‘Me’, ‘My’, ‘Mine’: Maternal Mental State Talk, Children’s Social Understanding and the Role of the Self-Concept

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Abstract

This longitudinal study assessed the role of children’s self-concept in the relation between maternal mental state talk and children’s later social understanding as measured by their mental state vocabulary and performance on social understanding tasks. At all three time points (21, 27 and 34 months), mothers (N = 70) described pictures to children and maternal talk was coded for mental state content. Children’s self-concept was measured using the classic rouge task, use of the term ‘mine’ and use of second-person pronouns. Results indicated that Time 1 mothers’ ‘current’ references to children’s desires at 21 months predicted unique variance in children’s subsequent acquisition of mental state vocabulary at 27 months, but this effect was exclusive to children who did not demonstrate a basic ‘self-concept’ as measured by their mirror self-recognition and use of the term ‘mine’ at the earlier time point. In contrast, maternal talk about her own thoughts and knowledge at 27 months predicted unique variance in children’s subsequent acquisition of mental state vocabulary and performance on objective measures of social understanding at 34 months, but this effect was greater for those children whose self-concept was present but not yet firmly in place as measured by their use of first-person but not second-person pronouns. Working within a social constructivist framework and drawing upon Vygotsky’s principle of a zone of proximal development, I argue that the specific type of maternal mental state talk that is most likely to facilitate advancements in children’s social understanding changes over time and depends on: 1) the child’s current level of social understanding and 2) the child’s understanding of the distinction between self and other.
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Introduction

My interest in children’s social understanding stems from my undergraduate degree in philosophy. During my time in the Philosophy Department I spent many hours pondering questions such as: What are mental states (Rene Descartes, 1596-1650)? What is a ‘self’ (David Hume, 1711-1776)? How do words become imbued with meaning (Ludwig Wittgenstein, 1889-1951)? I consider empathy and social understanding central to the human condition and believe that assessments of children’s social development can provide key insights into the fundamental nature of human experience.

Some researchers have claimed that children could not possibly form a concept of something that cannot be directly perceived (i.e., mental states), and therefore crucial aspects of children’s early conception of mental states must be innately specified (e.g., Leslie, 1987). The subsequent challenge for learning theorists (such as myself) has been to demonstrate that the invisibility of mental states does not preclude the possibility that they are learnt during the first few years of life. To this end, throughout this thesis I provide a social constructivist’s account of how children might come to learn about mental states during infancy. I argue that learning about mental states is not too difficult for children if it is broken down into small manageable pieces and I empirically assess how the type of maternal input that children receive facilitates their understanding of mental phenomena. From the very start I will make my ambitions for this study clear. I do not intend to adjudicate the issue as to whether theory of mind is innate or learned, rather, I intend to examine the possibility that children’s basic conception of mental states is learned during the first few years of life and provide empirical evidence for my proposed trajectory to mental state understanding.

In Chapter 1, I provide a literature review of the relevant research on children’s understanding of desires, intentions, emotions, belief, perspective-taking abilities and use of
mental state terms and assess the leading theories as to how children’s social understanding develops during the first few years of life. In Chapter 2, I look more specifically at the social constructivist research that has incorporated the complex social context and interpersonal interactions within which children develop social understanding and especially the influence of maternal mental state talk on children’s social understanding. In Chapter 3, I provide my rationale as to why children’s understanding of the distinction between self and other might moderate the relation between maternal mental state talk and children’s social understanding and describe the measures commonly used to assess children’s self-concept. My main hypotheses were that: 1) maternal talk about the child’s desires would be most helpful for children who do not yet possess even a basic understanding of the distinction between self and other, and 2) maternal talk about her own cognitions would be most useful for slightly older children whose self-concept is present but not yet firmly in place.

Chapter 4 includes a description of my methodology and Chapter 5 provides descriptive statistics for all mother and child language variables as well as measures of children’s self-concept and performance on objective measures of social understanding, paying particular attention to how these variables change over time. Chapter 6 describes analyses between Time 1 maternal mental state language and Time 2 child social understanding. Generally speaking, I use cross-lagged regression analyses to examine which specific types of maternal mental state talk predict variance in children’s later social understanding. I then assess how the specific type of maternal mental state talk most likely to facilitate gains in children’s social understanding differs depending on the child’s self-other understanding. This pattern of analyses is then repeated for the relation between maternal mental state talk at Time 2 and children’s later social understanding at Time 3 (Chapter 7) to allow for a comparison of how the specific type of maternal mental state talk most likely to facilitate children’s social understanding changes over time. Finally, in Chapter 8, I report
whether my hypotheses were supported and discuss my findings with regard to their relevance for the wider social understanding literature.
Chapter 1  Children’s Social Understanding

1.0  Introduction

Theory of mind

‘Theory of mind’ refers to the ability to ascribe mental states such as desires, emotions and cognitions to one’s self and to other people. As adults we often attempt to go beyond a person’s observable behaviour to make guesses as to what they might be thinking, how they might be feeling or what they might want. But exactly how and when children acquire a theory of mind remains an open question. Theory of mind is important for understanding and predicting human behavior and has ramifications for a wide range of domains of development including language acquisition (Milligan, Astington, & Dack, 2007; Tomasello & Farrar, 1986), social skills (Denham, Kimberly, et al., 2003; Watson, Nixon, Wilson, & Capage, 1999), self-esteem (Schaffer, 1996), well-being (Schaffer, 1996) and peer relations (Bosacki & Astington, 1999; Denham, Kimberly, et al., 2003; Slaughter, Dennis, & Pritchard, 2002).

The unobservable nature of mental states

In part, children learn the names for things in the world ostensively. That is, they are shown an object while it is given a name (e.g., “Look! It’s a bottle”). But people’s mental states are by definition unobservable. How, then, do children come to understand what mental states are? Take, for example, the learning of the mental state term, ‘sad’. Pointing to a person who is crying and saying the word ‘sad’ might only provide a means of labelling the crier’s observable facial features and expressions (tears, downward turned mouth, etc). How, then, do young children come to understand that mental state terms such as ‘sad’, ‘want’ and ‘think’ refer to internal psychological processes rather than their observable expressions?
In this thesis I present a social constructivist account of how children might acquire basic mental state concepts and learn about the subjective nature of mental states during the first few years of life. I argue that mothers talk to their developing children in such a way that helps structure the mental world into a tractable form and that children’s developing self-concept plays an important role in this process. The aims of this chapter are: (1) to provide a working definition of ‘mental states’ and of ‘social understanding’, (2) to provide an overview of the literature on social understanding, and (3) to provide an outline of the leading theories of infants’ social development.

1.1 What is Social Understanding?

The term ‘social understanding’ is prevalent in several domains of academia including philosophy, anthropology, and economics, with specific definitions varying markedly between disciplines. Likewise the term ‘mental state’ has been construed in many different ways especially in the philosophical literature. The aim of this section is to provide a clear working definition of these terms as derived from the field of developmental psychology.

1.1.1 What are Mental States?

The distinction between mental and physical attributes has a long history in both philosophy (Descartes, 1647) and psychology (James, 1890). The philosophical technicalities and associated controversies surrounding the specific ontological status of mental states are interesting but beyond the scope of this thesis (after all, the kind of mental state understanding being acquired by young children is a ‘common sense’ understanding). Rather,
I define mental states with regard to the challenge that children are faced with when attempting to form concepts of unobservable mental entities.

‘Mental states’ refer to internal psychological experiences (e.g., desires, intentions, emotions, cognitions, perspectives) that cannot be directly perceived by third persons in the same way that physical bodies can (Moore, 2007). Furthermore, mental states cannot be properly defined as isolated entities. Rather they must be understood with regard to the individual who is experiencing the mental state and the context in which the individual has the mental experience. This is why in the developmental literature mental states are often defined in terms of intentional relations\(^1\) in which a mental state mediates the relation between a subject and an object (Barresi & Moore, 1996) as presented in the following examples:

1. Chris *thinks* that his thesis is finished.
2. Chris *wants* to finish his thesis.
3. Chris *likes* his thesis.

Note that in all three examples there is an agent (Chris), who is engaged in some intentional activity (italicised) with an object (the thesis) and that the specific content of the mental state term changes how the relation between the subject and object are construed.

There are roughly three different categories of intentional relations (Moore, Mealiea, Garon, & Povinelli, 2007). Epistemic relations pertain to a person’s cognitions such as thoughts, beliefs and knowledge (e.g., sentence 1) and are capable of being true or false in virtue of the way that things actually are in the world. Conative relations include acts of

\(^1\) Here the term ‘intentional’ is a philosophical term that refers to the conscious component or ‘qualia’ of people’s experiences and interactions with the world (Searle, 1983).
desire and intention (e.g., sentence 2) and are either fulfilled or unfulfilled depending on whether or not things in the world comply with a desired state of affairs. Finally, affective or emotional relations (e.g., sentence 3) are neither true or false nor fulfilled or unfulfilled, but rather are evaluative statements that often lead to and result from actions, beliefs and desires.

1.1.2 ‘Social Understanding’ Versus ‘Theory of Mind’?

‘Social understanding’ and ‘theory of mind’ both describe children’s ability to make sense of human behaviour and are sometimes used interchangeably (Astington & Baird, 2005). However, the subtle differences between these terms are important with regard to the issues addressed in this thesis. Social understanding is a broader term that refers to children’s skill at making sense of the social world (Dunn, 1988) and more specifically to understand and predict human behaviour and engage in social interactions. Theory of mind is one explanation of how children achieve social understanding, that is, by imputing unobservable mental states. From birth, children demonstrate social behaviour (Dunn, 1988; Johnson, Dziurawiec, Ellis, & Morton, 1991; Meltzoff & Moore, 1977) but the age at which this behaviour includes an understanding of mental states has caused much debate within the developmental literature. Conceivably, infants’ early social interactions may be based on an understanding of statistical regularities in people’s behaviour without any insight into psychological states. If this is the case then young infants should not be credited with a ‘theory of mind’, but rather a ‘theory-of-behaviour’ (Perner, 1991), both of which are subsumed under the term ‘social understanding’.

There is also a difference between ‘social understanding’ and ‘theory of mind’ with regard to the emphasis placed on environmental and social factors. According to Carpendale and Lewis (2004), much of the research conducted under the rubric of theory of mind has
been too narrow in its focus, and that approaches to assessing theory of mind have been too individualistic such that they fail to incorporate the complex social context and interpersonal interactions within which children develop. In order to distance themselves from this individualistic setting and position themselves within a social-constructivist framework, Carpendale and Lewis explicitly state a preference for the term ‘social understanding’ over ‘theory of mind’.

In light of the aforementioned issues my operational definition for social understanding is as follows:

‘Social understanding’ refers to children’s skill at making sense of the social world either through an understanding of underlying mental states or through an understanding of behaviour and emphasises both the child’s social comprehension and the environment within which the child develops.

As mentioned above social understanding is an important aspect of children’s more general development and has ramifications for their well-being and achievement. How then do we assess children’s social understanding?

1.2 Assessing Children’s Social Understanding

In this section I will describe and assess some of the theories and methodological approaches that have been used to assess various aspects of children’s social understanding and especially their understanding of mental states, including their comprehension of belief, desires, intentions, emotions, perspective-taking abilities and use of mental state terms. In
order to provide a historical context of the study of social understanding, I will begin by providing a brief overview of the history, development and associated controversies of the false belief task.

1.2.1 Children’s Understanding of Belief

History of the false belief paradigm

During the 1970s, developmental psychology was heavily influenced by Jean Piaget’s (1972) theory of cognitive development. According to Piaget, children younger than 7 years old are predominantly “egocentric”. That is, they are unable to “de-centre” and comprehend that another person’s perspective, beliefs and knowledge may differ from their own. Changes in thinking were brought about by reactions to an influential paper by two primatologists, David Premack and Guy Woodruff (1978). After observing that chimps reliably selected the correct solution picture to a human actor’s frustrations, Premack and Woodruff concluded that the chimps understood the actor’s desires and intentions. Given that intentions are ‘inner’ and unobservable it was concluded that chimps have the ability to impute mental states to others, that is, they have a “theory of mind”. Chimps’ understanding was deemed a ‘theory’ because it is a system of inferences used to make predictions and a theory of mind because the predictions are about the ‘inner’ unobservable contents of the mind.

Several philosophers argued that the behaviour of the chimps in Premack and Woodruff’s study could be explained in terms of basic behaviourial contingencies rather than a theory of mind, but proposed a procedure to more decisively adjudicate the issue of whether primates truly understood the mental states of others (Bennett, 1978; Dennet, 1978; Harman, 1978). True mental state understanding would be demonstrated if one animal could predict the behaviour of
another animal based on an inferred mental state that differs from reality – a false belief. In his commentary of Premack and Woodruff’s paper, Harman wrote:

“Suppose that a subject chimpanzee sees a second chimpanzee watch a banana being placed into one of two opaque pots. The second chimpanzee is then distracted while the banana is removed from the first pot and placed in the second. If the subject chimpanzee expects the second chimpanzee to reach into the pot which originally contained the banana, that would seem to show that it has a conception of mere belief” (Harman, 1978, p.576).

The difficulty with implementing Harman’s proposed false belief paradigm was that chimps have limited language therefore making it difficult to ascertain a measure of their expectations. However, in non-verbal false-belief tasks chimps have still failed whereas 4-year-old children have passed (for a summary, see Krachun, Carpenter, Call, & Tomasello, 2010). The false belief paradigm would also prove to be useful outside the field of animal cognition. Thus, Wimmer and Perner (1983) took Harman’s logic and applied it to the field of developmental psychology by creating a false belief task (the Maxi Task) designed for children.

*The Maxi Task*

In the Maxi Task children are presented with a story character, Maxi, who puts some chocolate into a green cupboard and then leaves the kitchen. In his absence, Maxi’s mother takes the chocolate and puts it into the blue cupboard. Children are then asked to indicate the cupboard where Maxi will look for his chocolate when he returns to the kitchen. The correct answer is that Maxi will look in the green cupboard where he falsely believes it to be. The critical point is that
to pass the Maxi task children must recognise that Maxi will act upon a belief that is different from their own and that people act, not on the basis of the way things actually are in the world, but rather, on the way that they believe things to be. Or put differently, children must understand the ‘representational’ nature of mental states in that there is a distinction between reality and someone’s representation of reality.

Since the creation of the original Maxi task there have been dozens of studies assessing preschoolers’ performance on tasks based on the false belief paradigm. These studies collectively suggest a passing age of approximately 4 years old (Wellman, Cross, & Watson, 2001). Younger children tend to erroneously report that the protagonist will look for the object where they themselves believe it to be. Critics of the false belief paradigm have suggested that 3-year-olds’ failure is best attributed to the multitude of peripheral excessive information processing demands such as memory (Mitchel & Lachohee, 1991), salience and inhibition (Zaitchik, 1991) and the wording of the instructions (Freeman, Lewis, & Doherty, 1991) rather than a lack of understanding of belief. However, a meta-analysis across 178 separate studies revealed that the manipulation of information processing and stimulus variables does not significantly affect the age at which children successfully give the correct answer (Wellman et al., 2001). This makes it unlikely that performance on the false belief task depends on any surface feature of the task and adds weight to the hypothesis that around age 4 there is advancement in children’s conceptual understanding of belief.

**Implicit false belief**

There is also evidence that children’s explicit understanding of false belief is preceded by, and founded upon, a period of implicit understanding (Clements & Perner, 1994; Low, 2010). The first empirical investigation into implicit understanding of belief was conducted by Clements and Perner (1994) who examined children’s eye gaze during anticipation of a protagonist’s return...
to search for a displaced object. They found that between the ages of 2 years, 11 months and 3 years, 7 months, children looked to the correct location but provided an incorrect verbal response as to where the protagonist would re-appear to look for their object. The majority of older children both looked to the correct location and gave a correct verbal response. Clements and Perner argued that 3-year-old children may possess implicit knowledge of belief which could lay the foundation for their subsequent explicit understanding, which emerges sometime during their fifth year of life.

Looking time tasks

There have recently been a number of experiments using the violation-of-expectations paradigm or similar measures of looking time to test infants’ understanding of belief (e.g., Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2010). It has been found that infants as young as 15 months look longer (indicating increased processing time and possibly surprise) when a protagonist looks for a displaced object in its new location rather than where they last saw it (Onishi & Baillargeon, 2005). Indeed, recent researchers have argued that even 7-month-olds understand false belief (Kovacs et al., 2010). Such results have typically been used as ‘evidence’ that infants possess a basic concept of the representational nature of belief and even that an innate understanding of mental states is likely (see Caron, 2009 for an overview of such claims). That is, children’s early social behaviours are truly indicative of a theory of mind.

However, Perner and Ruffman (2005) argued that it is unclear whether the increased looking time of infants indicates an understanding of belief, or an understanding of behaviour. That is, it is possible that the infants looked longer because they expected the observed protagonist to behave in a particular way (e.g., people usually look for objects where they last saw them) without any insight of the mental activity of the protagonist. Several researchers have argued that it is difficult, if not impossible, to discern the depth of children’s social understanding
based on behavioural measurements of their looking time alone and that introduction of numerous control conditions to such paradigms does not go any way toward revealing a theory of mind, but rather, could merely indicate the specificity of children’s comprehension of how people behave (Perner, 2010; Ruffman & Perner, 2005; Sirois & Jackson, 2001). For instance, children’s early social understanding might not be based on a theory of mind, but rather, develop gradually and progress from an implicit understanding of behaviour, to an implicit understanding of mental states, which in turn forms the foundation for a representational theory of mind.

Deception and lying

Naturally there is more to belief understanding than passing the false-belief task. Gopnik, Slaughter and Meltzoff (1994) coined the term ‘neurotic task fixation’ to express their discontent with the fact the false-belief task has dominated social understanding research despite the dearth of information on other important aspects of children’s social development. Other assessments of children’s belief understanding have included evaluations of their ability to deliberately manipulate others’ behaviour. During their fourth and fifth years of life, children demonstrate improvement in their ability to deliberately withhold information or intentionally give false information during social interactions. For example, most 4-year-olds but only some 3-year-olds are able to keep a secret (Peskin & Ardino, 2003), remain covertly hidden while playing hide-and-seek (Peskin & Ardino, 2003), deliberately lie to avoid negative consequences (M Lewis, Stanger, & Sullivan, 1989; Stouthamer-Loeber, 1991) and engage in deliberately deceptive behaviours (Chandler, Fritz, & Hala, 1989; Perner, 1991; Peskin, 1992). Assessments of children’s social interactions in naturalistic settings reveal that even 2-year-olds engage in some deceptive behaviours (Newton, Reddy, & Bull, 2000; Wilson, Smith, & Ross, 2003). Although it has been argued that such behaviours reflect genuine attempts to create false beliefs in others (Newton, et al., 2000), children’s poor task performance suggests otherwise.
Children’s ability to engage in deceptive behaviour has received relatively little attention in the social understanding literature because it does not necessarily measure a child’s understanding of mental states as illustrated in the following example in which the child clearly doesn’t have an understanding of mental states but is attempting to manipulate behaviour nonetheless:

Child: “Mommy, go out of the kitchen.”
Mother: “Why?”
Child: “Because I want to take a cookie” (from Peskin, J, 1992, as cited in Doherty, 2009).

However, even if 2- and 3-year-olds’ deceptive behaviour is not truly indicative of a sophisticated understanding of mental states, it may serve as a precursor to a representational understanding of belief. That is, a representational understanding of mental states does not arise out of nowhere and understanding that particular behaviours are associated with positive and negative outcomes may precede and contribute to a more sophisticated understanding of beliefs later in life. One measure used to assess children’s early ability to deceive is the Penny-Hiding task (Oswald & Ollendick, 1989; Gratch, 1964; DeVries, 1970; Baron-Cohen, 1992).

**The Penny Hiding task**

During the Penny-Hiding task, the experimenter hides a coin behind his back and, bringing both closed hands forward with the coin hidden in one hand, asks the child to guess in which of the two hands the coin is hidden. After repeating the game a number of times children are then handed the coin and asked to play the same game as the hider. Baron-Cohen (1992) argues that certain behaviors exhibited by the child (keeping the coin hidden, placing both hands behind the back, bringing both closed hands forward) provide insight into a
child’s ability to manipulate the beliefs and knowledge held by another person, or is at least indicative of a sophisticated understanding of behaviour. The Penny Hiding task is ideal with use for younger children because it is fun and contains few verbal demands.

1.2.2 Children’s Understanding of Desires

Desire understanding as a foundation for belief understanding

Wellman and Woolley (1990) proposed a specific developmental trajectory for children’s social understanding. Initially children note simple regularities in behaviour (e.g., people who reach for an object usually grasp that object) which act as the basis for a simple-desire psychology. To begin with, children understand desire in the sense that other people have dispositions toward (or against) obtaining certain objects and that those dispositions can be used to predict behaviour. A simple-desire psychologist will be able to predict whether somebody will engage in goal-directed actions (e.g., reaching) and when they will display certain emotional responses such as fulfilment or frustration. Note that no theory of mind is required for a simple-desire psychology. Simply hearing that someone “wants” a particular object or state of affairs can be used to predict their subsequent behaviour and does not necessarily require the attribution of an internal state of desire.

According to Wellman and Wooley (1990), a rudimentary simple-desire psychology will lay the foundation for eventually attributing internal states of desire to people. This, in turn, might act as a catalyst to the process of attributing internal cognitive states such as beliefs and knowledge later during development. Cognitions are arguably more difficult for children to learn than desires because they do not have such obvious accompanying
behaviours and are less salient for young children who are limited in their cognitive capacity relative to adults (Taumoepeau & Ruffman, 2008).

To test these claims Wellman and Woolley (1990) had 2-year-old children make predictions about the actions and emotional reactions of a protagonist who was searching for a desired object (e.g., a rabbit). Almost all of the children were able to accurately predict the protagonist’s actions based on knowledge of the protagonist’s desires (e.g., whether he would stop or continue to look for the rabbit once he had found it), but were unable to predict actions based on the protagonist’s knowledge or beliefs (e.g., that he would look for the rabbit where he believed it to be). Wellman and Woolley concluded that at 2.5 years of age, children possess a simple-desire psychology, but do not yet possess the belief-desire psychology found in older children, and subsequent studies have corroborated the hypothesis that desire understanding precedes belief understanding (e.g., Wellman & Lui, 2004).

*The subjective nature of desires*

The specific age at which children understand the *subjective* nature of desires (that others’ desires can differ from one’s own) remains a contentious issue. Around 18 months of age, children demonstrate an understanding that other people sometimes want things that they themselves do not want (e.g., Repacholi & Gopnik, 1997). The contention is whether this understanding involves insight into mental states or mere behaviour. During the early stages of development a child might come to form person-object associations such that the contingencies between specific objects and the likelihood of certain emotional reactions are calculated separately for different people. Consistent with this theory, it is not until around 4 years of age that children pass tasks that require them to directly compare two people’s discrepant desires to the *same* outcome (e.g., during a competitive situation) which is
arguably a more stringent test of children’s understanding of the subjective nature of desires (Moore et al., 1995; Rakoczy, Warneken, & Tomasello, 2007).

1.2.3 Children’s Understanding of Intentions

Children’s understanding of intentions is closely related to their understanding of desires because desires often create goals which result in intentional activity (i.e., the effort directed to obtain the desired end-point). Several studies have employed a violation of expectations paradigm to assess children’s understanding of intentions (Biro & Leslie, 2007; Gergely, Nádasdy, Csibra, & Bíró, 1995; Luo, 2010; Woodward, 1998, 1999; Woodward & Guajardo, 2002; Woodward & Sommerville, 2010). Most recently, Luo (2010) habituated 3-month-olds to an event involving a box that moved from the centre of a display, always to one of two objects (e.g., Object A). In the test phase, the position of the objects was switched and babies looked significantly longer when the box now moved to the second object (Object B) compared to when the box moved to Object A in its new location. Luo argued that this was because children understood that the box’s intention was to obtain Object A and thus were surprised when the box moved to Object B.

Similar experimental designs are prevalent in social understanding research and have often been interpreted as infants possessing an understanding of an agent’s goals and intentions (e.g., Biro & Leslie, 2007; Sommerville Woodward, & Needham, 2005; Woodward, 1999). Within these interpretations there is debate as to whether infants’ understanding of intentions is learnt during early experience (Sommerville, et al., 2005; Tomasello, Carpenter, Call, Behne, & Moll, 2005), or made possible via an innately given computation system that guides infants’ goal-related understanding (Luo & Baillargeon, 2007) (see Woodward, 2005 for an overview). There is also debate as to whether infants’
initial early understanding of intentions is specific to humans (Sommerville, et al., 2005) or pertains to all acting agents including non-human agents (e.g., boxes such as in Luo, 2010).

Others researchers have argued that the infants’ increased looking time during violation of expectations paradigms is compatible with both rich- and lean accounts of understanding (Baldwin & Moses, 2001; Gergely & Csibra, 2003; Ruffman, Taumoepeau, & Perkins, submitted). That is, it is possible that infants may understand the intentions of the agent, but it is also possible that they are simply grasping statistical regularities in the behaviours that happen to correspond with intentional actions. Assessments that pivot around agents’ behaviour (a box’s motion, a person reaching toward an object, etc) assume that the child has witnessed the relevant behaviour, therefore making it difficult, if not impossible, to establish whether any subsequently measured behavioural reaction from the child reflects insights into intention or mere behaviour (Povinelli & Vonk, 2003).

In an attempt to rule out low-level accounts some researchers have employed numerous control conditions in which characteristics of the object, the object’s location, or the relation between the agent and the object are manipulated to help rule out specific behavioural explanations. However, this merely ‘shifts the posts’ so to speak and any new construal of the behavioural paradigm is still susceptible to alternative, more specific, behavioural explanations, a point emphasised in the following quote from Povinelli and Vonk (2003):

“The sobering point is that no experiment in which the theory of mind coding derives from a behavioral abstraction will suffice. Control will chase control with no end in sight, leaving only our intuitions, hopelessly contaminated by our folk psychology, to settle the matter.” (p.159)
Note, that like most sceptics, Povinelli and Vonk (2003) are not ruling out the possibility that infants possess a rich mentalistic understanding of mental states such as intentions. Rather, they are emphasising that the shortcoming of current paradigms employed to test infants’ understanding of mental states is that they are unable to distinguish between rich and lean accounts of children’s social understanding. In light of this methodological issue it is perhaps prudent to conclude that recent studies assessing children’s looking time provide evidence of some form of social understanding in young infants but whether or not this understanding entails insight into intentions and goals or mere behaviour remains an open question.

1.2.4 Children’s Understanding of Emotion

Research conducted during the early 1970s demonstrated that a set of facial expressions can be cross-culturally identified as representing discrete emotional states (Ekman, 1973) and that by the preschool years, most children can discriminate the facial expressions for happiness, fear, sadness and anger (Odom & Lemond, 1972). However, a comprehensive understanding of emotions involves drawing upon cues other than facial expressions alone (Harris & Saarni, 1989). In order to test children’s ability to understand emotions based on situational cues, children have been asked to verbally report the mental state of a protagonist who is depicted in an emotion-evoking situation but whose face is not visible (Denham, 1986; Taumoepeau & Ruffman, 2006, 2008). Other tasks involve the child indicating which of several facial expressions best suits a protagonist given their current situation (Denham, Blair, et al., 2003). Children as young as 24 months have been shown to understand the connection between situations and the emotions elicited by these situations (Denham, Blair, et al., 2003; Taumoepeau & Ruffman, 2006). Children typically understand the expressions and situational determinants of
happiness and fear earlier than their understanding of anger and sadness and it is not until even later that children are able to accurately recognise and articulate knowledge of situations that evoke more complex emotions, such as jealously, shame, pride, gratitude and worry (Harris, Olthof, & Terwogt, 1981).

