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DETAILED INVESTIGATION OF THE RELATION BETWEEN MOTHERS' MENTAL STATE LANGUAGE AND CHILDREN'S THEORY OF MIND ABILITIES

A Master's Thesis

by

SETENAY EVSEN

Department of Psychology

İhsan Doğramacı Bilkent University

Ankara

July 2022

To My Family

DETAILED INVESTIGATION OF THE RELATION BETWEEN MOTHERS' MENTAL STATE LANGUAGE AND CHILDREN'S' THEORY OF MIND ABILITIES

The Graduate School of Economics and Social Sciences
of
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by

SETENAY EVSEN

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DETAILED INVESTIGATION OF THE RELATION BETWEEN MOTHERS' MENTAL STATE LANGUAGE AND CHILDREN'S THEORY OF MIND ABILITIES

By Setenay Evsen

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Psychology.

……

Hande Ilgaz

Advisor

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

……

Jedediah W. P. Allen

Examining Committee Member

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

……

Başak Şahin-Acar

Examining Committee Member

Approval of Graduate School of Economics and Social Sciences

……

Refet Soykan Gürkaynak

Director

ABSTRACT

DETAILED INVESTIGATION OF THE RELATION BETWEEN MOTHERS' MENTAL STATE LANGUAGE AND CHILDREN'S' THEORY OF MIND ABILITIES

Evsen, Setenay

MA. Department of Psychology

Supervisor: Asst. Prof. Dr. Hande Ilgaz

July 2022

This study investigated the relation between maternal mental state language (MSL) in a storytelling context and preschoolers' Theory of Mind (ToM) abilities. Seventy-four Turkish-speaking mothers' mental state discourse was examined with a comprehensive coding of mental content (i.e., perception, physiological, desire, motivation, emotion, and cognition) at both lexical and morphological levels by marking the referents of each mental use (i.e., child-mother vs. story character). In addition, to distinguish the uses of perception terms as attention getters or genuine mental state references, a coding for perception words in terms of function was included. The results revealed that only certain functions of mothers' perception MSL was related to children's ToM performance. In particular, mothers' use of

perception MSL to give the literal meaning of the terms predicted children's ToM performance concurrently when children's cognitive abilities and age was controlled for. Results were discussed from a socio-cultural perspective to emphasize the importance of coding the pragmatic aspects of maternal MSL for a better understanding of ToM development in relation to language.

Keywords: Maternal Mental State Language, Theory of Mind, Socio-Cultural Perspective, Pragmatics

ÖZET

ANNELERİN ZİHİN DURUMU İFADE EDEN DİL KULLANIMI VE ÇOCUKLARIN ZİHİN KURAMI BECERİLERİ ARASINDAKİ İLİŞKİNİN DETAYLI İNCELEMESİ

Evsen, Setenay

Yüksek Lisans. Psikoloji Bölümü

Tez Danışmanı: Dr. Öğr. Üyesi Hande Ilgaz

Temmuz 2022

Bu çalışma annelerin hikâye anlatımı esnasında zihin durumu ifade (ZDİ) eden dil kullanımı ve anaokulu dönemi çocuklarının Zihin Kuramı (ZK) becerileri arasındaki ilişkiyi incelemektedir. Türkçe konuşan 74 annenin hikâye anlatısı hem sözcük hem de ek seviyesindeki ZDİ (algı, fizyolojik, istek, motivasyon, duygu ve bilişsel) ve bu ifadelerin atıflarını (anne-çocuk ve hikâye karakteri) içeren detaylı bir kodlama şeması ile çalışılmıştır. Buna ek olarak, kodlama şemasına görsel algı ifadelerinin (örn. "*bakmak*") farklı kullanımlarını inceleyen fonksiyonel bir kodlama da eklenmiştir. Çalışmanın sonuçları, annelerin görsel algı ifadelerini kullanım özelliklerinin çocuklarının zihin kuramı yeteneklerini ile ilişkili olan tek anne anlatı özelliği olduğunu göstermektedir. Çocukların bilişsel yetenekleri (yönetici işlevler

ve dil) ve yaşları istatistiksel olarak kontrol edildiğinde, annelerin görsel algı ifadelerini kelimelerin gerçek anlamlarını vermek amacıyla kullanmalarının çocuklarının ZK performanslarını eş zamanlı olarak yordayabildiği görülmüştür. Sonuçlar, sosyo-kültürel bakış açısı çerçevesinde tartışılmış ve anne zihin durumu ifade eden dil kullanımının pragmatik incelenmesinin ZK gelişiminin daha iyi anlaşılması için önemi vurgulanmıştır.

Anahtar Kelimeler: Anne Zihin Durumu İfadeleri, Zihin Kuramı Yetenekleri, Sosyo-Kültürel Bakış Açısı, Pragmatik

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CHAPTER I

INTRODUCTION

Theory of Mind (ToM) refers to our ability to understand other's mental states and to explain and predict their behavior based on these states (Astington & Baird, 2005). Literature shows that the language experience that children have is a significant contributor to the development of their ToM understanding (Devine & Hughes, 2018; Dunn et al, 1991). Specifically, mental state (MS) references in these linguistic experiences have been shown to be positively related to children's ToM understanding both cross-sectionally (Adrián et al., 2005; Chan et al., 2020; Symons et al., 2005; Taumoepeau et al., 2019) and longitudinally (Adrián et al., 2007; Devine & Hughes, 2019; Farkas et al., 2018; Nawaz & Lewis, 2018; Ruffman et al., 2002; Taumoepeau & Ruffman, 2008). While the majority of previous work has focused on English-speaking children (Symons et al., 2005; Ruffman et al., 2002; Devine & Hughes, 2019), there is an intensive effort to study this relation in various languages such as Spanish (Adrián et al., 2005; 2007; Farkas et al., 2018), Cantonese (Chan et al., 2020), Urdu (Nawaz & Lewis, 2018), and Farsi (Taumoepeau et al., 2019).

In the current study, the relation between maternal MS language and children's ToM abilities was examined with a detailed and comprehensive coding scheme in a Turkish-speaking sample. Previously, Bozbıyık (2016) investigated this relation with a sample of 32 Turkish-speaking mother-child dyads. This thesis extended Bozbıyık's study (2016) with a sample of 74 mother-child dyads and a detailed investigation of MS language with a specific focus on perception terms and their different functions. One of the rationales for this study is that while this relation has been investigated in the literature extensively, the aim has been predominantly and exclusively on certain MS categories such as cognition, emotion, and desire terms (Tompkins et al., 2018) which might fall short to capture all references to the mental world in maternal discourse and how they are related to children's social understanding (Ilgaz & Allen, 2020). Therefore, in this study, this relation was investigated with a more comprehensive coding scheme of MS language that covers the various aspects of mental processes, with the idea that a narrow focus would leave gaps in our understanding of how MS talk relates to children's ToM abilities.

In addition, by adopting a socio-cultural perspective, this study investigated whether the different functions of a MS category (i.e., visual perception terms) relate to children's ToM abilities differently. Previous studies reported relations between maternal MS language and children's social understanding by investigating the pragmatic aspects of MS uses in the maternal discourse such as causal MS talk (Slaughter et al., 2007), functions of cognitive MS talk (Adrián et al., 2007), functions of causal MS talk (Dunn & Brown, 1993), and the various uses of "*want*" references (Ruffman et al., 2018). One take-home message from these studies is that while the amount of MS talk matters for children's ToM understanding, it is the

pragmatic aspects of MS language that provide differences in this relation. Therefore, this study investigated a different aspect of the mental world, *perception*, and examined the different purposes for mothers to use perception MS references in storytelling interaction. The perception terms were specifically examined because references to these terms have been inconsistently coded in the literature (Ilgaz & Allen, 2020) due to the idea that they are mainly used as *attention-getters* but not *genuine MS references*, albeit perception is one of the earliest ways that we come to know things about the world. Accordingly, a coding scheme was created to investigate the different functions of perception MS references (i.e., redirecting attention, changing the focus, emphasizing an aspect, and giving a literal meaning to refer to an epistemological relation) and to examine whether these different functions relate to children's ToM abilities differently.

In what follows, first, ToM will be explained with its developmental trajectory. Following this, theories of ToM development (i.e., simulation theory, theory theory, and socio-cultural theory) will be presented. Finally, the literature on the relations between maternal MS talk and ToM will be explored.

1.1. Theory of Mind (ToM)

ToM, which is defined as our ability to attribute mental states (e.g., knowledge, intentions, and desires) to others, for the purposes of explanation and prediction, has been studied extensively in the last decades. The term "*theory of mind*" was first used in Premack and Woodruff's (1978) pioneering work on non-human animals' psychological world by observing their behaviors in social situations. Specifically, they observed the chimpanzee, Sarah, in various social situations where she was presented with different problems via visual stimuli. While Sarah's responses could

be interpreted differently by different researchers, this study has led to a fruitful study in social cognition in non-human animals and humans. One line of research that has emerged as a response to this paper is the study of false belief understanding (FB) in young children to demonstrate whether they could accurately predict the behavior of a person who has a belief that is not congruent with reality. Literature shows that children show an appreciation of false belief around 4 years of age (Wellman et al., 2001; however, for arguments regarding *implicit ToM* please see Perner & Roessler, 2012; Ruffman 2014).

While FB constitutes a critical milestone for human social understanding, ToM is a multifaceted construct, including understanding diversity in perspectives and different ways of acquiring knowledge. Wellman and Liu (2004) created a battery of tasks to assess these components in addition to FB understanding, which has been referred to as the *ToM battery* in the literature since then. In this battery, they included tasks that assess whether children can understand that people can have different desires (i.e., Diverse Desires) and beliefs (i.e., Diverse Belief), that seeing is a way to knowing things (i.e., Knowledge Access), whether children can predict the behavior of another who has a false belief about an entity or a situation (i.e., Content False Belief and Explicit False Belief), and finally whether children can understand that there could be incongruencies between what one is feeling and what one is expressing (i.e., Appearance Real Emotion). By using this battery, the literature shows that there is a significant developmental change between three and five years of age (Wellman, 2010); however, there are also cultural variations in how one's understanding of different aspects of the mind develops (Duh et al., 2016; Ilgaz et al., in prep; Kuntoro et al., 2017; Shahaeian et al., 2011; Selçuk et al., 2018; Taumoepeau et al., 2019; Wellman et al., 2006).

1.1.1. Theories of ToM Development

There are three prominent theories on ToM understanding and its development. These are (a) theory theory, (b) simulation theory, and (c) socio-cultural theory. In this section, each theory will be reviewed with explanations of their main premises and emphasis on their approach to language's role in ToM development.

1.1.1.1. Theory Theory

Theory Theory is one of the frameworks that has received much support from empirical work in this literature. This perspective uses the analogy of a theory formation process for children's understanding of minds (Astington & Gopnik, 1991). From this perspective, understanding of minds is a *theory* because (a) it is coherent which suggests that the concepts of minds are within a structure and work together, (b) it makes *ontological* distinctions between external observable reality and invisible mental entities, and (c) it provides a *causal-explanatory* mechanism to predict and explain behaviors (Gopnik & Wellman, 1994; Miller, 2016; Wellman, 1990). To get this process started, infants have innate theories about the mind, and they revise them throughout their development (Gopnik, 2003). In this theory revision process, the language that children encounter in social interactions provides data for them to learn and label unobservable mental concepts such as beliefs and desires (Wellman, 1990). With such a position, the theory theory account assumes an instrumental role for language in children's understanding of mind (Ilgaz & Allen, 2020).

Furthermore, Wellman (1990) suggests that mental concepts develop sequentially and at different ages. One of the earlier critical mental concepts that children develop is the concept of *desire*. For Wellman (1990), around two and a half years of age,

children explain and predict others' behavior with their desires. The *belief* concept, which requires a more complex appreciation of the mind, develops around four years of age. In line with this theory, Bartsch and Wellman (1995) reported that children use more desire terms than belief terms around two and a half years of age while their use of belief terms is more than desire terms at four years of age. Similarly, Bretherton and Beeghly (1982) reported that while 28-month-olds have perception, desire, and physiological terms in their vocabulary, cognitive terms are less common for this age group and mastered later. Paralleling the findings in children's use of MS terms, Wellman and Liu (2004) found that children first pass tasks that assess understanding of others' desires before they start passing tasks that assess understanding of others' beliefs.

1.1.1.2. Simulation Theory

Simulation Theory suggests that the underlying cognitive ability to understand others' mind is the process of *simulation* (Gordon, 1992), in other words, imagining oneself in another's situation (Goldman, 2006, pp. 19). Children first understand their own mental worlds and then simulates themselves as if they are in the state of others with the idea that others are "*like themselves*" and hence assuming similarity between one's own mind and others (Harris, 1992; Montgomery, 1997).

From the simulation account, pretend play and conversations are contexts that would promote children's understanding of different perspectives (Harris, 2005). Considering conversations, Harris (2005) noted that they are good vehicles for children to develop their understanding of others' points of view. Regardless of the MS terms, discourse during these conversations, specifically mothers' pragmatic intent to introduce various points of view, is critical for children's social

understanding. This pragmatic intent also promotes their appreciation of the sources of the variation in perspectives. Harris (2005) suggests one way to introduce and engage various points of views is through the role taking activities in pretend play. As supportive evidence for this argument, Astington and Jenkins (1995) reported that children's role assignment and joint proposals during pretend play were positively related to their FB understanding when age and language were controlled for. By providing longitudinal results, Youngblade and Dunn (1995) found that children's earlier engagement in pretend play predicted their performance on FB and emotion understanding 7 months later. This framework, hence, suggests that a context that has different points of perspective presented (Harris, 1996) such as pretend play, narratives, and conversations is critical for children's understanding of mind.

1.1.1.3. Socio-Cultural Theory

While there are different perspectives in socio-cultural theory, the main premise of this account has its roots in Vygotskian ideas that the higher mental functions are social in their origin (Fernyhough, 2008). As a proponent of this account, Katherine Nelson (2005) suggests that ToM development is akin to *entering a community of minds* where the experienced members of that community help children in their construction process and being a member of their community through shared tools such as language. She further states that "*ToM is not an individual possession but part of a communally shared belief system about human goals, aspirations, motivations, knowledge system and value system.*" (2005, pp. 45). Such a definition of ToM emphasizes the importance of social interactions and the notion that understanding minds is a socially constructed ability (Carpendale & Lewis, 2021). Accordingly, this perspective supports the idea that ToM understanding emerges

within social interactions. (Nelson, 2005; Carpendale & Lewis, 2006; 2021) and proposes a constitutive role for language and social interaction in its development (Ilgaz & Allen, 2020).

As Nelson (2005) suggests, one way for children to enter into a community of minds is through their engagement with MS language. However, this engagement is different than what is suggested by theory theory accounts. Ilgaz and Allen (2020) point out an important difference between these two theories' perspectives on the role of children in social interaction. Socio-cultural theories suggest a dynamical process where children co-construct meaning with other social agents within social situations, rather than constructing theories from a third-person perspective and that children actively contribute to the meaning-making process with other social members in these interactions (Carpendale & Lewis, 2021).

The meaning-making process in socio-cultural theories is also different from the general assumption that there is a direct link between meaning and the word (Nelson, 2005). By taking a Wittgensteinian perspective, Carpendale and Lewis (2021, pp. 57) claim that "*Meaning is a process, a function, not a content"*. In other words, the meaning of an utterance is not stable and is context-dependent, which varies by the social situations in which they are presented. Hence, considering the developmental relations between MS language and children's ToM understanding, it is critical not only to examine individual MS references or the total amount of MS but how this MS talk is used in social interactions (Carpendale & Lewis, 2006; Dunn & Brophy, 2005; Montgomery, 2005).

1.2. Mental State Language (MSL)

Mental state language refers to the terms that express references to mental worlds (Montgomery, 2005). As the human mental world has various components from intention to beliefs, the definition of MS language is important for studies that investigate how it relates to children's understanding of minds. Traditionally, the literature focuses on three main MS categories: *cognition*, *desire,* and *emotion*. Accordingly, cognitive MS language includes terms that refer to cognitive processes such as *think, know*, *imagine, remember,* and *believe*. Emotion MS language includes terms that refer to a feeling such as *happy*, and *excited*, and terms that refer to the behavioral manifestation of a feeling such as *smiling* and *crying* (Bretherton et al., 1981). Desire MS language, on the other hand, includes terms that refer to the desires and wishes such as *want, wish,* and *desire*. (Ruffman et al., 2002).

