CHAPTER 3

Mother–Child Conversations About Thoughts, Desires, and Emotions: Relations to Children’s Understanding of the Mind

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It is difficult for most of us to imagine making sense of the social world without automatically thinking about the beliefs, emotions, desires, and intentions of other people. Picture yourself in a preschool classroom. You see a boy and a girl rushing to the painting easels in the art area. The girl quickly dons a painting apron. The boy is turning his head back and forth with a frown on his face. The girl points to the counter near the sink. The boy picks up an apron from the counter and puts it on. They both begin painting, standing side by side. The girl smiles broadly as she paints. The boy looks at the girl’s painting and says something. The girl suddenly stops smiling. She stomps her feet and goes to find the teacher.

To explain what we see in this scene, we think automatically and effortlessly about mental states (shown in italics). The children rush to the easels because they want to paint and feel excited. The boy turns his head back and forth because he does not know where to find an apron. The girl points to the counter because she understands that the boy is confused, and she knows where to find a second apron. The girl is smiling because she is happy about her painting. The girl stomps her feet and seeks out the teacher because the boy’s comment made her feel upset and she wants help.

How could we make sense of this scene without engaging in this type of mind reading? We could, perhaps, simply assume that it is customary for all children to run—and not walk—toward easels, and for all boys to frown and wait for someone to point before donning an apron. This type of explanation does not rely on inferences about mental states, and it immediately strikes us as absurd (see Baron-Cohen, 1995; for a more elaborate discussion of this issue). Further, interpreting this social scene without thinking about
mental states also makes it impossible, either as a teacher or as a classroom peer, to be sensitive or helpful to the two children involved.

Indeed, one reason to care about children’s insight into the mind is that when children are less adept at interpreting others’ mental states, they are at greater risk for social struggles. For example, preschool-aged children who score higher on emotion understanding (eg, knowing how different situations make people feel) are rated by their peers as more likable (Denham, McKinley, Couchoud, & Holt, 1990). It makes intuitive sense that possessing relatively shallow insight into what leads people to feel good or bad would make it difficult to be a likable friend, perhaps like the boy in the aforementioned scenario who elicited upset feelings in his painting partner.

Insight into mental states is called “theory of mind” (ToM), and the process of achieving a mature ToM is a major task in social-cognitive development. By age 4 years, typically developing children have a fairly firm grasp of many of the basic aspects of how people experience mental states (Wellman & Liu, 2004). For example, across diverse cultures, most 4-year-olds understand that what a person believes will guide his or her behavior, and that behavior can be influenced by mistaken beliefs about what is true (eg, Avis & Harris, 1991; Perner, Leekam, & Wimmer, 1987).

ToM typically emerges along a fairly predictable timetable over the course of early childhood (Wellman, Fang, Liu, Zhu, & Liu, 2006). Although most people become “mind readers” without difficulty, there are some groups of people who have a harder time gaining insight into others’ mental states. In particular, children and adults on the autism spectrum often experience difficulty understanding and anticipating certain mental states (Kimhi, 2014). Although individuals on the autism spectrum who have relatively typical language and cognitive abilities tend to pass laboratory-based ToM tasks (Happé, 1995), their failure to spontaneously reason about other’s mental states (Senju, Southgate, White, & Frith, 2009) may explain some of the social difficulties that people on this spectrum encounter (Kimhi, 2014).

Although difficulties with understanding others’ minds are pronounced for people with disorders like autism (Baron-Cohen, 2001) and schizophrenia (Pickup, 2008), attention has also been paid to individual differences in ToM development among typically developing children. In this line of research, important questions have been asked about factors that might account for such differences. Examples of variables that have received attention in studies of individual differences in ToM acquisition are: the presence of siblings (Jenkins & Astington, 1996; McAlister & Peterson, 2006), the role of executive function (Hughes & Ensor, 2007), engagement in fantasy play
Another predictor of individual differences in ToM development that has received attention is the role played by parent–child conversations about mental states, and the types of talking parents do more generally about states of mind. This chapter is dedicated to exploring the topic of conversations about mental states and their relation to early-developing ToM. We explore this question using data from conversations between 40 mothers and their children captured in home settings via the LENA Digital Language Processor. Before we present our data, we first review what is known about ToM development and links to parent verbal input.

**THEORY OF MIND DEVELOPMENT IN CHILDHOOD**

It is not uncommon to hear that children acquire a ToM by about age 4 years, the age at which most typically developing children pass tests of explicit false belief understanding. False belief understanding involves an awareness that others’ beliefs are separable from reality, and that mistaken beliefs about what is real or true will guide behavior. Such an understanding is often assessed using procedures such as the classic change of location task (Baron-Cohen, Leslie, & Frith, 1985; Perner et al., 1987; Wimmer & Perner, 1983). In this task, a child views a scene in which Character A places a toy (or a treat) into a basket. Character A leaves, and in her absence Character B moves the toy from the basket to a box. Character A then returns, and the child is asked the key test question: where will Character A look for her toy? The child is given credit for passing this test of ToM if the child’s answer reflects an understanding that his or her own belief about the toy location (box) differs from Character A’s belief (basket).

Although typically developing 4-year-olds are often characterized as having a ToM, a better question to ask about ToM development is not “When do kids have it?” but instead, “What does a child understand about mental states now, and what still eludes him or her?” Indeed, very young children show a keen awareness of the mental states of others well before they show an explicit understanding of false beliefs. For example, 12-month-olds look in surprise when a person appears to like one object, but reaches for a different one (Phillips, Wellman, & Spelke, 2002), revealing an implicit understanding that desires and preferences guide behavior. By 18 months of age, many children verbally express their own desires (“I want it!”), and early in the second year of life many children make
references to desires held by others (Bartsch & Wellman, 1995). Very young, typically developing children engage in pointing behaviors, indicating an implicit awareness that a person may not have something in mind unless they can see it, and by age 3 years children can explicitly reason about the fact that seeing leads to knowing (Pratt & Bryant, 1990). Also at age 3 years, many children are quite adept at recognizing emotions and understanding simple causes of emotional reactions (Pons, Harris, & de Rosnay, 2004). Further, many 3-year-olds can reason easily about simple links between belief and behavior, such as knowing that a person might be looking for a lost pet because she thinks it ran away (Bartsch & Wellman, 1995). And, as noted, by age 4 years most children explicitly comprehend that a person’s beliefs may differ from what is true (or from what others believe), and that a person will act in predictable ways based on such beliefs (Wellman & Liu, 2004).