Emotions do not occur in isolation but rather lead to, and are the product of, actions desires and beliefs, and much research has focused on children’s understanding of the connection between emotions and other mental phenomena such as intentions, desires (Meltzoff, Gopnik, & Repacholi, 1999) and beliefs (Harris, Johnson, Hutton, Andrews, & Cooke, 1989; Ruffman & Keenan, 1996). Stein and Jewett (1986) argued that initially children associate simple emotions with goal-based outcomes. That is, people become happy or frustrated depending on whether their goals are attained or hindered. Similarly, Dunn (1988) argued that young children might initially understand emotions in the sense that the occurrence of specific facial expressions and behaviours is more or less likely depending on whether someone successfully attains a desired state of affairs. This rudimentary understanding forms the basis for their comprehension of more complex situations that involve a range of emotions and multiple parties.

The importance of studying children’s emotion understanding is that it is related to a wide range of domains of social competence (Denham, Kimberly, et al., 2003). Children who perform better on emotion recognition tasks are typically more popular with peers, more sensitive to social cues and are generally more pro-social and empathetic (Denham, 1986, 1990; Strayer, 1980) and these measures of social competence, in turn, predict indices of achievement and well-being (Birch & Ladd, 1997; Izard, et al., 2001; Ladd, Birch, & Buhs, 1999; Shields, et al., 2001).
1.2.5 Children’s Understanding of Perspectives

‘Perspective taking’ refers to a child’s ability to understand the visual perspective of another person, even if it differs from one’s own. Much of the research on children’s perspective taking has been conceptualised in terms of the distinction between Level-I and Level-II abilities (Flavell, 1974). Level-I refers to a child’s understanding that what two people can see may differ (e.g., “I can see the Teddy bear but you cannot”) whereas Level-II involves a more sophisticated understanding that the child and another person can simultaneously possess different perspectives of the same object (i.e., how we see objects is different). Classic Level-I perspective-taking tasks often involve an experimenter holding up a piece of card with different pictures on either side and assessing whether the child can correctly report what the child and the experimenter can see. Alternatively, a child is simply asked to hide an object behind a screen so that an experimenter cannot see it. Classic Level-II tasks often involve asking a child to select a photograph that best depicts how a scene looks to another person sitting at an opposite location (Ackerman, 1996; Light & Nix, 1983; Piaget & Inhelder, 1956).

Doherty (2009) assessed the available research to construct a comprehensive developmental trajectory to perspective-taking ranging from birth to the preschool period. According to Doherty, Level-I knowledge onsets at around 24 months of age and is based on an understanding of regularities in human behaviour. To successfully report that Person A can “see” Object X, a child need only understand that there is a particular spatial relation between Person A and Object X (i.e., that the object is roughly in front of that person’s face). Note that this does not require sophisticated knowledge of the first-person visual perspective that resides within Person A’s mind. Doherty argues that Level-I knowledge then provides a basis for children’s more sophisticated Level-II perspective-taking abilities. That is, an understanding of human behaviour provides a foundation to then attribute subjective first-person visual perspectives to others.
In support of Doherty’s theory, children demonstrate Level I knowledge by 24 months of age (Henrike & Tomasello, 2006), but do not pass Level II perspective-taking tasks until around their fourth birthday or beyond (Flavell, Everett, Croft, & Flavell, 1981; Masangkay, et al., 1974) suggesting that Level II is a more sophisticated form of knowledge. Furthermore, by 2 years of age, children are able to report what another person can see based on gross behavioural cues such as head direction and pointing, but it is not until later, during their fifth year of life, that children are able to report what a person can see based on subtle cues such as eye-direction alone (Doherty & Anderson, 1999).

1.2.6 Children’s Use of Mental State Terms

The importance of attempting to understand how and when children acquire a mental state vocabulary (e.g., “want”, “happy”, “think”) is that children’s use of mental state terms might provide a “window” into their early social understanding (Bretherton, McNew, & Beeghly-Smith, 1981; Carpendale & Lewis, 2006b; Luquet, 1913). This theory takes seriously the relation between thought and language (Vygotsky, 1978). Mental state terms might provide children with the ‘tools’ to explicitly consider mental phenomena (Claire Hughes & Dunn, 1998) and, conversely, gains in conceptual knowledge of mental phenomena may allow and motivate children to acquire new mental state terms (Perner, 1991). Social understanding is sometimes operationalised as performance on tasks and sometimes as children’s use of mental state terms. While tasks and mental state talk each have pros and cons as measures of social understanding, benefits of using mother reports of children’s mental state terms include that they reliably correlate with task-based measures of child social understanding (e.g., Bretherton & Beeghly, 1982; Howard, Mayeux, & Naigles, 2008; Claire Hughes & Dunn, 1998; Ruffman, Slade, & Crowe, 2002a), provide a sensitive measure of
children’s language in their normal social interactions, and avoid the various information-processing demands inherent to laboratory tasks of social understanding.

Bartsch and Wellman (1995)

Bartsch and Wellman (1995) conducted fine-grained analyses of 10 English-speaking children from elaborate longitudinal transcripts that were extracted from recordings of child-parent conversations taken at regular intervals in the age period from 18 months to 6 years. In order to ascertain exactly what children mean when they first start using mental state terms, Bartsch and Wellman examined both the age at which the children started using mental terms as well as the specific conversation and context within which the mental state terms were uttered. From their analyses, Bartsch and Wellman derived a specific developmental trajectory for the acquisition of mental state terms that progresses through three phases.

During the first phase, which begins sometime late during the second year of life, children begin to use emotion (“happy” and “sad”) and desire terms (“want” and “like”) in a variety of situations and in order to explain and predict people’s behaviour and emotional reactions. During phase two, which begins during the third year of life, children begin to make genuine references to people’s cognitions (“think”, “know”, “believe”) but will typically still appeal to desires when trying to explain and predict people’s behaviour. Finally, phase three begins around children’s fourth birthday. Children are now using cognitive terms to predict and explain people’s behaviour, to describe instances of two people’s contrasting beliefs and to describe situations in which people’s behaviour is driven by a false belief.

In light of their findings, Bartsch and Wellman (1995) argued that children’s early use of mental state vocabulary should be considered a valid measure of their social understanding because, from the beginning, mental state terms are typically used by children to refer to people’s internal states to explain and predict human behaviour and to articulate the subjective nature of
mental states. That is, children’s early use of mental state vocabulary is a valid indication that they understand the underlying mental state concepts associated with the terms that they are using.

*Smiley and Huttenlocher*

Consistent with simulation theory (section 1.3.2), Smiley and Huttenlocher (1989) argue that children’s social development progresses from an understanding of their own mental states, to noticing similarities in others’ behaviour, and then finally to understanding the mental states of others. Huttenlocher, Smiley, and Charney (1983) observed that when children begin using intentional action verbs (around the age of 20 months), they do so initially only for instances in which their own goals are involved. Later (around the age of 26 months), when children begin applying intentional action verbs to others, they only use the words that they have already applied to themselves. Furthermore, when children begin to use other-orientated verbs, they do so first for actions that can be categorised on the basis of directly observable features (e.g., “cry”, “kick”, “walk”), and then for actions which are based on inferences of intentions (e.g., “fix”, “make”). From this data, Huttenlocher et al. argued that children first linguistically categorise their own intentions, then notice parallels in others’ behaviour, before finally attributing intentions to others. More recently, Hughes and Dunn (1998) noticed a shift during the third year of life from children referring primarily to their own mental states to referring equally as often to the mental states of other people.

1.2.7 Section Summary

Much of the empirical literature on children’s social understanding has derived from assessments of children’s comprehension of belief and, in particular, preschoolers’
performance on the false belief task. More contemporary research has investigated how and when children comprehend a variety of mental phenomena including desires, intentions and emotions and how these different domains relate to one another. In this thesis, I will focus upon infants’ recognition of emotions (facial expressions, situational cues), deception, perspective-taking abilities (Level I, Level II, understanding of eye gaze) and use of mental state terms. I have chosen these select few domains because young children are limited in their attention span during testing sessions. I have chosen to focus on the social understanding of toddlers rather than older children because of the likely importance of this period to later social understanding and because of the dearth of research assessing aspects of social understanding that precede development in 3- and 4-year-olds, which may contribute to a more sophisticated understanding of the representational nature of mental states.

1.3 Social Understanding: Theories of Theory of mind

There are now a range of theories that purport to account for children’s developing theory of mind from birth to the preschool period. The purpose of this section is to review some of those theories.

1.3.1 Theory-theory

Advocates of the theory-theory argue that mental state attribution proceeds via inferences that are guided by interconnected causal principles and rules (A Gopnik & Wellman, 1994; Morton, 1980; Perner, 1991). In order to predict and explain behaviour, children refer to an overarching theory which is continually revised and updated in light of new evidence. Theory-theory is likened to the modern scientific paradigm in that children continually corroborate and falsify their overarching theory based on facts derived from
experience during observations and participation in social exchanges (Popper, 1974). If the overarching theory becomes too dissonant (i.e., contains too many pieces of contradictory evidence) children may undergo a ‘paradigm shift’ during which the fundamental assumptions are revised and adjusted to allow for maximum parsimony and elegance of the overarching theory (Kuhn, 1962). A distinguishing feature of theory-theory is that children’s understanding of their own mental states and of other people’s mental states develops in unison. That is, when children attribute mental states they apply to the same overarching theory regardless of whether the target of their attribution is another person or their self. For theory-theorists, an understanding of one’s own and of other’s mental states thus develops equally as the theory becomes increasingly sophisticated.

Gopnik (1993) argued that with enough experience our inference-making becomes automatic which leads to the illusion that we are somehow perceiving others’ mental states rather than drawing upon rules and causal principles from an overarching theory. Gopnik uses the analogy of master chess players who are able to simply ‘perceive’ that their king is vulnerable without having to consciously consider the individual chess pieces and the rules that govern their movements. In the same way, during social interactions, adults automatically pick up on subtle facial expressions, behaviours and contextual clues that are used to deduce other people’s psychological states with little conscious effort. For theory theorists childhood is, thus, a time in which these basic rules are formed, amalgamated and internalised.

Josef Perner

Perhaps the most comprehensively articulated theory-theory account is that presented by Perner (1991). According to Perner, during the first year of life children possess a reality-bound “single updating model” of the world (p.45). Then around 18 to 24 months of age
children begin to be able to represent multiple models (e.g., past, future, hypothetical or pretend situations in addition to the present). This new ability allows children to advance to an understanding of psychological states as mental entities rather than mere relations between people and situations. Multiple models also allow children to comprehend psychological phenomena as subjective (e.g., that two people can want different things) and changeable (e.g., what one individual might want can change over time). Perner’s (1991) theory is best construed under the rubric of theory-theory because mental entities are described as theoretical constructs that are postulated to describe and explain behaviour. For example, empathy derives from the postulation of theoretical mental constructs ascribed to make sense of other people’s strong emotional reactions such as displayed by someone in distress.

According to Perner (1991), although 2-year-old children are able to consider secondary representations they do not yet possess a recursive understanding that they are representations. This requires the domain general ability of ‘metarepresentation’ (the ability to represent that representations are representations) which is believed to onset around a child’s fifth birthday and allows for success on the false belief task. Perner argues that metarepresentation allows for the insight that beliefs are the types of things that can be true or false and that there is a distinction between reality and people’s beliefs about reality.

1.3.2 Simulation Theory

One version of simulation theory holds that children first learn about their own mental states via a process of introspection. Then children use their own mental state experiences as a tool to come to learn about other people’s mental states by ‘putting themselves in the other person’s shoes’ (Goldman, 2006; Gordon, 1995a, 1995b, 1996; Harris, 1992, 1995). That is, children’s social development progresses from an understanding of their own mental states, to noticing similarities in others’ facial expressions and behaviour, and then finally to
understanding the mental states of others. The process of simulation relies on the assumption that most minds work in a similar way. We can thus use our own mind as a working model to decipher what others’ mental states might be. The simulation process involves inputting information about another person into our own mind (e.g., facial expressions, known mental states, behaviour, their history and current situation, etc). Once inputted, we can imagine how others feel, what they want, what they believe, or how they are likely to behave (e.g., “How would I feel if that was me?”). Thus, according to simulation theory (but not theory-theory) children’s understanding of mental states precedes from an understanding of self to other.

Robert Gordon

Gordon (1996) describes theory-theory as a ‘cold’ theory. He argues that theory-theory overvalues mechanical rational processes and holds that theory-theory is a relatively dispassionate conceptualisation of social understanding that “makes no essential use of our own capacities for emotion, motivation, and practical reasoning” (Gordon, 1996, p.11). Gordon’s version of simulation theory predominantly focuses on the process of metaphorically assuming someone else’s perspective. This is made possible by using a technique called ‘ascent routines’ which involves using the faculties of the imagination to assume the first-person psyche of another person while holding one’s own dispositions “off-line”. In other words, during simulation children cease to become themselves and instead ‘become’ the person who they are simulating. Gordon’s version of simulation theory differs to traditional accounts in that simulation does not depend on introspection and subsequent inference from one’s self to another. He argues that “once a personal transformation has taken place there is no remaining task of mentally transferring a state from one person to another”. However, critics have argued that Gordon ‘sneaks in’ introspection and inference-making during the personal transformation process and that simulation necessarily hinges upon introspection if there is no overarching theory to draw upon (Goldman, 2006).
Paul Harris

Harris’s (1992) account of simulation theory relies heavily on the assumption that children are able to introspect accurately. Harris maintains that advancements in social understanding stem from “changes in the child’s imaginative flexibility, rather than from a transformation in children’s so-called theory of mind” (Harris, 1995, p. 216). Advancements in imaginative flexibility allow children to feed in a greater number of pretend inputs to their own decision-making faculties before running the simulation process. According to Harris, children have ‘default settings’ which pertain to their own assessments of reality and to their own intentional attitude to that reality. Understanding others involves a process of temporarily altering one’s own default settings to match what the other person’s mental states should be. Harris argues that simulation theory explains egocentric projection errors. That is, even in adulthood one’s own mental states often intrude on the simulation process leading to egocentric errors in mental state attribution to others (Birch & Bloom, 2007; Van Boven, Loewenstein, & Dunning, 2005).

Alvin Goldman

Goldman (2006) also argues that simulation is the predominant method by which children ascribe mental states to others. To highlight the importance of simulation over theory-theory, Goldman appeals to cases of individuals with autism who are known to have a specific deficit in theory of mind and whose social understanding is believed to be predominantly theoretically based with very little imaginative activity. Goldman also emphasises that at the same time that we use simulation to ascribe unobservable mental states based on knowledge of someone’s situation, we also use simulation to make predictions regarding the likelihood of another person’s subsequent actions based on knowledge of their mental states.
1.3.3 **Hybrid Theories**

Theory-theory and simulation theory are not mutually exclusive and most researchers acknowledge that both techniques are as likely, or unlikely, to be employed depending on the task at hand (e.g., Perner, 1991; Harris, 1992; Goldman, 2006). Nichols and Stich (2003) outline a hybrid theory in which different levels of sophistication of mindreading draw upon different cognitive processes and methods of attribution. During the early stages of development, a module develops that allows for a rudimentary understanding of other people’s desires and intentions by drawing upon basic cues such as facial expressions, dialogue and behaviour. A second system guides a process of simulation that is used to predict how another person is likely to act given their mental states, and, adversely, what their mental states are likely to be given their actions. Nicholas and Stich argue that simulation theory falls short when trying to attribute beliefs in more complex situations and that only a hybrid theory can account for the range of sophisticated skills involved in a real world context such as when trying to ascertain what another person believes that a third person believes. They argue that that under close analysis the boundaries between theory-theory and simulation begin to blur. The theory postulated by theory-theorists must be at least partially influenced by children’s own internal experiences, and the inputs used in simulation theory are influenced by theories as to what information is relevant to input into a simulation.

1.3.4 **Modularity Theories**

Modularity theorists argue for the existence of a domain-specific innate neurocognitive mechanism that allows children to detect unobservable mental states from birth. There has been variation in the types of modules postulated. Fodor (1983) emphasises the evolutionary benefits of mindreading and proposes a theory of mind module that inputs
behaviour and outputs mental states. Baron-Cohen (1995) argues that infants are born with an Eye-Direction Detector which detects eyes, calculates a relationship between the eyes and an object of attention and computes the gazer’s perspective. Leslie (1987), (see also, Leslie, 1994; Leslie, Friedman, & German, 2004) claims that there are two neurocognitive Theory of mind Mechanisms (TOMM1 and TOMM2) that mandate construal of goal-directed behaviour, and beliefs and desires respectively. According to Leslie, these innately given mechanisms provide children with a representational system that describes intentional relations and gives children insights into mental states early in life before a child’s domain-general cognitive capacities have matured. Typically, modularity theorists will acknowledge that the attribution of theoretical constructs (i.e., theory-theory) and simulation may take place, but these processes merely build upon innately given knowledge of the representational nature of mental states.

**Neural regions**

Impairment of the theory of mind mechanism has been used as an explanation for the theory of mind deficit found in children with autism (Baron-Cohen, 1995; Leslie, 1991, 1992), and neuroimaging studies have been used as evidence that specific neural structures are ‘dedicated’ to theory of mind (Frith & Frith, 2003; Gallagher & Frith, 2003). However, the specific neural regions proposed are being challenged (Apperly, Samson, Claudia, & Glyn, 2004) and broader assessment of neuroimaging studies suggests that different areas of the brain are considered responsible for different aspects of social understanding (Saxe & Powell, 2006) which does not reconcile with the proposed specificity of most theory of mind mechanisms. Furthermore, even if a specific area of the brain was identified as specific and exclusive to processing mental phenomena, this does not necessarily imply that it was this way from birth. That is, many brain regions become specified over time by virtue of experience (e.g., Gauthier & Curby, 2005).
Several commentators (Leslie, 2004, 2005; Caron, 2009; Bloom & German, 2000) argue that infants’ performance on tasks that use non-verbal measures such as looking time (Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2007; Surian, Caldi, & Sperber, 2007) provide evidence of mental state understanding in children as young as 9 months old and that the increasing number of such findings bolsters the hypothesis that children are born with an innate theory of mind mechanism (see Caron, 2009 for an overview). However, as mentioned above, there is some debate in the literature as to whether these looking-time tasks actually reveal mental state understanding or an understanding of behaviour (Perner & Ruffman, 2005). Furthermore, success by 9 months of age still leaves plenty of time for learning to occur.

*The ‘fundamental problem’*

Consistent with the philosophical principles of verificationism (Ayer, 1936), advocates of an innate neurocognitive mechanism have argued that children *could not possibly* form a concept of something that cannot be directly perceived (i.e., internal states), and therefore children’s early conception of mental states *must* be innately specified. They argue that it is difficult to conceive of how young children, who are limited in their cognitive capacity, might detect, comprehend and *learn about* the existence of something that is completely unobservable (Leslie, 1987; Leslie, et al., 2004). This a priori argument has come to be known as the ‘fundamental problem’ for learning theorists and is articulated by Leslie (1987) in the following passage:

“It is hard to see how perceptual evidence could ever force an adult, let alone a young child, to invent the idea of unobservable mental states. Nor is it clear how language learning could lead to such a concept
because the meaning of relevant linguistic expressions could not be grasped without first understanding the concept.” (Leslie, 1987, p. 422)

The subsequent challenge for learning theorists has been to address the fundamental problem by demonstrating that the invisibility of mental states does not preclude the possibility that they are learnt during the first few years of life. To this end, recent attempts have been made to provide specific developmental trajectories of how mental states might develop in ontogeny (e.g., Taumoepeau & Ruffman, 2006, 2008). These theories will be reviewed in the subsequent chapter.

1.4 Chapter Summary

‘Social understanding’ refers to children’s skill at making sense of the social world, an integral part of which includes the ability to attribute mental states or behaviours differentially to self and other. Separate investigations have been made into children’s understanding of belief, desire, intentions, emotions, perspectives and use of mental state terms. Although the majority of these assessments have been concerned with the age at which children gain rich insights into the subjective nature of mental phenomena (e.g., the false belief task), more contemporary studies have attempted to discern how children’s social understanding might develop gradually in a piecemeal fashion during the first few years of life. There is now a range of theories that purport to account for children’s developing theory of mind from birth to the preschool period (e.g., theory-theory, simulation theory, modular theory). These theories are diverse but are typically not mutually exclusive. A key question in the developmental literature regards whether it is possible for children to learn basic mental
state concepts during the first few years of life, or whether children’s basic conception of mental states must be innately specified. This question is addressed further in Chapter 2 from a social constructivist point of view.
Chapter 2

Understanding the Social Construction of Social Understanding

Before concluding that learning about mental states is “too hard” for young children (i.e., the fundamental problem), social constructivists hold that we should first examine the environment within which children develop to see whether children’s experience of the world coupled with their communicative interactions with others can shed light on how they might learn about mental states in ontogeny. The aim of this chapter is to review research that has focused on the social and environmental factors that are related to children’s developing social understanding. I will emphasise the importance of mother-child conversations to children’s social understanding and, drawing upon the relevant research, propose a specific trajectory of how children’s basic understanding of unobservable mental states develops gradually during the first few years of life. Children do not develop in a vacuum and I argue that individualistic assessments of children’s performance on objective tasks are likely to provide an incomplete account of how children come to learn about the world of minds.

2.1 Social Construction

There is debate regarding the development of children’s social understanding with regard to the relative influence of social and individualistic processes (Carpendale & Lewis, 2004). More specifically, the point of contention is whether investigations of social understanding should start with the individual child, or start with the broader influence of the social group of which the child is a member. A typical individualistic theory might construe a child as a little rational empiricist who continually processes incoming data from the social world to derive a theory that they use to make sense of human social interactions. By this
account, children construct a theory about the social world and then apply that theory when observing or partaking in social interactions.

In contrast, the social constructivist stance is that children’s interactions within their social environment are an integral part of their constructing knowledge about the social world. Children actively participate in conversations and activities which are governed by the norms and values of the society within which they are raised. By the social constructivist account, children engage in conversations during which they acquire information regarding the social world as well as processes of thinking with which to make subsequent advancements in their social understanding (Vygotsky, 1978). So the question becomes, to what degree does the environment that a child grows up in affect their developing social understanding?

2.2 Evidence for Social Construction

Hughes et al. (2005) conducted a longitudinal study on 1,116 60-month-old twin pairs who completed a comprehensive battery of theory-of-mind tasks. Using path analysis, it was found that 85% of the variance in children’s theory of mind performance was explained by environmental rather than genetic factors and that any genetic contribution to children’s developing theory of mind was largely mediated through domain-general abilities such as language. This finding is consistent with the social constructivist notion that social understanding is heavily influenced by the environment within which children develop, but is more difficult to reconcile with the idea that children’s social understanding is genetically determined and expressed via an innately given neuro-cognitive mechanism. Furthermore, the nature of the social interaction children experience is closely related to the development of their social understanding (Carpendale & Lewis, 2004). Children who are more securely
attached to their mothers (Symons & Clarke, 2000), who have older siblings (Ruffman, Perner, Naito, Parkin, & Clements, 1998), whose parents use a warmer and more responsive parenting style (Symons & Clarke, 2000) and live in favourable socioeconomic circumstances (Cutting & Dunn, 1999), tend to demonstrate greater social understanding as measured by false belief and emotion understanding tasks.

2.3 Socioeconomic Status and Children’s Social Understanding

There is evidence that the social and economic environment in which children are raised is related to their developing social understanding (Cutting & Dunn, 1999). Research on social understanding has predominantly focused on children from middle-class western families of European ethnicity (Doherty, 2009) and to the best of my knowledge there is currently no large scale meta-analysis assessing the overall effect of socioeconomic factors on social understanding. There is, however, reason for believing that socioeconomic status may play an important role in children’s social development. Cutting and Dunn (1999) directly compared the performance of children from working-class versus middle-class families on a battery of false belief and emotion understanding tasks and found that children from working-class families performed significantly worse on most measures. Similarly, Holmes et al. (1996) included only children from a low socioeconomic background in their large scale study and found that the children in their sample did not pass the false belief task until approximately 5 years of age (i.e., one year later than the passing age found in traditional theory of mind research).

Researchers who have assessed the relation between children’s socioeconomic environment and social understanding tend to argue that this relation is highly likely to be mediated by children’s general language abilities which is a known correlate of socioeconomic status (Cutting and Dunn, 1999; Hughes et al., 2005) and social understanding
(see section 1.3). Alternatively, it has been proposed that the content and quality of *parent-child conversations* may differ across social class and that the quality and form of conversations between children and parents, rather than socioeconomic status, is the major cause of differences in children’s social understanding (Hughes, 2005). In the following two sections, I assess these two environmental factors separately (children’s general language and parent-child conversations) to assess how they might influence children’s social understanding.

### 2.4 Children’s General Language and Social Understanding

de Rosnay and Hughes (2006) argue that research on social understanding should include both assessments of children’s comprehension of self and other as psychological agents, and identification of the underlying cognitive development that allows for advancements in understanding. Social understanding does not develop in isolation and it is important to determine how other aspects of children’s cognitive development might affect and mediate children’s understanding of the social world. In this section, I assess a domain of cognition that is closely related to children’s social understanding, namely, their general language.

Numerous studies have shown that children’s general language development is related to the social understanding of both typically developing children (see Milligan, et al., 2007 for an overview), and in clinical samples such as children with autism (Happé, 1995; Tager-Flusberg & Joseph, 2005) and deaf children (Peterson & Siegal, 1999). Associations between children’s general language and social understanding have been found to be bi-directional but with a stronger effect of children’s early language on their later social understanding (Milligan et al., 2007). Some argue that the observed relation between language and social
understanding is merely due to the fact that social understanding tasks are nothing more than verbal tasks that reveal a theory of mind that has been present since birth, or that the domain-general cognitive abilities needed to pass social understanding tasks require language for their explicit realisation (e.g., Bloom & German, 2000). Alternatively, it has been proposed that children’s general language is related to social understanding because both derive from domain-general abilities such as statistical learning (Ruffman et al., in press).

Social constructivists argue that children’s general language abilities are important for their social understanding because they allow them to engage in conversations during which they can discuss and receive information regarding the social world. Harris (2005) argues that developing language abilities allow children to engage in conversations with others during which they are exposed to differing points of view and opinions. For Nelson (2005), language allows children to become ‘members’ of a “community of minds” in which communally shared beliefs about human psychology are negotiated and internalised during social experiences, conversations and stories. Vygotsky (1978) argued that children’s language allows them to engage in “inner speech” which they use to help regulate their own behaviour and make sense of the world around them. Children acquire language during conversations with others and at the same time internalise the norms, values, and processes of thinking of the society and culture to which they are born. As children gain more language they become less reliant on their caregiver and more autonomous, relying on their own inner speech to make sense of the world around them.

By this social constructivist account, one reason why children’s general language is important for their social understanding is because it allows them to engage in conversations with other members of their social community. The question thus becomes, why are conversations with others so important for children’s social understanding?
2.5 Maternal Mental State Talk and Children’s Social Understanding

Researchers have focused on how the quantity, quality and type of conversations that children have with peers (J. Brown, Donelan-McCall, & Dunn, 1996; Hughes & Dunn, 1998), siblings (J. Brown, et al., 1996; Randell & Peterson, 2009; Youngblade & Dunn, 1995) and parents (Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; Symons, Peterson, Slaughter, Roche, & Doyle, 2005) are related to children’s developing social understanding. Given that in western societies mothers are often children’s primary caregivers, much of the research has focused on mother-child conversations (Dunn, Brown, & Beardsall, 1991; Ensor & Hughes, 2008; Slaughter, Peterson, & Mackintosh, 2007; Taumoepeau & Ruffman, 2006, 2008). There is now mounting evidence that mothers’ tendency to comment on people’s mental states, as opposed to their physical and behavioural characteristics, during mother-child conversations is positively related to children’s performance on social understanding tasks (Adrián, Clemente, & Villanueva, 2007; Adrián, Clemente, Villanueva, & Rieffe, 2005; de Rosnay, Pons, Harris, & Morrell, 2004; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Ensor & Hughes, 2008; Meins, et al., 2002; Peterson & Slaughter, 2003; Ruffman, Slade, & Crowe, 2002b; Slaughter, et al., 2007; Taumoepeau & Ruffman, 2006, 2008) and acquisition of mental state terms (Booth, Hall, Robison, & Kim, 1997; Furrow, Moore, Davidge, & Chiasson, 1992; Howard, et al., 2008; Symons, et al., 2005; Taumoepeau & Ruffman, 2006, 2008).

