of boys and girls (MLU), arguing against this being the only explanation of what was found.

That gender differences are not found in the older siblings suggests that there may be an interaction between birth order and parental socialization of mental state talk. It would be important to replicate the present findings with a larger sample of children and using a more varied measure of verbal ability.

It appears that mothers and fathers differ in their production of mental state terms in everyday conversations with their children. The present results are in keeping with the suggestion that mothers use more emotion labels than fathers during interactions with children (Parke, 1994). In addition, mothers also use more cognitive and desire labels than fathers in this study. Why this is the case needs to be explored further. All of the fathers in this study were employed full time, while 29 of the mothers were involved in full or part-time work. Perhaps by virtue of being home more often, mothers take on a different role than fathers, resulting in more frequent conversations between mothers and children about mental states. Fathers, on the other hand, may develop relationships with children that do not involve the labeling mental states. Our knowledge of gender differences in mental state talk would benefit from a more detailed investigation of the contexts and styles that parents use to talk about mental states.
The present study examined only feeling words or labels, and it may be that fathers express feelings and other mental states in ways other than labeling. In addition, the present findings should be replicated with a larger sample size.

The Referent of Mental State Talk

A second aim of this study was to investigate possible gender differences in parents and children's talk about 'others' (other than the child). In the present study, mothers speak more about the mental states of people other than the target child, than do fathers. These results are consistent with Gilligan's (1982) views, and inconsistent with those of other researchers who found no differences (Kuebli & Fivush, 1992). However, several methodological differences may account for our findings. First, this study examined references to 'other' in a naturalistic context, during everyday conversations, as opposed to Kuebli and Fivush's (1992) more structured context. Second, we observed the production of cognitive, desire and feeling terms about 'other' among families with two children and two parents simultaneously. Kuebli and Fivush conducted their observations of feeling terms with each parent separately.

The current study highlights new information about differences between mothers and fathers talking about a variety of mental states. Female children may selectively attend to and model the speech of their mothers, while boys may attend to their fathers. Given differences in parental modeling of talk about people other than the child to whom they are speaking, girls would then be more likely than boys to attend to the mental states of people other than themselves and this is supported by gender differences in the older siblings' talk about people other than themselves.
Our analyses did not reveal an overall gender difference in the younger siblings' talk about 'others', at either time point, however, younger girls did speak more than younger boys about the cognitions and desires of others. Results also indicate that older girls speak more about others' mental states than older boys, at both time points. That gender differences are not apparent for all types of speech in the younger children suggests that talk about others' mental states may develop along a different time line for each type of talk. One must interpret these results with caution, however, as the distribution for younger children's talk about 'other' remained positively skewed. Most children spoke very little of others' mental states and a few spoke much more. Gender differences may in fact be a function of the higher scores. A larger sample size might help to clarify this issue. The gender differences in older siblings support our prediction and are consistent with Gilligan’s (1982) perspective that girls and women show more of a focus on the internal states of other people. Given that talk about others shows a clear developmental pattern, as does talk about cognitions, it is likely to be how girls are more advanced in language than boys. This advantage is picked up in subtle ways, such as talking about cognitions, talking about others, and the combination.

While other researchers have not reported gender differences in talk about 'other', (Hughes & Dunn, 1998), methodological differences make a direct comparison difficult. Specifically, the definition of 'other' is inconsistent in the literature. Hughes and Dunn for example, collapsed references to 'other' (other than child) and to 'child plus friend' when they examined references to 'other': whereas for the current study, 'other' did not include shared references between the speaker and another person. Further, the
context of talk about the other in previous studies differs from the present study.

Whereas Hughes and Dunn observed children with a friend, the present study involved siblings, mothers and fathers.

The results of the this study illuminate gender differences in talk about the mental states of others, as occurs naturally in the home, an environment which has the potential to influence perspective taking and social development. It would be worthwhile to examine the developmental trajectories of children, as they refer to the mental states of ‘others’, over a longer period of time, in order to determine the existence of gender differences in adolescence.

The Effect of Siblings on Mental State Talk

The final aim of this study was to examine the effects of the presence of an older sibling on mental state talk. Children with an older sibling were found to be advantaged in cognitive talk, but not desire or feeling talk. Previous studies (Ruffman et al., 1998) have found an increase in false belief understanding amongst children with an older sibling in the home. It may be that cognitive talk with an older sibling is the mechanism involved in the association between the presence of an older sibling and false belief understanding. When older children talk to younger children about cognitions they may foster an understanding of the nature of cognitions and more specifically the nature of belief.

While the present study contributes new and important information about developmental changes in mental state talk, there is much to be learned about mental
state talk beyond age six. Furthermore, we have no measures, at any time point, of false belief understanding, perspective taking or other measures of social skills to correlate with the frequency of mental state talk. Because our design was correlational, we cannot make causal statements about the role of gender or parents in talk about mental states. Additional longitudinal studies are necessary to more fully understand developmental changes in the mental state talk of family members.

This is the first study that we are aware of that examines, longitudinally, the naturally occurring speech of children and both parents when children are between two and six years old. These results add important information to what is known about changes in mental state talk, as a function of age, gender and birth order. The present study also represents an important first step in identifying the developmental changes in fathers' mental state talk.
References