Although most typically developing children follow a fairly predictable developmental pathway as they gain explicit awareness of mental states, some children show precocious insight while others lag behind their peers. As noted earlier, these individual differences can have consequences for some children. For example, Denham et al. (1990) administered emotion understanding tasks to preschool-aged children and also had each child in the class rate how likable their peers were. Children who fared more poorly on the emotion understanding tasks were rated as less likable by their peers, and such likability ratings were rather stable when measured months later. It may be that children who have difficulty making sense of the emotional states of others are seen as less likable interaction partners, and this view of such children may be difficult to change, once established. Similarly, Slomkowski and Dunn (1996) assessed children’s performance on ToM tasks at 40 months of age, and then assessed the quality of children’s interactions with their close friends at 47 months of age. Children who were more successful at navigating the ToM tasks engaged in more coordinated play and connected verbal communication with friends at the later time point, compared with children who made more errors in thinking about mental states at 40 months. One way of thinking about these types of findings is that the skills necessary to pass various ToM tasks are some of the same skills required for engaging in sensitive and connected interactions with others, and this line of research indicates that some children face more difficulties in this regard than others. A meta-analysis of research on the links between mental state understanding and social competence affirms that the types of associations described here hold across a larger number of studies.
Thus, an understanding of the causes of individual differences in ToM development is important for promoting the social success of young children.

**Parent–Child Discourse and Theory of Mind Development**

One important predictor of individual differences in ToM development is the role of parent–child conversations about mental states (and the role of children’s language exposure and development more generally). Across a large number of studies, evidence has accumulated that parents vary in the extent to which they talk to their children about mental states, and that children who get more of this type of input tend to do better on ToM assessments than children who are exposed to less mental state talk. For example, when preschool-aged children and their parents were asked to talk with each other about a picture book in a laboratory setting, the extent to which mothers used emotion terms and explanations for emotions predicted children’s scores on a test of emotion understanding, and the extent to which fathers discussed desires and negative emotional states predicted children’s capacity to reason about beliefs and desires (LaBounty, Wellman, Olson, Lagattutta, & Liu, 2008). In a similar study that also made use of a picture book task, maternal talk about mental states positively predicted preschool-aged children’s own mental state talk and their performance on ToM assessments (Ruffman, Slade, & Crowe, 2002).

Ruffman et al. found that mothers’ talk about mental states at an earlier time point predicted children’s ToM performance at subsequent time points, even after controlling for children’s language abilities and their earlier understanding of mental states. Such a finding suggests that the talking parents do with children about the mind may play a causal role in children’s ToM development. Other studies have also provided longitudinal evidence that, during the preschool years, earlier language skills are predictive of later ToM abilities, but that the reverse is not true (Aastington & Jenkins, 1999).

How might language exposure and development influence children’s understanding of mental states? With regard to understanding a phenomenon such as false beliefs, de Villiers asserts that a critical developmental step is coming to grasp that a verbal proposition can be false (“The sky is green”) but that an attitudinal statement containing that proposition can hold truth (“Lucy thinks that the sky is green”; de Villiers, 2000; de Villiers & Pyers, 1997). This idea was put to test by Hale and Tager-Flusberg (2003), who
provided training to 60 preschoolers who had failed false belief tasks. Some of these children were randomly assigned to practice answering questions about statements that contained false propositions, embedded so that the overall sentence could be true. For example, these children had practice seeing a scene in which a protagonist kissed Grover but said that he kissed Big Bird. Children in this condition then practiced crafting a sentence that captured the protagonist’s false proposition, embedded in a verb phrase in such a way that the larger statement was true (eg, “The boy said that he kissed Big Bird.”). Other children received more training on false belief tasks. Still others received training on relative clauses, an aspect of language not thought to be relevant to false belief understanding (these involved propositions embedded in noun phrases instead of verb phrases, eg, “The truck that had big tires…”). The children trained on the embedded false propositions improved their performance on both the linguistic task itself, and on subsequent tests of false belief understanding, whereas the children who received training on solving false belief tasks improved on those tasks only, and not on their understanding of embedded false propositions (the language control group did not show ToM gains). This finding indicates that mastering certain aspects of language can improve understanding of mental states, but that the reverse linkage—ToM understanding leading to increased language competency—does not necessarily hold.

THE PRESENT STUDY

The connections between parental talk about the mind and children’s ToM development have also been investigated in home settings using recordings of naturally occurring parent–child conversations; these studies have found links between these variables that mirror the associations found in laboratory-based studies (eg, Ensor & Hughes, 2008).

In the present study, we built on the existing literature by examining mother–child talk about the mind in naturalistic conversations recorded with the enhanced audio recorders. The use of enhanced audio recorders provided a unique opportunity to capture conversations in participating households as children and their mothers engaged in conversations during times that typically involve a good deal of interaction.

We had three main goals for the present study. First, we sought to quantify the amount and variation of talk about thoughts, emotions, and desires between mothers and children, as captured by the enhanced audio recorders. Second, we were interested in whether there were systematic
associations between the mental state talk used by mothers and the mental state talk observed in children. Finally, we aimed to replicate previous work in this area by testing links between mental state talk used by both mothers and children and children’s performance on a test of mental state understanding. Based on previous work, we predicted that the amount of talking about mental states by both children and mothers would positively predict children’s understanding of mental states such as knowledge, desire, and emotion.