2.5.1 The Issue of Causality

The majority of studies investigating the relation between maternal mental state language and children’s social understanding have been cross-sectional and have assumed that the relationship between these two variables is causal, with increases in mothers’ mental
state language causing better social understanding. However, a significant correlation by itself does not imply causality, nor does it provide any information about the direction of the causality. That is, it could be the case that children with superior social understanding behave in a manner that causes their mothers to talk more about mental states.

To help adjudicate this issue, Ruffman, Slade and Crowe (2002) conducted a longitudinal study and used a cross-lagged style of analysis that allows for stronger inferences of causality. They measured maternal talk and 3- to 5-year-old children’s theory of mind at three time points over one year. An analysis across the first two time points revealed that Time 1 maternal mental state utterances predicted Time 2 theory of mind performance, after partialing out Time 1 theory of mind performance. This predictive relationship held true even when controlling for a comprehensive number of potentially mediating variables including children’s own use of mental state language, their general language ability, their age, mothers’ education, and mothers’ use of non-mental state utterances. Furthermore, the reverse relation (i.e., Time 1 theory of mind performance and Time 2 mothers’ mental state utterances) was not significant suggesting that maternal mental state utterances cause improvements in children’s social understanding but not vice versa. Ruffman et al. concluded that mothers’ propensity to talk about mental states during mother-child conversations is related to children’s social understanding and that there is evidence to suggest that this relationship is both causal and unidirectional, a finding corroborated by subsequent research (e.g., Taumoepeau & Ruffman, 2006, 2008). However, exactly how maternal talk helps remained unclear.
2.5.2 How Maternal Talk Helps

Studies that have sought to identify the specific link between certain aspects of mother-child conversations and children’s social understanding vary substantially both in their proposed causal mechanisms and the sampling of such discourse. Denham et al. (1994) focused predominantly on mothers’ discourse about emotions and argued that it is not mothers’ simple references to mental states (e.g., ‘He is sad’) but rather mental state references that explain the origins and consequences of mental states (e.g., ‘He is sad because he has scraped his knee’) that help children to identify and understand the existence of the internal states that underpin human behavior. A separate line of research focuses on the appropriateness of mothers’ mental state discourse. Meins et al. (2002) argued that only mothers’ appropriate/accurate identification of mental states during interactions with their child will facilitate children’s ability to connect internal states with their mothers’ mental state discourse because only such talk will be relevant to the child. Taumoepeau and Ruffman (2006, 2008) argue that specific types of maternal discourse will be more or less helpful for children’s social understanding depending on the age of the child. Further, they argue that to properly understand the relation between maternal discourse and social understanding maternal discourse must be broken down into subcategories depending on the content and referent of maternal utterances.

2.5.3 The Content of Mother Language

Again, social constructivists argue that mental state understanding is not too difficult for children to learn if it is broken down into small manageable pieces. Although maternal mental state talk is a consistent predictor of children’s later social understanding, studies that have compared the relative importance of different types of mental state talk have yielded
differing results depending on the ages of the children tested. The one study focusing on 15-month-old children found that maternal talk about *desires* (but not cognitions or emotions) at 15 months was significantly related to children’s later social understanding (Taumoepeau & Ruffman, 2006). Studies focusing on 24-month-old children have yielded conflicting results as to whether maternal talk about desires (Symons, Fossum, & Collins, 2006), cognitions (Ensor & Hughes, 2008), or both (Taumoepeau & Ruffman, 2008) are important, whereas studies focusing on children older than 2 years have tended to find that mothers’ references to *cognitive* states rather than desires are most strongly related to children’s social understanding (Adrián, et al., 2007; Adrián, et al., 2005; Slaughter et al., 2007). Taken collectively, these studies suggest that around the end of the second year of life there is a shift in importance from maternal talk about desires to talk about cognitions with regard to their child’s social understanding.

### 2.5.4 The Zone of Proximal Development

The idea that different types of maternal mental state talk are more or less important for children’s social development over the course of their development fits within Vygotsky’s (1978) framework for a *zone of proximal development* (Adrián, et al., 2007; Meins, 1999; Symons et al., 2006; Taumoepeau & Ruffman, 2006, 2008). Vygotsky argued that information that is pitched slightly beyond a child’s current level of understanding (as opposed to information that is either too simple or too advanced) will be most likely to facilitate advancements in children’s learning, a principle ubiquitous in the field of education (e.g., Wells, 1999). Thus, knowledge of a child’s current level of ability can be used to determine which specific type of input is most likely to facilitate subsequent advancements in learning, and, adversely, knowledge of the type of input that is currently facilitating a child’s
learning can be used to gauge his or her current level of ability and may provide clues into the manner in which they are learning.

This principle of the zone of proximal development implies that the type of maternal narrative input that is most helpful for children’s social understanding will change as children advance to more sophisticated levels of comprehension. Maternal talk about desires is likely to be most beneficial initially because children seem to develop an understanding of desires before cognitions (Wellman & Liu, 2004; Wellman & Woolley, 1990) (see section 1.2.1), and because a child’s desires are likely to initially be very salient with the child operating in ways to satisfy those desires. For these reasons, maternal talk about desires might build on children’s incomplete but developing understanding of mental states, whereas cognitive talk would be more helpful for slightly older children who have a relatively good understanding of desires and are learning more about cognitions (Taumoepeau & Ruffman, 2006, 2008).

2.5.5 The Referent of Mother Language

Maternal talk can also differ in terms of the referent, that is, whether a mother talks about the child’s, her own, or other people’s mental states. For very young children (i.e., 24 months and less), mother references to her child’s mental states correlate with later social understanding (Meins, et al., 2002; Symons, et al., 2006), and when talk about the child’s desires and talk about others’ desires has been explicitly compared, only talk about the child’s desires has been related to later social understanding (Taumoepeau & Ruffman, 2006). In contrast, for slightly older children, maternal talk about her own and other people’s mental states, and in particular the mother’s cognitions, is important for later gains in social understanding (Taumoepeau & Ruffman, 2008).
Taumoepeau and Ruffman (2006, 2008) argued that this pattern of results provides evidence that children’s understanding progresses from an understanding of their own mental states to an understanding that includes others’ mental states. During the early stages of development, a mother’s references to her child’s mental states will help the child connect her own salient internal experiences to mental state terms, whereas talk about others’ mental states might only help the child connect behavioural expressions to mental state terms, given that children do not have direct access to others’ internal experiences. Once children have a basic understanding of mental states based on their own internal experiences during the early stages of development, they can then use that knowledge to begin to understand the mental states of other people via a process of simulation (see section 1.42) and maternal talk about other people’s mental states will become increasingly important.

2.5.6 Current versus Conversational Desire Language

Taumoepeau and Ruffman’s (2006) aforementioned theory states that during the early stages of development, maternal talk about children’s desires may help children to connect their own internal experience of desire to their mother’s mental state term (e.g., “want”). Here I build upon this theory by proposing that maternal desire talk that accurately reflects their children’s current state of desire may be particularly helpful for children to connect their internal experiences with their mother’s desire utterances.

Previous research has suggested that, during the early stages of development, only maternal mental state talk that accurately reflects the child’s psychological state is associated with advancements in social understanding (Meins, et al., 2002; Symons, et al., 2006). Crucially, however, such talk might be particularly helpful when it is congruent with the child’s presently experienced mental state because the child will have an immediate internal
experience that corresponds to the mental state term. Mothers’ references to their children’s currently experienced mental states (e.g., desires) will be most helpful because these relatively salient experiences (e.g., of wanting) provide immediate feedback as to what a term (e.g., ‘want’) means. In contrast, mental state utterances that are used to soften instructions or requests such as admonitions to behave (e.g., “Do you want to be quiet please?”), might be less helpful because they do not necessarily match the child’s psychological state at the time that the utterance is spoken.

Consider, for example, a child who is desperately reaching toward a toy that is just out of reach. A mother who describes their child’s current state of desire (“You want the toy”) at the same time that the child is reaching will provide the child with an opportunity to match their presently experienced state of desire to their mother’s mental state term (i.e., “want”). On the other hand, consider a situation in which a mother is attempting to tell a child to pick up toys that are strewn across the lounge floor. If a mother instructs her child to tidy the room using a desire term to soften the instruction (e.g., Do you want to tidy the room?) it is less likely that the mother’s mental state term will match the child’s internal experience and therefore the child will not have the opportunity to associate the mental state term (e.g., “want”) with an internal experience (e.g., of wanting). To capture this contrast, below I refer to maternal talk about the child’s current mental states (i.e., mother references that pertain to a child’s presently experienced internal experience) versus conversational uses of mental state terms (e.g., maternal mental state utterance used to soften instructions or direct behaviour, (Bartsch & Wellman, 1995).
2.6 Chapter Summary

There is now compelling evidence that the majority of variation in children’s social understanding is explained by environmental rather than genetic factors. Maternal mental state language is related to gains in children’s social understanding. Results from longitudinal studies suggest that this relation is both causal and uni-directional. Around a child’s second birthday there is a shift in importance from maternal talk about the child’s desires to maternal talk about her own cognitions, which may reflect underlying advancements in children’s social understanding. Working from within a Vygotskyian social constructivist framework, Taumoepeau and Ruffman (2008) argued that mothers’ use of mental state language spoken during mother-child conversations facilitates children’s conception of basic mental state concepts, but that only maternal mental state language that is pitched at an appropriate level relative to the child’s current level of comprehension will facilitate subsequent advancements in learning. I advance this theory by proposing that, during the early stages of development, maternal mental state language spoken at the same time that the child is experiencing that mental state may be particularly helpful for the child’s acquisition of mental state concepts because it helps the child to identify and label their own internal states.

In this chapter I have considered how maternal input might facilitate children’s developing social understanding. Of note, most of the work derived from the social constructivist literature has investigated mother-child interactions by looking at how maternal language affects children’s social understanding. In the next chapter I consider how underlying advancements in children’s cognitive development influence the extent to which children benefit from maternal talk. I have already identified children’s general language as a cognitive development that moderates the degree to which the child benefits from conversations about mental states with others. If children have better language they are more able to engage in conversations and therefore learn about the social world from others. But
children bring more to the mother-child dyad than just their general language. In Chapter 3, I will argue that children’s self-concept also influences the extent to which they benefit from maternal talk. More specifically, I will argue that whether a young child benefits from talk about their own or another person’s mental states will depend on their underlying understanding of the distinction between self and other.
Chapter 3  ‘Me’, ‘My’, ‘Mine’: The Role of the Self-Concept

3.1  The Self-Concept

Like many constructs in psychology the ‘self’ is elusive in that everyone seems to know what it is, yet it is so very difficult to define. Lewis and Brooks-Gunn (1979) described self “as an experimental ghost haunting social science” (p.216) and Epstein has described it as “a slippery concept whose adequate definition is irritationally illusive” (1973, p.404). The literature on self-concept can be roughly divided into categories of self-identity and self-awareness (Marsh, 1990). Self-identity refers to people’s perception of their self as related to characteristics such as age, race, gender, academic achievement and social status (Crain, 1996; Marsh, 2011; Stipek & MacIver, 1989). Studies on self-identity tend to focus on school-aged children, adolescents and adults, but has less relevance to the preschool period and is therefore beyond the scope of this thesis.

Self-awareness on the other hand is a more rudimentary aspect of self-concept, is highly relevant to the preschool period, and can be thought of as preceding self-identity. That is, to attribute characteristics of identity to their self, children must possess a basic understanding that they are a similar but separate entity to other people so that they have a ‘vessel’ to which they can attribute their distinguishing qualities (Marsh, 1990). This basic insight is believed to develop during the end of the second year of life (Brooks-Gunn & Lewis, 1984) that is, at approximately the same time that there is a shift in the type of maternal mental state language that is helpful, from talk about the child to talk about others’ mental states. Hereafter, when I refer to self-concept, I will be meaning self-awareness.

Mead (1934) argued that the self is best construed as negatively defined such that an individual’s self-concept emerges from others’ behaviour and action toward the subject. In
contrast, Epstein (1973) argued that that the self is constructed by the individual themselves and consists of all of the attitudes, feelings and cognitions of the subject. For Brooks-Gunn and Lewis (1984), “the self is derived from knowledge of both self and other, with each developing through interaction with the social world” (p.216). That is, rather than thinking of self and other as separate insights, one should acknowledge the reciprocal relation between knowledge about self and other, and think instead of the ‘self-other’ distinction as a unified self-concept.

Several studies have attempted to identify the sequence in which specific self-concept components emerge during the first few years of life (M Lewis & Brooks-Gunn, 1979; Pipp, Fischer, & Jennings, 1987; Stipek, Gralinski, & Kopp, 1990). Children as young as 3 months can detect contingencies between their body and their reflection (Bahrick & Watson, 1985) and by 12 months are sensitive to information regarding their physical location in space relative to their surrounding environment (D. Lee & Aronson, 1974). Neisser (1988) and Stern (1985) argued that nascent forms of self, such as self as a separate entity from other, begin to emerge during the beginning of the second year of life and prepare children for what Lewis and Brooks-Gunn (1979) and Moore (2007) refer to as a categorical self, which emerges late during the end of the second year of life. According to Lewis and Brooks-Gunn, the categorical self is analogous to what James (James, 1890) called “me” or “self as object” and is particularly psychologically interesting because it is a form of self-awareness that is both cognitive as well as reflexive (“I am aware of myself as a self”) and develops simultaneously to understanding other as “I” or “other as agent” which entails an understanding of other people as subjective agents.

Lewis and Brooks-Gunn (1979, 1984) argue that anecdotal forms of self-concept emerge as early as the first year of life. There are two indices of infants’ self-concept that designate when a child has an explicit understanding of self-other understanding as an entity
that persists through time and space: Visual self-recognition (e.g., mirror self-recognition) and self-referential language (e.g., first-person pronouns).

3.1.1 Mirror Self-Recognition

One measure of children’s early self-understanding is the mirror self-recognition task in which a mark is surreptitiously placed on a child’s face, and the measure is whether children reach to the mark on their own face when they see their image in the mirror. Although success on the mirror self-recognition task has been subject to both ‘rich’ (M Lewis & Brooks-Gunn, 1979) and ‘lean’ (e.g., Loveland, 1992) interpretations regarding the sophistication of the underlying self-concept employed, recent research provides compelling evidence that, at the very least, success on the mirror task indicates that children recognise their own physical appearance (Nielsen, Suddendorf, & Slaughter, 2006) and may carry a mental model of their physical self which they compare with the image in the mirror in order to recognise the mark on their face as a foreign body.

Increased exposure to mirrors during infancy does not result in earlier mirror self-recognition which is consistent with the idea that mirror self-recognition is indicative of genuine insight into the self as opposed to knowledge about reflective surfaces (Priel & de Schonen, 1986) and success on the mirror self-recognition task has been found to be a prerequisite for a wide range of other indices of self-other awareness including self-conscious emotions such as pride (Geppert & Kuster, 1983), embarrassment (M Lewis, Sullivan, Stanger, & Weiss, 1989) and empathy (Bischof-Kohler, 1994; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992), as well as children’s ability to engage in contingent social interactions (Asendorpf, Warkentin, & Baudonnière, 1996) and their general physical self-awareness (Moore, et al., 2007). Perner (1991) argues that children’s success on the mirror
self-recognition task and their understanding of other people as subjective psychological agents both rely on the common capacity to represent multiple models because they rely on the simultaneous comparison of both directly perceived and abstract constructs.

**Mirror self-recognition and simulation**

As discussed above, simulation theory states that children’s social development progresses from an understanding of their own mental states, to noticing similarities in others’ facial expressions and behaviour, and then finally to understanding the mental states of others. This simulation of mental states from *self* to *other* clearly relies on an understanding of the distinction between self and other in order to understand the terminus (self) and destination (other) of the mental state that is being projected. In order to compare one’s own and others’ facial expressions and behaviour, a child must have at least some conception of self as a similar but separate physical entity to other people, more specifically, the simulation process will be facilitated if the child carries a mental model of their own physical appearance to draw upon for comparison with others during the simulation process.

3.1.2 **First Person Pronouns: ‘Mine!’**

Another early component of self-other representation is children’s use of personal pronouns (Meissner, 2008). Unlike proper names such as ‘James’ and ‘Bill’, personal pronouns shift referent depending on who is speaking and who is the addressee. For instance, whereas ‘James’ will always refer to James regardless of who uses the term, ‘mine’ could refer to different persons depending on who uses the term, requiring children to understand that the designated referent depends on the *perspective* of the speaker and this requires knowledge that others’ points of view can differ from one’s own (Riccard, Girouard, & Decarie, 1999). Consistent with this theory, children’s pronoun use has been found to be closely related to their development of visual perspective-taking abilities (Ricard, Girouard,
and some evidence suggests that children’s understanding of any given pronoun differs depending on the role that they take in the conversation (speaker, addressee, non-addressed third person (Charney, 1980)).

‘Mine’ is typically the first pronoun used by children (Bretherton, McNew, & Beeghly, 1991; Dale & Fenson, 1996) and is believed to signal early advancements in their understanding of self and other (Hay, 2006; Levine, 1983; M Lewis & Brooks-Gunn, 1979). For example, Hay (2006) found that toddlers who were using the term ‘mine’, were more likely than other children to demonstrate an understanding of their peers’ intentions and desires and to understand the concept of ‘possession’ which arguably requires some comprehension of the distinction between self and other.

Thus, children’s mirror self-recognition and use of the term ‘mine’ are considered two of the earliest signs of children’s rudimentary self-other understanding. Furthermore, these two insights tend to develop within close proximity (Lewis & Ramsay, 2004) with mirror self-recognition often immediately preceding children’s use of ‘mine’ (Bertenthal & Fischer, 1978; Courage, Edison, & Howe, 2004; Stipek et al., 1990), and ‘mine’ and mirror recognition are sometimes used in tandem as measures of children’s self-understanding (Stipek, et al., 1990). In light of these findings, in this thesis I designate children’s mirror self-recognition and use of the term ‘mine’ as markers of children’s ‘basic self-concept’, before which, children can be considered to have a poor self-concept.

3.1.3 Second Person Pronouns: A Self-Concept in Transition

Evidence suggests that insight into the self-other distinction grows gradually (Bertenthal & Fischer, 1978; Stipek, et al., 1990) and is marked by a number of
achievements, including mirror self-recognition and acquisition of ‘mine’, but also understanding of other pronouns such as second-person (e.g., “you”) pronouns. It is a well-established finding that first-person pronouns are typically mastered by children before second-person pronouns (Charney, 1980; Chiat, 1986) and cross-cultural research suggests that this pattern of acquisition holds true across different languages that contain a pronominal system, including English (Chiat, 1986; Riccard, et al., 1999), German (Deutsch & Pechmann, 1978), Hebrew (Rom & Dgani, 1985), and French (Plaza & Le Normand, 1996; Riccard, et al., 1999). It has been proposed that the lag between children’s acquisition of first- and second-person pronouns represents a period of development during which children develop finer perspective-taking skills and a firmer understanding of the distinction between self and other (Clark, 1978; Hobson, 1993; Ricard, et al., 1999).

Second-person pronouns are more likely than first-person pronouns to be incorrectly produced (Dale & Crain-Thoreson, 1993) and some researchers (e.g., Clark, 1978) have argued that the added challenge of learning second-person pronouns is that, in contrast to first-person pronouns that always refer to whomever is speaking, a term such as ‘you’ can be used to refer to multiple addressees by the same speaker even within the same sentence as demonstrated in the following hypothetical example:

“You come here, you go away and you go wait in the car”

Specifying exactly who is being referred to in this example would require specific knowledge of subtle cues (e.g., pointing, head direction and eye gaze) regarding the speaker’s perspective which might create an extra challenge for a child who is attempting to ascertain the meaning of a term such as ‘you’. Furthermore, a child needs to learn to omit such cues when using second-person pronouns in order to be understood by other people.
Evidence that children’s mastery of first- and second-person pronouns is related to their self-concept can also be found in studies of atypical development. Children with autism (Tager-Flusberg, 1993) and congenitally blind children (R. Brown, Hobson, & Lee, 1997; Gense & Gense, 1994) who are known to have a deficit in self-other understanding and perspective-taking abilities, frequently make reversal errors (denoting self with ‘you’ and other with ‘I’) which has been attributed to a deficient sense of self and others as opposed to impairment in domain-general abilities (Hobson, 1993; A. Lee & Hobson, 1994; Tager-Flusberg, 1993). In the previous section (3.3.2), I designated children’s mirror self-recognition and use of the term ‘mine’ as two markers of children’s basic self-concept. In light of the findings presented in this section, I identify a second (transitional) period of self-other understanding during which children’s basic self-concept is present but not yet firmly in place. This period of development is marked by children’s use of first-person pronouns but an absence of second-person pronouns.

Social Understanding and the role of the self-concept

Drawing upon the relevant empirical literature, Moore (2007) argues that children do not demonstrate an understanding of self as an objective physical entity until during the end of the second year of life. With this development, a child’s physical self can become an object of their own thought and therefore children can begin to explicitly represent their objective self in relation to other people. Moore argues that this in turn facilitates children’s insight that they themselves can be the subject of other people’s intentional relations and that other people have internal subjective experiences. Consistent with this theory, findings from behavioural (e.g., Pipp, et al., 1987) and neurocognitive (Decety & Jackson, 2006) studies suggest that an understanding of self as an objective entity and of other people as subjective first-person agents develop in unison during the second year of life and are inseparably interconnected. Moore argues that in a triad (e.g., mother, child and third person), children are
unlikely to benefit from talk about the mental states of persons other than themselves (i.e., about the mother or the third person) until they have acquired a self-concept because they do not yet construe other people as subjective agents who possess internal states. For this, children require self-other understanding so that they can draw parity between their own qualitative states and the internal states of other people.

3.2 Maternal language, Children’s Social Understanding and Children’s Self-Concept as a Zone of Proximal Development

I argue that children’s self-concept designates a zone of proximal development such that it dictates how receptive children will be to talk about their own versus their mothers’ mental states. That is, whether a mother’s mental state language is pitched at a level that is challenging but not too difficult for children to comprehend (i.e., is pitched within the child’s zone of proximal development) will depend on whether the child has made certain insights regarding the distinction between self and other.

Children who lack a basic self-concept

In line with the zone of proximal development, I argue that children without a basic self-concept might benefit more from talk about their own as opposed to someone else’s mental states. That is, maternal talk about the child’s own desires (e.g., “You want food”) will be more easily understood by the child because what is likely to be salient to a young child is his or her internal state (e.g., of wanting) and this state will correspond to the mental state term. If mother talks, instead, about another person (e.g., “He wants food”), but the child doesn’t have a basic distinction of self and other (i.e., does not understand terms such as “he” or “she” and understand that self and other are distinct entities who might experience
different mental states), the child might become confused if s/he doesn’t want food. That is, initially talk about the child’s mental states will lie within the child’s zone of proximal development because the child is still learning about their own mental states and is still learning about the distinction between self and other. During this early stage talk about other people’s mental states is too advanced and therefore not helpful for a child who does not yet possess the necessary insights to benefit from such talk.

*Children whose basic self-concept is present but still in transition*

Research suggests that children’s insight into the self-other distinction grows gradually (Bertenthal & Fischer, 1978; Stipek, et al., 1990). Once children have acquired a basic distinction between self and other, maternal talk about the child’s desires may no longer provide the optimal level of stimulation. Rather, during the period during which a child’s basic self-concept is still in transition but not yet firmly in place maternal talk about her own mental states and especially her own cognitions (e.g., “I think that it’s a frog”) may incrementally build upon what a child already knows by providing the child with an early opportunity to consider the distinct mental states of another person during a safe and simple one-to-one dyad. This in turn could prepare the child for slightly more challenging situations during which they must negotiate three or more perspectives such as dyads involving third and fourth persons. That is, maternal talk about her own thoughts and knowledge might be particularly helpful for a child who is still learning about the distinction between self and other but who is not yet ready to understand the mental states of a third person because it is then pitched within their zone of proximal development.
3.3 Section Summary

There are reasons for thinking that children’s self-concept plays an important role in children’s social understanding and moderates the degree to which children benefit from maternal talk about her child’s versus the mother’s own mental states. Children’s mirror self-recognition and use of the term ‘mine’ are considered two of the earliest signs of their rudimentary self-other understanding before which children can be considered to lack a basic self-concept. I propose that maternal talk about the child’s desires (and especially the child’s current desires) will be the specific type of mental state talk most helpful for children who lack a basic self-concept. I also propose that the period of development during which children demonstrate basic self-knowledge but do not yet use second-person pronouns may represent a period of development during which their self-other distinction is present but still in transition. I propose that maternal talk about her own thoughts and knowledge will be the specific type of mental state talk that is most helpful for children whose self-concept is still in transition but not yet firmly in place. The role that the self-concept plays in moderating the relation between maternal language and children’s understanding of mental states has been discussed speculatively in previous literature (Huttenlocher & Smiley, 1990; Moore, 2007; Taumoepeau & Ruffman, 2006), but the present study is the first to empirically assess the relation between maternal mental state talk, children’s social understanding and children’s self-other concept.
3.4 Aims and Hypotheses

To reiterate, drawing upon findings from their own and others’ research, Taumoepeau and Ruffman (2006, 2008) argued that around the end of the second year of life there is a shift in the specific type of maternal talk that is associated with gains in children’s social understanding, from talk about the child’s desires to talk about the mother’s own thoughts and knowledge (Figure 4).

![Timeline](image)

*Figure 4.* Taumoepeau and Ruffman (2006, 2008) argued that around the end of the second year of life there is a shift in the specific type of maternal talk that is related to gains in children’s social understanding.

In my study I advance this theory in two ways. First I propose that during the early stages of development, maternal desire talk that accurately reflects their children’s *current* state of desire may be particularly helpful for children to connect their internal experiences with their mothers’ desire utterances (Figure 5).
Second, I argue that it is children’s self-concept rather than their age per se that moderates the extent to which children benefit from maternal talk about the child’s desires versus the mother’s thoughts and knowledge (Figure 6).

*Figure 5.* I argue that mother talk that is specifically about the child’s *current* desires will facilitate children’s social understanding during the early stages of development.

*Figure 6.* I argue that it is children’s self-concept that moderates the degree to which children benefit from maternal talk about the child’s versus the mother’s mental states rather than age per se.
More specifically I propose a two-step process for children’s acquisition of mental state concepts in which, first, maternal talk about children’s current desires will provide the optimal level of stimulation for children who lack a basic self-concept (i.e., such talk will be particularly important when it matches the child’s presently experienced state of desire) because the child will have an internal experience to correspond to their mother’s mental state term. Second, talk about mothers’ own cognitions may be more appropriately pitched when spoken to children whose basic self-concept is present (though still in transition). Such talk may incrementally build upon what a child already knows by providing the child with an early opportunity to engage in simulation and consider the distinct mental states of another person during a simple one-to-one dyad.