In their pioneering work, Bretherton and Beeghly (1982) created an exhaustive coding scheme for mental references, which included *perception*, *cognition*, *emotional and affective states*, *physiological states*, *volition and ability*, and *moral judgments* (i.e., obligations) to study young children's production of mental state terms. While their coding scheme has provided a ground for many contemporary coding schemes for parental language in child-directed speech, the scope of the coding schemes, however, has been narrowed to mainly three MS categories that were explained above. However, human mental life is comprised of different layers of activities such as evaluation of one's certainty of a feeling or a thought, acquiring knowledge through sensory organs (e.g., seeing, hearing), having a state of mind which has a behavioral manifestation (e.g., being tired) and being a goal-oriented agent (e.g., motivations). These categories, in addition to *emotion*, *desire* and *cognition*, have a place in our everyday interactions and hence in our language. For instance, Bretherton and Beeghly (1982) and Bartsch and Wellman (1995) reported

that children talk about perception and physiological states around two years of age in addition to their desires, and perception was one of the first MS categories that they mastered.

1.2.1. MSL and Children's ToM Understanding

The theoretical work on ToM suggests that language engagement is important for ToM development, with the degree of importance varying across different approaches. The empirical work, on the other hand, indistinguishably supports these theories by reporting significant relations between parental MS language and children's ToM understanding. One consensus in this literature regarding this relation is that the total parental MS reference is positively related to children's ToM (Devine & Hughes, 2018; Tompkins et al., 2018). In their examination of the relations between family factors (i.e., SES, number of siblings, parental MS language, and mind-mindedness) and FB understanding, Devine and Hughes (2018) reported a modest relation between total parental MS language and children's FB. Similarly, in their meta-analysis with English-speaking samples, Tompkins and colleagues (2018) reported the same relation, albeit a smaller magnitude, between parents' total MS talk and ToM.

1.2.1.2. MS Categories

However, the aforementioned trend for narrowing the range of MS categories raises questions about the general finding regarding the positive relation between total parental MS language and children's ToM understanding. One of these questions is about the categories that the MS language totals include. Ilgaz and Allen (2020) emphasize the inconsistencies in the MS categories that have been coded in the literature. Specifically, the current literature mainly focuses on *cognition*, *desire*, and

emotion MS references (Jenkins et al., 2003; Ziv et al., 2014), with the additional *modulation of assertions* category (Ruffman et al., 2002, 2006; Symons et al 2005; Taumoepeau & Ruffman, 2008) while some categories have been coded inconsistently by a small amount of research such as *intention* (Ziv et al., 2013; Bozbıyık, 2016) and *perception* (Adrián et al., 2005; Bozbıyık, 2016; Jakubowska et al., 2018; Slaughter et al, 2007). That is the total MS language in these studies included different MS categories and thus, it is not the same "total" across studies. Accordingly, while the total maternal MS language is found to be related to children's ToM consistently in the literature, since these studies used different categories, more research is needed to define the relations between different MS categories and children's ToM understanding.

In their study, Adrián and colleagues (2005) investigated maternal MS language and children's ToM understanding in Spanish-speaking mother-child dyads by coding *cognition, emotion, desire,* and *perceptual states*. Their findings revealed that total maternal MS language was a significant concurrent predictor of children's FB performance (i.e., change of location) when children's age and verbal intelligence, maternal education, and the total number of words that mothers used in the interaction were controlled for. Furthermore, results revealed that, while both the frequency and the types of cognitive MS terms were positively related to children's FB, only the frequency of the emotion MS category was positively related to children's FB understanding.

Taumoepeau and Ruffman (2006, 2008) examined the relations between maternal MS and children's social understanding at three time points when children were 15-month-olds (Time 1), 24-month-olds (Time 2), and 33-month-olds (Time 3) in two

studies. They reported that mothers' reference to children's desires at Time 1 was a unique predictor of children's MS language and emotion understanding at Time 2 whereas only mothers' references to others' cognitive states at Time 2 predicted children's MS language at Time 3. This study, in line with previous work (Adrián et al., 2005; Ruffman et al., 2002), provides evidence for the positive relation between maternal talk about cognition and children's ToM performance and MS language. Indeed, in their meta-analysis, Tompkins and colleagues (2018) reported that cognitive MS talk was a better predictor of children's ToM understanding as compared to desire and emotion MS talk. However, Taumoepeau and Ruffman (2006, 2008) also reported that children benefitted from different MS categories at different ages by demonstrating desire MS as unique predictor when children were younger and cognitive MS as unique predictor when children were older. While this provides insight as to how maternal *cognition*, *desire*, and *emotion* MS talk related to children's ToM understanding differently at different ages, there is limited research on how other aspect of MS talk (such as other MS categories) relate to children's ToM abilities.

1.2.1.2. Pragmatic Aspects of MSL

As explained above, from a socio-cultural perspective, it is also essential to investigate the ways that MS language is used in a context while inspecting the relations between parental MS language and children's social understanding (Dunn & Brophy, 2005). Previous studies have investigated pragmatic aspects of parental MS language by focusing on different aspects. For instance, by examining the causal language in story-telling interaction, Slaughter, and colleagues (2007) found that explanatory, causal, and contrastive mental references about cognition were

significantly related to children's ToM performance while there was no relation between children's ToM abilities and mothers' references to cognition without further elaborations. Focusing on the cognitive MS terms only, Adrián and colleagues (2007) further supported Slaughter and colleagues' findings. They found that, in addition to the total cognitive MS, mothers' use of cognitive MS to ask and explain an aspect of the story (e.g., actions of the characters) and to serve different functions (i.e., reflections, moral conclusions, and exclamations) was related to children's ToM understanding both cross-sectionally and longitudinally.

By investigating a different aspect of causal language, Dunn and Brown (1993) examined the content and pragmatics of causal talks in family interactions longitudinally. They visited the participants' houses when the children were 33 months old (Time 1) and 40 months old (Time 2). At each time point, children completed one emotion labeling and one affective perspective-taking task, and their talk with their mothers was recorded. The researchers coded five categories of pragmatic contexts in maternal discourse (i.e., self-interest, reflecting, sharing positives, controlling-others, and provoking). Their results revealed that mothers' use of causal talk in a shared positive context (e.g., friendly humor, comforting others) was positively related to children's later emotion understanding, in contrast to their use of causal talk in control-other contexts which was negatively related children's emotion understanding.

In two consecutive studies, Ruffman and colleagues (2018) examined whether mothers' various uses of "*want*" was related to children's MS vocabulary longitudinally and whether the use of *want* in different pictures results in a gain in children's ToM understanding. In their first investigation, to gather maternal uses of

"*want*", they provided parents with pictures showing (a) an agent reacting unhappily to a situation, (b) an agent reacting happily to a situation, and (c) an agent reaching for an object. Their results revealed that mothers' total use of "*want*" at Time 1 was not related to children's MS vocabulary at Time 2 whereas their use of "*want*" in multiple pictures was positively related to children's MS language at Time 2. Following this, they trained mothers who had children between 26 and 40 months old for 6 weeks. They created two booklets with 4 drawings, one of which was about reaching for a desired object and the other was about negative affect (e.g., receiving an undesired object). The mothers were given two booklets (either the same or different) and asked to read them to their children in 6 weeks with the given order. Their results revealed that children of mothers who received different booklets gained more in composite ToM score (i.e., the total of their MS vocabulary score and ToM tasks scores) from Time 1 to Time 2, as compared to children in the same booklet condition.

Overall, these studies suggest that examining the pragmatic aspects of parental MS language is critical as there are important cross-sectional and longitudinal relations between different MS language uses and children's social understanding.

1.2.2. MSL in Storytelling Contexts and Children's ToM

As reported above, parental MS language is related to children's ToM understanding (Devine & Hughes, 2018; Tompkins et al., 2018). One factor that influences this relation is the context within which MS discourse is assessed (Tompkins et al., 2018). In literature, parental MS has been investigated in various contexts such as storytelling (Bozbıyık, 2016; Chan et al., 2020; Tompkins et al., 2021), picture description (Ruffman et al., 2002; Taumoepeau et al., 2019), reminiscing (Ontai &

Thompson, 2008), play (Meins et al., 2002; Olson & Frank-Masur, 2019) and naturalistic observations (Jenkins et al., 2003). In their meta-analysis, Tompkins and colleagues (2018) reported that storytelling discourse was one of the contexts that were more related to children's ToM understanding, as compared to reminiscing and natural settings.

Storytelling is a unique context for talking about mental worlds. Stories have characters who have feelings, desires, and thoughts that relate to intentions, events, and actions that unfold throughout the story. Bruner (1986) refers to the first part as the *landscape of consciousness* and the second as the *landscape of action*. The landscape of consciousness is about the mental worlds of the characters, including their desires, emotions, beliefs, and knowledge. Hence, a narrative is not only the sequence of actions but an integration of two landscapes. Therefore, engaging in a story is an important activity for a newly acquiring member to think about events and minds and interpret mental worlds through the actions and experiences of others (Nelson, 2005). Further, an important strength of the storytelling context is that it requires talks about both the characters' mental words (i.e., third-person perspective) and talk about the parent and their children's mental states (i.e., first and second person perspectives) during the interaction (Ilgaz & Allen, 2020).

Symons and colleagues (2005) investigated parental MS language and the ToM abilities of children between 5- and 7-year-old in joint book reading activity with an English-speaking sample. They provided parent-child dyads with a storybook with text which included mental state themes (e.g., anxiety) and coded both parents' and children's elaborations about the book (i.e., mentalistic, behavioral, and physical elaborations and characters' MS comments) without specifically separating MS

categories. For ToM measures, they used various FB tasks (i.e., unexpected content and identity, change of location, and emotion false belief) and collapsed across individual task scores to create an aggregate ToM score. The findings revealed that parent-initiated comments on characters' mental states were positively related to children's aggregate ToM scores.

By using picture book stimuli, Ruffman and colleagues (2002) examined maternal MS language longitudinally in English-speaking mother-child dyads. They assessed maternal MS language and children's ToM understanding at three time points: when children were 3 years old (Time 1), after five months (Time 2), and 1 year (Time 3). The pictures that they used reflected a mentalistic theme and these pictures differed between different data collection times. They coded both for mental (i.e., cognition, desire, emotion modulation of assertion, and other MS) and non-mental (e.g., descriptions, elaborations, causal and factual talk, links to child's life, and physical states) maternal language and found that maternal talks about cognition (i.e., *think* & *know*) and desires, but not emotions were positively related to children's ToM longitudinally. Using pictures as their stimuli, Taumoepeau, and colleagues (2019) investigated this relation in Australian and Iranian mother-child dyads. They coded both for maternal mental state utterances (i.e., *think* & *know*, modulation of assertion, other cognitive states, desire, emotion, emotion explanations), non-mental utterances (i.e., behavioral rules, behavioral explanations, and behavioral evaluations), and the referents of MS utterances (i.e., child, mother, and others). They found that Iranian mothers referred to others' MS more than New Zealander mothers while New Zealander mothers referred to their children's MS more than Iranian mothers. In addition, they found different relations between New Zealander and Iranian mothers' discourse and children's ToM abilities. After controlling for children's age,

language, and EF abilities, ToM was positively correlated to child-directed MS talk in the New Zealander sample while other-related MS talk was positively related to children's ToM in the Iranian sample.

By using a wordless storybook, which has been accepted to provide more flexibility for mothers to create a story and engage children (Ziv et al., 2013), Adrián and colleagues (2007) examined cognitive MS language according to whose cognitive state they were referencing to (i.e., mother and others' MS, child's MS and story characters' MS) at two time points with Spanish speaking mother-child pairs. They reported that mothers' references to their and children's cognitive MS during storytelling discourse were a unique predictor of children's ToM both cross-sectionally and longitudinally while maternal reference to the characters' cognitive MS was a predictor of children's ToM longitudinally. Similarly, Chan and colleagues (2020) investigated the relation between maternal MS language and FB in Cantonese-speaking parent-child pairs by using a wordless storybook. They reported that maternal talk about their own emotions and desires, and story characters' cognition were significantly related to children's ToM performance.

While the discourse material varies in these studies, overall, they revealed that storytelling is a rich context to elicit MS talk and this enables researchers to investigate another pragmatic aspect of MS language, namely the referents, which has been a focus of literature recently. Considering the limited studies on referents of parental MS in storytelling and the different results reported across cultures, this literature is open for further investigations of referents.

1.3. Current Study

The aim of the current study is to investigate maternal MS language in storytelling interaction in a more detailed way. To accomplish this purpose, a comprehensive MS language coding scheme that includes (1) a broader range of MS categories (i.e., perception, physiological, motivation, and modulation of assertion), (2) both lexical and morphological structures (for desire and cognitive MS), (3) the referent of the MS language (i.e., story characters versus mother and child), and (4) the functions of the visual perception MS language was adopted.

Maternal storytelling discourse was examined by focusing on various aspects of the human mental world since previous literature has revaled that MS categories are related to children's ToM differentially. For this purpose, maternal MS language was examined with the following categories: *perception*, *physiological*, *desire*, *motivation*, *emotion*, and *cognition*. By comparing our coding scheme with traditionally adopted coding schemes, including only cognition, desire, and emotion MS categories, this study inspected whether the use of a comprehensive coding scheme for MS language might provide researchers a space to explore the relation between language and ToM in more depth. In line with the literature, a positive relation between children's ToM and total maternal MS language was expected. Regarding the MS categories, cognitive MS language in particular was expected to be positively related to children's ToM understanding and significant relations between ToM and other MS categories (e.g., perception, desire) were also predicted.

Furthermore, MS language at both lexical and morphological levels was coded since Turkish is a language that allows for talk about mental states by using morphological structures without using a direct MS word. For instance, Turkish speakers can express their desires with suffixes (i.e., "-e/-a", "-se/sa") instead of using desire

terms such as *want*. Ilgaz and Allen (2020) suggest that coding these uses would allow researchers to capture mental content in a discourse. Lillard (1998) also states that there are important cultural differences in the concepts of mind and how these concepts are discussed in society. In line with this position, these morphological structures were coded. However, to maintain a baseline consistent with the literature's focus on lexical terms, these morphological uses were coded separately. This study examined whether MS language with these structures differs in how it relates to children's ToM understanding as compared to the MS language without these structures.

Further, the referents of maternal MS language were included in our coding scheme. As storytelling is a context that elicits different points of view from the child to the story characters, mothers' MS language was coded according to whose mental state they were referring to: either the mothers' and children's mental states or the characters' mental states. The first type of reference is important to create and maintain common ground between the teller (e.g., mother) and the listener (e.g., child). Similar to previous studies (Adrian et al., 2007; Taumoepeau et al., 2019; Taumoepeau and Ruffman, 2006, 2008), the referents of maternal MS language were examined in this study. Accordingly, children's ToM understanding was expected to relate to maternal MS language that refer to story characters' mental worlds positively.

Finally, the functions of perception terms were also considered. The literature has been coding the MS terms that have a "*genuine"* mental state meaning to demonstrate how the talk about certain mental concepts (e.g., belief) is related to children's appreciation of those concepts. Further, while perception terms can be

used as *attention getters* to regulate one's attention, these uses are not considered as referring to either a mental state or a concept. However, Carpendale and Lewis (2021) state that while these terms (e.g., look) are not considered MS words, one's use of them might vary within a context and these uses might help children to learn how to use such terms correctly. This process, according to Carpendale and Lewis (2021), is related to children's understanding of others' attention. In addition, although previous research reported no significant relations between maternal perceptual MS language and children's ToM, Bozbıyık (2016) reported that maternal perception MS language that referred to both the characters and the child and mother was positively related to children's ToM abilities. Hence, in addition to providing support for her finding, this study investigated the variety of functions for which mothers use perception MS terms in their storytelling discourse. Four possible functions were identified: (a) redirecting attention, (b) changing focus, (c) emphasizing an aspect of a story, and (d) giving a literal meaning. While this investigation is exploratory, it was hypothesized that as the use of a perception term to give a literal meaning implies the relation between seeing and knowing, there will be a positive relation between the function of giving a literal meaning and children's ToM abilities.

CHAPTER II

METHODS

2.1. Participants

Data from Bilkent Developmental Psychology Laboratory archive was used for this study. Among 96 Turkish-speaking parent-child dyads, sessions with fathers (9), children without Executive Function scores (4), and siblings (4: a pair of twins and a pair of sisters) were excluded. Three additional children were excluded due to experimental error or lack of cooperation. In addition, after analysis on maternal education levels, two more participants were excluded since their level of education was different than the overall sample (86.8% of mothers in our sample completed university or further-level education while 2.6% completed only their primary-level degree). After exclusions, data from a total of 74 Turkish-speaking child-mother dyads were used in the current study. Specifically, there were 25 3-year-olds (14 girls, mean age = 41.76 months), 27 4-year-olds (13 girls, mean age = 53.85 months) and 22 5-year-olds (11 girls, mean age = 63.27 months). Among these children, 41

had no siblings (55.4%); 31 had one sibling (41.9%) and the remaining had two siblings (2.7%).