Methods
Participants
Families were included in our analyses if English was the primary home language, the child was between 4 and 5 years of age and was enrolled in preschool, and the child was free of any major illness or disability. Further, families were included only if they had sufficient time to record during two weekdays and one weekend and had completed the relevant child assessments and parent questionnaires. These criteria resulted in the exclusion of six families of the larger sample of 46 families that were involved in this project, resulting in a sample of 40 families for the analyses reported here. Three of the excluded families were part of the pilot study conducted the previous year, two families were unable to complete the necessary hours of recording, and in one family the father was the primary caregiver.1

The remaining 40 preschool-aged children (27 boys and 13 girls) ranged in age from 3 years 2 months to 5 years 9 months (M = 4 years 5 months). Maternal education level was used as a demographic variable for many of the analyses reported below. This variable was measured in a continuous fashion, and mothers’ education levels ranged from a low of a high school diploma to a high of a graduate degree. For some of the analyses presented below, mothers were split into two education groups: those that had attained at least a bachelor’s degree (n = 25) and those that had not earned a bachelor’s degree (n = 15). In the final multiple regression analysis, maternal education level was entered as a continuous variable. Paternal education level was also entered in the final regression analyses as a continuous variable (this information was available for 38 fathers). The level of paternal education ranged from a low of having attended some years of high school (without earning a diploma) to a high of earning a graduate degree.

1 Father–child interactions were not included because research indicates that there are some differences in the way that mothers and fathers talk to their children (Lytton & Romney, 1991) and we did not have enough father–child interactions to explore these types of differences.
Twenty-three of the focal children had one sibling, six had two siblings, four had three siblings, and six were the only children (one family did not report the number of children in the home). As indicated by parent report, the following race-ethnicities were represented in the child sample: 26 European American, 8 African American, and 1 each who were Hispanic, South Asian, African American/Arabic, African American/Caucasian, and Asian Indian/Caucasian (one of the families did not report their ethnicity). To obtain a measure of socioeconomic status, the family’s income-to-needs ratio was calculated using their total family income, family size, and the US Census Bureau’s 2010 poverty threshold values. An income-to-needs ratio of 1.0 indicates that a family is at the poverty line and an income-to-needs ratio of 4.0 indicates that a family’s income is four times above the poverty line. Based on self-reported household income, the average income-to-needs ratio of the participating families was 3.32 times above the poverty threshold. Four of the families were below the poverty line, seven were near poverty, and the income-to-needs ratio range was 0.48–9.04.

**Transcriptions**

The enhanced audio recorders can capture up to 16 h of audio per day; on average, participating families recorded 9 h and 43 min per day. Although both mothers and children wore LENA recorders, we chose to transcribe the mother’s recordings because mothers more consistently wore the recorders, their speech was clearer, and they were often in close proximity to their children, allowing us to capture and transcribe both sides of the conversations. For the purpose of the analyses reported here, we chose two breakfast and two dinner times on weekdays for transcription. These times were chosen because families were more likely to be together and conversing around the breakfast and dinner periods. This resulted in the transcription of 4 h per family. When extracting dialogue for transcribing purposes we used the LENA software’s capacity to analyze the audio files to flag “meaningful speech” (ie, relevant speech sounds as opposed to background noise, television sounds).

To accurately identify ToM talk within the context of the home, recordings were transcribed using Transcriber (Boudahmane, Manta, Antoine, Galliano, & Barras, 2005), a software package that facilitated the labeling of the unique conversation partners present in the audio recordings. Because the present analyses focused on the use of mental state language by mothers and children, the transcribed input from other speakers will not be discussed further in this chapter.
The audio files containing mother and child speech were transcribed by research assistants (native English speakers) who were trained to transcribe at the level of utterance (ie, lines of speech). Utterances were assessed with regard to grammatical closure, intonation, pauses, and the switching of speakers that signals conversational turns (Melzi, Schick, & Kennedy, 2011; Pan, Rowe, Spier, & Tamis-LeMonda, 2004; Susperreguy, 2013; Worzalla, 2012). For example, “Hello. How are you?” was assessed as two separate utterances by the same speaker due to the break between Hello and How are you.

Two additional research assistants worked as transcript verifiers. These verifiers worked independently to check 20% of the transcripts for spelling mistakes, missing words, and other errors. The transcripts were found to be, on average, 97.3% error-free. After establishing that the transcribers had done acceptable work, the transcripts were saved as searchable Microsoft Word documents, and the coding for mental state language was then completed as described below.

**Coding**
To assess relations between the use of mental state language by mothers and children’s own ToM-related language and task performance, the transcriptions were coded for the use of mental state terms. The specific mental state categories we focused on were: (1) thought (eg, “I think it’s time to brush your teeth,” “I know what I want for dinner,” “I don’t remember”); (2) desire (eg, “I want to wear this shirt,” “I’d like for you to get dressed,” “I need to potty”); and (3) emotion (eg, “I hate broccoli,” “I like blue,” “Don’t be afraid”). We focused on these three mental states because they encompass the most commonly used mental state terms observed in conversations involving children in the present age range (Bartsch & Wellman, 1995; LaBounty et al., 2008). Using lists of thought-, desire-, and emotion-related words from previous studies (Bartsch & Wellman, 1995; LaBounty et al., 2008), we searched the transcriptions and tallied how many times mothers and children used these words. We then made a second pass and counted additional mental state words that were missing from the original lists. The final list of words flagged in the transcripts is provided in Table 3.1.

We next assessed the interrater reliability of the mental state coders. Using the pilot subject transcripts, two trained coders worked independently to flag mental state terms. The codes applied to the transcripts by each coder were assessed using intraclass correlation coefficients (ICCs; Shrout & Fleiss, 1979; Susperreguy, 2013). The ICCs ranged from 0.90 to
When coding for mental state terms, utterances were paired with their four preceding and three succeeding utterances so that we could examine the conversational context in which mental state words were used. This was an important step in coding, as some words were coded into different categories depending on context. For example, the term “like” could signal desire or emotion (“I would like some ice cream” vs “I like you”).