Replication

One aim of my study was to attempt to replicate Taumoepeau and Ruffman’s (2006, 2008) finding that the specific type of maternal mental state talk that is most helpful for children’s developing social understanding differs depending on the age of the child. More specifically, Taumoepeau and Ruffman argued that maternal talk about the child’s mental states and especially children’s desires is most helpful when spoken to young children (less than 24 months). In contrast, talk about mothers’ own mental states, and in particular her own cognitions, is most helpful when spoken to slightly older children. This shift in importance reflects underlying advancement in children’s understanding of mental states from an understanding of desires, to an understanding of cognitions, and from an understanding of their own mental states to an understanding of others’ mental states. Again, Vygotsky’s principle for a zone of proximal development states that the ideal maternal contribution will be one that is pitched slightly beyond a child’s current level of comprehension and will therefore change as the child advances to increasingly sophisticated levels of understanding. My specific hypotheses were that: A1) maternal talk about her child’s desires at 21 months of
age would be related to children’s later social understanding at 27 months of age, whereas 

A2) maternal talk about her own cognitions at 27 months would be related to children’s later 

social understanding at 34 months of age.

Current versus conversational mother language

Second, I examined whether there is a differential effect of mothers’ use of current 

versus conversational mental state language. I argue that maternal talk about the child’s 

presently experienced desires (e.g., *as the child struggles to get down off mother’s knee, the 

mother says*, “You don’t want to look at this book anymore”) will be particularly likely to 

relate to the child’s subsequent social understanding during the early stages of development, 

in contrast to conversational uses of desire terms such as directives (e.g., “Do you want to 

stop that now?”). Whereas previous research has focused on the accuracy and thus 

‘appropriateness’ of maternal mental state utterances (Meins, 2002; Symons et al., 2006), my 

study is the first to examine the relative importance of talk about the child’s *current* mental 

states in contrast to conversational uses of mental state language such as desire terms used in 

directives. Again, comments about currently felt desires stand to be particularly helpful 

because they help to connect the child’s salient internal state to a term such as “want”, 

helping the child to form a concept of “want” that includes the internal experience rather than 

just some observable behaviour (such as reaching, looking happy or looking sad). For these 

reasons, I hypothesised that: B1) maternal talk about the child’s *current* desires (but not 

directive desires) at 21 months would be associated with children’s later social understanding 

at 27 months.

The moderating role of the self-concept

The third and main aim of this study was to examine whether children’s self-concept 

moderates the extent to which young children benefit from maternal mental state talk. In line
with the zone of proximal development, I proposed that mother mental state talk about the child’s desires will be particularly helpful for children whose understanding of the distinction between self and other is relatively poor (as evidenced by their failure to recognise their self in the mirror and absence of first-person pronouns such as ‘mine’). In contrast, I expect that talk about mothers’ own cognitions will be particularly helpful for children whose self-concept is partially but not fully in place (as evidenced by the presence of first-person pronouns but an absence of second-person pronouns). Thus, my specific hypotheses were that: C1) The facilitating effect of maternal talk about the child’s current desires at 21 months would be greater for children who do not yet use the term ‘mine’ and who do not yet recognise themselves in the mirror, and that C2) The facilitating effect of maternal talk about her own cognitions at 27 months would be greater for children who possess first- but not second-person pronouns, than for children who possess both first- and second-person pronouns. In sum, I build upon the work of Taumoepeau and Ruffman (2006, 2008) by arguing that it is not children’s age per se but rather their self-concept that moderates the degree to which they benefit from maternal talk about their own versus their mothers’ mental states.
Chapter 4  
Methods

4.1  
Introduction

To test the aforementioned hypotheses a longitudinal study was conducted. Mother-child pairs were tested when children were 21 (Time 1), 27 (Time 2) and 34 (Time 3) months of age. A schedule of measures taken at each Time point is given below in Table 1. In order to gain a sample of the type of language mothers used while conversing with her child at all three time points mothers were asked to describe the same series of pictures to her child. Mother reports of children’s mental state vocabulary were used as a measure of children’s social understanding at all three time points and reports of children’s non-mental state vocabulary was also taken to be used as a control variable. At Times 1 and 2, measures of children’s self-understanding included their mirror self-recognition as well as their use of pronouns. In addition, at Time 3 children’s understanding of emotion, perspectives and deception were also assessed using objective measures. Children’s performance on these objective measures was not taken at Times 1 and 2 due to anticipated floor affects. Using a cross-lagged style of analysis, I examined which specific categories of mother language predicted unique variance in indices of children’s social understanding at a later time point after controlling for potentially mediating variables including children’s general language and socioeconomic status.
Table 1.  
*Child and Mother Tasks Given at Time 1, Time 2 and Time 3*

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<tr>
<th>Time 1 (21 months)</th>
<th>Time 2 (27 months)</th>
<th>Time 3 (34 months)</th>
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<td><strong>Child</strong></td>
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<td>Perspective Taking</td>
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<td>-Mirror task</td>
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<td>-Move Object Task</td>
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<td>Pronoun Use</td>
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<td>-Move Screen Task</td>
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<td>-Looking Where? Task</td>
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<td>Deception</td>
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<td>- Maternal Education Scale</td>
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MS = Mental State. NMS = Non-Mental State. MSSQ = Mental State Supplement Questionnaire, MCDI = MacArthur Communicative Developmental Inventory

### 4.2 Participants

Participants were recruited via the Early Learning Project database. Mothers were asked at the birth of their child if they would like to participate in any child-related studies that the university Psychology Department might undertake and consenting mothers’ contact details were added to the Early Learning Project database. Using this database I contacted families of the appropriately aged children and 70 mothers agreed to participate in this particular study. During recruitment, mothers were informed that the study aimed to increase
knowledge about the social and language development of infants. Mothers were not told, at any stage, that I was looking specifically at their or their child’s use of mental state terms.

At Time 2, 10 mother-child pairs were no longer contactable or had shifted out of the region, leaving 60 participants (30 girls). At Time 3, a further six mother-child pairs were unwilling or unable to attend their final testing session. A t-test yielded no difference in socioeconomic status (a measure of mothers’ education rated on an 8-point scale – see below) between those who did and did not attend all three testing sessions. Given that I was interested in longitudinal relations between variables, only children who attended both sessions (Times 1 and 2 or Times 2 and 3) were included in analyses conducted across time points. The mean age of the children at Time 1 was 21.00 months (range 18.60 – 22.30 months), at Time 2 it was 27.27 months (range 25.03 – 29.57 months) and at Time 3 it was 34.75 months (range 34.40 – 38.00). I tested children at 21 months of age initially because this is an age at which there is good variation in children’s self-other understanding in a sample of New Zealand children (Reese & Newcombe, 2007), with self-other differentiation still in transition at 27 months (Lewis & Brooks-Gunn, 1979). The children were predominantly of European descent (78%) and came from a range of socioeconomic backgrounds, but with the majority from middle- and upper middle-class backgrounds (see Table 3). At the end of each testing session, mothers were given a petrol voucher to reimburse their travel expenses and the infants were given a small toy.

4.3 Measures and Procedure

All testing was conducted in a quiet room located within the Psychology Department. At Time 1, approximately two thirds of testing sessions were conducted by one of two female undergraduate students employed by the university Psychology Department. The remaining
Time 1 sessions and all Time 2 and Time 3 sessions were conducted by a male PhD candidate (myself). The majority of tasks were conducted while the experimenter, mother and child sat around a small pink and white round table (60cm diameter x 40cm high). The child and experimenter sat on small child-sized chairs (30cm seat-to-ground) while the mother was provided with a more comfortable cushioned standard adult-sized chair. Time 1 and 2 testing sessions typically took between 30 to 45 minutes and the Time 3 testing session was between 50 to 60 minutes duration.

4.3.1 Child Language

At all three time points mother reports of children’s use of mental state terms were used as a measure of children’s social understanding and mother reports of children’s non-mental state vocabulary were used as control variables during analyses. Recall that the theory presented in this thesis is that there is a specific relation between maternal mental state talk and children’s social understanding such that maternal talk facilitates children’s acquisition of mental state concepts. In order to help determine the specificity of this relation I also took measures of children’s acquisition of terms pertaining to people’s non-mental states (actions, body parts) and a non-human control category of language (animals terms).

4.3.1.1 Child Non-Mental State Vocabulary

At Times 1 and 2 mothers filled out the MacArthur Communicative Developmental Inventory: Words and Sentences form (MCDI-W&S) (Dale & Fenson, 1993) indicating whether their child produced any of the listed words. The MCDI-W&S was designed for use with 16- to 30-month old children and is a catalogue of 680 words organised into 22 categories of language (e.g., actions, body parts, animals, food and drink, pronouns, clothing,
etc). The validity, reliability and norms for the MCDI were derived from a large sample of 2156 children from wide-ranging sociodemographic backgrounds. Children’s ‘Total Non-mental State Vocabulary’ raw score was the total number of words mothers reported her child to be using on all 22 sections of the MCDI. Children’s acquisition of terms pertaining to people’s physical states and body parts were measured using the ‘Actions’ (e.g., ‘bite’, ‘jump’, ‘kick’, ‘carry’, ‘play’) and ‘Body Parts’ (e.g., ‘arm’, ‘chin’, ‘nose’, ‘toe’, ‘tooth’) subsections of the MCDI, and a non-human control category of children’s language was measured using the ‘Animals’ (e.g., ‘cat’, ‘chicken’, ‘horse’) subsection of the MCDI. 

At Time 3 children’s non-mental state vocabulary was measured by asking mothers to indicate the words children produced using the MacArthur Communicative Developmental Inventory: Level-III (MCDI-III) (Fenson, et al., 2007) which is a 100-item word list suitable for assessing the vocabulary of children between 30 and 37 months of age. In order to obtain a pure measure of children’s non-mental state vocabulary 10 mental state words were removed from the MCDI-III form. The items removed were ‘idea’, ‘forget/forgot’, ‘hate’, ‘promise’, ‘think’, ‘bored’, ‘fine’, ‘angry’, ‘might’ and ‘need to’. The MCDI-III ‘Total Non-mental State Vocabulary’ score was the total number of words mothers reported her child to be using on the remaining 90 items of the MCDI. Nine words from the MCDI-III were used as a measure of children’s use of terms pertaining to people’s actions. They were; ‘catch’, ‘drop’, ‘fasten’, ‘hurry’, ‘leave’, ‘measure’, ‘peel’, ‘skate’, ‘sneeze’ and ‘somersault’. Unfortunately, there were not enough Body Part and Animal words on The MCDI-III to create separate subcategories of vocabulary.
4.3.1.2 Child Mental State Vocabulary


Total raw scores for the Desire, Emotion and Cognitive sections of the MSSQ were recorded for each child. The ‘Total Mental State Vocabulary’ score was the total raw score of the ‘Desire,’ ‘Emotion’ and ‘Cognitive’ sections combined.
4.3.1.3 Child Total Vocabulary

A ‘Total Vocabulary’ raw score included children’s total non-mental state (MCDI) and mental state (MSSQ) raw scores combined. At Time 2, two questionnaires regarding children’s vocabulary were not returned by mothers. Missing values for these children were estimated using regression based on children’s general language at Time 1 with a calculated adjustment for error (the “residuals” estimation adjustment in the SPSS statistical software package) (Tabachnick & Fidel, 2007).

4.3.2 Child Self-Understanding

Children’s self-understanding was measured using two indices: mirror self-recognition and pronoun acquisition. Recall that mirror self-recognition and use of the term ‘mine’ begin late during the second year of life and have been designated as my two markers of children’s basic self-concept (see sections 3.3.1 and 3.3.2). At Time 1, I was therefore hoping to capture a period of development during which there would be variation in the number of children who did and did not recognise themselves in the mirror and who used the term ‘mine’. Recall, also, that I have identified the stage of development during which children are using first- but not second-person pronouns as a time during which their basic self-concept is present, but not yet firmly in place (see section 3.3.3). At Time 2, I was therefore hoping to capture a period of development during which most children possessed at least one first-person pronoun but only some children possessed second-person pronouns.

4.3.2.1 Child Self-Understanding: The Mirror-Task

At Times 1 and 2 a standard mirror self-recognition task was employed to measure children’s self-understanding (Asendorpf et al., 1996; M Lewis & Brooks-Gunn, 1979). At
the beginning of the experiment children were placed in front of a mirror for a baseline period of two minutes. While semi-distracted with a box of toys, the experimenter asked children to blow their nose on a tissue that was secretly laden with a spot of blue face paint which was surreptitiously smeared onto the child’s nose. Later the child was exposed to the mirror for one minute and any exploration of the blue mark was recorded and considered a sign of self-recognition. The experimenter helped orientate the child towards the mirror by tapping the glass and saying, “Look.” Children who touched their nose before being exposed to the mirror were excluded from analyses (Time 1: \( n = 14 \); Time 2: \( n = 6 \))^2. The mirror self-recognition task was not completed at Time 3 due to anticipated ceiling performance for children aged 34 months.

**Scoring:** Children were given a score of 0 (fail) or 1 (pass) depending on whether they did or did not display mark-directed behaviour when placed in front of the mirror.

### 4.3.2.2 Child Self-Understanding: Pronoun Acquisition.

**Pronoun production**


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^2 In high-n-sight the use of a marker other than face pain (e.g., make up) would have been an easier marker to smear surreptitiously and may have resulted in a fewer number of children noticing the application of the mark.
Scoring: At Times 1 and 2, children received a score of 0 (not using mine) or 1 (using mine). A special note was also made as to whether children were using at least one first-person pronoun (0 = child does not use at least one first-person pronoun, 1 = child does use at least one first-person pronoun). In a separate analysis, children who were using at least one first-person pronoun were further divided into two groups depending on whether they also possessed at least one second-person pronoun (0 = child uses at least one first-person pronoun but does not yet use any second-person pronouns, 1 = child uses at least one first-person pronoun and at least one second-person pronoun). Again, the purpose of categorising children in this way was to identify children whose self-concept was present but not yet firmly in place.

4.3.3 Time 3 Objective Social Understanding Measures

In addition to children’s use of mental state vocabulary several objective measures of children’s social understanding were also taken at Time 3. These included children’s understanding of emotion, deception and perspectives.

4.3.3.1 Emotion Understanding

Letterbox task

Children’s recognition of emotion was assessed using a novel letterbox task. The letterbox was made out of a shoe box (33cm x 21cm x 13cm) that was painted red and had a post-slot (20cm x 5cm) cut out of one end. A red piece of cardboard (35cm x 38cm x 1mm) was folded in half and glued onto the top of the shoebox to create a pointed roof. The NimStim set of facial expressions (Tottenham et al., 2009) was used to select four sets of three photographs.
Each picture was printed onto a separate A4-sized piece of paper with the head and shoulders covering most of the page. Each set of three pictures consisted of the same woman displaying three different emotional expressions. The emotions displayed were fear, happiness, sadness or surprise. These emotions were chosen as they are typically the first emotions recognised by children (Harris, et al., 1981) and have been used in previous research with preschoolers (e.g., Qu & Zelazo, 2007).

During experimental trials, the experimenter placed a set of three pictures (one target picture and two non-target pictures) onto the table in front of the child one-by-one while saying “look”. The experimenter made sure that the child had looked at each picture before the next one was placed onto the table. The experimenter then asked one of four questions: “Which one is the happy lady?”, “Which one is the sad lady?”, “Which one is the scared lady?” or “Which one is the angry lady?” The location of the target picture was randomised across trials. To make the task enjoyable for children, once children indicated their choice by pointing to or picking up a picture, the experimenter then asked them to post the picture into the letterbox (“Will you please put her into the letterbox for me?”). This process was then repeated another three times using new sets of pictures every trial. A different woman was used for every set of pictures to help children realise that they were looking at different pictures. The order in which the four sets of pictures were presented to children was randomised across participants but the target picture for each set was the same for every child.

Scoring: A note was made during testing sessions as to whether children selected the correct picture and the total raw number of correct pictures selected (maximum = 4) was recorded and used during analyses.
Children’s ability to recognise emotion from both contextual cues and facial expressions was assessed using a reduced version of Taumoepeau and Ruffman’s (2006) emotion situation task in which children were presented with a series of four cartoon style vignettes designed to elicit specific emotional reactions from the protagonist. The vignettes were colour pictures (21cm x 15cm) printed onto cardboard with the protagonist’s face obscured so that the only clues regarding the protagonist’s emotions were situational clues. One vignette was of a child being chased by a lion (fear), another depicted a child holding a teddy bear whose leg had broken off (sadness), a third had a child receiving a present from Santa Claus (happiness) and a fourth vignette illustrated a child patting a puppy (happiness). Each vignette included two profile pictures of the protagonist’s face (approximately 3cm x 3cm diameter) displaying two different emotions (e.g., happiness versus sadness).

During trials children were presented with a vignette that was placed directly in front of them on the table and had the relevant situation explained to them (e.g., “Look this boy is being chased by a lion!”). The two profile faces (one target and one non-target face) were then placed directly below the vignette before the experimenter asked, “How does he feel? Does he feel like this (experimenter points to one of the faces) or does he feel like this (points to the second face)?” Children were then encouraged to make their selection by pointing to one of the two faces. Children who initially did not respond were encouraged by the experimenter to indicate their selection using prompts such as, “Which one?” This process was then repeated another three times using different vignettes. The location of the target face was counterbalanced across trials and the order in which the vignettes were presented was randomised across participants. This task thus required children to be able to both discern the protagonist’s emotion from situational clues (e.g., scared) and to recognise the correct facial expression in order to give a correct response (e.g., scared face). To help with concentration,
only four vignettes were used in contrast to Taumoepeau and Ruffman’s (2006) eight vignettes, given that several other tasks were also administrated.

Scoring: The total raw number of correct response made by each child (maximum = 4) was recorded.

4.3.3.2 Deception: The Penny Hiding Task

A deception task used in previous research with both typically developing (e.g., Hughes & Dunn, 1998) and children with autism (e.g., Barron-Cohen, 1992) was also used at Time 3. The penny hiding task was chosen because it is an assessment of children’s ability to manipulate other people’s beliefs that has virtually no verbal demands and is thus ideal for use with very young children. During the penny hiding task the experimenter hid a New Zealand 50 cent coin (2.5cm diameter) behind his back and, bringing both closed hands forward with the coin hidden in one hand, asked the child to guess in which of the two hands the coin was hidden (“Which hand is the coin in?”). After the child had made their choice the experimenter provided them with feedback, letting the child know s/he had made a correct (“Oh you got it right – well done”) or incorrect (“Not in this one, it was in the other hand (shows child the true location of the coin) – let’s have another go”) response. The experimenter repeated this game three times and then said to the child, “It’s your turn now, will you do it for me?”, while handing the child the coin. The child was asked to repeat the game three times.

Scoring: Scoring for the penny hiding task was based on the schedule outlined by Baron Cohen (1992). The child was allocated one point for each of the following criteria: 1) The child kept the coin hidden throughout the duration of the task, 2) the child put both hands
behind her or his back whilst putting the penny into one of their hands, 3) the child brought both hands forward (not just the hand with the coin in it) and, 4) the child kept both hands closed until after the experimenter had made his choice. Children could score a maximum of four points per game and the total number of points for all three games (maximum = 12) was recorded and used for analyses.

4.3.3.3 Perspective Taking Tasks

Three tasks were administered to test children’s perspective taking abilities. Two tasks assessed children’s comprehension of occlusion (the Move Object and Move Screen tasks) and one task assessed children’s ability to use eye gaze as a clue to what a protagonist was looking at (looking-where task).

Move Object Task

The move-object task involved the use of a wooden screen (23cm x 18.5cm x 3mm) that was painted with red glitter paint. The screen was mounted on two wooden legs (7cm x 4.2 x 2cm) so that the broad side of the screen sat upright to create an occluder. At the beginning of a trial, while seated on a small chair directly opposite the child (180° trial), the experimenter placed the screen on the table approximately 40cm from his eyes. The experimenter then gave the child a small object (a brown and white plastic horse approximately 6cm x 3 cm x 2 cm) and asked him/her to hide it behind the screen (“Will you hide Mr Horse from me? Will you put Mr Horse on the table so that I can’t see him?”). While asking this question the experimenter fixated his gaze on the centre of the screen and did not break it until after the child had finished placing the horse on the table. This procedure was repeated a further three times with the experimenter sitting 90° to the child’s left, 90° degrees
to the right, and then back at 180° from the child again. Having the experimenter move his starting location every trial meant that the child had to calculate a new spatial relation between the experimenter, the screen, and the horse, in order to successfully hide the object.

**Scoring:** Trials were scored as correct if the child placed the object behind the screen completely out of view of the experimenter. The total number of correct trials (maximum = 4) was recorded and used during analyses.

**Move Screen Task**

The move screen task involved a similar procedure to the Move Object task and used exactly the same stimuli but this time the child had to move the screen rather than the object. At the beginning of the first trial the horse was placed in the middle of the table and the child was handed the screen and to the experimenter said, “Will you hide Mr Horse from me? Put this screen on the table so that I can’t see Mr Horse.” The experimenter fixed his gaze straight on the horse until after the child had made her or his response. As with the Move Object task, four trials were administered with the experimenter sitting 180°, 90° (right), 90° (left) and 180° relative to the child. Responses were scored as correct if the child placed the screen on the table so that the experimenter could no longer see the horse.

**Scoring:** The total number of correct trials (maximum = 4) was recorded and used during analyses. The order of administration of the Move Object and Move Screen tasks was counterbalanced across participants.

**Looking-Where Task**

During the looking-where task children were presented with one of four A4 sized stimulus pages. Each page consisted of a schematic drawing of a face (‘Sam’) looking at one of four coloured shapes (green triangle, orange circle, blue square or red hexagon). The four
stimulus pages were identical with the exception of the direction of the pupil of Sam’s eye, thus manipulating his gaze direction. Previous research has shown that assessing the eye gaze of a schematic drawing is no more difficult for children than assessing the eye gaze of a human protagonist (Doherty & Anderson, 1999). At the start of each trial, children were familiarised with the stimulus page (“Look! Here is Sam (experimenter points to Sam and draws child’s attention to Sam’s eyes) and here are four shapes (experimenter points to each shape one by one).” The child was then asked, “Which shape is Sam looking at?” This procedure was repeated three times using a new stimulus page every trial. Children were required to point to the correct shape and those children who initially did not respond were encouraged to do so using prompts such as “Which one, you show me”.

Scoring: Trials were considered correct if a child pointed to the correct shape and the total number of correct responses (maximum = 4) was recorded and used during analyses.

4.3.4 Mother Language: The Picture Book Task

Central to this thesis is the question of the degree to which mother language facilitates children’s social understanding. To help address this question a sample of the type of language mothers used while conversing with their children was obtained using a picture book task. Mother language was measured using a shortened version of the picture book task used in Taumoepeau and Ruffman (2006, 2008). Each mother sat in a comfortable chair with her child on her lap and a book containing 13 photographs, including pictures depicting adults and children expressing a range of emotions in various naturalistic settings (e.g., at the park). The experimenter instructed the mother to, “Describe the pictures to your child as if you were at home reading a story. I’ll leave the room while you describe the pictures. When you get to the end of the book I’ll come back”. These sessions were recorded on a video camera and
later transcribed and coded for various aspects of mothers’ language (see below). The picture book task was always completed at the start of the session in order to provide children with time to become comfortable within the testing environment before interacting with the experimenter during subsequent tasks. The same set of pictures was described at all three time points.

Transcribing and coding

The general criteria for coding mother language were taken from Taumoepeau and Ruffman (2006, 2008) as well as Bartsch and Wellman (1995), Ruffman et al. (2002) and Shatz et al. (1983). Transcribing involved all mother and child language spoken during the picture book session being typed out manually by referring to the DVD recordings. Coding involved manual identification of specific categories of mother language within transcripts and codes were organised and tallied using the SALT transcript analyses software package. I examined each category of maternal mental state language as a percentage of total utterances in order to control for mothers’ general verbosity (Meins et al., 2003; Taumoepeau & Ruffman, 2006, 2008).

Scoring: The content of mother language

Mother language was coded for content (references to desires, emotions, cognitions, and references to physical states/non-mental states) and each category was further coded based on the referent of the utterance, that is, mother references to her child’s, her own or others’ physical and mental states. Table 2 includes a brief outline of each of the main categories of mother language. Appendix A includes an exhaustive list of all categories of mother mental state language terms and concomitant inter-rater reliability statistics.
One category of maternal mental state language included all utterances pertaining to emotions (e.g., ‘happy’, ‘unhappy’, ‘sad’, ‘bored’). A second category of mental state language was all mother references to thoughts and knowledge (i.e., ‘think’, ‘know’). Mothers’ isolated use of the phrase, ‘I don’t know’, was prevalent in transcripts and was not included in the think/know category because of a consensus that its function is conversational as opposed to a genuine reference to knowledge (e.g., Bartsch and Wellman, 1995 but see Harris, 1996). Another category included Modulations of Assertions, terms used to express the degree of certainty (e.g., ‘might’, ‘must’, ‘maybe’) and an Other Mental State category that included terms pertaining to mental activity that did not fall into any of the aforementioned categories (e.g., ‘remember’, ‘understand’, ‘forget’).

Mothers’ general references to desires included all utterances involving the terms ‘want’ and ‘like’. Following the work of Bartsch and Wellman (1995) and Shatz (1983), I further categorised mothers’ references to her child’s desires as current or conversational (directives). The key difference between codes was that the main function of a directive utterance was to direct the child’s future behavior whereas a current utterance was a comment about the child’s presently felt mental state. Directives included instructions that were ‘softened’ by the use of a desire term, often by couching them as questions (“Would you like to come here and sit down?”, “Do you want to stop that now?”) and accounted for approximately half (52%) of mothers’ desire utterances directed at her child. As a rule of thumb, an utterance was deemed to be a directive if omitting the desire term from the utterance yielded a clear instruction pertaining to the child’s future behavior (e.g., “Would you like to come here and sit down?”, “Do you want to stop that now?”).

The remaining half (48%) of mothers’ references to her child’s desires were judged to be current references to the child’s current psychological states of desire. Current desire utterances were identified when mothers used a desire term that accurately reflected her
child’s underlying mental state as judged by the child’s behaviour at the time that the utterance was spoken. Of these utterances, the majority (74%) were comments on the child’s current state of desire (e.g., *as the child struggles to get down*, “No, you don’t want to look at this book anymore”), and the remainder were simple questions about the child’s current state of desire (e.g., *as the child reaches forward*, “What do you want?”). Any ambiguous maternal desire utterance (“Do you want to have another look?”) was adjudicated as current or a directive by viewing the video recording to assess the mother’s tone and the child’s behaviour and language at the time that the utterance was spoken.

Analyses of all other categories of maternal mental state language were conducted to assess whether categories other than talk about the child’s desires could also be neatly divided into genuine/current versus directive utterances. To do this, using the SALT transcript analyses software package, every maternal mental state utterance was organised into separate categories and listed based on the content (cognitions, emotions, modulations of assertion, perceptions, other mental states) and referent (references to the child’s, the mother’s or other’s mental states) of the mother utterance. Each category was then individually assessed as to whether a distinction between genuine/current versus directive language was present. It was found that only maternal talk about the child’s desires could be neatly divided into genuine/current versus directive utterances. Other maternal mental state utterances tended to be genuine utterances.

Total mental state scores were derived from the sum of all of the aforementioned categories of maternal mental state language (emotions, cognitions, modulations of assertions, other mental states, and desires – both current and directive).

*Scoring: mother physical state talk*
The claim in this thesis is that it is maternal mental state talk rather than her talk about people per se that facilitates children’s acquisition of mental state concepts. To help test this claim I also coded for maternal talk that was about people but was not about mental states (i.e., physical state talk). Initially, physical state talk was coded separately for descriptions of people’s features (“He’s got a funny nose”) versus people’s actions (“Those boys are having a fight”). However, preliminary analyses yielded no noteworthy differences when codes were analysed separately so (for the sake of brevity) references to peoples’ features and actions were collapsed into one category of physical state talk. Physical states thus referred to all mother references to people’s observable states as opposed to their internal states.

**Scoring: The referent of mother language**

All aforementioned categories of maternal mental state language were coded separately depending on the referent of the utterance. Maternal talk was coded separately for references to her child’s (“Do you want to see that again”), versus own (“I think that’s a frog”) versus other people’s (“He looks pretty scared”) mental and physical states.