The sample consisted of highly educated parents: 89.2 % of the mothers had a university degree while the remaining 10.8% received high school degree and 90.5 % of the fathers had a university degree while the remaining 9.5 % had a high school degree. In addition, 97.3 % of parents reported having a household income more than 3000TL per month and 91 % of the sample considered their income as good or above average. Thus, the current sample can be considered as a middle SES sample.

2.2. Materials

2.2.1. Demographic Information Questionnaire

This form consists of questions about parents' demographic information (i.e., age and education), child's birthdate, number of children in the household, and family income.

2.2.2. Book Reading Habits Survey. (Ilgaz & Aksu-Koç, 2005)

This survey is a parental report of children's exposure to oral and written narratives in their home setting. It includes questions about the onset and frequency of book reading and telling narratives.

2.2.3. Theory of Mind Measures

The theory of mind battery, developed by Wellman and Liu (2004) was adopted into Turkish and used in this study. This battery is composed of 6 theory of mind tasks (i.e., diverse desire, diverse belief, knowledge access, explicit false belief, contents

false belief, and appearance-reality emotion), each of them assessing different aspects of ToM. Each task was administered with pictures to keep the cognitive load equal. The pictures were matched with the children's gender.

2.2.3.1. Diverse Desire

This task assesses children's ability to understand others' desire that is different from their own and to predict another person's behavior based on their desires. In this task, children are presented with two pictures: a cookie and a carrot. Then, they are asked to indicate their favorite one. Following, they are presented with a gender-matched picture of a character who is told to have a favorite item, different from the child's favorite. Then, the experimenter says that the protagonist is hungry and can have only one of the options and the child is asked to pick the option that the protagonist would choose. Children received 1 point if they choose the protagonist's favorite food as a response to this question.

2.2.3.2. Diverse Belief

Diverse Belief task assesses children's ability to understand others' belief that is different from their own and to predict another person's behavior based on their beliefs. In this task, children are presented with another gender-matched picture of a character who is searching for their cat. Following, two pictures of possible places (i.e., *under a car* or *inside the bushes*) are presented to the children. Then, the experimenter asks children to tell where they think the cat is. According to the child's answer, the experimenter indicates that the protagonist believes that the cat is in the other location. Having provided this information, the child is asked where the protagonist will look for the cat. Children received 1 point if they choose a location that is concurrent with the protagonist's belief.

2.2.3.3. Knowledge Access

This task assesses children's ability to understand that seeing leads to knowing and a person who has not seen what is inside a box, would not know its content. In this task, the experimenter shows the children a nondescriptive box and asks them to guess what is inside the box. After the child's guess, the experimenter opens and reveals that there is a little dog figure inside the box. The child, then, is presented with a picture of another gender-matched character who has not seen what is inside the box. The experimenter asks the following two questions in a fixed order: 1. "*Does the character know what is inside the box?*" and 2. "*Did the character see what is inside the box?*". Unless the child gives correct responses for both questions (i.e., "*no*" for both), they will receive 0.

2.2.3.4. Explicit False Belief

This task assesses children's ability to understand and predict another person's behavior, based on their false belief about the world. In this task, the experimenter shows a picture of another gender-matched character and two possible locations (i.e., *a bag* vs. *a closet*). The children are told that the character is looking for their gloves. Then, the experimenter informs the child that the gloves are actually in the bag, but the protagonist mistakenly believes that they are in the closet. Children are then asked the following two questions in the fixed order: 1. "*Where will the protagonist search for the gloves?*" and 2. "*Where is the actual location of the gloves?*". Children received 1 point only when they give correct responses to both questions ("*in the closet*", and "*in the bag*" respectively).

2.2.3.5. Content False Belief

Content False Belief task assesses children's ability to understand that a person might have a false belief about the world based on the appearance of an object. In this task, the experimenter shows children a familiar box (i.e., '*bonibon'* candy box) and asks what the child thinks is inside the box. After receiving a response from the child, the experimenter shows that there is a crayon inside the box by revealing its content to the child. The child is then shown a picture of another gender-matched character who has not looked inside the candy box. The experimenter asks the following two questions in the given order: 1. "*What does the protagonist think is inside the box?*" and 2. "*Did the protagonist see inside of the box?*". Children received 1 point only when they give correct responses to both questions (i.e., "*a candy*" and "*no*" respectively).

2.2.3.6. Appearance-Reality Emotion

This task assesses children's ability to understand that a person might feel and show different emotions. There was a slight change between this version of the task and the original task. In the original task, Matt and his friends were playing when Rosie, one of his friends, made a mean joke about Matt and all of his friends laughed at the joke. Despite Matt did not think the joke was fun, he laughed as well as he did not want his friends to call him as baby. (Wellman & Liu, 2004). This version of the task, however, is about a boy and his aunt. In this version, the experimenter shows pictures of three emotions (i.e., *happy*, *sad*, and *neutral*) and ensures that the children understand these emotions by asking them to point out each emotion. Following, the experimenter tells a story about the protagonist and their aunt. The story goes as follows: the protagonist's aunt goes abroad and before leaving, she promises to bring

a gift for the protagonist. The protagonist likes toys as gifts but does not like clothes. The aunt, however, brings clothes for the protagonist as a gift. The protagonist should hide their emotions because otherwise, the aunt would never get a gift for the protagonist ever again. Two control questions are asked after the story: 1. "*What did the aunt bring as a gift?*" and 2. "*What would the aunt do if she learns the protagonist's real emotions?*". If the child could not give the correct responses to both questions (i.e., "*a cloth*" and "*She will not get another gift for the protagonist again*" respectively), the story is read again. If the child gives incorrect answers to any of the questions after the second reading too, they received 0. If the child correctly answered control questions in either trial (first or second), the experimenter asks two target questions: 1. "*What did the protagonist feel when the aunt gave the clothes as a gift?*" and 2. "*How did the protagonist look like when the aunt gave the clothes?*". Children are also provided with pictures of three faces showing the emotions, happy, sad, and neutral for their responses. Children received 1 point only when they answer both target questions correctly (i.e., "*sad*" and "*happy*" respectively).

2.2.4. Dimensional Card Sort Task (Zelazo, 2006)

This task assesses children's cognitive flexibility and inhibition (Zelazo & Muller, 2002). In this task, there are 28 cards with either demonstrating a picture of a red car or a picture of a blue elephant. Among these cars, half of them have a black border around the picture. There are three sorting games that are stated in a fixed order for the child to learn and perform. The first game is the color game. The instructions for the color game are as follows: "*This is a color game. In the color game, the red ones go here (by showing the box with a picture of a red elephant on it) and the blue ones*

go here (by showing the box with the picture of a blue car on it). This one is red/blue. Where does this one go?" There are two training and six test trials, with four red cards and four blue elephants. The order of the cards is pseudo-randomized in that no two cards with the same color appear consecutively. Children can receive 1 point for each correct sorting with a total of 6 points. After the color game, the experimenter introduces the second game (i.e., *the shape game*) by stating the instructions as follows: "*This is a shape game. In the shape game, elephants go here (by showing the box with a picture of a red elephant on it) and cars go here (by showing the box with the picture of a blue car on it). This is an elephant/ a car. Where does this one go?*" There are six test trials, with three red cards and three blue elephants. The order of the cards is pseudo-randomized where no two cards with the same shape appear consecutively. Children can receive 1 point for each correct sorting with a total of 6 points. If the child successfully completes this game, the experimenter introduces the final game (i.e., the *border game*) by stating the following: "*This is a border game. In the border game, if there is a black border around the card, we play the color game; if there is no border around the card, we play the shape game. There is a border around this card/no border around this card. Where does this one go?*" There are two training and 12 test trials, with seven red cars and seven blue elephants. For the training, one card with a border and without a border is used to introduce the game to the child. In the remaining 12 test trials, the order of the cards is pseudo-randomized in that no two cards with the same rule appear consecutively. Children can receive 1 point for each correct sorting with a total of 12 points. Overall, children can get a total of 24 points if they successfully sort all cards.

2.2.5. Turkish Receptive and Expressive Language Test (TIFALDI, Berument & Güven, 2013)

This is a standardized language measure, assessing the receptive and expressive language abilities of Turkish children (Berument & Güven, 2013). It has two subscales: receptive language and expressive language. The order of these two subscales is fixed: first receptive and then expressive test. In the receptive language subscale, there are 516 pictures, four per page, and the child is asked to tell which one the object is indicated by the experimenter (e.g., "*Which one of these pictures is a bed?*"). In the expressive language subscale, there are 80 pictures, one per page, and the child is asked to tell what the object in the picture is (i.e., "*What is this?*"). Children's standardized scores for each subscale are calculated.

2.2.6. Wordless Picture Book

Mothers were given a wordless picture book, "*Frog, where are you?*" (Mayer, 1969) and asked to narrate it to their children. The story of the book is about the adventures of a boy and a dog searching for a missing frog. There are 24 pictures in this book, demonstrating these adventures. The pictorial demonstration of the story requires the narrator to make inferences about the character's mental states (i.e., a picture showing a surprised character while sitting on a deer whose antlers are presented as if they are sticks, on the previous page).

2.3. Procedure

All data were collected in Bilkent Developmental Psychology Laboratory. Parents and their children were invited to the university's psychology laboratory. With their arrival, the first experimenter asked the child to play together in the playroom where a standard set of toys was presented to them. After this initial 5-minutes warm-up session, the experimenter gave the experimental measures in the given order: ToM battery, EF task, and language task. Mothers, who were in the waiting room during

this period, were asked to fill out the demographic information form and book reading habit survey. After they completed these, they were asked to look at the wordless picture book to become familiar with it and told to tell the story to their children as to how they tell stories at home. When the testing session ended, the mother was also invited into the playroom, and they were given a toy set to play with for 10 minutes. Data from this child-mother play session will not be reported in this thesis. After the 10-minute period ended and the toys were collected, the experimenter gave the wordless picture book to the mother who was asked to tell the story to the child.

2.4. Maternal MSL Coding

All child-mother storytelling interactions were transcribed for verbatim. The unit of analysis is determined by the C-Unit Protocol (MacWhinney, 2000). Accordingly, each main clause with its complement clauses (e.g., relative clause) is taken as one unit. The coding scheme was created by Bilkent Developmental Psychology Team as a result of careful examinations of the existing coding schemes in the literature (Adrián et al, 2005; Bretherton & Beeghley, 1982; Bozbıyık, 2015; Ruffman et al., 2002). Accordingly, mothers' mental state language was coded in three phases. In the first step, mental state content of in mothers' discourse was coded. In the second step, all mental state codes were coded according to their referents (story character vs. child-mother, for examples, see Table 1). Finally, in the last step, the functions of maternal use of visual perception expressions that referenced themselves, their children, or both were coded.

2.4.1. MS Categories

Maternal mental state language was coded via six main categories: perception, physiological state, desire, motivation, emotion, and cognition. Considering the linguistic features of the Turkish language (Göksel & Kerslake, 2005), some of these categories included uses at both the lexical and the morphological levels.

2.4.1.2. Perception

Words and phrases that refer to the process of information which is gathered by sensory organs (e.g., look, hear, smell) were coded under this category.

2.4.1.2. Physiological

Expressions that refer to a physiological state which needs to be evaluated by the observer (e.g., being tired, getting hurt, sleep) were coded under this category.

2.4.1.3. Desire

Expressions that refer to one's desire states were coded under this category. Both lexical and morphological uses were coded since, in Turkish, there are conjugations that indicate desire and intentions (for others or self) to do something as well as lexical uses.

2.4.1.3.1. Lexical Level

Words and phrases that refer to desires (e.g., want, wish, desire) were coded under this category.

2.4.1.3.2. Morphological Level

Morphological structures that are used to refer to one's desires or wishes (i.e., "-a, -e" and "-se, -sa") were coded under this category. In Turkish, we have two types of

conjugations that could be used to indicate a desire or intention: (a) volitional wishes (dilek kipi, -e, -a) and (b) volitional suggestions (istek kipi, -se, -sa). In Turkish, speakers use volitional wishes to express a desire for self or others to perform an action and use volitional suggestions to express an action that is suggested by the speaker to be performed by others or self (Göksel & Kerslake, 2005).

2.4.1.4. Motivation

Expressions that refer to the process of reaching goals (e.g., try, promise) were coded under this category. However, since the storytelling material was about a character searching for a frog, we did not code for certain expressions which express motivation (e.g., searching, looking for).

2.4.1.5. Emotion

Words and phrases that express one's feelings, emotions, and affective states were coded under this category (e.g., happy, upset, sad, excited, worried). In addition, certain behavioral indications of emotions (e.g., laughing, crying) were also coded in this category.

2.4.1.6. Cognition

Expressions that refer to one's cognitive mental processes, evaluation of certainty, contrastives, and perspectives were coded under this category. As the Turkish language allows us to express such states both on a lexical and morphological level, all cognitive mental state expressions were coded in different categories and a total score for cognitive mental state expressions was created later.

2.4.1.6.1. Cognitive Terms (Lexical Level)

Words and phrases that refer to a mental activity or a process were coded under this category (e.g., think, know, understand, remember, come up with an idea).

2.4.1.6.2. Cognitive Certainty (Lexical Level)

Words and phrases that refer to the evaluation of the certainty of the reality were coded under this category (e.g., maybe, absolutely, guess).

2.4.1.6.3. Cognitive Certainty (Morphological Level)

Expressions that refer to probability and certainty in morphological levels were coded under this category. In Turkish, there is a certain suffix (i.e., *(y)Abil*) to mark a possibility and an obligatory form of the auxiliary verb *ol-* to indicate an inference (i.e., *olmalı*). Such uses imply that the speaker is not sure about the reality however express their opinion or their inference by marking their certainty (Göksel & Kerslake, 2005).

2.4.1.6.4. Cognitive Contrastives.

Words and phrases that express a contrast between the thought and reality were coded under this category (e.g., in fact, in reality, surprise). In addition, two special verbs are generally used in Turkish to express one's falsely believing something (i.e., zannetmek, and sanmak)**.** These verbs, inherently, imply a contrast with one's belief and reality and hence were coded under this category.

2.4.1.6.5. Cognitive Perspectivals (Morphological Level)

In Turkish, one can refer to the perspectives via certain suffixes (i.e., "-ce, ca). These suffixes are added to the personal pronouns (e.g., I, me, you) to refer that the given statement in the sentence is from that person's point of view and can be translated into English as *according to me/you* or *in my opinion/view* (Göksel & Kerslake, 2005).

2.4.2. Referents

All MS references were also coded according to whose mental world the expression refers.

2.4.2.1. References to Child's and Mother's Mental Worlds

MS expressions that refer to the mental words of mothers and their children were coded under this category.

2.4.2.2. References to the Story Characters' Mental Worlds

MS expressions that refer to the mental words of the story characters were coded under this category.

2.4.3. Functions of Perception Language

After the first phase of MSL coding was completed, visual perception MS expressions were coded according to their functions in the storytelling interaction. For this purpose, the transcriptions were inspected with the video recordings of the interactions. Along with the meaning of the expressions, there are two determinants for these categories: (a) the children's attentive status and (b) mothers' evaluation of

their children's attentive status. As a result, there were four main categories. However, during coding, ambiguous cases were encountered where even though it was clear that the child was not attending, the mother did not show any indication of the fact that they noticed their children's inattentive behavior. Therefore, these instances were coded in a separate category, *unclassified*, since it is not possible for the coders to determine the function of the mental state expressions with clarity.

2.4.3.1. Redirecting Attention

In this type of use, children are not attending to the book or the story. When this is the case, mothers redirect their children's attention to the book or the story by using visual perception mental state expressions. Therefore, the function of these uses is to *re-direct the child's attention to the story*. To attribute such a function to these uses, the videos of the storytelling interaction are examined thoroughly: the codes exclusively applied when the child is not attending (e.g., running around, not looking at the book, etc.), and mothers show a *clear* indication for their understanding of their children's attentiveness. The behavioral indications that accompany this type of use are generally having eye contact with the child, and making some attention-gathering movements (e.g., waving hand, etc.).

2.4.3.2. Changing the Focus

In this type of use, children are attending to the book or the story, but they are not attending to the picture of interest. Hence mothers are directing the children's attention to the picture of interest. Therefore, the function of these uses is to *change the focus*. To attribute such a function to these uses, the videos of the storytelling interaction are examined thoroughly: the codes are exclusively applied when the

child is attending to the book, and the mother directs the child's attention to another picture of the story.