Immediate repetitions of mental state terms were not counted twice unless a second speaker interjected or disrupted the conversation. For example, if a mother said, “I love you, I love you,” love was counted once as an emotion term. However, if a mother said, “I love you,” a child replied with, “I love you too,” and then the mother said, “I love you more,” the

<table>
<thead>
<tr>
<th>Thought words</th>
<th>Desire words</th>
<th>Emotion words</th>
<th>Emotion words (cont.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real/really</td>
<td>Hope</td>
<td>Afraid</td>
<td>Mean (trait)</td>
</tr>
<tr>
<td>Expect</td>
<td>Like (reference to object)</td>
<td>Amaze</td>
<td>Mean (behavior)</td>
</tr>
<tr>
<td>Dream</td>
<td>Love (reference to object)</td>
<td>Angry</td>
<td>Nice (behavior)</td>
</tr>
<tr>
<td>Forget</td>
<td>Want/wanna</td>
<td>Calm</td>
<td>Sad</td>
</tr>
<tr>
<td>Guess</td>
<td>Wish</td>
<td>Concerned</td>
<td>Scared</td>
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<tr>
<td>Know</td>
<td>Need</td>
<td>Crabby</td>
<td>Shy</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>Cross</td>
<td>Startled</td>
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<tr>
<td>Pretend</td>
<td></td>
<td>Cry</td>
<td>Surprised</td>
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<tr>
<td>Recognize</td>
<td></td>
<td>Disappointed</td>
<td>Unhappy</td>
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<tr>
<td>Remember</td>
<td></td>
<td>Enjoy</td>
<td>Upset</td>
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<tr>
<td>Suppose</td>
<td></td>
<td>Excited</td>
<td>Mad</td>
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<tr>
<td>Think</td>
<td></td>
<td>Feel</td>
<td>Grumpy</td>
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<tr>
<td>Understand</td>
<td></td>
<td>Frightened</td>
<td>Annoying</td>
</tr>
<tr>
<td>Wonder</td>
<td></td>
<td>Fun</td>
<td>Boring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glad</td>
<td>Bothered</td>
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<tr>
<td></td>
<td></td>
<td>Happy</td>
<td>Cranky</td>
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<td></td>
<td></td>
<td>Hate</td>
<td>Worry</td>
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<tr>
<td></td>
<td></td>
<td>Like (person)</td>
<td>Care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lonely</td>
<td>Worry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Love (person)</td>
<td></td>
</tr>
</tbody>
</table>

For all verbs listed in the table, all forms of the verb were included during coding (e.g., hope, hoped, hoping).
mother was viewed as engaging in two instances of emotion talk because of the interjection by the child.

Finally, to create variables that accounted for the fact that some mothers and children vocalized more than others, we calculated the proportion of mental state terms used out of the total number of words used (this was done for both children and mothers).

**Theory of Mind Tasks**

Four ToM tasks, adapted from Wellman and Liu (2004), were used to assess children’s understanding of mental states. The tasks are described in detail below.

**Knowledge access task.** The knowledge access task assesses whether children understand that seeing something leads to knowing something. Although such an understanding seems basic to adults and older children, very young children often assume that protagonists in storylines are always aware of key events, even when they have not seen those events take place (Wellman & Liu, 2004). Children were first asked their opinion about the contents of a closed, opaque plastic box. Children were then shown the actual contents of the box: a toy dog. As a check on their understanding, children were then asked once more about the contents of the box. The critical test question was then administered: children were asked whether Mr. Mouse, a toy mouse who had never looked inside the box, would know what the box contained. Children who correctly answered that Mr. Mouse would not know the contents of the box were given credit for passing the task.

**Contents false belief task.** The contents false belief task assesses whether children understand that someone can hold a belief that runs counter to reality. Children were presented with a Band-Aid box and were asked what they thought was inside. Prompts were given if the child did not respond with the reasonable answer, which was “Band-Aids.” After children provided this response, the actual contents of the box were revealed: ribbons. Children were then asked again about the contents of the box, and were corrected if they did not say ribbons. Finally, for the test question, children were asked whether Mr. Horse, a toy horse who had never seen inside the box, would think there were Band-Aids or ribbons in the box. Children who correctly answered that Mr. Horse would think that there were Band-Aids in the box were given credit for passing the task. This task differed from the first task in that successful children had to consider the fact that the nature of the box would lead Mr. Horse to hold a false belief.
Socializing Children through Language

**Hidden emotion task.** The hidden emotion task assesses whether children understand that a person can feel one emotion on the inside but display a different emotion on his or her face. To ensure that children were able to correctly label basic emotion expressions, children were first asked to label facial expressions (sad, happy, and okay), and corrections were provided when necessary. Children were then told a story about a boy named Mike whose aunt told him that she was going to get him a toy car, but instead got him books. Children were told that Mike did not like the books, but that he had to hide his feelings from his aunt so that she would continue to buy him presents. Children were then asked a series of questions. The first two questions were designed to ensure that the child understood the story (“What did Mike’s aunt say she would buy him?” and “What did Mike’s aunt really buy for him?”). Children were then asked to use an emotion rating scale to indicate how Mike really felt (sad, happy, or okay) and how he tried to look on his face (sad, happy, or okay). Finally, children were asked to explain why Mike would be trying to display the stated emotion. Children were given credit for passing the test if they answered the emotion questions correctly and provided a reasonable explanation for Mike’s facial display (eg, “He did not want to be mean” or “He did not want to hurt his aunt’s feelings”).

**Change of location false belief task.** The final ToM task assessed children’s ability to attribute a false belief to another person, and their understanding of the behavioral implications of holding a false belief. This task differed from the contents false belief task in that it required children to make a behavioral prediction based on their attribution of a mental state to another person. Children watched as two figures, Heidi and Tom, played with a ball. Heidi placed the ball in a box and left the room. While she was away, Tom took the ball out of the box and placed it under the bed and then left the room. Children were then asked where Heidi, who was not in the room when Tom moved the ball, would look for the ball, and where the ball actually was. Children were given credit for passing the task if they correctly indicated where Heidi would look for the ball (in the box) and where the ball was actually located (under the bed).

Note that for each ToM task, questions were asked to check on children’s basic comprehension of the scenarios (eg, in the change of location task, children were asked where Heidi originally put the ball, and if Heidi saw the ball being moved). When scoring the ToM tasks, children were awarded a point for each task they passed. These points were summed to create a single, summary ToM score for each child, with a possible range of 0–4.
Results and Discussion
The results presented below are organized around three main research questions. First, how is mental state language used in the home setting by mothers and their children? To answer this question, descriptive data on the use of mental state terms by mothers and children are presented. Second, were there associations between mothers’ use of mental state terms and children’s own use of such terms? To address this question, correlations among the mental state talk variables are presented. Finally, was there a connection between the use of mental state language in the home and children’s understanding of mental states? To test this connection we used a multiple regression analysis to examine the extent to which mothers’ and children’s talk about mental states predicted children’s performance on the battery of four ToM tasks.