**Inter-rater reliability coding**

One coder coded all transcripts and a second coder coded 20% of transcripts. Table 2 includes inter-rater reliability ratings (kappas) for each category of maternal mental state talk, with good reliability for all categories as well as examples of each category of mother language.
Table 2.  
*Inter-Rater Reliabilities for the Coding of Mother Language Variables*

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
<th>Cohen’s kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mental state utterances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>“And this little boy doesn’t look very happy either.”</td>
<td>.82</td>
</tr>
<tr>
<td>Desire (current)</td>
<td><em>(Child turns book back to previous page)</em></td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>“Oh you want to see that one again do you?”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>(Child pushes the book away and struggles to get down)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“You just really wanna go play don’t you?”</td>
<td></td>
</tr>
<tr>
<td>Desire (directive)</td>
<td>“Do you want to come sit on the red chair?”</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>“Do you want to give that back to mum?”</td>
<td></td>
</tr>
<tr>
<td>Think/Know</td>
<td>“What do you think that boy’s doing?”</td>
<td>.96</td>
</tr>
<tr>
<td>Other mental state</td>
<td>“You remember we saw that fire truck?”</td>
<td>.87</td>
</tr>
<tr>
<td>Non-mental state utterances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical state</td>
<td>“He’s got a blue top on hasn’t he?”</td>
<td>.94</td>
</tr>
</tbody>
</table>

4.3.5  
**Socioeconomic Status: Maternal education level**

As a measure of socioeconomic status (SES), mothers’ education was coded on an 8-point scale: 1 = no high school qualification, 2 = school certificate (high school qualification), 3 = university entrance (high school qualification), 4 = bursary (higher high school qualification), 5 = some university or polytechnic papers, 6 = polytech or teachers’ college diploma, or degree, 7 = undergraduate degree, 8 = postgraduate degree or diploma.  
Socioeconomic status was not measured using parental income or employment status because many mothers stop working when they have children, thus affecting their employment and total income (Taumoepeau & Ruffman, 2008).
Chapter 5  RESULTS (Results I, II, and III)

Results are broken down into three sections (Results I – Descriptive Statistics, Results II - Times 1 to 2 analyses, and Results III - Times 2 to 3 analyses). In the Results I – Descriptive Statistics section, I provide descriptive statistics for all mother and child variables measured at Time 1 (21 months), Time 2 (27 months) and Time 3 (34 months) and assess how mother and child language changes over time. In the Results II - Times 1 to 2 section, I examine the relation between Time 1 maternal mental state language and Time 2 child use of mental state terms and the degree to which this relation is moderated by early markers of children’s self-other understanding. Finally, in the Results III - Times 2 to 3 section, I examine the relation between Time 2 maternal mental state talk and Time 3 child social understanding and the degree to which this relation is moderated by advancements in children’s self-other understanding.

Results I: Descriptive Statistics and Changes Over Time in Mother and Child Language

This section is broken down into two main sections. In Section 5.1, I present the descriptive statistics for all mother and child variables including socioeconomic status, mother and child mental and non-mental state language, child self-concept and child performance on all Time 3 objective measures. In Section 5.2, I examine how the proportion of maternal mental state utterances and raw number of mental state terms reportedly used by children changed overtime.
5.1 Descriptive Statistics

This section provides the descriptive statistics for all mother and child variables measured at Time 1, Time 2 and Time 3.

5.1.1 Descriptive Statistics: Socioeconomic Status

The children were predominantly of European descent (78%). Ten mothers (14%) identified their child’s ethnicity as mixed New Zealand European and New Zealand Maori. One child was of mixed New Zealand European and Chinese ethnicity, another was identified as having mixed New Zealand European Turkish ethnicity and one child was of mixed New Zealand European and Samoan ethnicity. Children came from a range of socioeconomic backgrounds, but with the majority from middle- and upper middle-class backgrounds. Full descriptive statistics for participants’ socioeconomic status (SES) are presented in Table 3.

Table 3. Descriptive Statistics of Socioeconomic Status Based on Mother Education

<table>
<thead>
<tr>
<th>SES</th>
<th>Number</th>
<th>%</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No High School Qualification</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>School Certificate</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>University Entrance</td>
<td>2</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Bursary</td>
<td>1</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Some University of Polytechnic Papers</td>
<td>10</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>Polytechnic or teachers’ college diploma</td>
<td>15</td>
<td>22</td>
<td>51</td>
</tr>
<tr>
<td>Undergraduate Degree</td>
<td>17</td>
<td>24</td>
<td>75</td>
</tr>
<tr>
<td>Postgraduate Degree</td>
<td>17</td>
<td>24</td>
<td>100</td>
</tr>
</tbody>
</table>

5.1.2 Descriptive Statistics: Maternal Mental and Non-Mental State Language
Table 4 provides descriptive statistics for maternal mental state and physical state language during the picture book task at all three time points. The mean number of mother utterances was 90.78 (SD = 41.03) at Time 1, 80.47 (SD = 32.19) at Time 2 and 78.10 (SD = 25.56) at Time 3. To help control for verbosity maternal mental state variables were analysed as a proportion of their total utterances. For each category of maternal mental state talk the number of utterances that contained a mental state term was divided by the total number of utterances the mother used during the entire picture book task. Any scores on mother or child language variables identified as equal to or further than three standard deviations from the mean were considered outliers and were re-assigned as the maximum score plus one (Tabachnick & Fidel, 2007). Maternal mental state and physical state talk accounted for approximately 16% and 44%, respectively, of the range of utterances mothers used during the picture book task across all three time points. The remaining 40% consisted of miscellaneous utterances (e.g., “Bye-bye”, “All done”) and exactly repeated utterances. These categories were not included in the analyses discussed below because preliminary analysis and previous research (Bretherton & Beeghly, 1982; Ruffman, et al., 2002b; Taumoepeau & Ruffman, 2006, 2008) have shown them to bear no relation to child mental state understanding. A series of independent samples t-tests yielded no significant gender differences in the type of language mothers used while speaking to girls versus boys for any category of maternal mental state language (e.g., talk about desires, cognitions, emotions, total mental state talk, physical state talk) with all ps > .25.
Table 4. 
**Descriptive Statistics for Mother Language used During the Picture Book Task at all Three Time points**

<table>
<thead>
<tr>
<th></th>
<th>Time 1 (N=70)</th>
<th></th>
<th>Time 2 (N = 60)</th>
<th></th>
<th>Time 3 (N = 54)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(SD)</td>
<td>Range</td>
<td>%</td>
<td>M(SD)</td>
<td>Range</td>
<td>%</td>
</tr>
<tr>
<td><strong>Mother MS Talk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total MS utterances</td>
<td>13.13 (6.71)</td>
<td>0-28.99</td>
<td>97</td>
<td>18.15 (9.37)</td>
<td>3.45-42.3</td>
<td>100</td>
</tr>
<tr>
<td>Total Child</td>
<td>4.84 (3.77)</td>
<td>0-14.29</td>
<td>86</td>
<td>6.70 (5.16)</td>
<td>0-20.21</td>
<td>92</td>
</tr>
<tr>
<td>Total Mother</td>
<td>1.25 (1.47)</td>
<td>0-5.56</td>
<td>60</td>
<td>2.14 (2.19)</td>
<td>0-9.00</td>
<td>67</td>
</tr>
<tr>
<td>Total Other</td>
<td>6.34 (4.37)</td>
<td>0-19.35</td>
<td>94</td>
<td>8.80 (5.65)</td>
<td>0-25.00</td>
<td>94</td>
</tr>
<tr>
<td>Total Desire</td>
<td>3.31 (3.01)</td>
<td>0-11.86</td>
<td>79</td>
<td>2.53 (2.28)</td>
<td>0-8.93</td>
<td>73</td>
</tr>
<tr>
<td>Total Emotion</td>
<td>6.37 (4.75)</td>
<td>0-20.51</td>
<td>93</td>
<td>8.52 (5.39)</td>
<td>0-24.24</td>
<td>94</td>
</tr>
<tr>
<td>Total Think/Know</td>
<td>3.12 (3.46)</td>
<td>0-13.58</td>
<td>71</td>
<td>7.04 (6.02)</td>
<td>0-25.00</td>
<td>85</td>
</tr>
<tr>
<td>Child Desire</td>
<td>2.28 (2.67)</td>
<td>0-10.17</td>
<td>64</td>
<td>1.64 (1.91)</td>
<td>0-7.14</td>
<td>58</td>
</tr>
<tr>
<td>- Desire (Current)</td>
<td>1.19 (1.99)</td>
<td>0-6.60</td>
<td>40</td>
<td>0.63 (1.14)</td>
<td>0-4.84</td>
<td>33</td>
</tr>
<tr>
<td>- Desire (Directives)</td>
<td>1.44 (1.94)</td>
<td>0-7.00</td>
<td>43</td>
<td>1.11 (1.11)</td>
<td>0-5.88</td>
<td>60</td>
</tr>
<tr>
<td>Child Emotion</td>
<td>0.31 (2.58)</td>
<td>0-2.70</td>
<td>24</td>
<td>0.17 (0.46)</td>
<td>0-1.70</td>
<td>12</td>
</tr>
<tr>
<td>Child Think/Know</td>
<td>2.00 (2.58)</td>
<td>0-10.20</td>
<td>61</td>
<td>1.97 (2.07)</td>
<td>0-8.00</td>
<td>79</td>
</tr>
<tr>
<td>Maternal desire</td>
<td>0.06 (0.28)</td>
<td>0-1.96</td>
<td>8</td>
<td>0.01 (0.05)</td>
<td>0-0.38</td>
<td>2</td>
</tr>
<tr>
<td>Mother Emotion</td>
<td>0.15 (0.57)</td>
<td>0-3.70</td>
<td>13</td>
<td>0.11 (0.39)</td>
<td>0-1.92</td>
<td>8</td>
</tr>
<tr>
<td>Mother Think/Know</td>
<td>0.87 (1.26)</td>
<td>0-5.10</td>
<td>44</td>
<td>1.70 (1.75)</td>
<td>0-6.45</td>
<td>67</td>
</tr>
<tr>
<td>Other Desire</td>
<td>0.44 (0.81)</td>
<td>0-3.10</td>
<td>31</td>
<td>0.82 (1.19)</td>
<td>0-4.55</td>
<td>44</td>
</tr>
<tr>
<td>Other Emotion</td>
<td>5.96 (4.34)</td>
<td>0-17.74</td>
<td>93</td>
<td>7.64 (5.24)</td>
<td>0-22.73</td>
<td>92</td>
</tr>
<tr>
<td>Other Think/Know</td>
<td>0.12 (0.43)</td>
<td>0-2.08</td>
<td>9</td>
<td>0.32 (0.94)</td>
<td>0-6.12</td>
<td>17</td>
</tr>
</tbody>
</table>

**Mother NMS Talk**

<table>
<thead>
<tr>
<th></th>
<th>Time 1 (N=70)</th>
<th></th>
<th>Time 2 (N = 60)</th>
<th></th>
<th>Time 3 (N = 54)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total NMS</td>
<td>49.24(17.47)</td>
<td>14-100</td>
<td>100</td>
<td>37.51(9.66)</td>
<td>15-59.99</td>
<td>100</td>
</tr>
<tr>
<td>Total Child</td>
<td>4.37 (4.24)</td>
<td>0-17.24</td>
<td>80</td>
<td>3.20 (2.78)</td>
<td>0-12.02</td>
<td>84</td>
</tr>
<tr>
<td>Total Mother</td>
<td>0.27 (0.63)</td>
<td>0-2.31</td>
<td>20</td>
<td>0.47 (0.83)</td>
<td>0-2.88</td>
<td>40</td>
</tr>
<tr>
<td>Total Other</td>
<td>38.43 (15.1)</td>
<td>11-78.0</td>
<td>100</td>
<td>31.77 (8.61)</td>
<td>15-38.50</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* All mother language variables calculated as a percentage of total utterances. MS = Mental State. NMS = Non-mental State. % = percentage of mothers using category of language at least once during the picture book task.
5.1.3 Descriptive Statistics: Child Mental and Non-Mental State Language

Table 5 provides descriptive statistics for child mental state and non-mental state vocabulary. Time 1 to Time 2 and Time 2 to Time 3 dependent sample t-tests were conducted for all child language variables listed in Table 5. As expected, there were significant increases in all child language categories from Time 1 to Time 2 and from Time 2 to Time 3, with all \( p < .05 \). Girls’ language was found to be superior to boys’ on all measures of language. For example, at Time 1, girls had a higher total non-mental state MCDI Vocabulary score, \( t(1, 69) = -2.29, p < .05 \), and a superior total MSSQ total mental state vocabulary score, \( t(1, 69) = -2.06, p < .05 \), compared to boys. This pattern of results was also found at Times 2 and 3.

Consistent with the theory that mother reports of children’s use of mental state terms is a valid measure of children’s social understanding, at Time 3 children’s total mental state vocabulary on the MSSQ was significantly related to their performance on Time 3 objective measures of social understanding including, performance on the Penny Hiding (deception) task, \( r_s(52) = .49, p < .001 \), the Move Object task (perspective-taking), \( r_s(52) = .24, p < .05 \), and with the relation between Time 3 total MSSQ vocabulary and the Letter Box task (emotion recognition) approaching significance, \( r_s(53) = .21, p < .06 \), one-tailed. Note that the reduced numbers in these analyses were due to the number of participants who did not complete the tasks (see section 5.1.5).
Table 5.  
**Descriptive Statistics for Time 1, Time 2 and Time 3 Child Language Variables**

<table>
<thead>
<tr>
<th>Child Language</th>
<th>Time 1 (N = 70)</th>
<th>Time 2 (N = 60)</th>
<th>Time 3 (N = 54)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(SD)</td>
<td>Range (max)</td>
<td>M(SD)</td>
</tr>
<tr>
<td><strong>MS Vocabulary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desires</td>
<td>0.57 (.91)</td>
<td>0-4 (11)</td>
<td>2.59 (2.05)</td>
</tr>
<tr>
<td>Emotions</td>
<td>1.56 (2.06)</td>
<td>0-11 (32)</td>
<td>6.45 (5.65)</td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.40 (0.84)</td>
<td>0-4 (13)</td>
<td>2.92 (3.73)</td>
</tr>
<tr>
<td>Total Mental State</td>
<td>2.45 (3.67)</td>
<td>0-17 (56)</td>
<td>11.07 (9.54)</td>
</tr>
<tr>
<td><strong>Non-MS vocabulary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Terms</td>
<td>21.64 (22.94)</td>
<td>0-90 (103)</td>
<td>62.45 (32.29)</td>
</tr>
<tr>
<td>Body Parts</td>
<td>11.94 (8.25)</td>
<td>0-26 (27)</td>
<td>21.06 (5.73)</td>
</tr>
<tr>
<td>Animal Names</td>
<td>15.25 (11.77)</td>
<td>0-41 (43)</td>
<td>31.16 (9.91)</td>
</tr>
<tr>
<td>Total NMS Vocabulary</td>
<td>175.22 (129.93)</td>
<td>10-509 (680)</td>
<td>410.53 (160.96)</td>
</tr>
<tr>
<td><strong>Total Vocabulary Score</strong></td>
<td>(MS + NMS vocabulary)</td>
<td>184.71 (140.24)</td>
<td>10-526 (736)</td>
</tr>
</tbody>
</table>

*Note.* Max = maximum score possible. MS = Mental state. NMS = Non-Mental State. Time 1 and Time 2 non-mental state vocabulary taken from the MacArthur Communicative Developmental Inventory – Words & Sentences form. Time 3 non-mental state vocabulary taken from the MacArthur Communicative Developmental Inventory – Level III form.
5.1.4 Descriptive Statistics: Child Self-Concept

*Mirror self-recognition.* My study was designed to capture a period during which there would be variation in children’s emerging self-concept at the time of the first testing session. I was thus interested in the variation of children’s performance on the mirror self-recognition task. Table 6 provides percentages of children passing and failing the mirror self-recognition task at both time points. The percentage of children passing the mirror task increased significantly between Time 1 and Time 2, $Z = -2.89, p < .005$.

<table>
<thead>
<tr>
<th></th>
<th>Time1 %</th>
<th>(n)</th>
<th>Time2 %</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>48</td>
<td>(29)</td>
<td>77</td>
<td>(46)</td>
</tr>
<tr>
<td>Fail</td>
<td>28</td>
<td>(17)</td>
<td>13</td>
<td>(8 )</td>
</tr>
<tr>
<td>Confound/ Non-compliant</td>
<td>23</td>
<td>(14)</td>
<td>10</td>
<td>(6 )</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>(60)</td>
<td></td>
<td>(60)</td>
</tr>
</tbody>
</table>

*Note.* Confound /Non-compliant = Children who would not allow the experimenter to put paint on their nose or who touched their nose during the baseline period.

*Child use of first-person pronouns.* My second measure of children’s basic self-concept at the time of the first testing session was their use of first-person pronouns. The mean number of first-person pronouns used by children was 1.10 ($SD = 1.12$) at Time 1 and 3.05 ($SD = 1.43$) at Time 2. Consistent with the theory that the acquisition of first-person pronouns precedes the acquisition of second-person pronouns, at Time 1 28 children (47%) reportedly used first-
person pronouns but did not use any second-person pronouns. In contrast, only one child (2%) was reported to use second-person but no first-person pronouns. The remaining 31 children (51%) used both first- and second-person pronouns (20%) or did not possess any pronouns at all (31%).

Table 7 provides descriptive statistics for child first-person pronoun use at Times 1 and 2 as reported by mothers on the MCDI. As can be seen in Table 7, at Time 1, ‘mine’ was the most commonly used pronoun such that there was a greater percentage of children using ‘mine’ than the second most common pronoun, ‘me’, $Z = -2.36, p < .02$. There was also a greater percentage of children using ‘mine’ exclusively (i.e., reported to be using ‘mine’ but no other pronoun) compared to the second most common pronoun used exclusively, ‘me’, $Z = -2.11, p < .05$. Furthermore, children’s use of the term ‘mine’ (but no other first-person pronoun) at Time 1 was related to children’s performance on the mirror task, $r_{(68)} = .24, p < .05$, one-tailed.

Table 7
Percentage of Children Using First-Person Pronouns at Time 1 and Time 2 as Reported on the MCDI

<table>
<thead>
<tr>
<th>First-Person Pronoun</th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% exclusive (n)</td>
<td>% (n)</td>
<td>% exclusive (n)</td>
</tr>
<tr>
<td>Mine</td>
<td>50 (30)</td>
<td>18 (11)</td>
<td>87 (52)</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Me</td>
<td>33 (20)</td>
<td>3 (2)</td>
<td>80 (48)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>I</td>
<td>17 (10)</td>
<td>3 (2)</td>
<td>55 (33)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>My</td>
<td>15 (9)</td>
<td>0 (0)</td>
<td>58 (35)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Myself</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>20 (12)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

At least one 1\textsuperscript{st} PP 58 (25) 98 (59)
At least one 2\textsuperscript{nd} PP 12 (7) 65 (39)

Note. % = percentage of children reported to be using pronoun at time of testing. % exclusive = percentage of children using pronoun but not using any other pronoun. MCDI = MacArthur Communicative Developmental Inventory. 1\textsuperscript{st} PP = First-person pronoun. 2\textsuperscript{nd} PP = Second-person pronoun.
Use of first and second person pronouns at Time 2. At Time 2, I was interested in the transitional period of self-other understanding during which children were still moving from use of first- to second-person pronouns. The mean number of second-person pronouns reportedly used by children was .12 (SD = .33) at Time 1 and 1.10 (SD = 1.01) at Time 2. Table 7 also provides the proportion of children using at least one first-person pronoun, and using at least one second-person pronoun at both Times 1 and 2. At Time 2, 59 out of 60 children (98%) possessed at least one first-person pronoun, but only 39 (65%) also possessed at least one second-person pronoun as reported by mothers on the MCDI. That is approximately half of children were still in transition from first- to second-person pronouns whereas the remaining children had already successfully acquired both first- and second-person pronouns.

5.1.5 Descriptive Statistics: Child Performance on Time 3 Objective Measures of Social Understanding

Table 8 provides descriptive statistics for children’s performance on the objective measures administered at Time 3. Also given is the number of children out of 54 (number of participants at Time 3) who completed each task. Of note, only 37 children completed the penny hiding deception task most likely due to the high performance demands.
Table 8.
Children’s Performance on Time 3 Objective Measures

<table>
<thead>
<tr>
<th>Task</th>
<th>M score (SD)</th>
<th>Max</th>
<th>Chance Performance</th>
<th>Number Completed task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letterbox Task</td>
<td>2.70 (1.02)</td>
<td>4</td>
<td>1.32</td>
<td>54</td>
</tr>
<tr>
<td>Situation Emotion Task</td>
<td>2.26 (1.00)</td>
<td>4</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>Deception</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penny Hiding</td>
<td>5.14 (2.77)</td>
<td>12</td>
<td>---</td>
<td>37</td>
</tr>
<tr>
<td>Perspectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move Object</td>
<td>3.48 (1.80)</td>
<td>4</td>
<td>---</td>
<td>54</td>
</tr>
<tr>
<td>Move Screen</td>
<td>0.37 (.83)</td>
<td>4</td>
<td>---</td>
<td>54</td>
</tr>
<tr>
<td>Looking Where</td>
<td>1.43 (1.33)</td>
<td>4</td>
<td>1</td>
<td>54</td>
</tr>
</tbody>
</table>

Max = maximum score possible. Chance Performance = Average performance expected if children were selecting at random.

A series of one sample *t*-tests were conducted to determine which Time 3 tasks were completed by children at a level above chance. It was found that, on average, children performed significantly above chance on the Letterbox task, *t*(53) = 9.65, *p* > .001, but were at chance on the Situation-Emotion task, *t*(52) = 1.79, *p* > .05. Children’s poor performance on the Situation-Emotion task was most probably due a serious confound in that during testing sessions several mothers independently reported that their child had a fear of Santa Claus, or had a fear of dogs (i.e., the two stimuli supposed to evoke ‘happiness’ from the protagonist).

There was adequate variation in children’s performance on the Penny-Hiding task (Table 8) with the majority of children (89%) who completed the task receiving a score above 0. There was also adequate variation in children’s performance on the Move-Object task (Table 8), but children’s performance on the move screen task was poor with the vast
majority of children (80%) receiving a score of 0 indicative of a floor effect. Children’s performance on the Looking-Where task was also at floor and was not significantly different from chance, t(53) = .83, p > .05. That children typically passed the move object but failed the move screen and looking where tasks is consistent with Doherty and Anderson’s (1999) theory that children’s perspective taking abilities develop gradually and that perspective taking tasks that require a richer understanding of perspectives are not passed until the latter stages of development. Due to children’s poor performance, the situation emotion, move screen and looking where tasks were excluded from subsequent analyses.

5.2 Changes across Time in Mother and Child Mental State Talk

To provide a coherent picture of mother and child language, I next examine whether the content and referent of mothers’ mental state utterances changed across time and how children’s use of mental state terms changed across time.

5.2.1 Changes across Time: Changes in the Content of Maternal mental State Language

First I assessed how the content of maternal mental state language changed over time. To this end, I conducted a 3 (Time: Time1, Time 2, Time 3) X 3 (Content: Desire, Emotion, Cognition) repeated measures analysis of variance to investigate how specific categories of maternal mental state talk changed over time. There was a main effect of Time, F(2, 108) = 6.67, p < .002, MSE = 119.04, η² = .12, such that mothers increased their talk about mental states over time and a significant effect of content, F(2, 108) = 33.43, p < .001, MSE = 1,036.55, η² = .41. On average, collapsed across all three time points, mothers talked
significantly more about emotions than cognitions, $t(53) = 2.55$, $p > .014$, and significantly more about cognitions than about desires, $t(53) = 6.35$, $p > .001$. There was also a significant Time x Content interaction, $F(4, 216) = 7.69$, $p < .001$, $MSE = 86.25$, $\eta^2_p = .14$. A series of paired samples $t$-tests revealed that the mean proportion of maternal talk about desires and emotions remained stable across time points (both $p$s > .12) but that maternal talk about thoughts and knowledge significantly increased between Times 1 and 2, $t(53) = 6.00$, $p < .001$, and between Times 2 and 3, $t(53) = -2.41$, $p < .001$, as illustrated in Figure 1.

![Figure 1. Changes across time in the content of mother mental state language](image)

**5.2.2 Changes across Time: Changes in the Referent of Maternal mental State Language across Time**

Next I assessed how the referent of mother language changed over time. To this end, I carried out a 3 (Time: Time 1, Time 2, Time 3) X 3 (Referent: child’s mental states, mother’s mental states, other’s mental states) analysis of variance. There was a significant effect of
Time, $F(2, 108) = 17.51, p < .001$, $MSE = 332.71$, $\eta^2_p = .23$, and a significant effect of Referent, $F(2, 108) = 17.51, p < .001$, $MSE = 332.71$, $\eta^2_p = .23$, but no significant interaction, $F(4, 108) = 1.36$, n.s. On average, collapsed across all three time points, mothers talked significantly more about other people’s mental states than their child’s mental states, $t(53) = -2.87, p < .006$, and talk more about their child’s mental states than their own mental states, $t(53) = 8.22, p < .001$. As illustrated in Figure 2 this trend was present at all three time points.

![Figure 2](image)

*Figure 2. Changes across time in the referent of mother mental state language*

### 5.2.3 Changes across time: Changes in Child Mental State Vocabulary

Next I assessed how children’s use of mental state terms changed over time. To this end, I carried out a $3 \times 3$ (Time: Time 1, Time 2, Time 3) X 3 (Category: desire, emotion, cognition) analyses of variance. There was a significant effect of Time, $F(2, 108) = 116.32, p < .001$, $MSE = 3415.47$, $\eta^2_p = .70$, and a significant effect of Category, $F(2, 108) = 104.96, p < .001$, $MSE = 1452.25$, $\eta^2_p = .67$, as well as a significant Time X Category interaction, $F(4,
216) = 42.23, $p < .001$, $MSE = 338.76$, $\eta^2_p = .45$. To explore this interaction further, I first conducted a series of paired samples $t$-tests to examine the degree to which children’s use of mental state terms changed between time points. All three categories of children’s mental state vocabulary significantly increased between Times 1 and 2 and between Times 2 and 3, all $p < .001$, but as shown in Figure 3, the interaction was due to a greater increase for emotion terms. This may be due to the fact that the emotion section of MSSQ included a greater number of words (maximum = 32) than the desire (maximum = 11) and cognitive (maximum = 12) sections of the MSSQ and thus there was greater scope for change.