2.4.3.3. Emphasizing

In this type of use, children are attending to the relevant picture and the mothers are emphasizing a certain part of that picture. Apart from that, mothers use perceptual state expressions to ensure that the child is looking at a particular picture that is not hard to see (to make sure that the child is looking at the picture). Both uses were coded under this category and this function is to *emphasize* detail in the relevant part of the book. The codes are exclusively applied when the child is attending to the book, and the mother directs the child's attention to a particular place in the relevant picture. Generally, this type of use is accompanied by a *pointing gesture* by mothers.

2.4.3.4. Literal Meaning

Perceptual mental state expressions that refer to the act of seeing or looking were coded under this category. Therefore, the function of perception state expression for this category is to *give literal* meaning.

2.4.3.5. Unclassified

During the coding process, some uses of perceptual mental state expressions which could not be classified in either of the four categories. For a perception state expression to be coded in either one of the categories above, there are certain behavioral indications (i.e., children's attentiveness to the book/story & mothers' indications of noticing this attentiveness level). When there is a clear indication that the mothers misjudged their children's attentive status (i.e., thinking they are attending while their children do not), these uses are coded as unclassified. These

misjudgments were inferred from mothers' child-directed behaviors (e.g., looking at the child's position, leaning into their children, etc). If these behaviors were not present at the time of utterance and when the child is not attending, we coded such instances as unclassified. In our dataset, there are only 18 instances of such uses where the function of maternal perception MSL could not be determined.

2.5. Reliability

All data were coded by the main coder. Two trained undergraduate research assistants coded 20 % of the data, respectively for the MSL by referent category (N = 16) and the functions of perceptual state terms (N = 16). The reliability with the main coder was in excellent range [ICC (1,2) = .99, with a 95% confidence interval from .99 to 1.00, $p < .001$] for both mental state categories and the references of the mental state language. For the functions of perceptual mental state expressions, we conducted the reliability analyses for each category since the *unclassified* category was added after the undergraduate research assistant completed the coding. The reliability with the main coder was [ICC (1,2) = .98, with a 95% confidence interval from .96 to .99] for redirecting attention, [ICC (1,2) = .92, with a 95% confidence interval from .79 to .97], for changing the focus of the child, [ICC (1,2) = .99, with a 95% confidence interval from .99 to 1.00] for emphasizing, and [ICC (1,2) = .99, with a 95% confidence interval from .99 to 1.00] for literal meaning (ps < .001).

Table 1. Mental State Language Coding Scheme with Examples

Categories	Levels	Examples (Story Characters)	Examples (Child-mother)
Perception		TR: "Ama bir **bakmış** ki o dal değil!" EN: "Once he **looked**, it was not a branch."	TR: "Şur(a)da küçük bir şey **görüyorum**." EN: "I **see** something small there."
Physiological State		TR: "Bu yüzden uzun kulak ve Can erkenden **uyuyakalmışlar**." EN: "Because of this, long ear and Can **fell asleep** earlier."	TR: "Sen de böyle mi **uyuyo(r)sun**?" EN: "Do you also **sleep** like this?"
Desire	Word Level	TR: "Ve Can'a demiş ki: "Can kurbağayı korumanı **istiyorum**."" EN: "And he told Can: "Can, I **want** you to protect the frog."	TR: "Gerçekten senin **istediğin** gibi mi ol(a)cak?" EN: "Will it really happens, as you **wish**?"
	Morph-Syntactic Level	TR: "Şimdi seninle gel**e**yim." EN: "I **shall** come with you."	TR: "Kaç tane yavrusu var hadi say**a**lım." EN: "**Let's** count how many children he has."
Motivation		TR: "Kurbik'i bulmaya **çalışıyorlarmış.**" EN: "They were **trying** to find Kurbik."	TR: "Sen de bana **yardım** eder misin?" EN: "Will you also **help** me?"
Emotion		TR: "Bıdık da Umut da onu bulduklarına çok **mutlu** olmuşlar." EN: "Both Bıdık and Umut were so **happy** that they found him."	TR: "Ben çok **mutlu** oldum." EN: "I became very **happy**."
Cognition	Cognitive Words (Word level)	TR: ""Pencereden sarkarsan düşeceğini **bilmiyor** musun?" demiş." EN: "He told: "Don't you **know** you would fall if you lean out of the window?"	TR: "Artık dışarda aramaya başladılar **fark ettin** mi?" EN: "They started to search outside, did you **notice**?"
	Certainty (Word level)	TR: "Köpeği "Sus" demiş "**Sanırım** kovuğun içinde şimdi onu bulacağız."." EN: "His dog said "Hush! I **suppose** we will find him inside the hole now."	TR: "O da **belki** kurbağa beslemek istiyo(r)dur." EN: "**Maybe**, he too wants to feed the frog."
	Certainty (Morph-Syntactic Level)	TR: "Ahmet "Hiii kurbağa buraya saklanmış **olmalı**" demiş." EN: "Ahmet said" Hım, the frog **must have** hidden here.""	TR: "İnsanı mı çağrıyo(r) **olabilir**?" EN: "**Could** he be calling the human?"
	Contrastives	TR: "Ağaç **zannetmiş** çünkü onu." EN: "Because he **falsely thought** that it was a tree."	TR: "**Meğerse** burada bir geyik varmış!" EN: "**But it seems**, there was a deer here."
	Perspectival	TR: "…**bence** o "vrraak, vrraak" falan demiyordur." demiş Bolt." EN: "Bolt said "**according to me**, he would not say "vrak vrak"	TR: "Bu insan mı **sence**?" EN: "Is this a human, **according to you**?"

CHAPTER III

RESULTS

In this section, first preliminary analyses on book reading habits, child cognitive variables and maternal MS language variables will be presented. Following, the correlational and regression analyses on the relations between child variables and maternal MS language variables will be demonstrated. Finally, additional analyses on the relation between children's ToM performance and maternal MS language will be presented.

3.1. Preliminary Analyses

3.1.1. Book Reading Habits Survey

Regarding reading habits, 49 parents (65.3%) reported that they started to read to their children within the first year (i.e., 6-months to 12 months). Seventy-one (95.9%) of them reported that they read stories (books) to their children currently and 67 (90.5%) of them reported that they tell stories to their children.

3.1.2. Cognitive Variables

3.1.2.1. Language

For language scores, raw scores were used in the analyses because (1) age was always controlled for in analyses and (2) in some cases where children have a score that is higher than the highest raw score in the standardization table, and these children's scores are reported as the highest standard score within the table. In order to be more sensitive to these differences between children who score higher than the highest standardized score and children whose raw score is equivalent to the highest standardized score, raw scores were used in the following analyses.

Multivariate analysis with receptive and expressive language raw scores as dependent and age in year and gender as independent variables revealed a main effect of age (Pillai's Trace (.45) F (4, 136) = 9.84, $p < .001$, partial $\eta^2 = .23$) for both receptive and expressive language scores. 4- and 5-year-olds performed significantly better than 3-year-olds for both receptive and expressive language scores ($M_{3\text{-}year\text{-}olds}$ = 47.2, $M_{4\text{-}year\text{-}olds}$ = 66.7, $M_{5\text{-}year\text{-}olds}$ = 72.9 for receptive; $M_{3\text{-}year\text{-}olds}$ = 41.3, $M_{4\text{-}year\text{-}olds}$ = 51.9, $M_{5\text{-}year\text{-}olds}$ = 55.2 for expressive, ps < .001) while 4- and 5-year-olds did not differ from each other. While there was no main effect of gender on expressive language scores, our analyses revealed a significant main effect of gender on receptive language scores (F (1, 68) = 4.64, p = .04, partial η^2 = .06), showing that girls outperformed boys (M_{Girls} = 65.5, M_{Boys} = 59.1). No interaction effect was found.

3.1.2.2. Executive Functions

EF scores were evaluated in two ways: (a) the total number of correct responses with a maximum score of 24 (Range = 5 – 23, M = 14.7, SD = 5.7); and (b) the status of

pass/fail for each game (Zelazo, 2006). The second method of coding yielded a range of scores between 0 and 3 where 0 indicated children who could not pass the color game, 1 indicated children who passed the color game but failed the shape game, 2 indicated children who passed both color and shape but failed the border game; and 3 indicated children who passed all games. None of the 3-year-olds passed the border task whereas small groups of 4- and 5-year-olds (15% and 14% respectively) passed border task (See Figure 1).

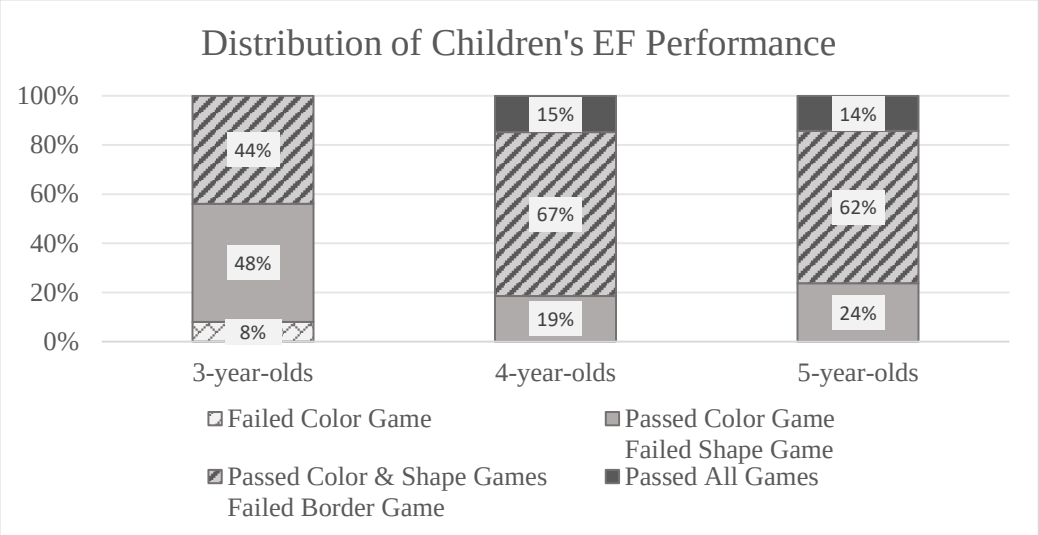

Figure 1. Distribution of Participants, Based on Their EF Performances

Univariate analysis with EF scores (i.e., the number of correct responses) as dependent and age in year and gender as independent variables revealed a main effect of age (F (2, 68) = 6.797, p = .002, partial η^2 = .17) and a significant interaction between age and gender (F (2, 68) = 4.681, p = .012, partial η^2 = .12). No main effect of gender was found. Pairwise comparisons showed that EF performance of 4- ($M_{4\text{-}year\text{-}olds}$ = 16.3, p = .005) and 5-year-olds ($M_{5\text{-}year\text{-}olds}$ = 16.4, p =.008) were significantly better than 3-year-olds ($M_{3\text{-}year\text{-}olds}$ = 11.8) while 4-year-olds performances did not differ from 5-year-olds' performance (p = 1.00). When inspected the interaction effect further, no significant difference was observed in children's EF performance across age groups for boys. However, for girls, pairwise

comparisons revealed that 4- and 5-year-olds' performances were significantly better than 3-year-olds ($p < .001$ for both) while 4-year-olds' performances did not differ from 5-year-olds ($p = .75$). Overall, while performances of girls and boys differed from each other for 3-year-olds ($p = .046$) and 4-year-olds ($p = .041$), there was no gender difference among 5-year-olds (See Figure 2)

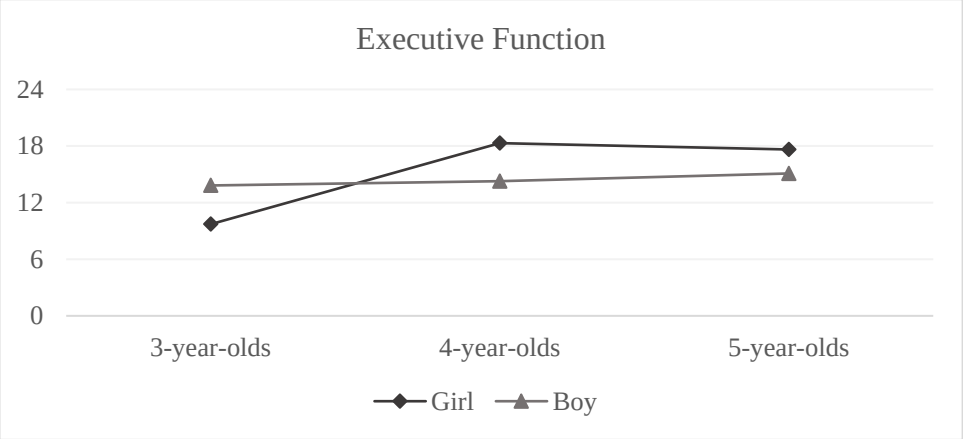

Figure 2. Children's EF Performance by Age and Gender

3.1.2.3. Theory of Mind

For ToM measures, the distribution of children's performance for each individual task within the ToM battery was investigated first. The distribution for KI, CFB, and ARE tasks revealed that the percentage of children who succeeded in the task increased by age. However, a similar pattern was not found for DD, DB, and especially EFB (See Table 2).

Table 2. Percentage of Children Who Passed Individual ToM Tasks

	3-year-olds	4-year-olds	5-year-olds
1. Diverse Desire	80.0%	88.9%	77.3%
2. Diverse Belief	68.0%	63.0%	63.6%
3. Knowledge Access	52.0%	74.1%	77.3%
4. Explicit False Belief	20.0%	7.4%	22.7%
5. Content False Belief	12.0%	37.0%	50.0%
6. Appearance-Reality/Emotion	0.0%	11.1%	27.3%

After this inspection, the relations between ToM tasks were examined to decide whether it was possible to create a composite score. A bivariate correlation with all ToM measures and children's age in months was conducted. Three correlations within ToM measures were observed: Diverse Desire and Diverse Belief (r = .33, p = .004), Diverse Belief and Explicit False Belief (r = .33, p = .005), and Knowledge Access and Content False Belief (r = .30, p = .011). Children's age was significantly related to Knowledge Access (r = .33, p = .005), Content False Belief (r = .33, p = .005), and Appearance-Reality Emotions (r = .33, p = .005), When controlled for age, the relation between Knowledge Access and Content False Belief tasks became significant at trend level (See Table 3). Due to these non-significant results, one composite score for all ToM tasks was not created. Instead, two total scores, one for Diverse Desire and Diverse Belief, and one for Knowledge Access and Content False Belief were created. These scores were named as *diversity* and *normativity* scores respectively. EFB measure was excluded from further analyses, as it was clear that it did not reveal a developmental trajectory that was observed in other ToM measures.

Table 3. Age-Controlled Partial Correlations Between ToM Tasks

	DD	DB	KA	EFB	CFB	ARE
DD	1					
DB	.33**	1				
KA	.07	-.14	1			
EFB	.11	.33**	-.09	1		
CFB	-.06	-.02	.22†	.01	1	
ARE	-.04	.03	-.15	.07	-.10	1

DD: Diverse Desire; DB: Diverse Belief; KA: Knowledge Access; EFB: Explicit False Belief; CFB: Content False Belief; ARE: Appearance-Reality Emotion.

$^{\dagger}p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

Regarding the Diversity, Normativity, and Appearance-Reality Emotion Task scores, the distribution of these scores by age was examined first (See Table 4). Inspection of the overall success of the children in our sample for these two scores revealed that the success rate (i.e., success in both measures) was higher for diversity scores (*N* = 44, 59.5%) than normativity scores (*N* = 21, 28.4%). However, our initial inspection of this distribution showed that while there was an increase in the percentage of children who had passed either one or both tasks for normativity score by age (61.6%, 82.5%, 86.4% for 3-, 4-, and 5-year-olds, respectively), this was not the case for diversity score (88.0%, 92.6%, 81.8% for 3-, 4-, and 5-year-olds, respectively).