Mental State Language in the Home Environment
We first assessed the overall amount of talk that occurred during the mealtime periods that were selected for transcription. There was, not surprisingly, a wide range across the participating households. For mothers, the overall number of words captured in the transcripts ranged from 1316 to 15,089 ($M = 6823.10$, $SD = 3115.75$), and for children, the overall number of words ranged from 663 to 4264 ($M = 2122$, $SD = 934$).

We next examined whether there was an association between maternal education level and the number of words used by mothers during the mealtimes we focused on for this study. Consistent with previous research (eg, Brooks-Gunn & Markman, 2005; Hart & Risley, 1995; Hoff, 2006), we found that mothers who had more years of schooling (a bachelor’s degree or higher) tended to use more words with their children ($M = 7940$, $SD = 2990$) than mothers who had not attained a bachelor’s degree ($M = 4962$, $SD = 2405$), $t(38) = −3.27$, $p = .002$. Given this finding, and given that we focused on periods of mother–child interaction, it is not surprising that children of mothers with a bachelors’ degree or higher also used more words overall ($M = 2336$, $SD = 1027$) than children whose mothers did not have this level of education ($M = 1765$, $SD = 639$), $t(38) = −2.17$, $p = .04$.

We next explored the frequencies with which mothers made use of language related to thoughts, desires, and emotions, accounting for maternal education level and amount of overall speech. For each mother, we first calculated the percentage of each type of mental state word out of the overall number of words spoken. We then examined these percentages using a 3 (mental state category: thoughts, desires, and emotions) × 2 (maternal
education level) mixed-measures analysis of variance (ANOVA), with mental state category as the within-subjects factor and maternal education level as the between-subjects factor. The pattern of means is presented in Fig. 3.1 (note in Fig. 3.1 that, on average, no one category of mental state talk compromised even 1% of mothers’ overall verbal output during the recording times considered in the present study).

The results of the initial ANOVA indicated that mothers used at least one category of mental state talk (thoughts, desires, and emotions) more than the others, $F(2,76) = 41.69, p < .001$. A series of follow-up analyses indicated that the mean percentages of both thought-related ($p = .004$) and desire-related ($p < .001$) words were significantly higher than the mean percentage of emotion words used (the percentages of thought- and desire-related words did not differ from each other; $p = .17$). After accounting for overall levels of speech via the calculation of percentages of mental state talk, there were no differences in the amount of mental state talk as a function of maternal education level ($p = .79$; and the interaction of mental state category and maternal education level was also not significant, $p = .28$).

Next we explored whether mothers’ use of mental state language differed depending on the age of the child. Possibly due to the limited age
range of the children in the sample, there were no significant associations between child age (measured in months) and the percentages of mental state terms in each category ($p$-values ranged from .22 to .62).

Finally, we explored the percentages of mental state terms used by children (out of the overall number of words used by the child) via the same type of mixed-measures ANOVA that was used earlier: 3 (mental state category: thoughts, desires, and emotions) × 2 (maternal education level). In this case, we also controlled for child age (measured in months) by including it as a covariate in the analysis. This was done to ensure that any systematic differences between older and younger preschoolers were accounted for in the analysis. The pattern of means is presented in Fig. 3.2.

The results of the initial ANOVA indicated that children used at least one category of mental state talk (thoughts, desires, and emotions) more than the others, $F(2,74) = 9.95, p < .001$. Follow-up analyses indicated that all three categories of mental state talk made up significantly different percentages of children’s overall talk, controlling for child age and maternal education ($p$-values ranged from .009 to <.001). As is evident in Fig. 3.2, desire-related words made up the highest percentage of children’s overall output, followed by thought-related and then emotion-related words. Thus, for both mothers and children, emotion-related words represented the

Figure 3.2 Mean percentages of children’s use of thought-, desire-, and emotion-related words, computed based on the total number of words used by children during target recording times.
smallest percentage of mental state talk of all transcribed talk. Children’s use of mental state talk did not differ as a function of maternal education level, \( p = .40 \) (and there was no interaction between the type of mental state talk and maternal education level, \( p = .40 \)).

**Associations Between Mother and Child Use of Mental State Language**

The next set of analyses explored associations between mothers’ and children’s use of mental state language using a series of correlation analyses. The thought-, desire-, and emotion-related talk variables in these analyses were the same percentage scores described earlier. When a significant, positive relation emerges between two variables in a correlation analysis, it means that an increase in one variable (e.g., maternal talk) is associated with an increase in the other variable (e.g., child talk), on average.\(^2\)

First, children’s use of thought-related language was significantly and positively associated with mothers’ use of thought- (\( r = 0.67, p < .001 \)), desire- (\( r = 0.48, p = .002 \)), and emotion-related (\( r = 0.32, p = .04 \)) language. Similarly, children’s use of desire-related language was significantly and positively associated with mothers’ use of thought- (\( r = 0.52, p = .001 \)), desire- (\( r = 0.65, p < .001 \)), and emotion-related (\( r = 0.38, p = .02 \)) language. Finally, children’s use of emotion-related language was significantly and positively associated only with mothers’ use of emotion-related language (\( r = 0.42, p = .008 \)). Notable in the pattern of correlations was the fact that the strongest associations for each category of children’s mental state talk were with the same category of mothers’ mental state talk (0.67 for the thought\(_{mother}\)–thought\(_{child}\) correlation, 0.65 for the desire\(_{mother}\)–desire\(_{child}\) correlation, and 0.42 for the emotion\(_{mother}\)–emotion\(_{child}\) correlation).

**Interim Summary**

Thus far we have shown that there is wide variation in how much mothers talked with their preschool-aged children overall, and that level of maternal education was positively associated with overall verbal output by mothers. However, after accounting for the overall amount of talking mothers did, the percentages of thought-, desire-, and emotion-related words used by mothers, calculated with their overall output as the denominator, did not differ as a function of maternal education level. We found that mothers did

\(^2\) Conversely, when a significant, negative relation between two variables emerges in a correlation analysis, it means that an increase in one variable is associated with a decrease in the other variable, on average. These types of associations should not be interpreted in causal terms, but can nonetheless be informative in describing important relations among variables.
more talking with their children about thoughts and desires than about emotions, and children’s own use of mental state language was particularly focused on desires (and, like mothers, was relatively less focused on emotions). We further found, when assessing simple bivariate associations between mothers’ and children’s use of mental state talk, that the strongest associations for each category of children’s mental state talk (i.e., thoughts, desires, and emotions) was the corresponding category of mothers’ mental state talk. Thus, the types of talking mothers and children do about the mind are related, although causal conclusions should not be drawn from the present research.