![Figure 3](image_url)

*Figure 3.* Number of emotion, desire and think know terms used by children as reported by mothers on the MSSQ

### 5.3 Chapter Summary

At Time 1, there was variation in the number of children who possessed a basic self-concept (as measured by their mirror self-recognition and use of the term ‘mine’) and at Time
2 there was variation in the number of children whose self-concept was still in transition versus being more firmly in place (as measured by their use of both first- and second-person pronouns). On average, children initially used very few mental state terms but there was a significant increase in all categories of child mental state vocabulary (i.e., desire, emotion and cognitive terms) across time. There was also an increase in the proportion of desire, emotion and think/know utterances mothers used during the picture book task, with the proportion of think/know utterances increasing at a significantly greater rate than both desire and emotion talk.
Chapter 6  Results II: Time 1 Maternal Mental State Talk to Time 2 Child Use of Mental State Vocabulary and the Role of the Self-Concept

6.1  Introduction

In this section, I examine the relation between maternal mental state language at Time 1 (21 months) and child mental state vocabulary at Time 2 (27 months) and assess the degree to which this relation is moderated by early markers of children’s understanding of the distinction between self and other. More specifically, I test the hypotheses that for 21 month old children: A1) maternal talk about the child’s desires is the type of maternal talk that will be related to children’s later use of mental state vocabulary, and that B1) it will be specifically mother current desire talk (i.e., desire talk that describes the child’s presently experienced state of desire) as opposed to directive desire talk that is related to children’s later use of mental state vocabulary at 27 months, and C1) maternal talk about the child’s current desires will be especially helpful for those children who have a relatively poor understanding of the distinction between self and other as measured by their mirror self-recognition and use of the term ‘mine’. Where I conducted correlations and violations of normality occurred, non-parametric correlations \( r_s \) were used, and when the assumptions required for multiple regression analysis were not met, Kendall’s non-parametric partial correlations were used. When using regression I checked for the normality of the residuals using the Kolmogorov-Smirnov test for normality (Field, 2000) and I checked for particularly influential cases using Cooks-D test for influence (Tabachnick & Fidel, 2007).
6.2 Presentation of Regression Analyses

This results section contains frequent use of regression analyses. In many sections one regression model is repeated several times with the only difference being a change of the dependent variable. For example, in Tables X, Y and Z below, the variables entered into the models are exactly the same with the only difference between analyses being the dependent variable (Time 2 Desire Terms, Time 2 Emotion Terms, Time 2 Cognitive Terms). For the sake of brevity and to allow for easy comparison, I amalgamated such analyses into one table so that in the example below, Tables X, Y and Z would become Table Q.

<table>
<thead>
<tr>
<th>Table X</th>
<th>Table Y</th>
<th>Table Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable:</strong> Time 2 Desire Terms</td>
<td><strong>Dependent Variable:</strong> Time 2 Emotion Terms</td>
<td><strong>Dependent Variable:</strong> Time 2 Cognitive Terms</td>
</tr>
<tr>
<td>( \beta )</td>
<td>( \Delta R^2 )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>T1 Child Vocabulary</td>
<td>.11</td>
<td>T1 Child Vocabulary</td>
</tr>
<tr>
<td>T1 Child SES</td>
<td>.22</td>
<td>T1 Child SES</td>
</tr>
<tr>
<td>T1 Mother Language</td>
<td>.33 .00</td>
<td>T1 Mother Language</td>
</tr>
</tbody>
</table>

*Note. T1 = Time 1*

<table>
<thead>
<tr>
<th>Table Q</th>
<th>Example of Amalgamated Regression Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time 2 Mental State Terms</strong></td>
<td><strong>Desire Terms</strong></td>
</tr>
<tr>
<td></td>
<td>( \beta )</td>
</tr>
<tr>
<td>1. T1 Child Vocabulary</td>
<td>.11</td>
</tr>
<tr>
<td>2. T1 Child SES</td>
<td>.22</td>
</tr>
<tr>
<td>2. T1 Mother Language</td>
<td>.33 .00</td>
</tr>
</tbody>
</table>

*Note. T1 = Time 1*

My regression analysis typically involves variables entered into a model in two steps. I then report standardised beta weights (\( \beta \)) taken from the full model with all variables
included in the equation (i.e., the second step). To help remind the reader of which variables were entered into each step, I have put the number of the step that each variable was first entered in the left hand column. So in Table Q, Time 1 Child Vocabulary and Time 1 Child SES were first entered at Step 1, and Time 1 Mother language was entered at Step 2. The amount of additional variance ($\Delta R^2$) thus refers to the proportion of additional variance explained by entering Time 1 Mother Language to the model over and above that already explained by Child Language and Child SES.

6.3 **Time 1 Maternal mental State versus Physical State Talk: Non-Parametric Correlations**

Table 9 provides Kendall’s non-parametric partial correlations between Time 1 mother language used during the picture book task and Time 2 child mental state vocabulary as reported by mothers on the MSSQ while controlling for the appropriate Time 1 cross-lagged child language variable. For example, when analysing the relation between Time 1 mother language and Time 2 child desire terms, I controlled for *Time 1* child desire terms. As in previous research (Ruffman et al., 2002; Taumoepeau & Ruffman, 2006, 2008), mothers’ total mental state talk at Time 1 was significantly related to all four categories of children’s Time 2 mental state terms. In contrast, mothers’ total physical state talk at Time 1 was not significantly related to any of the four Time 2 child mental state term categories. Taken collectively this pattern of results suggests that maternal mental state but not physical state talk is related to children’s acquisition of mental state concepts.
Table 9. 
*Kendall’s Non-Parametric Partial Correlations between Time 1 Mother Language and Time 2 Child Mental State Vocabulary (Controlling for Time 1 Child Mental State Vocabulary)*

<table>
<thead>
<tr>
<th>Time 2 child MSSQ mental state vocabulary (N = 60)</th>
<th>Desire Terms</th>
<th>Emotion Terms</th>
<th>Cognitive Terms</th>
<th>Total MS Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 mother language:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mental state</td>
<td>.37***</td>
<td>.28**</td>
<td>.30***</td>
<td>.35***</td>
</tr>
<tr>
<td>Total physical state</td>
<td>.05</td>
<td>.06</td>
<td>.01</td>
<td>.07</td>
</tr>
</tbody>
</table>

**p < .01 (all significance tests are two-tailed).

*Note. All mother language variables were analysed as proportion of total utterances. MS = Mental State. MSSQ = Mental State Supplement Questionnaire.*

6.4 Preliminary regression analyses: Selecting covariates and assumptions of regression

In order to obtain a more thorough understanding of the relation between mother language and children’s social understanding I next used regression analysis. Preliminary analyses were conducted to identify control variables likely to mediate this relation. Mothers’ total utterances during the picture book task, the number of questions they asked their children during the picture book task, the mean length of utterances during the picture book task and the specific age of the child at the time of the first testing session were all considered but dismissed as likely mediators because they were not significantly related to any category of Time 1 maternal mental state language or Time 2 child total mental state vocabulary, all $r_s < .20$, and all $p > .10$. Socioeconomic status as measured by mother education was identified as a potentially confounding covariate as it was positively related to all relevant categories of Time 1 maternal mental state language as well as all categories of Time 2 child mental state vocabulary with $r_s$ ranging from .03 to .22 and $p$-values ranging from .89 to .05. Time 1
MCDI total vocabulary score (including all non-mental state and mental state terms) was strongly related to all categories of Time 2 child total mental and non-mental state vocabulary, all $ps < .01$, including children’s Time 2 total mental state vocabulary, $r_{s}(58) = .61$, $p < .001$ and was therefore considered an important control variable for all subsequent regression analyses.

6.5 The Content of Maternal mental State Talk: Maternal desires versus emotion versus think/know talk collapsed across all categories of referent (talk about the child, mother’s own and others’ mental states)

Taumoepeau and Ruffman (2006) and Symons et al. (2006) found that for young children (2 years old and younger) mothers’ total talk about desires was more likely (than talk emotions and cognitions) to be related to the child’s later social understanding. Because no other study has examined this issue, I carried out cross-lagged linear regressions in which I entered two control variables at the first step: SES and Time 1 child total MCDI vocabulary (including all mental state terms). I then entered Time 1 maternal talk about desires, talk about emotions, or talk about cognitions into the second step to determine whether any of these three variables accounted for additional variance in children’s use of mental state terms at Time 2. These analyses were repeated using various categories of children’s mental state vocabulary (i.e., desires terms, emotion terms, cognitive terms, total mental state vocabulary) as the dependent variable and control analyses were performed using categories of Time 2 child non-mental state vocabulary (action words, body parts, animal names, total non-mental state vocabulary) as the dependent variable. Of interest was the proportion of additional variance ($\Delta R^2$) explained by adding the Time 1 mother language variable to the regression model.
Consistent with Taumoepeau and Ruffman (2006), mother total talk about *desires* was the most consistent predictor of later child mental state vocabulary. Time 1 maternal talk about desires explained significant unique variance in two out of four categories of Time 2 child mental state vocabulary, including child cognitive terms, $\Delta R^2 = .13$, $p < .001$, and child total mental state vocabulary, $\Delta R^2 = .05$, $p < .05$, with the relation with desire terms approaching significance, $\Delta R^2 = .04$, $p < .093$. In contrast, mothers’ talk about emotions and maternal talk about cognitions was not related to any of the four categories of Time 2 child mental state terms: all $\Delta R^2 \leq .02$, all $p$s $> .10$. The effect of Time 1 maternal talk about desires was specific to children’s acquisition of *mental state* terms at Time 2. Thus, Time 1 talk about desires was not significantly related to Time 2 child MCDI action words, body parts, animal names or Time 2 child total Non-mental state vocabulary: all $\Delta R^2 < .01$, all $p$s $> .43$.

6.6 The Referent of Maternal mental State Talk: Maternal talk about the child’s versus her own versus others’ mental states collapsed across all categories of content (i.e., desires, emotions and cognitions)

Taumoepeau and Ruffman (2006) also found that mothers’ total talk about the child’s mental states (desires, emotions and cognitions) at 15 months was more likely (than talk about herself or others) to be related to the child’s later social understanding. Because no other study has examined this issue, I carried out cross-lagged linear regressions in which I entered two control variables at the first step: SES and Time 1 child total MCDI vocabulary (including all mental state terms). I then entered Time 1 maternal talk about her child’s mental states, talk about her own mental states, or talk about others’ mental states in the second step to determine whether any of these three variables accounted for additional variance.
Consistent with Taumoepeau and Ruffman (2006), mother total talk about the child’s mental states was the most consistent predictor of later child mental state vocabulary. Time 1 maternal talk about the child’s mental states explained unique variance in all four categories of Time 2 child mental state vocabulary, including child desire terms, $\Delta R^2 = .13, p < .001$, child emotion terms, $\Delta R^2 = .05, p < .05$, child cognitive terms, $\Delta R^2 = .11, p < .001$, and child total mental state terms, $\Delta R^2 = .09, p < .01$, even after accounting for SES and children’s total vocabulary at Time 1. In contrast, Time 1 maternal talk about her own or others’ mental states, either on their own or in combination, were not related to any of the four categories of Time 2 child mental state terms: all $\Delta R^2 \leq .02$, all $ps > .11$. Again, the effect of Time 1 maternal talk about the child’s mental states was specific to children’s acquisition of mental state terms at Time 2. Thus, Time 1 talk about the child’s mental states was not significantly related to Time 2 child MCDI actions words, body parts, animal names or Time 2 child total non-mental state vocabulary: $\Delta R^2 < .01$, all $ps > .10$.

6.7 The Content X Referent of Maternal mental State talk: Maternal talk about the child’s desires

Taumoepeau and Ruffman (2006) and Symons et al. (2006) found that maternal talk about the child’s desires is particularly important for young children’s later social understanding. Using cross-lagged linear regressions, I replicated these results. Having accounted for SES and Time 1 child MCDI total vocabulary (including all mental state terms), Time 1 maternal talk about the child’s desires was a significant predictor of two of four child categories: Time 2 child cognitive terms, $\Delta R^2 = .12, p < .001$, and Time 2 child total mental state terms, $\Delta R^2 = .05, p < .05$. In contrast, Time 1 maternal talk about the child’s cognitions and maternal talk about the child’s emotions were not related to any of the four
categories of Time 2 child mental state terms, including Time 2 child total mental state talk, \( \Delta R^2 < .01, ns \). In fact, no other specific aggregate of Time 1 maternal mental state language (including Time 1 maternal talk about her own thoughts and knowledge) was related to any category of Time 2 child vocabulary.

Again, the effect of Time 1 maternal talk about the child’s desires was specific to children’s acquisition of mental state terms. Talk about the child’s desires was not significantly related to Time 2 child MCDI action words, body parts, animal names or total non-mental state vocabulary: all \( \Delta R^2 = .00 \), all \( p > .88 \). In sum, my results are consistent with those of Taumoepeau and Ruffman (2006, 2008) and Symons et al. (2006) in demonstrating that with very young children, maternal talk about the child (as opposed to others) and about desires (as opposed to emotions or cognitions), and especially talk about the child’s desires is particularly important for later child social understanding for children 2 years old or younger.

### 6.8 Current Desire Talk versus Directive Desire Talk

Current versus directive desire talk: non-parametric correlations

The second aim of the present chapter (B1) was to test the hypothesis that mother current desire talk (desire talk that referred to a child’s presently experienced state of desire) as opposed to directives (desire talk used to soften instructions or requests, see section 2.2.5) is particularly helpful for children’s developing social understanding. Table 10 provides Kendal’s non-parametric partial correlations between Time 1 mother desire language used during the picture book task and Time 2 child mental state vocabulary as reported by mothers on the MSSQ, while controlling for the appropriate cross-lagged Time 1 child mental state vocabulary variable. For example, when analysing the relation between Time 1 mother
current desires and Time 2 child emotion terms, the appropriate cross-lagged variable was *Time 1* child emotion terms.

Table 10

*Kendall’s Rank-Order Partial Correlations Between Time 1 Mother Desire Language and Time 2 Child Mental State Vocabulary Controlling for Time 1 Child Mental State Vocabulary.*

<table>
<thead>
<tr>
<th>Time 2 Child MSSQ Mental State Vocabulary (N = 60)</th>
<th>Desire Terms</th>
<th>Emotion Terms</th>
<th>Cognitive Terms</th>
<th>Total MS Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 Mother Desire Language:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Desires</td>
<td>-.01</td>
<td>.27*</td>
<td>.15</td>
<td>.24*</td>
</tr>
<tr>
<td>Directive Desires</td>
<td>.07</td>
<td>.09</td>
<td>.17</td>
<td>.15</td>
</tr>
</tbody>
</table>

*p < .05 (all significance tests are two-tailed).

*Note.* All mother language variables were analysed as proportion of total utterances. MS = Mental State. MSSQ = Mental State Supplement Questionnaire.

As predicted, and as shown in Table 10, mother talk about her child’s *current* desires was the best predictor of children’s mental state vocabulary at Time 2 with Time 1 current desires significantly related to two out of four Time 2 categories of child mental state terms including children’s total mental state vocabulary. In contrast, Time 1 mother directive desire talk was not significantly related to any category of Time 2 child mental state language.

*Current versus directive desire talk: Regression analyses*

In order to obtain a more complete understanding of the relation between mother current desire language and children’s social understanding, I next used regression analysis. I created a series of regression models that would tell me whether Time 1 mother current desire talk predicted unique variance in children’s mental state vocabulary after accounting for children’s Time 1 total vocabulary (both mental state and non-mental state terms). Because mother current and directive desire talk were significantly related, $r_s(58) = .25, p < .05$, I
controlled for mother directive desire talk when assessing the relation between mother current
desire talk and children’s later use of mental state vocabulary to ensure that I had accounted
for any shared variance between these two Time 1 mother language variables.

I entered two control variables at the first step of the regression model: Time 1 child
total MCDI vocabulary (including all mental state terms) and Time 1 mother directive
desires. I then entered Time 1 mother talk about her child’s current desires in the second step
to determine whether this variable accounted for additional variance in categories of Time 2
mental state vocabulary. Table 11 provides standardised regression coefficients ($\beta$) for all
three variables entered into the model predicting categories of Time 2 child mental state
language. The coefficients that are presented are taken from the full model with all control
variables included in the regression equation. Also provided is the additional variance ($\Delta R^2$)
explained by adding mother current desire talk into the regression model. As can be seen in
Table 11, Time 1 mother current desire talk predicted significant unique variance in three out
of four categories of Time 2 child mental state vocabulary over and above that explained by
the two control variables.
Table 11 shows that there was a different pattern of results for mother directive desire talk. That is, mother directive desire talk did not predict significant unique variance in any category of Time 2 child mental state vocabulary over and above that already explained by children’s total vocabulary and mother current desire talk.

Current desire talk and children’s non-mental state vocabulary: regression analyses

Conceivably mother current desire talk could facilitate children’s acquisition of all vocabulary pertaining to people or all categories of vocabulary per se. To test this possibility the analyses presented in Table 11 were repeated but this time using children’s non-mental state vocabulary (body parts, actions, animal names, total non-mental state vocabulary) as the dependent variable. As can be seen in Table 12, Time 1 mother current desire talk was not significantly related to any category of Time 2 child non-mental state vocabulary suggesting...
that the relation between mother current desire talk and children’s vocabulary is specific to children’s acquisition of mental state vocabulary. Taken collectively, the pattern of results presented in this section suggests that mother current desire talk, but not directive desire talk, is related to children’s acquisition of mental state concepts.

Table 12
Summary of Linear Regression Statistics Predicting Time 2 Child Non-Mental State Language From Time 1 Mother Current Desire Talk, Controlling for Time 1 Child Total Vocabulary and Time 1 Mother Directive Desire Talk

<table>
<thead>
<tr>
<th>T2 Child Mental State Vocabulary (MSSQ)</th>
<th>Body</th>
<th>Action</th>
<th>Animal</th>
<th>Total NMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parts</td>
<td>β</td>
<td>ΔR²</td>
<td>β</td>
<td>ΔR²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. T1 child total vocabulary</td>
<td>.52***</td>
<td>.61***</td>
<td>.58***</td>
<td>.67***</td>
</tr>
<tr>
<td>1. T1 mother directive desires</td>
<td>.08</td>
<td>.13</td>
<td>.01</td>
<td>.09</td>
</tr>
<tr>
<td>2. T1 child current desires</td>
<td>-.18</td>
<td>.03</td>
<td>-.11</td>
<td>.02</td>
</tr>
</tbody>
</table>

Note. ***p < .001 (all significance tests are two-tailed). All mother language variables were analysed as proportion of total utterances. MSSQ = Mental State Supplement Questionnaire.

6.9 Current Desire Talk and the Role of Children’s Self-Concept: Mirror self-recognition

The third aim of this chapter (C1) was to examine whether children with a poorer understanding of the self-other distinction would be particularly likely to benefit from maternal talk about the child’s mental states. To examine this aim, I categorised children as passing or failing the mirror task and created an interaction term (Time 1 mirror task pass/fail x Time 1 maternal talk about children’s current desires). Using regression, I then examined whether, having accounted for Time 1 child total vocabulary (including all mental state
terms) and the interaction term constituents (e.g., the mirror task and maternal talk about children’s current desires), there was a significant effect for the interaction term, indicating maternal talk about the child’s current desires was particularly beneficial for one group over the other.

In step 1 of my Model 1 I entered Time 1 child total vocabulary (including all mental state terms), in step 2 I added both constituents of the interaction term (the mirror task and maternal talk about current desires) and in the final step I added the interaction term (mirror task*maternal talk about current desires). Table 13 (Model 1) provides standardised regression coefficients (β) for all four variables entered into Model 1 predicting various categories of Time 2 child mental state and non-mental state language. The coefficients that are presented are taken from the full model with all control variables and interaction terms included in the regression equation. Also provided is the additional variance (ΔR²) explained by adding the interaction term to the regression model. Time 1 mother current desire talk was related to all four categories of Time 2 child mental state vocabulary but no category of Time 2 child non-mental state vocabulary. The interaction term was also a significant predictor of all four Time 2 child mental state (but not non-mental state) term categories, such that the effect of mother current desire talk about the child was greater for children who did not recognise themselves in the mirror.

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3. To avoid violating the number of variables per cases rule for regression analysis, mother SES was not included in analyses containing an interaction term.
Table 13
Summary of Linear Regression Statistics Predicting Time 2 Child Language From Interaction Terms Between Time 1 Child Self-Concept Measures and Time 1 Mothers’ Current References to her Child’s Desires.

<table>
<thead>
<tr>
<th>TIME 2 CHILD VOCABULARY (Dependent Variable)</th>
<th>T2 Child Mental State Vocabulary (MSSQ)</th>
<th>T2 Child Non-Mental State Vocabulary (MCDI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desire Terms</td>
<td>Emotion Terms</td>
</tr>
<tr>
<td></td>
<td>β</td>
<td>ΔR²</td>
</tr>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. T1 child total vocabulary</td>
<td>.56***</td>
<td>.65***</td>
</tr>
<tr>
<td>1. T1 child mirror task</td>
<td>.04</td>
<td>.06</td>
</tr>
<tr>
<td>1. T1 maternal desire talk</td>
<td>.54**</td>
<td>.50**</td>
</tr>
<tr>
<td>2. T1 mirror*T1 desire talk</td>
<td>-.56***</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>-.06</td>
<td>.00</td>
</tr>
</tbody>
</table>

Model 2

|                                             |              |               |                 |           |                |               |              |              |
| 1. T1 child total vocabulary               | .55**        | .71***        | .64***          | .68***    | .52***         | .54***       | .58***       | .64***       |
| 1. T1 child use of ‘mine’                  | .17          | .08           | .04             | .09       | -.07           | .18          | -.07         | .08          |
| 1. T1 maternal desire talk                 | .40**        | .31*          | .44**           | .40***    | -.31*          | -.06         | -.29*        | -.08         |
| 2. T1 mine*T1 maternal desire              | -.46**       | .10           | -.25            | .03       | -.28           | .04          | -.31*        | .05          |
|                                           | .24          | .03           | -.03            | .00       | .29            | .00          | .03          | .00          |

***p < .001, **p < .01, *p < .05 (all significance levels two-tailed). 1 = Mother ‘current’ talk about the child’s desires. Note. All mother language variables were analysed as proportion of total utterances. MS = Mental State. NMS = Non-mental state, MCDI = MacArthur Communicative Developmental Inventory. MSSQ = Mental State Supplement Questionnaire. All regression statistics taken from the full model with both control variables entered into the equation.
6.10 Current Desire Talk and the Role of Children’s Self-Concept: Use of the Term ‘Mine’

There was a similar pattern when the analysis involving mirror self-recognition was repeated substituting children’s use of the term ‘mine’ as the measure of children’s self-concept included in the interaction term (Table 13, Model 2), with the interaction term a significant predictor of two of four child mental state term categories, including desire terms and total mental state terms. In contrast, there was no such pattern when analysing similar effects for Time 2 child non-mental state terms, with the direction of the relation even sometimes reversed.

6.11 Current Desire Talk and the Role of Children’s Self-Concept (split analyses)

The significant interactions described above suggest that maternal talk about the child’s desires was helpful for children who have a poor self-concept but not for those with a better self-concept, and this was indeed the case (see Table 14). For children who failed the mirror task, cross-lagged regressions indicated significant positive relations between mothers’ Time 1 talk about the child’s current desires and Time 2 child mental state terms (all four relations significant) after accounting for Time 1 child total vocabulary (including all mental state terms). Likewise, for children who did not use ‘mine’, the cross-lagged regressions were significant for four of four Time 2 child mental state categories. In contrast, for children who passed the self-concept measures, there were no significant relations found between maternal talk about children’s current desires and any category of Time 2 child mental state terms.
Table 14.
Summary of Linear Regression Statistics Predicting Child Mental and Non-Mental State Language at Time 2 from Time 1 Maternal talk about the Child’s Current Desires While Controlling for Child Time 1 Total Vocabulary

<table>
<thead>
<tr>
<th>T2 Mental State Vocabulary (MSSQ)</th>
<th>T2 Non-Mental State Vocabulary (MCDI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Desire Terms</strong></td>
<td><strong>Body Parts</strong></td>
</tr>
<tr>
<td><strong>Emotion Terms</strong></td>
<td><strong>Animal Names</strong></td>
</tr>
<tr>
<td><strong>Cognitive Terms</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total MS Vocabulary</strong></td>
<td><strong>Total NMS Vocabulary</strong></td>
</tr>
<tr>
<td><strong>Terms</strong></td>
<td><strong>β</strong></td>
</tr>
<tr>
<td><strong>T1 child total vocabulary</strong></td>
<td>.73***</td>
</tr>
<tr>
<td><strong>T1 (current) desires</strong></td>
<td>.20 .04</td>
</tr>
<tr>
<td><strong>Children passed mirror task</strong></td>
<td>(n = 28)</td>
</tr>
<tr>
<td><strong>1. T1 child total vocabulary</strong></td>
<td>.36†</td>
</tr>
<tr>
<td><strong>2. T1 (current) desires</strong></td>
<td>.57* .32</td>
</tr>
<tr>
<td><strong>Children failed mirror task</strong></td>
<td>(n = 20)</td>
</tr>
<tr>
<td><strong>1. T1 child total vocabulary</strong></td>
<td>.58***</td>
</tr>
<tr>
<td><strong>2. T1 (current) desires</strong></td>
<td>-.25 .06</td>
</tr>
<tr>
<td><strong>Children saying mine</strong></td>
<td>(n = 30)</td>
</tr>
<tr>
<td><strong>1. T1 child total vocabulary</strong></td>
<td>.46***</td>
</tr>
<tr>
<td><strong>2. T1 (current) desires</strong></td>
<td>.42** .17</td>
</tr>
<tr>
<td><strong>Children not saying mine</strong></td>
<td>(n = 30)</td>
</tr>
<tr>
<td><strong>1. T1 child total vocabulary</strong></td>
<td>.46***</td>
</tr>
<tr>
<td><strong>2. T1 (current) desires</strong></td>
<td>.42** .17</td>
</tr>
</tbody>
</table>

Note. ***p < .001, **p < .01, *p < .05, † p < .10 (all significance levels two tailed). All mother language variables analysed as proportion of her total utterances. MS = Mental State. NMS = Non-mental state, MCDI = MacArthur Communicative Developmental Inventory. MSSQ = Mental State Supplement Questionnaire. All regression statistics taken from the full model with both variables entered into the equation.
Fisher r-to-z transformations were conducted and Z-tests were performed in order to assess the significance of the difference between the correlation coefficients presented in Table 14 for children who did versus did not pass the mirror self-recognition task. When comparing children who failed the mirror self-recognition task to those who passed, there were significant differences in the correlations between Time 1 mother current desire talk and Time 2 child (a) emotion terms, \( Z = -2.03, p < .02 \), (b) cognitive terms, \( Z = -2.98, p < .001 \), and (c) total mental state vocabulary, \( Z = -2.70, p < .003 \). Correlations were higher for those children who failed the mirror self-recognition task compared to those who passed. The effect approached significance for Time 2 child desire terms, \( Z = -1.43, p < .07 \). Similarly, when comparing children who did not say ‘mine’ to those who did say ‘mine’, there were significant differences in the correlation between Time 1 mother current desire talk and Time 2 child (a) desire terms, \( Z = -2.58, p < .005 \), (b) cognitive terms, \( Z = -1.60, p < .05 \) and (c) total mental state vocabulary, \( Z = -2.47, p < .006 \) (again in the same direction). In addition, again the effect approached significance for Time 2 child desire terms, \( Z = -1.49, p < .07 \).

Although mother current desire talk was far more effective for children who failed the self-concept measures, it was not the case that mothers of the self-concept failers talked more about current desires with these children. Thus, there was no difference in the mean mother references to her child’s current desires in the children who passed versus failed the mirror self-recognition task, \( F(1, 45) = .92, p = .34, n.s. \) A similar result was obtained for children who did not use ‘mine’ and who did use ‘mine’, \( F(1, 59) = .12, p = .72, n.s. \)

6.12 The Relation between Mother Directive Desire Talk and Children’s Mental State Language

Finally, I carried out identical analyses to those in Table 14, but substituted mother directives (desire talk used to soften instructions) in place of maternal talk about the child’s
current desires. In Model 1 (when examining the interaction between the mirror task and mother directives), neither Time 1 maternal desire talk nor the interaction term (mirror task*directives) were related to any of the four categories of Time 2 child mental state talk, with βs hovering around 0 (β range = -.16 to .13). The same was true in Model 2 when examining the interaction between use of ‘mine’ and mother directives, again with βs hovering around 0 (β range = -.17 to .16). Thus, the results were very consistent in showing that it is maternal talk about the child’s current desires that is important for the child’s later social understanding and that interacts with the child’s self-concept, whereas other kinds of maternal desire talk are not as helpful.

6.13 What Type of Maternal Language Facilitated the Social Development of Children who did Pass the Self-Recognition Measures?