Table 4. Distribution of Participants, Based on Their Diversity and Normativity Scores

	Diversity Scores			Normativity Scores			**TOTAL**
	Failure in both Score = 0	Success in one Score = 1	Success in both Score = 2	Failure in both Score = 0	Success in one Score = 1	Success in both Score = 2	
3-year-olds	3 (12.0%)	7 (28.0%)	15 (60.0%)	11 (44.0%)	12 (48.0%)	2 (13.6%)	25
4-year-olds	2 (7.4%)	9 (33.3%)	16 (59.3%)	7 (25.9%)	10 (37.0)	10 (45.5%)	27
5-year-olds	4 (18.2%)	5 (22.7%)	13 (59.1%)	3 (13.6%)	10 (45.5%)	9 (40.9%)	22
TOTALS	9 (12.2%)	21 (28.4%)	44 (59.5%)	21 (28.4%)	32 (43.2%)	21 (28.4%)	*N* = 74

To examined whether there were age or gender related differences in ToM performance, two univariate analyses were conducted. The univariate analysis with diversity scores as dependent variable and children's age and gender as independent variables revealed no significant effect of age and gender and no interaction effect. However, univariate analysis with normativity scores as dependent and children's age and gender as independent variables revealed a significant main effect of age (F (2, 68) = 6.205 p = .003, partial η^2 = .15) and gender (F (1, 68) = 10.340, p = .002, partial $\eta 2$ = .13). Pairwise comparisons showed that 4- and 5-year-olds performed

significantly better than 3-year-olds (p = .03, and p = .005 for 4- and 5-year-olds respectively) while there was no difference between 4- and 5-year-olds (See Figure 3). As for gender, when inspecting further, the results revealed that girls significantly outperformed boys (p = .002).

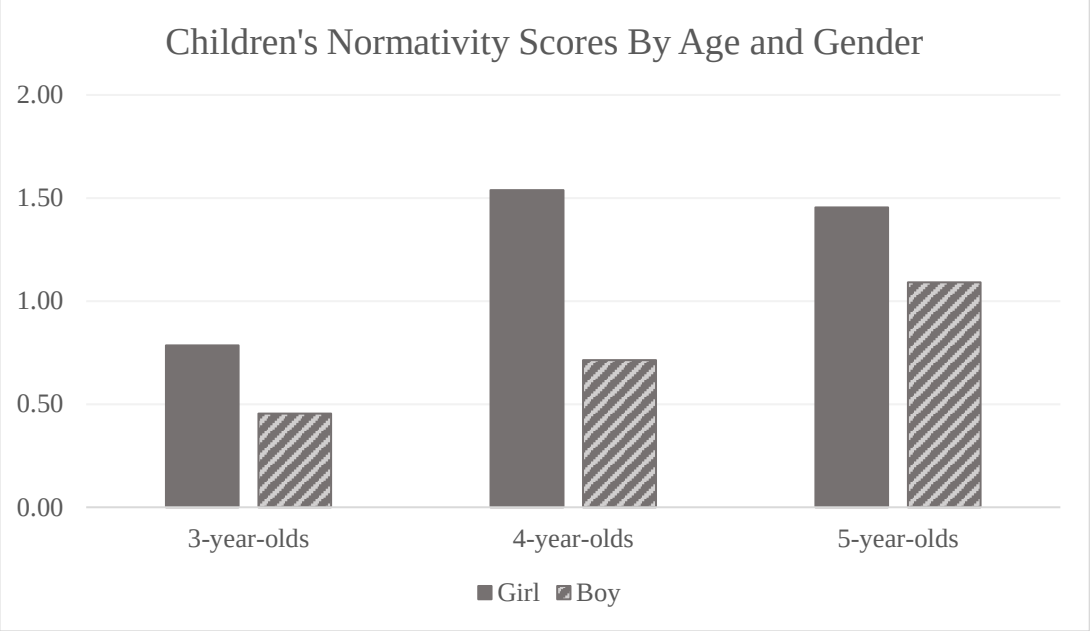

Figure 3. Children's Normativity Scores by Age and Gender

3.1.2.4. Relations Between Child Cognitive Measures

To investigate the relations between child cognitive variables, a bivariate correlation was conducted with children's diversity, normativity, appearance-reality emotion task scores, EF, and expressive and receptive language scores (Table 5). When children's age in months was controlled for, diversity score was significantly related to children's receptive language scores (r = .25, p = .03) and normativity score remained to be positively related to EF (r = .29, p = .01). While the relation between EF and receptive language became non-significant, EF remained related to expressive language at the trend level (r = .22, p = .06). Finally, the relation between expressive and receptive language remained (r = .55, p < .001).

Table 5. Bivariate Correlations Between Age, Diversity and Normativity Scores and Child Cognitive Control Variables

	Age in Months	Diversity Score	Normativity Score	ARE	EF	Exp. Lang.	Rec. Lang.
Age in Months	1						
Diversity Score	-.05	1					
Normativity Score	.40***	-.08	1				
ARE	.35**	-.02	.00	1			
EF	.40***	.13	.40***	.18	1		
Exp. Lang.	.62***	.11	.32**	.20†	.40***	1	
Rec. Lang.	.73***	.13	.36**	.25**	.37**	.75***	1

EF: Executive Function; Exp. Lang.: Expressive Language; Rec. Lang.: Receptive Language

Note: † $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

3.1.3. Maternal MSL

Before our analyses with maternal MS language, it was examined whether there were mothers who were outliers in the dataset. To do this, total scores for both traditional and comprehensive coding schemes were created first. For traditional coding totals, desire MS expressions on the lexical level, emotion expressions, and cognitive MS terms on the lexical level were included. For the comprehensive coding totals, all MS categories (i.e., perception, physiological, desire, motivation, emotion, and cognition for both lexical and morphological levels) were included. After the scores were summed for these categories, proportion scores were calculated for each by controlling for total communication units with the following formulas:

$$\text{For traditional proportion scores} = \frac{Traditional\ Total\ of\ MSL}{Total\ C\text{-}Units}$$

$$\text{For comprehensive proportion scores} = \frac{Comprehensive\ Total\ of\ MSL}{Total\ C\text{-}Units}$$

Both the frequency and proportion scores for both these totals were examined. As a result of our examination of traditional MS language total, there appeared three cases, none of which remained as outliers after controlling for length. For the comprehensive totals, in the analyses with frequencies, there was 4 potential outliers. Controlling for length, one case remained as a potential outlier (0.80) where the value was 2.5 SD above the mean (M = 0.50, SD = 0.12). Hence, this case who was a mother of a 5-year-old girl was excluded from our dataset. The following analyses were conducted with 73 participants in only proportion score to eliminate any effect that outliers would have on the data when the analyses were to be conducted in frequency.

3.1.3.1. Total Maternal MSL

To inspect whether there were age or gender related differences in maternal MSL, a univariate analysis with comprehensive total of maternal MSL proportion scores as dependent and children's age in year and gender as independent variables was conducted. No significant main effect of age and gender and no age by gender interaction was found. Results were the same for maternal traditional total MSL proportion scores. This revealed that mothers in our sample did not differ in terms of their MSL totals according to their children's age and gender.

3.1.3.2. Maternal MS Categories

To investigate whether mothers' uses of MS categories (i.e., perception, physiological, desire, motivation, emotion, and cognition) vary by children's age and gender, two separate multivariate analyses with traditional and comprehensive proportion scores as dependent and children's age in year and gender as independent variables were conducted. There was no main effect of age and gender, and no age

by gender interaction for both analyses. To move one step further, a mixed model ANOVA with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subject and MSL categories (perception, physiological, desire, motivation, emotion, cognition) as within-subject variables was conducted. This analysis was completed twice with traditional and comprehensive proportion scores. For both analyses, the sphericity assumption was violated ($p < .001$). Hence, we reported the results with Greenhouse-Geisser correction.

3.1.3.2.1. Analyses with MSL at Lexical Level

Our analysis with traditional proportion scores revealed that there was no effect of age and gender or no age by gender interaction. However, there was a significant difference in mothers' use of MS categories in their discourse, F (1.812, 121.397) = 355.335, $p < .001$, partial $\eta^2 = .84$ (See Figure 4). Mothers' use of perception expressions was significantly greater than emotion expressions ($p < .001$). Mothers' use of emotion expressions was more than their use of cognitive expressions, only at a trend level ($p = .05$). Mothers' use of cognitive expressions was greater than physiological expressions which were also used more frequently than desire and motivation expressions (ps < .001). However, there was no significant difference between their use of desire and motivation expressions ($p = 1.00$). The order of mothers' use of MS categories from the most used to least used with their means in parentheses as follows: Perception (0.22), Emotion (0.07), Cognitive (0.05), Physiological (0.03), Desire (0.01), Motivation (0.008).

There was also a category by age interaction F (3.624, 121.397) = 3.033, $p = .024$, partial $\eta^2 = .08$). When inspected further, while the same pattern was true for all age groups, mothers of 5-year-olds used emotion expressions significantly more often

than cognitive expressions (p = .001) and used cognitive expressions more frequently than physiological expressions only at trend level (p = .053). In addition, 3-year-olds' mothers used more perception expressions than 4-year-olds' mothers ($M_{3\text{-}year\text{-}olds}$ = 0.24 & $M_{4\text{-}year\text{-}olds}$ = 0.19, p = .011) and mothers of 4-year-olds used desire and cognitive expressions more often than mothers' of 5-year-olds (for desire $M_{4\text{-}year\text{-}olds}$ = 0.01 & $M_{5\text{-}year\text{-}olds}$ = 0.007, p = .08; for cognition $M_{4\text{-}year\text{-}olds}$ = 0.06 & $M_{5\text{-}year\text{-}olds}$ = 0.04, p = .06).

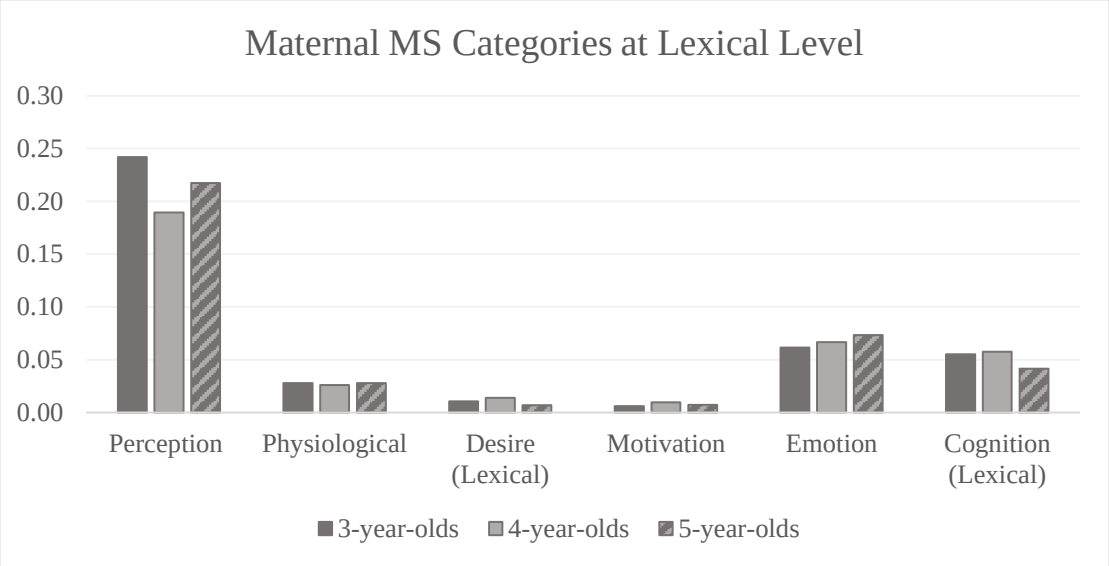

Figure 4. Mothers' Use of MS Categories at Lexical Level in Their Discourse

3.1.3.3. Analyses with Comprehensive Scores (Lexical and Morphological)

Paralleling our results with traditional total scores, our analysis with comprehensive proportion (lexical and morphological) scores revealed that there was no effect of age and gender or no age by gender interaction. Similarly, mothers' use of MS categories significantly differed from each other, F (2.774, 185.886) = 227.714, p < .001, partial η2 = .77 (See Figure 5). Mothers' use of perception expressions was more often than cognitive expressions (p < .001). Mothers' use of cognitive expressions was also more frequent than their use of emotion expressions (p < .001).

There was no significant difference between mothers' use of emotion and desire expressions while mothers' use of desire expressions was more often than physiological and motivational expressions ($p < .001$ for both). The order of mothers' use of MSL categories from the most used to least used with their means in parentheses as follows: Perception (0.22), Cognitive (0.12), Emotion (0.67), Desire (0.64), Physiological (0.27), and Motivation (0.008).

In addition, there was a trend for category by age interaction (F (5.549, 185.886) = 2.236, p = .046, partial η2 = .06) where 3-year-olds' mothers used more perception expressions than 4-year-olds' mothers ($M_{3\text{-}year\text{-}olds}$ = 0.24 & $M_{4\text{-}year\text{-}olds}$ = 0.19, p = .011).

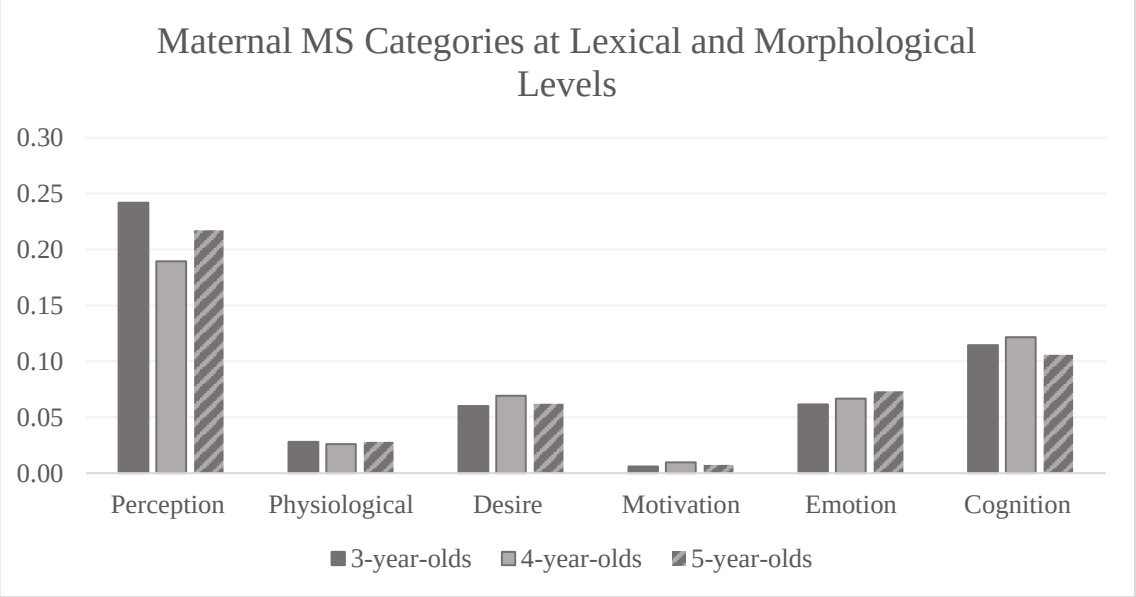

Figure 5. Mothers' Use of MS Categories at Lexical and Morphological Levels in Their Discourse (Comprehensive Coding)

3.1.4. Total Maternal MSL by Referent Categories (Story Character vs. Child-Mother)

Two separate univariate analyses with maternal MSL that referenced to story characters' mental worlds and that referenced to child's and mother's mental worlds as dependent and children's age in year and gender as independent variables were

conducted for both traditional and comprehensive scores. Further, two mixed-model ANOVAs with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subjects and the reference of MS language (Story Character, Child-Mother) as within-subject variables were conducted for both traditional and comprehensive total scores. There was no main effect of age or gender and no age by gender interaction for maternal MSL that referenced to story characters' mental worlds, for both traditional and comprehensive scores.

Regarding maternal MSL that referenced children's and mothers' mental worlds, there was a difference between traditional and comprehensive scores: while univariate analysis with comprehensive scores revealed no main effect of age and gender and no age by gender interaction, analysis with traditional scores revealed a trend for an age effect (F (2, 67) = 2.967, p = .06, partial η2 = .08). Post-hoc analyses revealed that mothers of 3-year-olds used MSL that reference to their own and children's mental states more than mothers of 4-year-olds ($M_{3\text{-year-olds}}$ = 0.14, $M_{4\text{-year-olds}}$ = 0.09). However, there was no significant main effect of gender and no age by gender interaction for traditional scores.

Further, a mixed model ANOVA with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subjects and the reference of MSL (Story Character, Child-Mother) as within-subject variables was conducted for both traditional and comprehensive total scores. Our results revealed that there was no main effect of age and gender for both traditional and comprehensive scores. However, the references of mothers' MSL in their stories differed significantly for comprehensive (F (1, 67) = 18.374, p < .001, partial η2 = .22) and traditional scores (F (1, 67) = 83.030, p < .001, partial η2 = .56). The results revealed that mothers talked about the mental state of the story characters

more than they did for themselves and their children (comprehensive coding: $M_{\text{MSL-SC}} = 0.29$, $M_{MSL\text{-}CM} = 0.20$; traditional coding: $M_{\text{MSL-SC}} = 0.27$, $M_{MSL\text{-}CM} = 0.11$).