A central goal of the present study was to assess whether mental state talk, especially by caregivers, relates to children’s insights into the mind. We first present information about children’s performance on the ToM assessment; we then test whether the child and mother language variables predicted how well children fared on the ToM assessment.

**Children’s Performance on Theory of Mind Tasks**

Fig. 3.3 presents basic statistics on children’s performance on the four ToM tasks, with the number passing each task represented by the white portion of each bar. As is represented in Fig. 3.3, 68% of children passed the knowledge access task, 23% passed the contents false belief task, 15% passed the hidden emotion task, and 45% passed the change of location task.

![Figure 3.3](image)

*Figure 3.3* Numbers of children passing and failing the four theory of mind tasks.
As an initial step in the analyses of the ToM tasks, children were put into two groups for each task, those who passed and those who did not (the latter group included both children who passed the control/memory-check questions but failed the task, and those that failed the control/memory-check questions). For each of the four tasks we then compared the ages (measured in months) of the children who passed and those who failed. Children who passed the knowledge access ToM task did not differ significantly in age ($M = 54.26$) from those who failed ($M = 51.77$), $p = .22$. Similarly, there were no significant age differences between children who passed the hidden emotion and change of location tasks (mean ages in months were 55.50 and 54.06, respectively) and those who failed those tasks (mean ages were 53.09 and 52.95, respectively). However, children who passed the contents false belief ToM task were significantly older ($M = 57.00$) than the children who failed ($M = 52.42$), $t(38) = −2.11$, $p = .04$.

As noted earlier, children were awarded a point for each ToM task they passed, and these points were summed across the tasks to create a single ToM score for each child. The mean score on this measure was 1.50 ($SD = 1.11$), which suggests that, on average, children in our study passed 1.5 of 4 ToM tasks. The correlation between child age (in months) and the total ToM score was positive in direction and approached significance ($r = 0.30$, $p = .06$). This trend is consistent with many other findings showing that, in early childhood, children gain increasing insight into mental states with increasing age (eg, Wellman & Liu, 2004).

**Mental State Language and Children’s ToM Performance**

In the final analysis that addressed our central research question, a multiple regression model was used to predict children’s ToM scores. We were especially interested in whether mothers’ mental state talk would predict children’s performance on the ToM tasks. The use of multiple regression allows for the simultaneous examination of multiple predictors of an outcome variable of interest (in this case, children’s ToM scores). In this type of analysis, predictor variables that emerge as significant are those that predict unique variance in children’s ToM performance, above and beyond any variance predicted by the other variables in the model.

Three categories of independent variables were included in the model: demographic variables, child language variables, and maternal language variables. The three demographic variables that were included in the
model were: child age (in months), maternal education level (entered as a continuous variable), and paternal education level (entered as a continuous variable). (In a preliminary analysis we also included the number of siblings as an independent variable, but this was not a significant predictor of children’s ToM scores.) The two child mental state language variables that were entered in the model were percentages—of total words used by child—of thought- and desire-related words. Finally, two maternal mental state language variables were included: percentages—of total words used by mother—of thought- and desire-related words. Note that for both children and mothers, the percentages of emotion-related words were not included as predictors in the model. Due to the relative rarity of emotion-related words and to the small sample, these percentages were excluded from the regression models for parsimony. A summary of the model is presented in Table 3.2.

The adjusted $R^2$ statistic for the model was 0.48, indicating that roughly half (48%) of the variance in children’s ToM scores was accounted for by the variables in the model. Four variables emerged as significant predictors of children’s performance on the ToM assessment. As these significant predictors are discussed later, it should be noted that (1) these predictors were significant after controlling for all other variables in the model, and (2) the direction of the associations represent average trends, and may not apply to all individuals in the sample.

First, paternal education level was a significant, positive predictor of children’s ToM scores, $\beta = 0.44$, $p = .04$. Children whose fathers had higher levels of education tended to score higher on the battery of ToM tasks, on average. Second, the percentage of children’s words that were thought related was a significant, positive predictor, $\beta = 0.37$, $p = .04$, indicating that

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE$ B</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s age (in months)</td>
<td>0.03</td>
<td>0.02</td>
<td>0.19</td>
</tr>
<tr>
<td>Paternal education</td>
<td>0.19</td>
<td>0.09</td>
<td>0.44*</td>
</tr>
<tr>
<td>Maternal education</td>
<td>0.06</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Child thought words (% of total words)</td>
<td>0.79</td>
<td>0.37</td>
<td>0.37*</td>
</tr>
<tr>
<td>Child desire words (% of total words)</td>
<td>−0.46</td>
<td>0.20</td>
<td>−0.40*</td>
</tr>
<tr>
<td>Mother thought words (% of total words)</td>
<td>−0.60</td>
<td>0.39</td>
<td>−0.42</td>
</tr>
<tr>
<td>Mother desire words (% of total words)</td>
<td>0.93</td>
<td>0.46</td>
<td>0.53*</td>
</tr>
</tbody>
</table>

Adjusted $R^2$ for model = 0.48.

*p < .05.
children who spoke more about thought-related issues tended to score higher on the ToM assessment. Third, the percentage of children’s words that were desire related was a significant, negative predictor, $\beta = -0.40$, $p = .03$, indicating that children who spoke more about desire-related issues tended to score lower on the ToM assessment. Finally, the percentage of mothers’ words that were desire related was a significant, positive predictor, $\beta = 0.53$, $p = .05$, indicating that children whose mothers spoke more about desire-related issues tended to score higher on the ToM assessment. In sum, as predicted, aspects of mental state talk by both mothers and children accounted for significant variance in children’s understanding of mental states. We next discuss these findings in greater detail.