As mentioned in section 2.3.4 there are reasons for thinking that, maternal talk about her own cognitions will become increasingly important for children who possess a basic understanding of the distinction between self and other and my results provide evidence that this indeed was the case (Table 15). For children who passed the mirror task, cross-lagged regressions indicated significant relations between mothers’ Time 1 talk about her own thoughts and knowledge and Time 2 child mental state terms (three of four relations significant) after accounting for Time 1 child total vocabulary (including all mental state terms). In contrast, for children who failed the self-concept measures, there were no significant relations between maternal talk about her own thoughts and knowledge and
Table 15.

Summary of Linear Regression Statistics Predicting Child Mental and Non-Mental State Language at Time 2 from Time 1 Maternal talk about her own Thoughts and Knowledge While Controlling for Child Time 1 Total Vocabulary

<table>
<thead>
<tr>
<th></th>
<th>T2 Mental State Vocabulary (MSSQ)</th>
<th>T2 Non-Mental State Vocabulary (MCDI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desire Terms</td>
<td>Emotion Terms</td>
</tr>
<tr>
<td></td>
<td>$\beta$  $\Delta R^2$</td>
<td>$\beta$  $\Delta R^2$</td>
</tr>
<tr>
<td>Children passed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mirror task (n = 28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. T1 child total vocabulary</td>
<td>.66***</td>
<td>.66***</td>
</tr>
<tr>
<td>2. T1 mother T&amp;K</td>
<td>.26*</td>
<td>.07**</td>
</tr>
<tr>
<td></td>
<td>.25*</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>.63</td>
<td>.03</td>
</tr>
<tr>
<td>Children failed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mirror task (n = 20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. T1 child total vocabulary</td>
<td>.37**</td>
<td>.68**</td>
</tr>
<tr>
<td>2. T1 mother T&amp;K</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>-.12</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. ***p < .001, **p < .01, *p < .05, † p < .10 (all significance levels two-tailed). All mother language variables analysed as proportion of her total utterances. MS = Mental State. NMS = Non-mental state, MCDI = MacArthur Communicative Developmental Inventory. MSSQ = Mental State Supplement Questionnaire. All regression statistics taken from the full model with both variables entered into the equation.
any category of Time 2 child mental state terms, with most Time 2 mental state terms actually negatively related (but not significantly) to Time 1 mother think/know language. Fisher $r$ to $Z$ tests revealed that correlations were significantly higher for children who did pass the mirror task for two out of three categories of T2 mental state language, including emotion terms, $Z = 2.11, p < .02$, and total mental state vocabulary, $Z = 1.64, p < .05$. In addition, the effect was approaching significance for the Time 2 cognitive terms, $Z = 1.28, p < .10$. For children who did use the term ‘mine’, the cross-lagged regressions were also significant for one of the four Time 2 child mental state categories, Time 2 child desires, $\Delta R^2 = .10, p < .001$, whereas there were no significant relations between mother think know language and Time 2 child vocabulary for children who were not yet saying ‘mine’, (all $ps > .05$).

6.14 Reverse Analyses: The relation between Time 1 child mental state vocabulary and Time 2 maternal mental state talk.

To help determine the direction of causality between maternal mental state language and children’s mental state vocabulary, all regression analyses presented in Chapter 6 were conducted in reverse order with Time 1 child vocabulary predicting categories of Time 2 maternal mental state language while controlling for SES and maternal mental state language at the earlier time point. No significant regression coefficients were found. That is, after accounting for SES and the appropriate cross-lagged Time 1 maternal mental state language variable, no category of child mental state vocabulary predicted significant variance in any category of mother’s later mental state language. Thus results are consistent with the theory that the relation between mothers’ mental talk and children’s mental state language is unidirectional with the former facilitating changes in the latter.
When analyses were conducted across all participants it was found that there was an unidirectional relation between Time 1 maternal talk about the child’s mental states and especially the child’s current desires and Time 2 child use of mental state (but not non-mental state) vocabulary. This relation remained significant even when controlling for potentially mediating variables including mother SES and Time 1 child total vocabulary (including all mental states). When children were separated into groups depending on their self-understanding it was found that the facilitating effect of mother current desire talk was exclusive to those children who did not yet demonstrate an understanding of the distinction between self and other (as measured by their mirror self-recognition and use of the term ‘mine’). In contrast, for those who did demonstrate self-other understanding, Time 1 maternal talk about her own thoughts and knowledge was consistently related to Time 2 child mental state vocabulary.
Chapter 7  

Results III: Time 2 maternal mental state talk and Time 3 child use of mental state vocabulary and performance on objective measures of social understanding, and the role of the self-concept

7.1 Introduction

In this section, I examine the relation between maternal mental state language at Time 2 (27 months) and children’s social understanding at Time 3 (34 months) and assess the degree to which this relation is moderated by children’s self-other understanding. More specifically, I test the hypothesis that for 27 month olds: A) maternal talk about *her own thoughts and knowledge* will be particularly important for children’s later social understanding, and that C) maternal talk about her own thoughts and knowledge will be especially helpful for those children whose self-concept is still in transition (i.e., children who possess first- but not second-person pronouns) as opposed to those children whose self-concept is more firmly in place (i.e., children who possess both first- and second-person pronouns). For the sake of clarity, children’s Time 3 use of mental state terms (section 7.2) and Time 3 performance on objective measures (section 7.3) are examined separately.

7.2 Maternal mental State and Physical State Talk: Non-Parametric correlations

Unlike Time 1 to Time 2 analyses, the proportion of maternal mental state language mothers used during the picture book task (desires, emotions and cognitions) at Time 2 was not related to any category of children’s Time 3 use of mental state terms after accounting for children’s mental state terms at Time 1 (see Table 16).
Table 16.
Kendall’s Non-Parametric Partial Correlations between Time 2 Mother Language and Time 3 Child Mental State Vocabulary Controlling for Time 1 Child Mental State Language

<table>
<thead>
<tr>
<th>Time 3 Child MSSQ Mental State Vocabulary (N=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Desire Terms</strong></td>
</tr>
<tr>
<td>Total mental state</td>
</tr>
<tr>
<td>Total physical state</td>
</tr>
</tbody>
</table>

Note. *p < .05 (all significance tests are two-tailed). All mother language variables were analysed as proportion of total utterances. MS = Mental State. MSSQ = Mental State Supplement Questionnaire.

7.2.1 The Content of Maternal mental State Talk: Maternal desire versus emotion versus think/know talk collapsed across all categories of referent (talk about the child, mothers’ own and others’ mental states)

To investigate whether the content of Time 2 maternal mental state language was related to children’s use of mental state terms, I carried out cross-lagged linear regressions in which I entered two control variables at the first step: SES and Time 2 child total MCDI vocabulary (including all mental state terms). I then entered Time 2 maternal talk about desires, emotions or cognitions in the second step to determine whether any of these three variables accounted for additional variance in Time 3 child mental state vocabulary. It was found that no category of maternal mental state content accounted for variance in children’s mental state vocabulary over and above that already explained by SES and Time 2 child total MCDI vocabulary, with all $\Delta R^2$ ranging between 0 and .03 and all $ps > .10$. 
7.2.2 The Referent of Maternal mental State Talk: Maternal talk about the child’s versus her own versus others’ mental states collapsed across all categories of content (i.e., desires, emotions and cognitions).

To investigate whether the referent of Time 2 maternal mental state language was related to children’s use of mental state terms, I continued cross-lagged linear regressions in which I entered two control variables at the first step: SES and Time 2 child total MCDI vocabulary (including all mental state terms). I then entered Time 2 maternal talk about her child’s mental states, talk about her own mental states, or talk about others’ mental states in the second step to determine whether any of these three variables accounted for additional variance in Time 3 child mental state vocabulary. It was found that no category accounted for variance in children’s mental state vocabulary over and above that already explained by SES and Time 2 child total MCDI vocabulary, with all $\Delta R^2$ ranging between 0 and .03 and all $ps > .10$.

7.2.3 The Content X Referent of Maternal mental State talk: Maternal talk about the child’s desires and maternal talk about her own cognitions

Taumoepeau and Ruffman (2006, 2008) found that maternal talk about her own cognitions became increasingly important for slightly older children. Using cross-lagged linear regressions, I replicated these results. Having accounted for SES and Time 2 child MCDI total vocabulary (including all mental state terms), Time 2 maternal talk about her own cognitions predicted significant unique variance in three out of four categories of child Time 3 mental state vocabulary: Time 3 desire terms, $\Delta R^2 = .05, p < .05$, cognitive terms, $\Delta R^2 = .06, p < .02$, and Time 3 total MCDI vocabulary, $\Delta R^2 = .07, p < .02$, with the relation with Time child emotion terms approaching significance, $\Delta R^2 = .05, p < .10$. 
Interestingly, I also found that maternal talk about the child’s desires also remained a significant predictor of children’s later use of mental state terms. Time 2 talk about the child’s desires predicted significant variance in three out of four categories of Time 3 child mental state language: Time 3 child desires terms, $\Delta R^2 = .06, p < .04$, emotion terms, $\Delta R^2 = .07, p < .04$, and Time 3 child total mental state terms, $\Delta R^2 = .06, p < .05$, with the relation between Time 2 maternal talk about the child’s desires and Time 3 cognitive terms approaching significance, $\Delta R^2 = .03, p < .10$. Given that maternal talk about her child’s desires and maternal talk about her own cognitions were not related, $r_s(58) = .05, p > .96$, my findings are consistent with the theory that at 27 months, maternal talk about her child’s desires and maternal talk about her own cognitions both predict unique variance in children’s later use of mental state terms.

Recall that at Time 1 only mothers’ current references to her child’s desires were related to children’s later use of mental state vocabulary. This was also the case at Time 2 although the disparity was less marked perhaps due to the fact that, on average, there were significantly less mother current desire utterances at Time 2 compared to Time 1, $t(59) = -2.90, p < .005$, (see Table 4), and therefore less variance in the Time 2 variable. Nevertheless, Time 2 mother current desire utterances predicted variance in Time 3 child emotion terms, $\Delta R^2 = .13, p < .004$, and was approaching significance for Time 3 child total mental state vocabulary, $\Delta R^2 = .04, p < .10$. In contrast Time 2 mother directive desire utterances were not related to any of the four categories of Time 3 child mental state vocabulary with $\Delta R^2$ ranging from .01 to .02 and all $ps > .23$.

No other specific aggregate of Time 2 maternal talk other than maternal talk about her own cognitions and talk about her own desires (i.e., talk about the child’s cognitions, child’s emotions, mother’s desires, mother’s emotions, others’ desires, others’ emotions, others’ cognitions) was positively related to any category of Time 3 child mental state vocabulary.
with most $\Delta R^2$ hovering around 0 and all $ps > .10$. The effect of both Time 2 maternal talk about the child’s desires and mother’s cognitions was specific to children’s later use of mental state terms and was not significantly related to any Time 3 control category including child MCDI action words, or animal names: all $\Delta R^2 = 0$, all $ps > .88$. In sum, my results are consistent with those of Taumoepeau and Ruffman (2006, 2008) in demonstrating that maternal talk about her own cognitions becomes increasingly important for slightly older children.

In section 7.2.1 and 7.2.2 I found that broad categories of the content and referent of Time 2 maternal mental state talk did not predict children’s later social understanding. Why might this be? More specifically, if Time 2 maternal talk about her own cognitions was a reliable predictor of children’s social understanding then why didn’t the broader categories of Time 2 mother total talk about her own mental states (desires, emotions and thoughts and knowledge) and Time 2 mother total talk about thoughts and knowledge (her own, her child’s and others) also predict children’s later social understanding? The answer to this question might lie in the fact that maternal talk about her own emotions tended to be negatively related to children’s later use of mental state terms (but not significantly so) which might have ‘washed out’ any broader relation between Time 2 mother total talk about her own mental states and Time 3 child social understanding. Similarly, Time 2 maternal talk about her child’s cognitions accounted for over 56 percent of all mother think-know talk and tended to be slightly negatively related to Time 3 child mental state vocabulary. For example, the standardised correlation coefficient between Time 2 maternal talk about her child’s cognitions and Time 3 child total mental state vocabulary was, $\beta = -.07, p > .05$, which may have weakened the overall relation between Time 2 mother total talk about thoughts and knowledge and Time 3 child total mental state vocabulary.
7.2.4 Maternal talk about Her Own Cognitions and the Role of Children’s Self-Concept: From first- to second-person pronouns

The second aim of the present section was to examine whether children whose self-other distinction was still in transition (as opposed to more firmly in place) would be particularly likely to benefit from maternal talk about her own cognitions. To examine this hypothesis, I categorised children into two groups: those who reportedly did not yet use any second-person pronouns and those who possessed at least one second-person pronoun\(^4\), and I created an interaction term (Time 2 pronoun use × Time 2 maternal talk about her own cognitions). Using regression, I then examined whether, having accounted for Time 2 child total vocabulary (including all mental state terms) and constituents (e.g., Time 2 pronouns and maternal talk about her own cognitions), there was a significant effect for the interaction term, indicating that maternal talk about her own cognitions was particularly beneficial for one group over the other.

In step 1 of the Model 1, I entered Time 2 child total vocabulary (including all mental state terms), in step 2 I added both constituents of the interaction term (Time 2 second-person pronouns and maternal talk about her own cognitions), and in the final step I added the interaction term (second-person pronouns × maternal talk about her own cognitions)\(^5\). Table 17 provides standardised regression coefficients (\(\beta\)) for all four variables entered into Model 1 predicting various categories of Time 2 child mental state and non-mental state language. The

\(^4\) Recall that all children (except one) possessed at least one first-person pronoun at the Time of the second testing session (see section 5.1.2). Thus, the two groups included those children who were still in transition from first- to second-person pronouns versus those who had successfully acquired both first- and second-person pronouns.

\(^5\) To avoid violating the number of variables per cases rule for regression analysis, mother SES was not included in analyses containing an interaction term. The interaction terms created and children’s SES were not significantly related suggesting that omission of the SES variable would not affect the relation between the interaction terms and the dependent variables.
coefficients that are presented are taken from the full model with all control variables and interaction terms included in the regression equation. Also provided is the additional variance ($\Delta R^2$) explained by adding the interaction term to the regression model. Time 2 maternal talk about her own cognitions was related to all four categories of Time 3 child mental state vocabulary but no category of Time 3 child non-mental state vocabulary. The interaction term was also a predictor of unique variance in all four Time 3 child mental state (but not non-mental state) term categories, such that the effect of maternal talk about her own cognitions was greater for children who had not yet acquired any second-person pronouns.
Table 17

*Summary of Linear Regression Statistics Predicting Time 3 Child Language from Interaction Terms Between Time 2 Child Self-Concept Measures and Time 2 Maternal talk about Her Own Thoughts and Knowledge.*

<table>
<thead>
<tr>
<th>TIME 3 CHILD VOCABULARY (N = 54)</th>
<th>T3 Child MS Vocabulary (MSSQ)</th>
<th>T3 Child NMS Vocabulary (MCDI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desire Terms</td>
<td>Emotion Terms</td>
</tr>
<tr>
<td>1. T2 child total vocabulary</td>
<td>.61***</td>
<td>.63***</td>
</tr>
<tr>
<td>1. T2 child at least one 2nd PP</td>
<td>.02</td>
<td>-.22</td>
</tr>
<tr>
<td>1. T2 mother T/K</td>
<td>.68***</td>
<td>.47*</td>
</tr>
<tr>
<td>2. T2 2nd PP x T2 mother T/K</td>
<td>-.63***</td>
<td>.12</td>
</tr>
</tbody>
</table>

**Full Model**

***p < .001, **p < .01, *p < .05, †p < .10 (all significance levels two-tailed). Note. All mother language variables were analysed as proportion of total utterances. MS = Mental State. NMS = Non-mental state, MCDI = MacArthur Communicative Developmental Inventory. MSSQ = Mental State Supplement Questionnaire. PP = person pronoun.**
To examine whether maternal talk about the child’s desires also interacted with children’s use of second-person pronouns I carried out identical analyses to those in Table 17, but substituted maternal talk about the child’s desires or maternal talk about the child’s current desires in place of maternal talk about her own cognitions. When examining the interaction between children’s second-person pronouns and maternal talk about her child’s desires (current or directives) the interaction term was not related to any of the four categories of Time 2 child mental state talk, with $\beta$s hovering around 0 ($\beta$ range = -.16 to .13). Thus, the results were consistent in showing that it is maternal talk about her own cognitions that interacts with the child’s self-concept in this age group when the self-concept is still in transition.

7.2.5 Mother Think/Know Talk and the Role of Children’s Self-Concept (split analyses)

The significant interactions described above suggest that maternal talk about her own cognitions is helpful for children whose self-concept is still in transition but not for those with a better self-concept, and this was indeed the case (see Table 18). For children who did not yet possess any second-person pronouns, Kendal’s partial rank-order correlations$^6$ indicated significant relations between mothers’ Time 2 talk about her own cognitions and Time 2 child mental state terms (all four relations significant) after accounting for Time 2 child total vocabulary (including all mental state terms). In contrast there were no significant partial correlations between mothers’ Time 2 think/know language and Time 3 mental state vocabulary for children who possessed both first- and second-person pronouns. There were no significant relations between maternal talk about her own thoughts and knowledge and any

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$^6$ In this instance Kendal’s rank-order partial correlations were used instead of regression because when regression was performed it was found that residuals were not normally distributed.
category of Time 3 child non-mental state terms and there were no significant partial
correlations between Time 2 maternal talk about the child’s desires and Time 3 child mental
state vocabulary.

Table 18.
\textit{Kendall’s Partial Rank-Order Correlations between Time 2 Mother Language and Time 3 Child
Mental State Vocabulary Controlling for Time 2 Child Total Language}

<table>
<thead>
<tr>
<th>Time 3 Child MSSQ MS vocabulary</th>
<th>Desire Terms</th>
<th>Emotion Terms</th>
<th>Cognitive Terms</th>
<th>Total MS Terms</th>
</tr>
</thead>
</table>
| \textit{Children with no 2\textsuperscript{nd} PP
pronouns at Time 2 (n = 20)}    |              |               |                 |                |
| T2 maternal talk about her own T&K | .51***       | .29*          | .41**           | .40**          |
| \textit{Children with at least
one 2\textsuperscript{nd} PP at Time 2 (n = 34)} |              |               |                 |                |
| T2 maternal talk about her own T&K | .16          | .09           | .27             | .21            |

Note. ***p < .001, **p < .01, *p < .05. All mother language variables were analysed as proportion of total utterances. MS = Mental State. ‘MSSQ = Mental State Supplement Questionnaire. 2\textsuperscript{nd} PP = Second person pronouns. T&K = thoughts and knowledge.

Although mother think/know talk was more effective for children who did not yet use
second-person pronouns, it was \textit{not} the case that mothers of such children talked more about
their own cognitions. Thus, there was no difference in the mean mother references to their
own thoughts and knowledge in children who did versus did not have second-person
pronouns, \(F(1, 53) = 2.83, p > .05, n.s.\)

\textbf{7.2.6 Reverse Analyses: The relation between Time 2 child mental state vocabulary and
Time 3 maternal mental state talk}
To help determine the direction of causality between maternal mental state language and children’s mental state vocabulary, all regression analyses presented in sections 7.21 to 7.23 were conducted in reverse order, with Time 2 child vocabulary predicting categories of Time 3 maternal mental state language while controlling for SES, children’s general language and maternal mental state language at the earlier time point. In no case was early child talk a predictor of later maternal talk. That is, after accounting for SES, children’s general language and the appropriate cross-lagged Time 1 maternal mental state variable, no category of child mental state vocabulary predicted significant variance in any category of mother’s later mental state language.

7.2.7 Section Summary

In contrast to Time 1 to Time 2, analyses of broad categories of Time 2 maternal mental state content and referent were not predictive of Time 3 child use of mental state terms. This may be because some aggregates of these broader terms were slightly negatively related to children’s later mental state vocabulary. However, when more fine-grained analyses were performed it was found that Time 2 maternal talk about her child’s desires but also Time 2 maternal talk about her own thoughts and knowledge were related to children’s later use of mental state vocabulary at Time 3. Furthermore, it was found that the facilitating effect of maternal talk about her own thoughts and knowledge was greater for those children whose self-other understanding was still in transition (as evidenced by their lack of second-person pronouns) compared to those whose self-other understanding was more firmly in place.
7.3 **Time 2 Mother Language and Time 3 Child Performance on Objective Measures of Social Understanding**

Next, I examined which categories of Time 2 mother language were related to Time 3 child performance on objective measures. For the following analyses, assumptions of regression were not met (i.e., residuals tended to be non-normally distributed) and therefore non-parametric partial correlations were used.

### 7.3.1 The Relation between Time 3 Objective Measures

Table 19 provides Spearman’s non-parametric zero-order correlations between Time 3 child social understanding tasks. As can be seen children’s performance on the Letterbox Task at Time 3 was related to Time 3 performance on the Penny Hiding and Move Object tasks with the relation between children’s performance on the Penny Hiding and move-object task approaching significance ($p = .07$).

<table>
<thead>
<tr>
<th>Time 3 Task</th>
<th>Letterbox Task (Emotion) ($N = 54$)</th>
<th>Penny Hiding (Deception) ($N = 37$)</th>
<th>Move-Object (Perspectives) ($N = 54$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letterbox</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deception</td>
<td>.29*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Move Object</td>
<td>.33*</td>
<td>.24†</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. † $p < .10$, * $p < .05$ (all significance tests one-tailed).*

### 7.3.2 The Relation between Time 2 Mother Language and Children’s Performance on Objective Measures of Social Understanding at Time 3
Next, I assessed which categories of Time 2 maternal mental state language were related to Time 3 child performance on objective measures of social understanding. Table 20 provides non-parametric partial correlations between all categories of Time 2 mother language and Time 3 child task performance while controlling for Time 2 child total vocabulary (including all mental state terms).

Table 20.
Kendall’s Non-Parametric Partial Correlations Between Time 2 Maternal Language and Time 3 Child Task Performance Controlling for Time 2 Child Total Vocabulary

<table>
<thead>
<tr>
<th>Time 2 Mother Language</th>
<th>Letterbox (Emotion) (N=54)</th>
<th>Penny Hiding (Deception) (N=37)</th>
<th>Move Object (Perspective Taking) (N=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total MS</td>
<td>.33***</td>
<td>.20†</td>
<td>.00</td>
</tr>
<tr>
<td>Total NMS</td>
<td>.14</td>
<td>.20†</td>
<td>.03</td>
</tr>
<tr>
<td>Total Child MS</td>
<td>.27**</td>
<td>-.06</td>
<td>.07</td>
</tr>
<tr>
<td>Total Mother MS</td>
<td>.23**</td>
<td>.20†</td>
<td>.30**</td>
</tr>
<tr>
<td>Total Other MS</td>
<td>.12</td>
<td>-.27*</td>
<td>-.12</td>
</tr>
<tr>
<td>Total Desires</td>
<td>.00</td>
<td>-.16</td>
<td>.04</td>
</tr>
<tr>
<td>Total Emotions</td>
<td>.25**</td>
<td>-.02</td>
<td>.08</td>
</tr>
<tr>
<td>Total Think/Know</td>
<td>.27**</td>
<td>.07</td>
<td>.08</td>
</tr>
<tr>
<td>Child’s Desires</td>
<td>.10</td>
<td>-.11</td>
<td>.07</td>
</tr>
<tr>
<td>- Current Desires</td>
<td>.03</td>
<td>.31**</td>
<td>.36**</td>
</tr>
<tr>
<td>- Directive Desires</td>
<td>.03</td>
<td>-.01</td>
<td>.03</td>
</tr>
<tr>
<td>Child Emotion</td>
<td>.16†</td>
<td>.15</td>
<td>.18†</td>
</tr>
<tr>
<td>Child Think/Know</td>
<td>.15</td>
<td>-.01</td>
<td>.03</td>
</tr>
<tr>
<td>Maternal desire</td>
<td>.02</td>
<td>.23†</td>
<td>.11</td>
</tr>
<tr>
<td>Mother Emotion</td>
<td>-.18†</td>
<td>-.18</td>
<td>.09</td>
</tr>
<tr>
<td>Mother Think/Know</td>
<td>.20*</td>
<td>.19*</td>
<td>.16†</td>
</tr>
<tr>
<td>Other Desires</td>
<td>-.08</td>
<td>-.15</td>
<td>-.07</td>
</tr>
<tr>
<td>Other Emotions</td>
<td>.23**</td>
<td>-.18</td>
<td>-.10</td>
</tr>
<tr>
<td>Other Think/Know</td>
<td>-.03</td>
<td>-.09</td>
<td>-.13</td>
</tr>
</tbody>
</table>

Note. ***p < .001, **p < .01, *p < .05, †p < .10. MS = Mental State. NMS = Non-mental State. All mother language variables were analysed as proportion of total utterances.

As shown in Table 20, two categories of Time 2 maternal mental state language were related to all three Time 3 child object measures of social understanding (with the magnitude
of the relation either significant or approaching significance). They were Time 2 mother total references to her own mental states (Total Mother MS) and Time 2 mother references to her own thoughts and knowledge (Mother Think/Know). Not surprisingly, children’s ability to recognise emotions (Letterbox Task) was related to categories of maternal talk about emotions (i.e., Time 2 total emotion, Time 2 child’s emotion and Time 2 others’ emotions). Yet interestingly, Time 3 Letterbox task performance was also related to aggregates of maternal talk about thoughts and knowledge and especially the mother’s own thoughts and knowledge. Maternal talk about children’s current desires was related to two out of three Time 3 tasks (Penny Hiding and Move Object) whereas mother directive desires talk was not related to any Time 3 objective measure. Of note, at Time 2 only one out of 54 mothers made a reference to her own desires (< 2%) and only four mothers (< 8 %) made a reference to her own emotions during the picture book task (see Table 4, section 5.1.2) and therefore correlations between these categories of mother language and child task performance are potentially spurious.

7.3.3 Mother Think/Know Talk and the Role of Children’s Self-Concept (split analyses)

Although there was a consistent positive relation between maternal talk about her own cognitions and children’s later task performance, contra to my hypothesis, there was no evidence suggesting that this relationship is moderated by children’s self-concept. When children were split into two groups (those who did versus did not possess second-person pronouns), Kendall’s partial rank-order correlations (controlling for all child language at Time 2) indicated no significant relations between mother think/know language and children’s later performance on objective social understanding measures. Indeed, correlations
were approximately equal for the two groups (see Table 21). Due to the large number of children who did not complete the Penny Hiding task children could not be broken down into smaller groups and thus the Penny Hiding task is excluded from the analyses presented in Table 21.

Table 21. Kendall’s Non-Parametric Partial Correlations Between Time 2 Maternal Language and Time 3 Child Mental State Vocabulary Controlling for Time 2 Child Total Language

<table>
<thead>
<tr>
<th>Time 3 Child Social Understanding Task</th>
<th>Letterbox (Emotion)</th>
<th>Move Object (Perspective Taking)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with no 2nd PP pronouns at Time 2 (n = 20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2 maternal talk about her own T&amp;K</td>
<td>.15</td>
<td>.12</td>
</tr>
<tr>
<td>Children with at least one 2nd PP at Time 2 (n = 34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2 maternal talk about her own T&amp;K</td>
<td>.19</td>
<td>.15</td>
</tr>
</tbody>
</table>

Note. ***p < .001, **p < .01,*p < .05. All mother language variables were analysed as proportion of total utterances. MS = Mental State. MSSQ = Mental State Supplement Questionnaire. 2nd PP = second-person pronouns. T&K = thoughts and knowledge.

7.4 Section Summary

The same categories of Time 2 maternal mental state language that were consistently related to children’s later mental state vocabulary (i.e., Time 2 maternal talk about her child’s current desires and Time 2 maternal talk about her own thoughts and knowledge) were also consistently related to Time 3 child performance on objective measures of social understanding. However, contra to my hypothesis, unlike the relation between mother
language and children’s acquisition of mental state vocabulary, the facilitating effect of mothers’ talk about their own cognitions was not exclusive to children whose self-concept was still in transition.