3.1.5. Maternal MS Categories by Referent Categories (Story Character vs. Child-mother)

To see whether maternal MS categories by referents vary by children's age and gender, two separate multivariate analyses with children's age in year and gender as independent variables and maternal MS categories that referenced story characters and that referenced children's and mothers' mental worlds as dependent variables were conducted for both traditional and comprehensive scores.

3.1.5.1. Story Character Referenced Maternal MS Categories

Multivariate analyses with maternal MS categories that referenced story characters as dependent and children's age in year and gender as independent variables revealed no significant main effect of age and gender, and no age by gender interaction for both traditional and comprehensive scores. To inspect the story character referenced maternal MS categories, a mixed model ANOVAs with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subject and MSL categories (SC-Perception, SC-Physiological, SC-Desire, SC-Motivation, SC-Affect, SC-Cognition) as within-subject variables was conducted for both traditional and comprehensive scores (See Figure 6).

3.1.5.1.1. Analyses with MSL at Lexical Level

Since the sphericity assumption was violated, statistics with Greenhouse-Geisser correction were reported. Our results revealed that there was no main effect of age and gender. However, maternal MS categories that referenced to story characters

significantly differed from each other (F (2.368, 158.677) = 231.996, p < .001, partial η2 = .78). Mothers talked about the story characters' perception significantly more than their emotions (p < .001). Mothers also talked about characters' emotions more than they talked about their cognition (p < .001). However, mothers' use of cognitive expressions was not different than their use of physiological expressions (p = 1.00). While mothers talked about characters' physiological states more than their desires (p < .001), there was no difference in their talk regarding story characters' desires and motivations (p = 1.00). The order of mothers' use of mental state language categories while talking about story characters from the most used to least used with their means in parentheses is as follows: Perception (0.13), Emotion (0.07), Cognition (0.03), Physiological (0.03), Desire (0.008), and Motivation (0.007).

3.1.5.1.2. Analyses with Comprehensive Scores (Lexical and Morphological)

The results with comprehensive scores revealed that maternal MS categories that referenced story characters significantly differed from each other (F (2.999, 200.928) = 177.511, p < .001, partial η2 = .73), and the order was the same as the results with traditional scores, except the fact that mothers significantly talked more about characters' desires than motivation (p < .001). The order of mothers' use of mental state language categories while talking about story characters from the most used to least used with their means in parentheses is as follows: Perception (0.13), Emotion (0.07), Cognition (0.05), Physiological (0.03), Desire (0.02), and Motivation (0.007).

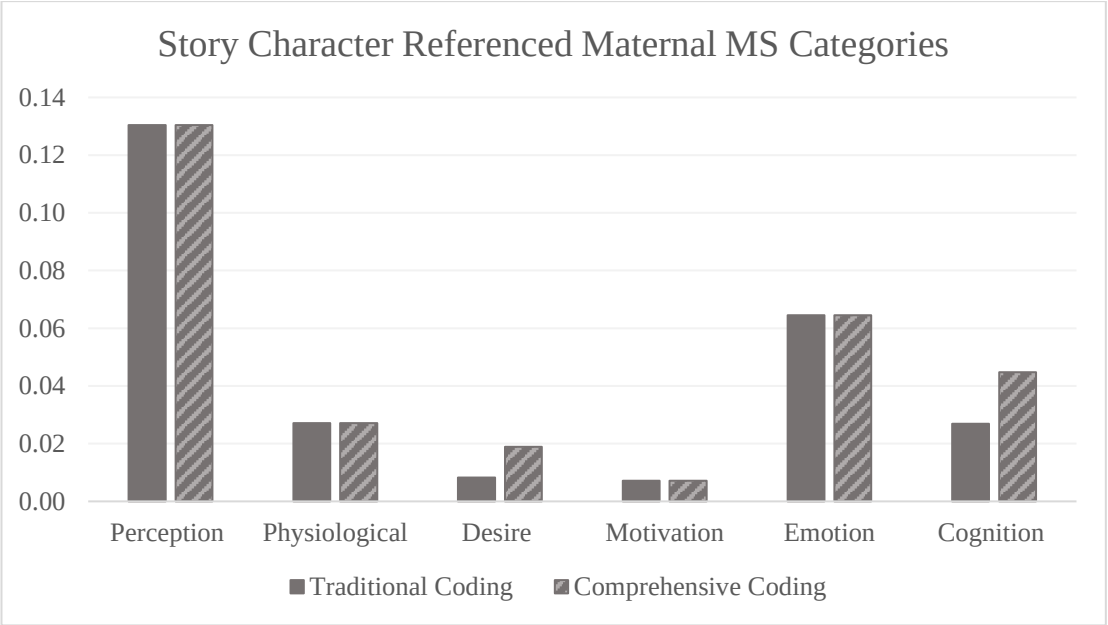

Figure 6. The Use of Story Character Referenced Maternal MS Categories in Their Discourse (Both Comprehensive and Traditional Scores)

3.1.5.2. Child-Mother Referenced Maternal MS Categories

Multivariate analyses with maternal MS categories that referenced mothers and children as dependent and children's age in year and gender as independent variables revealed a significant main effect of age (Pillai's Trace (.38), F (2.129, 12.000) = 126.000, p = .02, partial η2 = .17). This age effect was observed for emotion expressions (p = .007) where mothers of 5-year-olds talked about their and their children's emotions more than mothers of 4-year-olds ($M_{4\text{-year-olds}}$ = 0.001, $M_{5\text{-year-olds}}$ = 0.005), and for perception expressions (p = .06) where mothers of 3-year-olds talked about their and their children's perception more than mothers of 4-year-olds at trend level ($M_{3\text{-year-olds}}$ = 0.107, $M_{4\text{-year-olds}}$ = 0.61). In addition, there was a trend for a gender effect for emotion expressions (F (1, 67) = 2.954, p = .09, partial η2 = .04), mothers of girls talked about their and their children's emotions more than mothers of boys (M_{Girls} = 0.004, M_{Boys} = 0.001). The same pattern was observed when the comprehensive scores were used. However, there was also a main effect of gender for desire expressions (F (1, 67) = 4.427, p = .04, partial η2 = .06) in analysis with

comprehensive scores. Mothers of girls ($M = 0.05$) talked about their and their children's desires more than mothers of boys ($M = 0.04$). To inspect the child-mother referenced maternal MS categories, a mixed model ANOVA with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subject and MSL categories (CM-Perception, CM-Physiological, CM-Desire, CM-Motivation, CM-Affect, CM-Cognition) as within-subject variables were conducted for both traditional and comprehensive scores (See Figure 7).

3.1.5.2.1. Analyses with MSL at Lexical Level

Since the sphericity assumption was violated, statistics with Greenhouse-Geisser correction were reported. Our results revealed that there was a trend for a main effect of age (F (2, 67) = 2.967, p = .06, partial η2 = .08), which was qualified by a trend for age by category interaction (F (2.379, 79.680) = 2.678, p = .065, partial η2 = .07). Overall, mothers of 3-year-olds used more MSL than mothers of 4-year-olds ($M_{3\text{-year-olds}} = 0.024$, $M_{4\text{-year-olds}} = 0.015$, p = .053). This age effect was due to (a) mothers of 3-year-olds using more perception expressions than mothers of 4-year-olds ($M_{3\text{-year-olds}} = 0.11$, $M_{4\text{-year-olds}} = 0.06$, p = .02), (b) mothers of 5-year-olds using more emotion expressions than mothers of 4-year-olds ($M_{4\text{-year-olds}} = 0.001$, $M_{5\text{-year-olds}} = 0.005$, p = .002). In addition, we found that the MS categories significantly differed from each other (F (1.189, 79.680) = 98.253, $p < .001$, partial η2 = .60). Mothers used perception expressions more than cognitive expressions while talking about their own and their children's mental states ($p < .001$). Mothers talked about their own and their children's cognition more than their emotions ($p < .001$). However, there was no significant difference between (a) emotion and desire expressions (b) motivational and physiological expressions (ps = 1.00); and (c) desire and motivation expressions

that referenced their own and their children's mental world (p = .132). The order of mothers' use of MS categories while talking about self and others' mental states from the most used to least used with their means in parentheses is as follows: Perception (.09), Cognition (0.3), Affective (0.003), Desire (0.002), Motivation (0.0004), and Physiological (0.00001).

3.1.5.2.2. Analyses with Comprehensive Scores (Lexical and Morphological)

The mixed ANOVA with comprehensive scores revealed that maternal MS categories significantly differed from each other (F (2.263, 151.637) = 85.00, p < .001, partial η2 = .56). There was no difference in mothers' use of perception and cognitive expressions (p = .64). However, mothers talked about their and their children's cognitive states more than their desires (p = .002). and talked more about their desires than emotions (p < .001). While mothers talked about their own and their children's emotions more than their motivations (p < .001), there was no difference in their talk about motivations and physiological states (p = 1.00). The order of mothers' use of MS categories while talking about self and others' mental states from the most used to least used with their means in parentheses is as follows: Perception (0.09), Cognition (0.7), Desire (0.05), Emotion (0.003), Motivation (0.0004), and Physiological (0.0001).

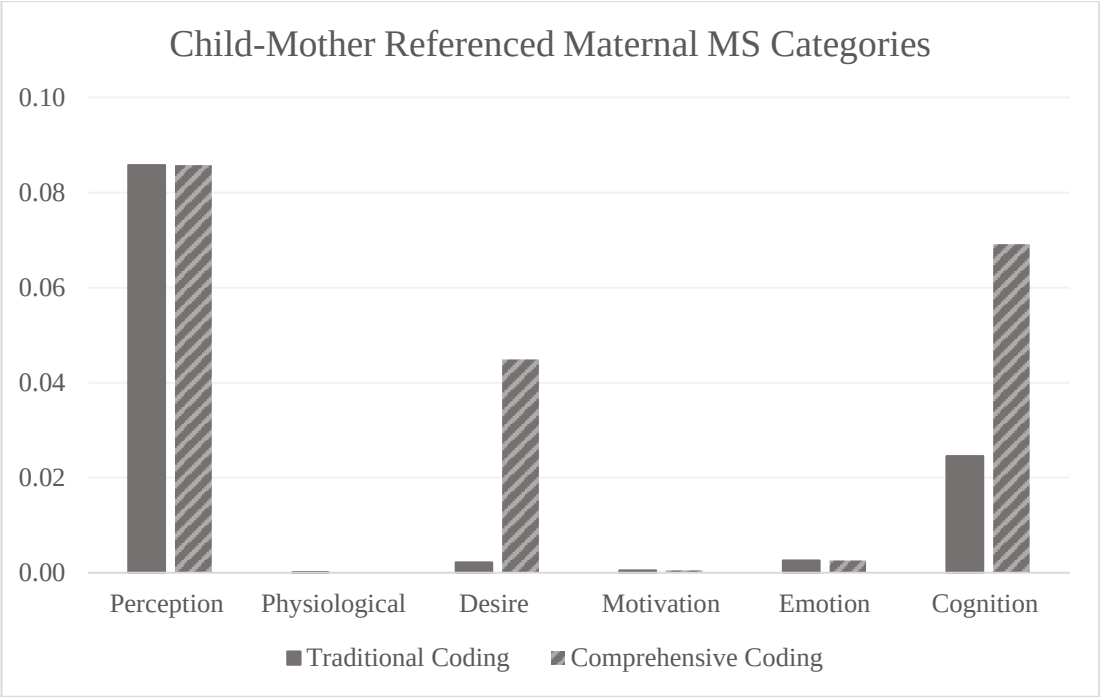

Figure 7. The Use of Child-Mother Referenced Maternal MS Categories in Their Discourse (Both Comprehensive and Traditional Scores)

3.1.5.3. Perception MSL

In order to investigate the functions of maternal perception MSL, the division of the use of perception terms in mothers' discourse for both child-mother referenced, and story character referenced MSL was examined. The first division was about the modalities of perception (i.e., vision, auditory, olfactory, and other modalities). The distribution of perception MSL by controlling the total perception MSL suggested that the majority (97%) of child-mother referenced perception MSL was visual perception state terms. For story character referenced perception MSL, while visual perception state terms were again the most used perceptual modality (75%) in mothers' discourse.

One of the aims of this thesis was to demonstrate the functions of maternal child-mother referenced perception MSL and their relation with children's ToM performances. For this purpose, the distribution of maternal visual perception MSL

was inspected to see whether there were any outliers in our data. Since the frequency scores were highly skewed, two proportion scores (one with total c-units and one with a total of child-mother referenced perception MSL) were created. Comparing both scores, scores that were controlled with the total perception MSL were close to a normal distribution and have fewer cases as outliers. Hence, the analyses with the proportion scores that were controlled by total child-mother referenced perception MSL in their discourse were reported. Three mothers (i.e., of 5-year-old boy, 4-year-old girl and 3-year-old girl) used child-mother referenced perception MSL more than 2.5 SD above the mean (M = 0.09, SD = 0.14) for function 1 (i.e., redirecting attention) and one mother (i.e., of a 4-year-old boy) used more than 2SD above the mean (M = 0.07, SD = 0.02) for function 2 (i.e., changing the focus). These cases were excluded from our analyses with functions and the analyses on functions were conducted with 69 participants.

A mixed model ANOVA with age (3 vs. 4 vs. 5) and gender (girls vs. boys) as between subject and the perception MSL functions (Redirecting Attention, Changing Focus, Emphasizing and Literal Meaning) as within subject variables were conducted (See Figure 8). Results revealed that mothers use of perception MSL functions significantly differed from each other (F (1.356, 86.042) = 46.66, p < .001, partial $\eta 2$ = .43). Mothers used more perception MSL to emphasize an aspect of the story (M = .50, SD = .04) than to refer a literal meaning of the term (M = .32, SD = .04) at trend level (p = .08) and used both of these functions more than to redirect their children's attention (M = .07, SD = .01, both ps < .001) and to change their focus (M = .06, SD = .01, both ps < .001). However, there was no difference between the uses for redirecting child's attention and changing their focus.

There was also a function by age interaction, F (2.732, 86.042) = 3.130, p = .03, partial η2 = .09. When inspected further, it was found that mothers of 3-year-olds used significantly more perception MSL to emphasize than mothers of 4-year-olds ($M_{3\text{-year-olds}}$ = 0.64, $M_{4\text{-year-olds}}$ = 0.40, p = .01). The difference between 3-year-olds and 5-year-old for emphasizing function was only significant at trend level ($M_{5\text{-year-olds}}$ = 0.46, p = .06). In addition, mothers of 4-year-olds used more perception MSL to refer a literal meaning of the visual perception term than mothers of 3-year-olds ($M_{3\text{-year-olds}}$ = 0.21, $M_{4\text{-year-olds}}$ = 0.42, p = .02).

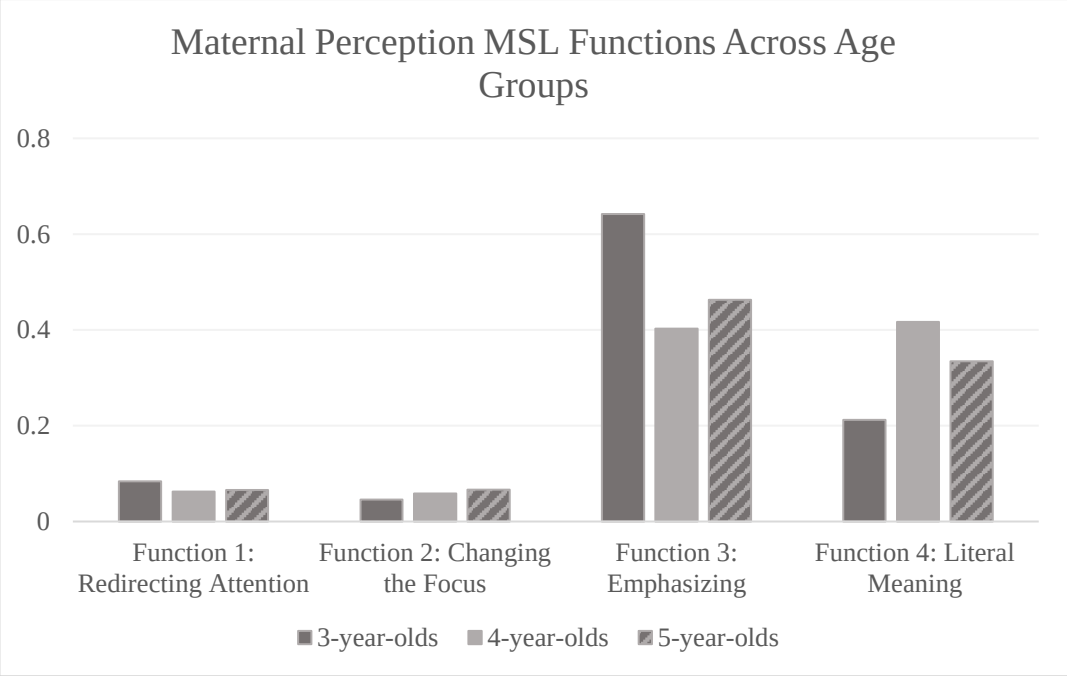

Figure 8. Maternal Perception MSL Functions by Age

In addition, there was a main effect of gender (F (1,63) = 3.573, p = .06, partial η2 = .05) where mothers of girls used more perception MSL (M_{Girls} = 0.25, M_{Boys} = 0.23). This effect was qualified by a gender by function interaction (Pillai's Trace (.16) F (3, 61) = 3.81, p < .05, partial η2 = .16). Mothers of boys used perception MSL to redirect their children's attention more than mothers of girls (M_{Girls} = 0.45, M_{Boys} = 0.97, p = .04) while mothers of girls used literal meaning function more than

mothers of boys (M_{Girls} = 0.39, M_{Boys} = 0.26, p = .09) though this difference was not significant.