**Theory of Mind Development: The Role of Mother and Child Language**

The finding that mothers’ and children’s mental state talk each predicted unique variance in children’s understanding of mental states is consistent with previous research in this area (eg, Ensor & Hughes, 2008). However, our findings also diverge in some ways from existing research. For example, Ensor and Hughes (2008) found that mothers’ references to thoughts were more predictive (in a positive direction) of children’s mental state understanding than were mothers’ references to desires. We found the opposite; mothers’ references to desires positively predicted children’s performance on the ToM assessment, but the same was not true for their references to thoughts. Ensor and Hughes (2008) theorized that the lack of connection they found between maternal references to desires and children’s ToM performance could be explained by the variability within the desire category of mental state talk. They used the example “Do you want this crayon?” to assert that many common references to desires are unlikely to elicit reflection on mental states by children. We argue, on the other hand, that conversations about desires with children can often lead to reflections on mental states, as children are frequently faced with situations in which multiple people are conversing about competing or conflicting desires. Take, for example, a relatively innocuous example captured by the enhanced audio recorders in the present study:

Child: Yay!

Mother: Kids, I want to show you my dance!

Child: I want to show you my dance first.

Mother: I want to show you that the eagle has landed man.

In such an exchange, the child is explicitly faced with the notion that two different minds can hold two different desires about what happens next.
Further, we argue that maternal references to thoughts do not necessarily spark deeper reflection on mental states. Take this example, captured by the recorders:

Mother: That is so cute. Don’t you think that’s cute? Isn’t that cute?
Child: Yeah.

In this example, the mother’s reference to thinking is rather akin to “Do you want this crayon?” in that it does not necessarily push the child to consider their own or others’ mental states in any extended fashion. Additional work in this area may shed light on when and why caregivers’ references to thoughts and desires predict children’s mental state understanding. For example, additional coding of desire references, with attention to references to multiple desires in connected conversation turns (versus references to a single desire) may shed light on the types of talk about desires that especially promote children’s mental state understanding.

Although mothers’ references to thoughts did not predict children’s ToM performance in the present study, the opposite was true of children’s own mental state talk: children’s own references to thoughts positively predicted their performance on the ToM assessment, and their references to desires were a significant, negative predictor. More research is needed to replicate and clarify such a pattern of findings, but in speculating about the bases of these results we first note that the mental state lexicon used by young children is typically populated with desire words prior to words related to thoughts and beliefs (Ferres, 2003; Kristen, Sodian, Licata, Thoermer, & Poulin-Dubois, 2012; Tardif & Wellman, 2000). It may be that the children in the present study who had a larger proportion of desire-related talk in their total output were at a less mature stage of talking about the mind, and thus at a less mature stage of explicitly thinking about the mind. It may have also been the case that children with relatively more thought-related talk in their verbal output had made important advances in both talking about and thinking about the mind. Further, we speculate that mothers may be more likely than preschool-aged children to use talk about desires to highlight competing or diverse desires in the space of a single conversation, thus benefiting children’s developing social understanding. On the other hand, young children may be more likely than mothers to use talk about desires to simply highlight their own wants and needs. An example of a child’s focus on his/her own desires, taken from the recordings, is provided here:

Child: Okay, but I wanna play with your cookies.
Mother: You wanna to– You wanna play. I know, we will play eventually, honey.
Child: But I wanted to go to preschool with Daddy. Because Daddy has to be not going to work today.

As suggested earlier, future research could consider variables such as the average number of people whose mental states are being considered in conversations involving each category of mental state talk (thoughts, desires, emotions, etc.). Such an approach to coding transcripts may reveal important complexities, e.g., desire talk working as a positive predictor of ToM performance for some children and as a negative predictor (or a nonsignificant predictor) for other children.

We note that, for both mothers and children, talk about emotions was relatively rare in the samples of speech we collected. A potential reason for this could be that conversations regarding emotions often arise during situations that evoke specific emotional experiences. Our focus on mealtimes may have hindered our ability to capture emotion-arousing situations, whereas if we had focused on free-play times between siblings we may have heard more talk about emotions from both parents and children.

Why Language Matters

We next turn to some additional questions related to our findings and to this area of research more generally. First, we consider the question of how language in the home may be helpful to children as they develop an understanding of mental states. Conversations with caregivers and other older conversation partners likely give children valuable practice thinking about multiple perspectives, which is a critical aspect of mature mental state understanding. In this example involving mental state talk from the recordings, a mother pushes her child to consider what other people might want/need:

Child: How come we can’t just put a fence here?

Mother: No fences. People have to be able to get into the closet if they need something.

Child: Mom? But no one will need something.

Mother: You don’t think?

Another line of theorizing about why language plays a role in the development of mental state understanding focuses on syntactic advances made by children in the preschool years that allow them to more easily express the differences between, for example, two people’s beliefs, or between a person’s belief and what is actually true (de Villiers & de Villiers, 2014). As children get more practice with language they get better at crafting sentences such as, “Isaac thought it was Calvin at the door, but it wasn’t.” Such a sentence
highlights another person’s belief and the relation between that belief and what is true. Further, being able to describe such a situation explicitly could make it easier for a child to then make a prediction about what Isaac might feel, or what he might do next. Grasping such connections between beliefs, emotions, and behavior is a central aspect of a more mature ToM. Below is an example of a child making sense of the child’s own behavior using a linguistic construction in this vein:

Mother: I already asked you. You said you didn’t want the apple.
Child: I want it. But I didn’t hear you.

In this example, the child points out his/her own mental state and also clarifies why a conversation partner was unaware of that mental state. As we noted earlier, children who receive training on grammatical constructions that allow for the expression of these types of phenomena perform better on subsequent ToM tasks than children who get practice with other, less ToM-relevant aspects of language (Hale & Tager-Flusberg, 2003).

When Language Matters
The present study adds to a body of research that underscores the importance of exposing children to mental state talk early in life. However, in light of relatively recent ToM research with preverbal infants, it is important to consider the aspects of mental state understanding for which language exposure is particularly important. Here we highlight the distinction between an implicit versus an explicit understanding of mental states.