### 7.5 Results Summary

*Maternal mental state talk and children’s social understanding*

To help summarise the longitudinal relations between maternal mental state talk and children’s social understanding Table 22 provides the number of significant relations between categories of maternal mental state language and children’s later mental state vocabulary and performance on objective social understanding (having accounted for children’s earlier talk).

<table>
<thead>
<tr>
<th>Table 22. Number of Significant Correlations Between Maternal mental State Language and Later Child Mental State Language and Social Understanding Task Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column A</td>
</tr>
<tr>
<td>21-27 months&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>27 – 34 months&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Mother Language</strong></td>
</tr>
<tr>
<td>Total Child MS</td>
</tr>
<tr>
<td>Total Mother MS</td>
</tr>
<tr>
<td>Total Other MS</td>
</tr>
<tr>
<td>Total Child’s desires</td>
</tr>
<tr>
<td>- Current desires</td>
</tr>
<tr>
<td>- Directive desires</td>
</tr>
<tr>
<td>Mothers T&amp;K</td>
</tr>
<tr>
<td>Total Possible Correlations</td>
</tr>
</tbody>
</table>

*Note.*<sup>a</sup> = total of four child mental state language measures correlations taken from regression analyses. *b* = total of seven child mental state measures including four measures of child mental state vocabulary and three measures of child performance on objective social understanding tasks. * Indicates a negative correlation. All correlations were calculated while controlling for children’s total language (including all mental state terms) at the earlier time point. Correlations between mother language and children’s mental state vocabulary (but not task performance) were conducted while controlling for mother SES.
As can be seen in Table 22, maternal talk about her child’s mental states, about the child’s desires and especially the child’s current desires at 21 months were the only categories of mother language significantly associated with children’s later social understanding at 27 months (Column A). This is a similar finding to that of Taumoepeau and Ruffman (2008). At 27 months, maternal talk about the child’s current desires remained a significant predictor of indices of children’s later social understanding. However, as expected maternal talk about her own mental states and especially her own thoughts and knowledge was the most consistent predictor of children’s later social understanding with maternal talk about her own thoughts and knowledge significantly related to six out of seven measures of children’s social understanding (Column B). The increasing importance of mothers’ talk about her own mental states and especially her own thoughts and knowledge as children grow older is also similar to the findings of Taumoepeau and Ruffman.

Maternal mental state talk and children’s social understanding: The role of the self-concept

The main aim of this thesis was to assess whether the relation between maternal mental state talk and children’s social understanding is moderated by children’s comprehension of the distinction between self and other. Table 23 provides the number of significant positive correlations between maternal mental state talk and children’s later mental state vocabulary separately for children who did versus did not pass measures of self-understanding at the earlier testing session. For example, the top row of Column A shows the number of significant correlations between Time 1 maternal talk about children’s current desires and Time 2 child social understanding. There were four such correlations for children who failed the mirror task (i.e., who had a poor self-concept) but zero such correlations for children who passed the mirror task (i.e., who had a good self-concept). The relation between
maternal mental state talk and child performance on Time 3 objective measures is not included in Table 19 because children’s performance on objective measures did not differ depending of their level of self-other understanding.

Table 23.
Number of Significant Relations Between Maternal mental State Language and Later Child Mental State Vocabulary

<table>
<thead>
<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-27 months</td>
<td>21-27 months</td>
<td>27-34 months</td>
<td></td>
</tr>
<tr>
<td>Mirror-Task</td>
<td>Using ‘Mine’?</td>
<td>2nd P Pronouns?</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Passed</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mother Language

Child’s Current desires

<table>
<thead>
<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
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<td>21-27 months</td>
<td>27-34 months</td>
<td></td>
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<td>Mirror-Task</td>
<td>Using ‘Mine’?</td>
<td>2nd P Pronouns?</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Passed</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mothers’ own thoughts and knowledge

<table>
<thead>
<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
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<td>Using ‘Mine’?</td>
<td>2nd P Pronouns?</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Passed</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Total Possible Correlations

<table>
<thead>
<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>Mirror-Task</td>
<td>Using ‘Mine’?</td>
<td>2nd P Pronouns?</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Passed</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note. All relations were calculated while controlling for children’s total language (including all mental state terms) at the earlier time point. 2nd P Pronouns = Second-Person Pronouns. *Although there were no significant relations when children were split into those who had and did not have second-person pronouns, recall that maternal talk about children’s desires at 27 months was a significant predictor of children’s mental state talk at 34 months.

As shown in Table 23, maternal talk about her child’s current desires was related to children’s later mental state vocabulary only when spoken to 21-month-old children who lacked a rudimentary understanding of the distinction between self and other as measured by their mirror self-recognition and use of the term ‘mine’. In stark contrast, at the same age maternal talk about her own thoughts and knowledge was related to children’s later mental state vocabulary when children did pass the mirror self-recognition task and did use the term ‘mine’. Furthermore, maternal talk about her own thoughts and knowledge was related to children’s later mental state vocabulary when spoken to 27-month-old children who used
first- but not second-person pronouns, but not for children used both first- and second-person pronouns. Taken collectively these findings are consistent with the theory that maternal talk about the child’s current desires is most helpful for children who lack a basic self-concept, whereas maternal talk about her own thoughts and knowledge is most helpful for children whose self-concept is still in transition but not yet firmly in place.
Chapter 8  Discussion

8.1  Introduction

The purpose of this study was to assess the relation between maternal mental state talk and children’s social understanding and the degree to which this relation is moderated by children’s understanding of the distinction between self and other. Working within a social constructivist framework and drawing upon Vygotsky’s principle of a zone of proximal development, I argued that the specific type of maternal mental state talk that is most likely to facilitate advancements in children’s social understanding changes over time and depends on (amongst other things): 1) the child’s current level of social understanding and 2) the child’s understanding of the distinction between self and other.

8.2  Summary of Hypotheses

Recall that my hypotheses were categorised into three sections. First, I wanted to re-test Taumoepeau and Ruffman’s (2006; 2008) theory that around a child’s second birthday there is a shift in importance in the specific type of maternal mental state talk most likely to be related to children’s later social understanding from maternal talk about her child’s desires to talk about her own thoughts and knowledge. Theirs was the only study to demonstrate such a shift, making replication an important step in establishing reliability.

My novel contribution to the literature has been to build upon Taumoepeau and Ruffman’s (2006; 2008) theory by bringing more clarity to the process by which children acquire basic mental state concepts and benefit from different types of maternal talk during their trajectory to social understanding. First, I have argued that during the early stages of
development, maternal talk about the child’s current desires (desire talk that matches the child’s presently experienced state of desire), as opposed to desire talk that is used to direct the child’s behaviour, would be related to children’s later social understanding. Second, I have argued that the shift in importance from maternal talk about the child’s desires to talk about her own thoughts and knowledge might pivot around children’s developing understanding of the distinction between self and other.

8.3 The Predictive Relation between Maternal Mental State Talk and Children’s Later Social Understanding.

Consistent with the findings of Taumoepeau and Ruffman (2006), I found that maternal talk about her child’s desires and especially her child’s desires at 21 months of age, was related to children’s acquisition of mental state terms at 27 months, even when controlling for children’s vocabulary and socioeconomic status at the earlier time point. In contrast, no other specific types of maternal mental state talk were related to children’s later social understanding and no aggregate of maternal mental state talk was associated with children’s acquisition of terms pertaining to people’s observable actions or body parts, suggesting a specific association.

To reiterate, desires may be a good starting point for children to learn about mental states because much of an infant’s life involves the fulfilment of desires. The high frequency and salience with which infants experience states of desire will help them to understand what mothers are referring to when they use a word such as “want” or “like” (Taumoepeau & Ruffman, 2006). Furthermore, mothers’ comments about the child’s desires (as opposed to comments about her own or other people’s desires) will provide children with the opportunity to label their own inner psychological experiences to which they have direct access via
introspection. Helping children to first name and understand their own mental states then gives them a basis for engaging in simulation to understand others (i.e., “What would I be feeling if I was in that person’s shoes?”) (Harris, 1991).

In contrast, and also consistent with the findings of Taumoepeau and Ruffman (2008), I found that maternal talk about her own mental states and especially her own thoughts and knowledge at 27 months of age, was the most consistent predictor of children’s later social understanding at 34 months. Again, this relation remained significant even when controlling for children’s total vocabulary at the earlier time point and (for analyses between mother language and child vocabulary) socioeconomic status. Furthermore, the relation was specific to children’s mental state vocabulary with no category of maternal mental state language predicting children’s acquisition of observable actions or body parts.

Once a child has mastered a rudimentary understanding about the subjective nature of desires they are then better prepared to confront the slightly more difficult task of learning about cognitions (e.g., thoughts and knowledge) (Wellman & Wooley, 1990; Perner, 1991; Taumoepeau & Ruffman, 2008). Cognitions are arguably more difficult for children to learn about compared to desires because they do not have such obvious accompanying behaviours and do not have the salient internal experiences that often accompanies desires (Taumoepeau & Ruffman, 2008).

Consistent with the theory that mothers are pitching their language within their child’s zone of proximal development, over the same time period during which maternal talk about cognitions became increasingly important, there was also a marked increase in the proportion of cognitive language mothers used while conversing with their child and this increase was significantly greater than for any other category of maternal mental state language. An obvious interpretation of this pattern is that mothers increase their talk about cognitions when
they sense their child has some understanding of desires and/or is better able to understand talk about cognitions.

In sum, increasingly during their third year of life, there is advancement in children’s understanding of mental states such that children begin to refer to (Bartsch & Wellman, 1995; Dale & Fenson, 1993) and demonstrate an understanding of (Wellman & Liu, 2004; Wellman & Woolley, 1990) cognitions rather than just desires. In line with Vygotsky’s zone of proximal development, there is also a concomitant shift in the type of maternal talk that is most helpful for children’s developing social understanding; initially, talk about the child’s desires is most helpful (in the present study and in Taumoepeau & Ruffman, 2006 and Symons et al., 2006), whereas later, maternal talk about her own cognitions is helpful (see section 1.2.1). That is, the type of maternal talk that is most helpful for children’s social understanding depends on the child’s current level of understanding.

8.4 The Direction of Causality

The controlled, cross-lagged design of the present study provides further evidence that the relation between maternal mental state language and children’s social understanding is causal, unidirectional, and specific. First, when analyses were reversed, no category of children’s mental state vocabulary at the earlier time point predicted later maternal mental state talk. Second, all analyses conducted between maternal mental state language and children’s later mental state vocabulary were conducted while controlling for all child language (including all mental state terms) at the earlier time point to help account for any potentially mediating shared variance between mother language and child vocabulary at the earlier time point. This helps to rule out the possibility that the relation between mother
language and children’s *later* mental state vocabulary was mediated through children’s vocabulary at the earlier time point.

Objective measures of social understanding (i.e., the Letterbox, Penny Hiding and Move-Object tasks) were only administered at 34 months and therefore the same type of cross-lagged analyses was not possible. Claims regarding the direction of causality between mother language and later child performance on objective measures are thus interpreted more conservatively. That is, stronger evidence for maternal talk about mental states facilitating later performance on objective measures would exist if early performance on objective measures could be accounted for. Yet, the reason such measures were not included at the earlier time point (27 months) was that floor effects or near-floor effects were anticipated so that even if this early performance was accounted for, the results would have been similar. Furthermore, I controlled for all child mental state language at the earlier time point (and child mental state language is highly correlated with child task performance and is a marker of social understanding in its own right). Finally, where early performance on objective measures has been controlled for, early maternal mental state talk has still been related to later child social understanding (e.g., Ruffman et al., 2002, Taumoepeau & Ruffman, 2006, 2008).

8.5 ‘Current’ Versus ‘Directive’ Desire Talk

The second aim of the present study (B1) was to assess the relative effectiveness of mother ‘current’ versus ‘directive’ mental state talk on children’s social development. Previous research had established that “appropriate” use of mental state language was helpful for subsequent social understanding (Meins, 2002; Symons et al., 2006). In these studies, appropriate talk included mother descriptions of infants’ psychological states that were
deemed accurate by an independent coder. For example, a mother utterance (e.g., “Would you like to play with the ball?”) was deemed appropriate if the child subsequently expressed interest in playing with the ball, but was inappropriate if the child was unresponsive or demonstrated a contrary interest. My coding was different in that maternal desire utterances were deemed current only if the desire utterance matched the child’s current behavior at the exact time that the utterance was spoken. I found that a large proportion (approximately half) of maternal desire utterances were directives used to soften instructions pertaining to the child’s future behavior (“Do you want to come here and sit down?”). Thus, the mother utterances in my ‘current desires’ category would also have been included as ‘appropriate’ in the studies of Meins and Symons et al., but their category of appropriate talk also included utterances I labelled as directive. My findings are in general agreement with those of Meins and Symons et al., but suggest that when children are 21 months of age it is only a subset of their category of ‘appropriate’ talk that is important for children’s subsequent social understanding; talk about the child’s current desires.

References to a child’s desire, spoken while the child is currently experiencing that state, are likely beneficial because the child’s salient internal state will correspond to the mental state term. Mothers are likely to use a given mental state term (e.g., “want”) when their children are evincing a range of different behaviours (e.g., reaching for a toy, looking happy when receiving a toy, and looking unhappy when not receiving a toy). Over time, a child might come to learn that the only thing common to their mothers’ use of a term such as “want” or “like” is an internal feeling of desire because their associated behaviour, and the object that they desire, will differ across occasions. Thus, discourse about currently felt desires will provide children with an early opportunity to learn that some verbs pertain to internal experiences rather than behaviour, and to consider the distinction between mental states and the behaviours and objects commonly associated with mental states. These
rudimentary but important insights might help prepare the child for subsequent advancements in learning, for instance, comprehension of other types of mental states such as cognitions and an understanding of the subjective nature of mental states.

I found that the importance of mother current desire talk over mother directive desire talk was robust for Time 1 to Time 2 analyses, but less marked for Time 2 to Time 3 analyses. Why might this be? One explanation is that there was significantly less current desires talk at Time 2 relative to Time 1 and therefore the statistical probability of finding a significant relation was reduced. That mothers reduced their current desire talk may be indicative that on some level they were aware that this type of talk had become less important for their child’s social development. A second explanation is that during the early stages of development talk about the child’s presently experienced desires will be pitched at an appropriate level because it provides young children with information regarding the here-and-now. Once children have learned about their presently experienced desires they may then be ready to ‘move on’ to the slightly more difficult task of learning about their future, past and hypothetical desires as well as conversational uses of desire language such as that found with directive desire talk.

Interestingly, it has recently been proposed that children will benefit more from maternal mental state discourse when mother and child are engaged in connected conversations (each speaker’s comment is semantically related to the previous speaker’s comment), in part, because the mental state will be relevant to the child’s focus of attention while it is being discussed (Ensor & Hughes, 2008). My finding that maternal talk about the child’s current desire is most beneficial is consistent with this theory in that young children will be motivated to attend to their own current desires as a point of mutual consideration and discussion. Future research might explicitly investigate whether maternal desire talk is particularly helpful during such connected interactions with very young children.
The importance of mothers’ use of current desire talk can also be construed in terms of a broader attachment theory. Mothers who are more likely to identify and comment on their child’s presently experienced desires may also be mothers who are more sensitive per se, and maternal sensitivity is considered a crucial aspect of the relationship she has with her child (Ainsworth, Blehar, Waters, & Wall, 1978). Mothers who are generally more sensitive may be more likely to intentionally pitch their language within their child’s zone of proximal development Symons and Clark (2000) and Sroufe (1996) suggests that children with mothers who model sensitive behaviour are more likely to be empathetic and to take the perspective of other people during social interactions. Furthermore, children with sensitive mothers are more likely than other children to have a secure mother-child attachment and therefore will be less anxious and more willing to explore and learn during social situations(Ainsworth, et al., 1978). Finally, Moss et al. (1997) argue that more sensitive parents are also more likely to be ‘metacognitive’ such that they are aware of both the child’s behaviour and underlying motivations which, if verbalised can help the child become more metacognitive themselves. Although there is empirical evidence that suggests that it is the content of maternal mental state talk rather than maternal sensitivity that predicts children’s social understanding (e.g., Ruffman et al, 2006) more research is required to more decisively adjudicate this issue.

8.6 The Referent of Maternal Mental State Talk and Children’s Self-Concept

The third and main aim of the present study was to examine whether children’s self-concept moderates the extent to which children benefit from different types of maternal mental state talk. I found very consistent evidence that maternal talk about the child’s desires is particularly helpful for children who fail to demonstrate a basic understanding of ‘self’ as measured by their mirror self-recognition and their use of the term ‘mine’. Why would this
be? If a mother describes the child’s current desire (e.g., “You don’t want to do this”) a child with a poor distinction between self and other (i.e., who doesn’t understand “you” refers to themselves and that self and other are distinct entities with different desires) could still match the statement (“… don’t want to do this”) to their own current, salient desire. However, if a mother describes someone else’s desire, the child’s current salient desire will often not match the statement and confusion will ensue. That is, consistent with the zone of proximal development, maternal talk about the child’s mental states will be most helpful for children’s understanding of mental states when the child has not yet acquired an understanding of self because maternal talk is then pitched slightly beyond the child’s current level.

I also found very consistent evidence that maternal talk about her own thoughts and knowledge is particularly helpful for children who did possess a basic self-concept. Why would this be? Once children have acquired a basic understanding of their own mental states and of ‘self’, they can then use that knowledge to begin understanding other people’s mental states, at least partly via a process of simulation. For example, once a child possesses a mental model of their own physical appearance, a child’s physical self can become an object of their own thought and therefore children can begin to explicitly represent their objective self in relation to other people. Moore (2007) argues that this facilitates children’s insight that they themselves can be the subject of other people’s intentional relations and that other people have internal subjective experiences. Thus, once children carry a mental model of their own physical appearance they can more easily make comparisons between their own and other people’s facial expressions and behaviour, which is an integral part of the simulation process. As children’s distinction between self and other grows, maternal talk about her own mental states will become increasingly important because it will be pitched slightly higher than the child’s current level of understanding.
My data are also consistent with Perner’s (1991) idea that children’s success on the mirror self-recognition task and their understanding of other people as subjective psychological agents both rely on the common capacity to represent multiple models. I found that at the same time that children began to recognise themselves in the mirror, they also began to benefit more from maternal talk about her own unobservable internal states. Mirror self-recognition requires simultaneous comparison of directly perceived information presented in the mirror (primary representation) and a mental model of the self represented in imagination (secondary representation). Likewise, ascribing mental states to others requires simultaneous processing of other people’s directly observable behaviour (primary representation) and the ascription of abstract theoretical mental constructs (secondary representation) that are postulated to describe and understand their behaviour.

At the same time that I found that maternal mental state talk about her own cognitions was particularly helpful for children who did possess a basic self-concept, I also found that this type of talk was most helpful for children whose self-concept was not yet firmly in place as evidenced by their use of both first- and second-person pronouns. Why might this be? When a mother talks about her own mental states a child must negotiate two perspectives (i.e., the child’s own perspective and her mother’s). This type of language might be challenging but instructive for a child who is beginning to be able to negotiate two perspectives. In contrast, maternal talk about her own mental states may no longer provide the optimal level of stimulation for a child who already has a firm distinction of self and other because such children are ready to ‘move on’ to the slightly more difficult task of negotiating three perspectives so that maternal talk about a third person’s mental states may then become increasingly important. Understanding maternal talk about a third person’s mental states may be slightly more difficult because to understand such talk the child will often have to attribute
unobservable entities to a third person as ascribed by a second person (e.g., “I think that he wants the toy”).

8.7 Why was Maternal talk about her own Cognitions not moderated by Children’s Self-Concept when the Dependent Variable was Children’s Performance on Time 3 Objective Measures?

Recall that when children were split into groups there was no differential effect of maternal talk about her own cognitions for children who did, versus did not, use second-person pronouns (see section 7.3.3). Prima-facie, this finding seems surprising given that the same types of maternal mental state talk that predicted children’s Time 3 mental state language also predicted children’s performance on Time 3 objective measures (section 7.3.2), but a differential effect of maternal talk about her own cognitions was found when Time 3 child mental state language was the dependent variable.

Possibly, mother reports of children’s use of mental state terms may have provided a more sensitive measure of children’s social understanding compared to children’s performance on objective measures in the laboratory. The advantage of using mother reports of children’s mental state vocabulary is that it draws upon mothers’ expertise of their child’s ability in a naturalistic setting and avoids the information processing demands and motivational factors inherent to laboratory tasks that could have led to greater experimental error in assessing child social understanding.

An alternative explanation is that there was more variance in children’s Time 3 MSSQ mental state vocabulary than there was for the objective measures. The maximum possible score for children’s Time 3 use of desire, emotion, cognitive and total mental state terms was
11, 32, 13 and 56 respectively with standard deviations ranging from 2.24 to 12.44. In contrast, both of the Time 3 objective measures included in the split analyses (the Letterbox task and the Move object Task) had a maximum possible score of 4 with standard deviations of 1.02 and 1.80 respectively. That is, it may have been the case that Time 3 objective measures did not contain the variance required for such a fine-grained split analysis.

8.8 Conclusions

Whereas there is much research on the social understanding of preschoolers and especially preschoolers’ performance on the false belief task, my study has focused on the social development of infants. I measured aspects of infants’ social understanding that I believe may precede and contribute to a more sophisticated understanding of the representational nature of mental states. I have provided evidence that mothers talk to their developing children in such a way that helps structure the mental world into a tractable form and that children’s developing self-concept plays an important role in this process. To address the supposed ‘fundamental problem’ for learning theorists (i.e., that the invisibility of mental states precludes the possibility that they are learnt during the first few years of life), I have pointed out that although mental states are not observable in the sense of being visible, they are observable in the sense that children experience their internal states and this may be a good starting point for their acquisition of basic mental state concepts. Further, I have argued that mothers help their child identify and label their own internal experiences by making timely and informative comments about presently experienced desires. Once children have gained knowledge of their own mental states and of the distinction between self and other, they can then begin to start using that knowledge to understand the mental states of others, in part via a process of simulation, at which point maternal talk about other people’s mental
states will become increasingly important. I do not claim that my findings adjudicate the issue as to whether theory of mind is innate or learned. Indeed, an advocate of the nativist position could argue that specific types of mental state talk facilitate the development of an innately given neurocognitive mechanism that was present from birth. Rather, I have demonstrated that it is possible that children’s basic conception of mental states is learned during the first few years of life and have provided empirical evidence for my proposed trajectory to mental state understanding.

In sum, I have argued that different types of maternal discourse will be more or less helpful for children depending on the child’s current level of understanding. In this way, I reiterate the sentiments of de Rosnay and Hughes (2006) that research on social understanding should include both assessments of children’s comprehension of self and other as psychological agents and identification of the underlying cognitive developments that allow for advancements in understanding. To this end, the present study provides evidence that maternal talk about the child’s current mental states will be most helpful for a young child, that maternal talk about her own thoughts and knowledge will be more helpful for slightly older children, and that the self-concept moderates the degree to which he or she benefits from maternal mental state talk and plays a pivotal role in his or her developing social understanding.

8.9 Limitations of the Present Study and Directions for Future Research

The book used during the picture books task in my study was laden with pictures that evoked talk about other people’s mental states and especially other people’s emotions. It is thus unlikely that the picture book task provided an accurate and valid measure of mothers’ use of emotion language and total talk about others’ mental states. That is, it could be the case
that maternal talk about others and about emotions may play a more important role than suggested in the present study. Further evidence for my conclusions would be provided if future research used different methods to elicit maternal talk. For example, a free-play mother-child scenario is common with young children. Furthermore, although my study included participants from a range of socioeconomic backgrounds, the majority were from middle- to upper middle-class backgrounds. A more comprehensive study would ensure that the sample included an equal number of participants from lower socioeconomic backgrounds. Similarly, a more comprehensive study would also include input from other caregivers other than the mother and in particular siblings and fathers who undoubtedly also influence children’s development.

I have argued that mother reports of children’s use of mental state terms can be a very useful measure of children’s social understanding. However, using a simple tally of children’s mental state terms also has its shortcomings (Carpendale & Lewis, 2006a). My proposed trajectory to mental state understanding implies that children refer to their own mental states before referring to others’ mental states, yet my measure of children’s vocabulary based on mother reports on the MSSQ did not specify the referent of children’s mental state terms. A more comprehensive study might include a measure of children’s mental state vocabulary that specifies the referent of the child’s mental state terms or, ideally, derives a measure of children’s spontaneous use of mental state terms from naturalistic observations (although the work load involved in this kind of assessment would be significantly greater).

The controlled cross-lagged design of my study allowed for inferences regarding the direction of causality between maternal mental state language and children’s later social understanding. However, only a controlled randomised intervention study would decisively adjudicate the issue of causation. Such a study might consist of having one group of mother-child pairs engage in a home-based activity that requires mothers to talk about their children’s
current desires several times per week for a prolonged period of time (e.g., six weeks). At the end of the intervention the improvements in children’s social understanding as measured by standardised tasks would be compared to a group of mother-child pairs who engaged in a control activity for the same period of time. Indeed, we are currently carrying out such a project. If we confirm that mother mental state language has a genuine causal effect on children’s social understanding then recommendations can be made available to parents and caregivers regarding the specific type of maternal talk that is most likely to facilitate gains in children’s social understanding at specific stages of development.

Despite these limitations, the research described herein indicates that maternal mental state talk facilitates children’s social understanding and that this relation is moderated by children’s understanding of the distinction between self and other. To address the fundamental problem, although children cannot directly observe other people’s mental states, they experience their own internal states, and this may be a good starting point for their mental state understanding. I argue that the ‘fundamental problem’ undervalues parent-child interactions and that fine-grained analyses such as those presented in this study can help to identify the subtleties needed to understand the intricate processes of learning between mothers and their children in the context of social understanding.
References


Rakoczy, H., Warneken, F., & Tomasello, M. (2007). "This way!", "No! That way!" - 3-year-olds know that two people can have mutually incompatible desires. *Conigive Development, 22*, 47-68.


### APPENDIX A: An Exhaustive List of Categories of Mother Language Variables and Concomitant Cohen’s Kappa Statistics for Inter-Rater Reliability

<table>
<thead>
<tr>
<th>Category</th>
<th>Cohen’s Kappa</th>
<th>Exhaustive List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total MS Talk</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>All References to Child’s MSs</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td>All References to Mother’s and Other’s MSs</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>Desire Talk</td>
<td></td>
<td>“want”, “like”, “love”, “don’t like”, “hope”, “prefer”, “keen on”</td>
</tr>
<tr>
<td>Child’s Desires</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Child’s Desires (Genuine)</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>Child’s Desires (Directives)</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>Mother’s and Other’s Desires</td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>Child’s Emotions</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Mother’s and Other’s Emotions</td>
<td>.95</td>
<td></td>
</tr>
<tr>
<td>Think/Know Talk</td>
<td></td>
<td>“think”, “thinking”, “thinks”, “thought”, “know”, “knows that”, “knew”</td>
</tr>
<tr>
<td>Child’s T/K</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>Mother’s and Other’s T/K</td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>Other Mental State</td>
<td>.91</td>
<td>“remember”, “understand”, “forget”, “remind”, “realize”, “idea”, “consider”, “have in mind”, “daydream”, “dream”, “mean”, “imagine”, “wonder”, “expect”</td>
</tr>
</tbody>
</table>
| Modulations of Assertion        | .89           | “might”, “must”, “maybe”, “perhaps”, “possibly”, “probably”, “could be”, “certainly”, “definitely”, “sure” “guess”, “
<table>
<thead>
<tr>
<th>Physical State Talk</th>
<th>.89</th>
</tr>
</thead>
</table>