3.2. Relations Between Maternal MSL and ToM

Since there were three ToM scores (i.e., Diversity, Normativity, and ARE scores), our hypotheses were examined separately for each score. The results with diversity scores were presented first, followed by the results with normativity scores, and ARE scores. In all regression analyses, that were reported in this section, the following variables were included as predictor variables in the first step: children's age in months, children's EF scores, and total language scores. Because two language scores (i.e., expressive, and receptive) were highly correlated even after controlling for age, to avoid multicollinearity problem, a total language score (i.e., the sum of expressive and language raw scores) was created and used in the following analyses.

Before presenting the results of regression analyses, bivariate and partial correlations with children's diversity, normativity, and appearance-reality emotion task scores and maternal MSL variables were conducted (for MS categories see Table 6, for MSL totals and functions, see Table 7). Children's diversity score was not related to any of the maternal MS categories. However, mothers' use of motivation MS to refer both the story characters' and their and their children's intentions was marginally related to children's apparent-reality emotion task performance in different directions. In addition, children's performance in apparent-real emotion task was marginally related to mothers' references to story characters' desires, only for comprehensive scoring that combined lexical and morphological uses. In addition, maternal MS reference to story characters' emotions was positively related to children's normativity scores.

Table 6. Bivariate and Partial Correlations Between MS Categories and Children's ToM Scores

	Diversity Score	Normativity Score	ARE
Child-Mother			
Perception MS	.03 (.02)	-.10 (-.05)	-.03 (.02)
Physiological MS	-.08 (-.06)	.00 (-.11)	-.04 (-.12)
Desire (Traditional) MS	.00 (.01)	.01 (-.02)	.04 (.02)
Desire (Comprehensive) MS	-.00 (.00)	.07 (.05)	.17 (.17)
Motivation MS	-.18 (-.18)	.16 (.12)	.23† (.20†)
Emotion MS	.17 (.18)	.07 (.01)	.16 (.12)
Cognition (Traditional) MS	.09 (.08)	-.11 (-.01)	.03 (.12)
Cognition (Comprehensive) MS	.14 (.14)	.09 (.10)	.03 (.04)
Story Character			
Perception MS	.05 (.05)	-.02 (.00)	-.13 (-.12)
Physiological MS	-.05 (-.05)	.00 (.03)	.18 (.20†)
Desire (Traditional) MS	.10 (.10)	-.14 (-.12)	-.09 (-.08)
Desire (Comprehensive) MS	.19 (.19)	-.12 (-.10)	-.21† (-.20†)
Motivation MS	-.09 (-.08)	.12 (.09)	-.23† (-.27*)
Emotion MS	-.03 (-.03)	.27* (.24*)	-.09 (-.13)
Cognition (Traditional) MS	.04 (-.04)	-.06 (-.05)	-.18 (-.18)
Cognition (Comprehensive) MS	.08 (-.08)	-.10 (-.12)	-.17 (-.18)

Note. Partial correlation after children's age was controlled for reported in parentheses.

$^{\dagger}p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

Furthermore, there were important relations between traditional and comprehensive scores and between different maternal MSL variables (See Table 7). Traditional maternal MSL total scores (i.e., total, story character referenced, and child-mother referenced) were positively and highly correlated with comprehensive maternal MSL totals of the same categories *(*r = .88, r = .97 and r = .91; ps <.001, for total, story character referenced, and child-mother referenced MSL respectively). However, our results revealed that maternal MSL totals were negatively related between different referent categories. Story character referenced MSL scores were negatively related to child-mother referenced MSL between and within traditional and comprehensive scores (r range between -.36 to -.38, all ps < .01).

Apart from the relations between different maternal MSL scores, there were notable relations between child scores and maternal MSL. Children's expressive language was marginally related to traditional MSL total (r = .22, p = .08), story charactered referenced traditional (r = .21, p = .08) and comprehensive MSL (r = .22, p = .07) and positively related to comprehensive MSL total (r = .30, p = .02). Regarding children's ToM scores, only normativity score was related to three of maternal MSL. Mothers' perception MSL that was used to change children's focus and redirect children's attention was negatively related to their children's normativity scores (r_s = -.26, ps < .05). On the other hand, mothers' perception MSL which was used to refer to a literal meaning was positively related to children's normativity scores (r = .26, p = .03). None of the maternal MSL scores were significantly related to children's diversity scores and appearance-reality emotion task.

3.2.1. Maternal MSL and Children's Diversity Scores

To investigate **(RQ1)** whether mothers' total MSL was related to children's ToM performance, two hierarchical regression analyses were conducted with children's diversity scores as the outcome variables. Children's age, EF, and total language scores were entered as predictors in the first step and maternal MSL total was entered in the second step for traditional and comprehensive scores, respectively. Results revealed that the first model was not significant, F (3, 69) = 2.101, p = .11, adjusted R^2 = .04. For the maternal MSL comprehensive total, we found that the second model did not improve the first model significantly F (1, 68) = .697, p = 41, adjusted R^2 = .04. The same pattern was replicated in the hierarchical regression analysis with traditional maternal MSL total. Since total maternal MSL did not significantly

predict children's performance on diversity measures, the first hypothesis was rejected.

Following, to investigate **(RQ2)** whether maternal MS categories (i.e., perception, physiological, desire, motivation, affective, cognition) are related to children's diversity scores, a hierarchical regression analysis was conducted by entering traditional MSL categories (Desire, Emotion, and Cognition) as predictors in the second step. Results revealed that the second model did not improve the first model significantly F (3, 66) = 0.272, p = .85, adjusted R^2 = .01. Analyses with comprehensive scores (i.e., perception, physiological, desire, motivation, affective, cognition) revealed the same pattern where neither the second model improve the first model, nor any maternal MSL variables emerged as significant predictors. Hence, second hypothesis was rejected.

To investigate **(RQ3)** whether maternal MSL totals that referenced story characters and that reference child and mothers' mental worlds are related to children's diversity scores, maternal MSL totals that referenced story characters and that reference child and mothers' mental worlds were entered as predictors in the second step. Again, the second model did not improve the first model significantly for comprehensive scores (F (2, 67) = 0.351 p = .71, adjusted R^2 = .03) and for traditional scores (F (2, 67) = 0.257 p = .77, adjusted R^2 = .02). Therefore, our third hypothesis was rejected.

Table 7. Age-Controlled Correlations Between Child Variables and Maternal MSL Variables

	Div.	Norm.	ARE	EF	Rec. Lang.	Exp. Lang.	MSL T-Total	MSL C-Total	MSL T-Total SC	MSL T-Total CM	MSL C-Total SC	MSL C-Total CM	Redir.	Change	Emph.	Lit. Mean.
Div.	1															
Norm.	-.03	1														
ARE	-.01	-.16	1													
EF	.16	.32**	-.08	1												
Rec. Lang.	.29*	.11	.01	.09	1											
Exp. Lang.	.25*	.08	-.02	.20	.49***	1										
MSL T-Total	.05	.06	-.13	.05	.02	.22†	1									
MSL C-Total	.13	.08	-.10	.01	.08	.30*	.88***	1								
MSL T-Total SC	.00	.11	-.17	.09	.08	.21†	.62***	.40**	1							
MSL T-Total CM	.05	-.05	.04	-.04	-.07	.02	.49***	.58***	-.39**	1						
MSL C-Total SC	.05	.07	-.20	.04	.08	.22†	.58***	.41**	.97***	-.40**	1					
MSL C-Total CM	.09	.03	.06	-.02	.02	.13	.44***	.69***	-.36**	.91***	-.38**	1				
Functions:																
Redir.	.08	-.26*	.15	.03	-.14	-.04	.50	-.01	-.12	.19	-.14	.10	1			
Change	.01	-.26*	.06	.02	.03	-.10	-.09	-.07	-.43***	.37**	-.46***	.29*	.18	1		
Emph.	-.11	-.01	.04	-.13	.14	-.11	.20†	.12	-.05	.29*	-.04	.15	-.23†	-.00	1	
Lit. Mean.	-.03	.26*	-.04	.14	-.15	.11	-.09	.00	.20	-.33**	.20	-.15	-.11	-.25*	-.77***	1

Div.: Diversity Score; Norm.: Normativity Score; ARE: Appearance-Reality Emotion; EF: Executive Function; Rec. Lang.: Receptive Language; Exp. Lang: Expressive Language; MSL T-Total: Mental State Language Traditional Total; MSL C-Total: Mental State language Comprehensive Total; MSL T-Total SC: Mental State Language Traditional Total for Story Character References; MSL T-Total CM: Mental State Language Traditional Total for Child-Mother References; MSL C-Total SC: Mental State Language Comprehensive Total for Story Character References; MSL C-Total CM: Mental State Language Comprehensive Total for Child-Mother References; Redir.: Redirecting; Emph.: Emphasize; Lit. Mean.: Literal Meaning.

Note. Analyses were conducted with 69 participants' data.

†$p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

Finally, two regression analyses were conducted by entering maternal MS categories as predictors in the second step for story character referenced and for child-mother referenced uses separately. The results with comprehensive scores for story character referenced MS categories revealed that second model did not improve the first model significantly (F (6, 63) = .511, p = .80, adjusted R^2 = .001) and this non-significant result was replicated in the MS categories that referenced to child and the mother's mental world (F (6, 63) = 0.565, p = .76, adjusted R^2 = .006). The results with traditional scores revealed the same pattern.

To investigate **(RQ4)** whether the functions of mothers' perception MSL relate with children's ToM performance, a hierarchical regression analyses with children's diversity score as outcome variable was conducted. Children's age, EF, and total language scores were entered as predictors in the first step and maternal perception MSL functions (i.e., redirecting attention, changing focus, emphasizing, literal meaning) were entered as predictors in the second step. Our first model was significant, F (3, 65) = 2.899, p = .04, adjusted R^2 = .12. Children's age in months (B = -0.04, SE = 0.01, p < .05, β = -.45) and total language scores (B = 0.01, SE = 0.005, p < .05, β = .45) emerged as significant predictors of their performance on diversity measures. However, the second model did not improve the first model significantly, F (4, 61) = 0.806 p = .53, adjusted R^2 = .16. As a result, our fourth hypothesis was rejected.

Overall, our analyses with diversity scores revealed that maternal MSL variables were not related to children's performance on ToM tasks that measure children's understanding of diversity in beliefs and desires. However, our model predicted that younger children were more likely to have lower scores on diversity measures when

controlling for their EF and total language abilities. On the other hand, when controlling for age and EF abilities, children with higher total language abilities were more likely to score higher on ToM tasks that assess children's understanding of diversity in belief (i.e., Diverse Belief) and in desire (i.e., Diverse Desire).

3.2.2. Maternal MSL and Children's Normativity Scores

To investigate **(RQ1)** whether mothers' total MSL was related to children's ToM performance, two hierarchical regression analyses with children's normativity scores as the outcome variable were conducted. Children's age, EF, and total language scores were entered as predictors in the first step and maternal MSL total was entered in the second step for traditional and comprehensive scores, respectively. Our first model with age, EF, and total language as predictors, was significant F (3, 69) = 7.317, $p < .001$, adjusted $R^2 = .21$. Results revealed that only children's EF score (B = 0.04, SE = 0.02, $p = .02$, $\beta = .28$) was a significant predictor of their normativity score. However, the second model with maternal MSL comprehensive total as predictor, did not improve the first model significantly, F (1, 68) = 0.188 $p = .67$, adjusted $R^2 = .20$. The same pattern was replicated in the hierarchical regression analysis with traditional maternal MSL total. Hence, our first hypothesis was rejected.

To investigate **(RQ2)** whether maternal MS categories (i.e., perception, physiological, desire, motivation, affective, cognition) are related to children's normativity scores, a hierarchical regression analysis was conducted by entering traditional MS categories (Desire, Emotion, and Cognition) as predictors in the second step. Results revealed that the second model did not improve the first model significantly, F (3, 66) = 1.686, $p = .18$, adjusted $R^2 = .23$. Results were the same

when the regression analysis was conducted with comprehensive scores (i.e., perception, physiological, desire, motivation, affective, cognition). As a result, our second hypothesis was rejected.

To investigate **(RQ3)** whether maternal MSL totals that referenced story characters and that referenced child and mothers' mental worlds are related to children's normativity scores, maternal MSL totals that referenced story characters and that referenced child and mothers' mental worlds were entered as predictors in the second step. Again, the second model did not improve the first model significantly for comprehensive scores, F (2, 67) = 0.115, p = .89, adjusted R^2 = .19 and for traditional scores, F (2, 67) = 0.032 p = .97, adjusted R^2 = .19. Hence, our third hypothesis was rejected.

Finally, two regression analyses were conducted with maternal MS categories as predictors in the second step for story character referenced and for child-mother referenced uses separately. The analyses with comprehensive scores for story character referenced MS categories showed that second model did not improve the first model significantly (F (6, 63) = 1.048, p = .40, adjusted R^2 = .21) and this non-significant result is replicated in the MS categories that referenced to child and the mother's mental world (F (6, 63) = 0.389, p = .88, adjusted R^2 = .16). Our analyses with traditional scores also revealed the same pattern.

To investigate **(RQ4)** whether the functions of mothers' perception MSL relate with children's ToM performance, a hierarchical regression analysis with children's normativity score as outcome variable were conducted. Children's age, EF, and total language scores were entered as predictors in the first step and maternal perception MSL functions (i.e., redirecting attention, changing focus, emphasizing, literal

meaning) were entered in the second step. Our first model was significant, F (3, 65) = 7.388, $p < .001$, adjusted $R^2 = .35$. The only predictor was children's EF performance ($B = 0.04$, SE = 0.02, $p = .01$, $\beta = .31$). The second model significantly improved the first model, F (4, 61) = 3.583, $p = .011$, adjusted $R^2 = .40$. In the final model, EF scores ($B = 0.04$, SE = 0.02, $p = .008$, $\beta = .30$) and mothers' perception MSL to give literal meaning ($B = 1.01$, SE = 0.48, $p = .04$, $\beta = .41$) emerged as significant predictors of children's performance on normativity measures. Our fourth hypothesis was confirmed by demonstrating a relation between maternal perception MSL functions and children's ToM performances.

Overall, contrary to the results with diversity scores, our analyses with normativity scores revealed that children's EF performance and mothers' use of perception MSL to give the literal meaning of the perception terms were predictors of children's performance on ToM tasks that measure children's understanding of perception and knowledge (i.e., KA and CFB). However, there were no relations between other maternal MSL variables and children's normativity scores.

3.2.3. Maternal MSL and Children Appearance-reality Emotion Task Scores

Before conducting logistic regression analyses with children's performance on appearance-reality emotion task scores, data was inspected for any violations of assumptions (i.e., linearity, independence of error, and multicollinearity). While no critical problems were found with the assumptions, the distribution of participants across failed and passed groups was revealed to be unequal (See Table 8). To conduct a logistic regression analysis, there should be enough number of cases (i.e., participants) in each cell for each independent variable, and the rule of thumb is at least having more than one case in each cell (Field, 2013). However, there was no

children in 3-year-old group who had succeeded this task, which was not desired as age was one of the main predictors of all analyses. Furthermore, there was a total of 9 participants who had passed this task and this number dropped to 8 because one participant was excluded due to being an outlier in maternal MSL scores (see Preliminary Analysis for Maternal MSL). Considering this and the probability of this situation causing overfit of the proposed model to the data, the logistic regressions on children's performance on apparent-emotion task performance were not conducted.