In a remarkable study, Onishi and Baillargeon (2005) presented 15-month-old infants with a scenario in which a person placed a toy in a yellow box and was then unaware that the toy was moved to a green box. Subsequently, some infants saw the person search for the toy in the yellow box (the original location), while other infants saw the person search in the green box (the actual location). This is, as may be apparent, an adaptation of the classic change of location false belief task. Infants looked significantly longer, presumably in surprise, when the person looked for the toy in the new location (where it actually was) compared to the original location, suggesting that infants were aware that the person had a false belief and that they expected the person to act on that belief (ie, to look in the yellow box). Of course these 15-month-olds were unable to engage in explicit reasoning about the events they were watching or about the protagonist’s mental state. Instead, they stared longer at the unexpected event because, the argument goes, they possessed an implicit, nonverbal understanding of these phenomena.
It is undeniably impressive that 15-month-olds, with their looking behavior, can “solve” a task that 3-year-olds often fail. Such a discrepancy highlights the difference between an implicit versus an explicit understanding of mental states. Acquiring language and engaging in conversations with others does not appear to be necessary for typically developing children to exhibit an implicit understanding of certain mental states and their relations to behavior. On the other hand, as we have seen, language appears to play an important role in children’s ability to explicitly understand a variety of mental states, and the lack of exposure to language early in development, such as when deaf children do not learn sign language early in life, can have negative effects on children’s ability to think explicitly about the activities of the mind (e.g., Meristo et al., 2007; Woolfe, Want, & Siegal, 2002). As children get older, they can no longer solve social problems with their looking behavior (as infants can in psychology laboratories). Thus, the development of explicit, language-based insight into others’ minds is important. This is where rich exposure to language plays a critical developmental role.

**FUTURE DIRECTIONS**

In this chapter we have suggested a number of new avenues for research on the relations between discourse in the home and children’s ToM development. In particular, we recommend that future research in this area utilize a more fine-tuned categorization of conversations about mental states, paying specific attention to the number of perspectives that are being discussed, and the extent to which those perspectives are in conflict. For example, it is likely that mental state talk in some households, e.g., those with relatively large numbers of people, is characterized by references to many, often conflicting mental states. Conversely, in other households it is likely the case that conversations about mental states are focused on fewer perspectives, and these come into conflict relatively less often. Attention to these additional variables may shed light on the conditions in which talk about specific mental states, such as beliefs or desires, especially benefits ToM development in young children, and when such talk does not provide extra scaffolding.

Another approach that could benefit research on language exposure and children’s ToM development is the elicitation of more family-based conversations about the mind. This has been done to some extent by asking parents
and children to read and talk about books that are specifically designed to stimulate conversations about mental states (eg, LaBounty et al., 2008). Such tasks have the advantage of putting all parent–child dyads in a similar context, so that differences in the use of mental state talk cannot be accounted for by differences in the type of activity in which a family is engaged (as can happen in home-based studies like the present one). However, book reading tasks run the risk of failing to elicit the more naturalistic mental state talk that children are most likely to encounter/engage in when interacting normally with family members (eg, talk involving negotiation, conflict management, the sharing of experiences). Future research could harness the advantages of both book reading tasks (getting people together for a standardized, semistructured activity) and of home-based observations (richer, more naturalistic interactions outside of parent–child dyads) by presenting all family members with “interaction games” that elicit open-ended conversations about the mind. For example, a family could play a game in which they have to agree on five items they would bring with them if they were stranded on an island. Such a task would elicit relatively naturalistic mental state talk involving conflicts and bargaining that would differ meaningfully from one household to the next. Ideally, this type of task could be captured using enhanced audio recorders, and the recorders could also be used to capture naturally occurring speech before and after the semistructured interaction games. The resulting data would allow for analyses that are relatively difficult with most existing family-talk data sets.

Finally, we turn to the practical implications of this area of research. The present results, combined with the findings from other studies on this topic, underscore the importance of early and regular exposure to talk about mental states. The clear signal emerging from this body of research is that caregivers who do more of this type of talking in the home may be promoting the development of richer social understanding in their children, and caregivers who do less may be putting the development of their children’s social understanding on a slower pathway relative to their children’s peers. One factor that may influence the extent to which parents engage in talk about mental states with their children is a construct termed “mind-mindedness,” which involves treating one’s child as a being with an active and developing mind, rather than simply as a person whose needs must be met (Meins et al., 2003). More mind-minded mothers tend to make more relevant comments about their children’s mental states, and maternal mind-mindedness is positively associated with children’s later performance on
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ToM tasks (Meins et al., 2003). Similarly, paternal mind-mindedness is positively associated with greater interactional attunement between fathers and children, and with children’s performance on assessments of mental state understanding (Lundy, 2013). Thus, interventions designed to help parents consistently consider their children’s states of mind may lead to increases in beneficial talk about mental states in at-risk families. Studies involving the recording of everyday family interactions, like the research presented here, could contribute in valuable ways to the design and assessment of ToM-related family interventions.

REFERENCES


**APPENDIX**

**Coding Procedure Used for Theory of Mind Analyses**

The following steps were used to code the mother–child mental state talk that served as the data for the theory of mind chapter.

1. Each transcript, formatted as a Word document, was searched for mental state terms that were used by the mother and focal child. Other children or family members were sometimes present during the conversations between the mother and focal child; care was taken to not include this speech in the coding process unless the mother was speaking to all children present.

2. The find function in Word (ie, *Command + F* or *Control + F*) was used to search for each mental state term, and counts were made of the number of terms that were found. The terms that were searched for are in the list below (Rubric Example). Because some words have meanings that depend on context, an important step involved highlighting each mental state word in context. The system used in the present chapter involved highlighting the utterance containing the mental state term, along with the four preceding and three succeeding utterances.

3. A useful step for others using this coding system is to color-code the mental-state-related utterances in the transcript. Here, for example, thought-related utterances are highlighted in *yellow*, desire-related utterances in *blue*, and emotion-related utterances in *red*. If an utterance contains multiple mental state terms from different categories, multiple colors can be used to highlight the categories.

4. When a single utterance contained mental state terms from the same category, for example, two thought-related terms, these were counted as two instances of mental state talk unless they were direct repetitions. For example, in line i of the sample transcript, the child said, “You know, you know why I wanna get out?” The child directly repeated “know,” which is a thought term, so it was only counted as one instance of a thought-related utterance by the child. However, repetitions were counted twice if a second speaker interjected or interrupted. For example, in lines i–k,