Table 8. Division of Participants Based on Their Performance (i.e., Pass vs. Fail) on Appearance-Reality Emotion Task

	ARE		**TOTALS**
	Failure Score = 0	Success Score = 1	
3-year-olds	25 (100%)	0 (0%)	25
4-year-olds	24 (88.9%)	3 (11.1%)	27
5-year-olds	16 (72.7%)	6 (27.3%)	22
Totals	65 (87.8%)	9 (12.2%)	*N* = 74

3.3. Additional Analyses with Maternal Perspective Diversity Scores

In addition to the analyses which were reported above, additional analyses were conducted with the number of perspectives presented in mothers' discourse. For this purpose, the author coded the data for the number of perspectives for both child-mother referenced, and story character referenced MSL. For child-mother referenced MSL, we coded whether the MSL referred to mothers, their children, both, and other person's mental states. For story character referenced MSL, we coded whether the MSL referred to either main characters (i.e., the frog, the dog, and the boy) in singular form, main characters in the plural (i.e., they), and other supportive characters' (e.g., deer) mental states. Hence, there were 4 categories for child-mother

referenced MSL and 5 categories for story character referenced MSL. Two diversity scores for both child-mother referenced MSL, and story character referenced MSL were created, according to the number of perspectives present in mothers' discourse. The range was between 0-4 for child-mother referenced MSL (M = 1.60, SD = 0.98 for traditional, and M = 2.77, SD = .57 for comprehensive coding), and 0-5 for story character referenced MSL (M = 3.70, SD = 1.01 for traditional, and M = 4.58, SD = .69 for comprehensive coding). Both traditional and comprehensive values were analyzed.

3.3.1. Perspective Diversity in Child-Mother Referenced MSL

All but 3 mothers referred to more than one person's perspective when they were talking about their and their children's mental worlds. The majority of the mothers (N = 55, 75.3%) referred to their mental states, their children's mental states and their (both mother and children) states together (see Figure 9).

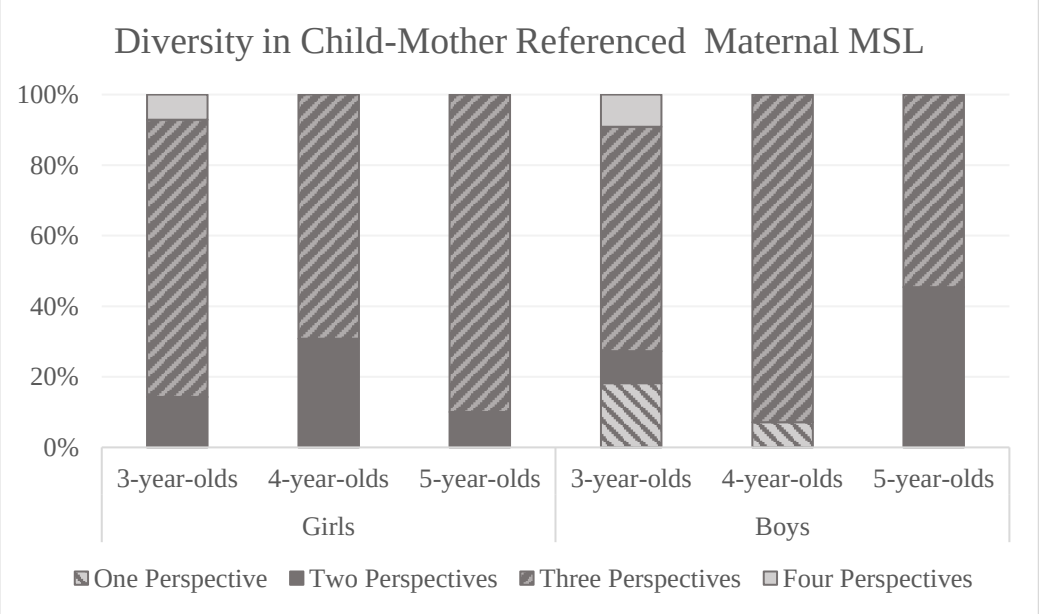

Figure 9. Distribution of Child-Mother Referenced MSL Perspective Diversity Scores

Univariate analysis was conducted with traditional child-mother referenced MSL perspective diversity values as dependent and children's age in year and gender as

independent variables (See Figure 10). Results revealed that there was no main effect of age or gender. However, there was an age by gender interaction (F (2, 67) = 3.285, p = .04). Pairwise comparisons revealed that while there was no difference between mothers of girls and boys for 3- and 4-year-olds, mothers of 5-year-old girls referred to more perspectives than mothers of 5-year-old boys (M_{girls} = 2.20, M_{boys} = 1.18, p = .02). In contrast, univariate analyses with comprehensive scores revealed no main effect of age or gender and no interaction effect.

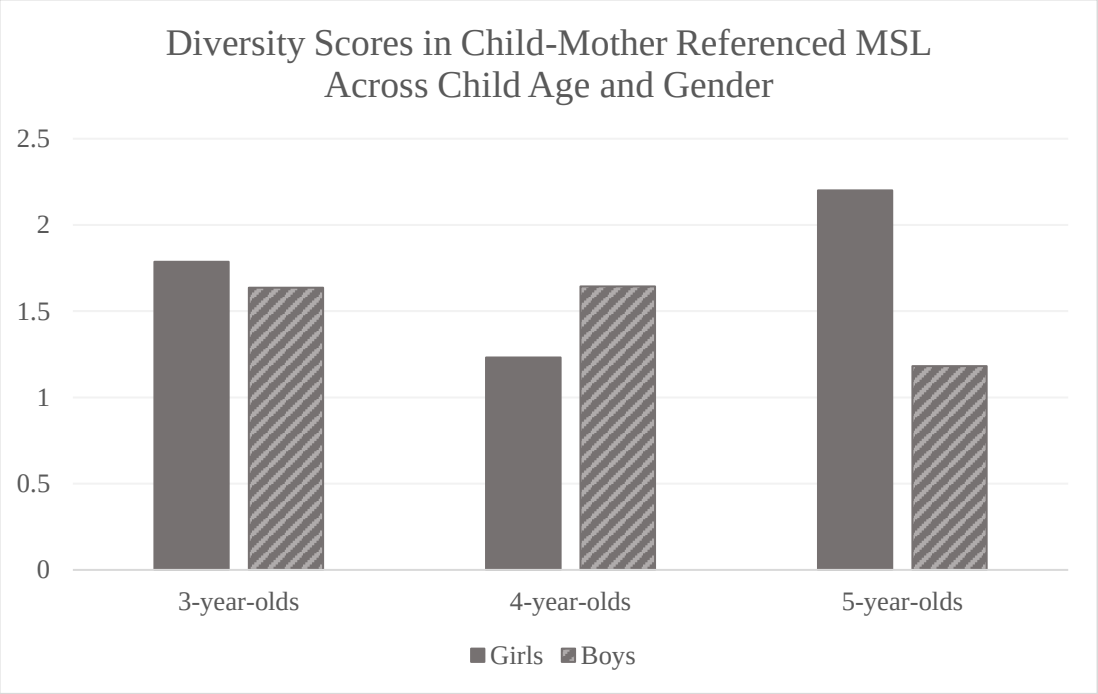

Figure 10. Child-Mother Referenced MSL Diversity Scores in Traditionally Coded MS Categories (i.e., Cognition, Emotion, Desire) by Children's Age

3.3.2. Perspective Diversity in Story Character Referenced MSL

All but 1 mother referred to more than one character's perspective when they were talking about the story characters' mental worlds. The majority of the mothers (N = 49, 67.1%) referred to all main and supportive characters' mental worlds while there was only one mother (of a 3-year-old boy) who only referred to two perspectives (see Figure 11).

Univariate analysis with the number of perspectives in maternal MSL which referenced story characters as dependent and children's age and gender as independent variables revealed no main effect of age or gender, and no age by gender interaction for both traditional and comprehensive scores.

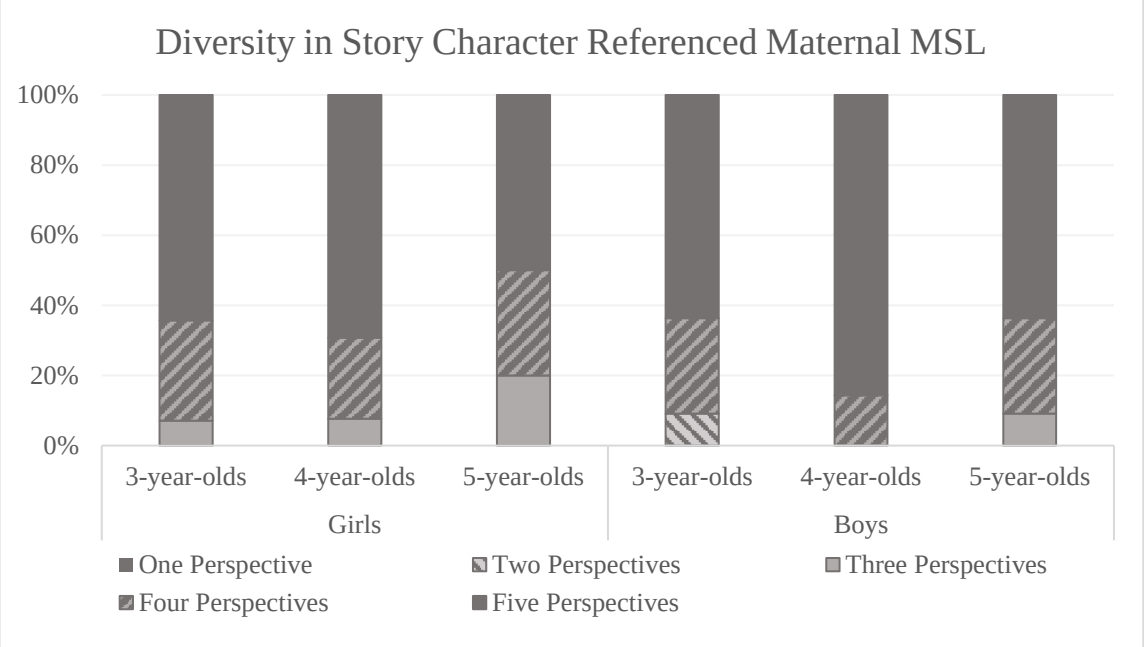

Figure 11. Distribution of Story Character Referenced MSL Perspective Diversity Scores

3.3.3. Relations Between Maternal MSL Scores

Partial correlations were conducted with maternal MSL variables to inspect the relations between different maternal MSL variables (See Table 9). Perspective diversities in traditional MSL were positively correlated with perspective diversities in comprehensive MSL of the same categories (r = .64, r = .56; ps < .001 for story character referenced and child-mother referenced MSL, respectively). Each perspective diversity score was positively related to both traditional and comprehensive MSL totals for the same referent category. Perspective diversity in traditional story character referenced MSL was positively related to story character referenced MSL totals for traditional and comprehensive values (r_{SC} = .46, r_{CM} = .51; ps < .001). While the same relations and directions were observed for perspective

diversity in comprehensive story character referenced MSL, the power of these relations were weaker (r = .22, p = .06 for traditional story character MSL total and r = .29, p = .01 for comprehensive story character MSL total). In addition, the same pattern was observed between perspective diversity child-mother referenced MSL (both traditional and comprehensive) and traditional and comprehensive child-mother referenced MSL totals (r_s between .35 to .49; all ps < .001). In contrast, traditional story character referenced MSL was negatively related to perspective diversity scores in child-mother referenced MSL for both traditional (r = -.25, p = .04) and comprehensive (r = -.20, p = .09) coding. Considering the previous negative relations between child-mother referenced MSL and story character referenced MSL, these results supported the differentiation between referent categories.

Table 9. Age-Controlled Correlations Between Maternal MSL Variables

	MSL T-Total	MSL C-Total	MSL T-Total SC	MSL T-Total CM	MSL C-Total SC	MSL C-Total CM	SC T-Total MSL Pers. Div.	CM T-Total MSL Pers. Div.	SC C-Total MSL Pers. Div.	CM C-Total MSL Pers. Div.
MSL T-Total	1									
MSL C-Total	.88***	1								
MSL T-Total SC	.57***	.36**	1							
MSL T-Total CM	.50***	.58***	-.43***	1						
MSL C-Total SC	.53***	.37**	.97***	-.45***	1					
MSL C-Total CM	.45***	.69***	-.40***	.91***	-.42***	1				
SC T-Total MSL Pers. Div.	.35**	.36**	.46***	-.10	.51***	-.05	1			
CM T-Total MSL Pers. Div.	.16	.35**	-.25*	.44***	-.19	.49***	.00	1		
SC C-Total MSL Pers. Div.	.13	.23†	.22†	-.09	.29*	-.00	.64***	.14	1	
CM C-Total MSL Pers. Div.	.13	.29*	-.20†	.35**	-.17	.42***	-.00	.56***	.10	1

MSL T-Total: Mental State Language Traditional Total; MSL C-Total: Mental State language Comprehensive Total; MSL T-Total SC: Mental State Language Traditional Total for Story Character References; MSL T-Total CM: Mental State Language Traditional Total for Child-Mother References; MSL C-Total SC: Mental State Language Comprehensive Total for Story Character References; MSL C-Total CM: Mental State Language Comprehensive Total for Child-Mother References; SC T-Total MSL Pers. Div.: Story Character Referenced Traditional MSL Perspective Diversity; CM T-Total MSL Pers. Div.: Child-Mother Referenced Traditional MSL Perspective Diversity; SC C-Total MSL Pers. Div.: Story Character Referenced Comprehensive MSL Perspective Diversity; CM C-Total MSL Pers. Div.: Child-Mother Referenced Comprehensive MSL Perspective Diversity.

$^{\dagger}p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

3.3.4. Relations Between Child Cognitive Variables and Perspective Diversity in Maternal MSL

To investigate the relations between child cognitive variables and perspective diversity in maternal MSL, bivariate and age-controlled correlations were conducted. Both bivariate and partial correlations revealed that none of the child scores were related to maternal MSL variables (See Table 10).

Table 10. Age-Controlled Correlations Between Children's Diversity, Normativity, and Appearance-Reality Emotion Task Scores and Maternal MSL Diversity Variables

	Diversity	Normativity	ARE	SC T-Total MSL Pers. Div.	CM T-Total MSL Pers. Div.	SC C-Total MSL Pers. Div.	CM C-Total MSL Pers. Div.
Diversity	1						
Normativity	-.05	1					
ARE	-.03	-.14	1				
SC T-Total MSL Pers. Div.	.10	.01	-.03	1			
CM T-Total MSL Pers. Div.	.11	.03	.13	.00	1		
SC C-Total MSL Pers. Div.	.13	.01	-.06	.64***	.14	1	
CM C-Total MSL Pers. Div.	.17	.02	.08	-.00	.56***	.10	1

SC T-Total MSL Pers. Div.: Story Character Referenced Traditional MSL Perspective Diversity; CM T-Total MSL Pers. Div.: Child-Mother Referenced Traditional MSL Perspective Diversity; SC C-Total MSL Pers. Div.: Story Character Referenced Comprehensive MSL Perspective Diversity; CM C-Total MSL Pers. Div.: Child-Mother Referenced Comprehensive MSL Perspective Diversity.
$^{\dagger}p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

3.3.4.1. Analyses with Normativity Scores

A hierarchical regression analysis was conducted with children's normativity scores. Children's age in months, EF, and total language scores were entered as predictors in the first step and maternal perspective diversity in comprehensive MSL total was entered as a predictor in the second step. Our first model was statistically significant (F (3,69) = 7.317, $p < .001$, partial η2 = .21). EF emerged as a significant predictor

of children's normativity scores (B = 0.04, SE = 0.02, p = .02, β = .28). However, the second model did not improve the first model significantly (F (1, 68) = 0.066, p = .80, adjusted R^2 = .20). Analysis with perspective diversity score in traditional MSL total revealed the same pattern.

Following, to investigate whether maternal perspective diversity in MSL categories (i.e., perception, physiological, desire, motivation, affective, cognition) are related to children's normativity score, a hierarchical regression analysis was conducted by entering maternal perspective diversity in traditional MSL categories (Desire, Emotion, and Cognition) as predictors in the second step. Results revealed that the second model did not improve the first model significantly F (3, 66) = 0.274, p = .84, adjusted R^2 = .18. Analyses with comprehensive scores (i.e., perception, physiological, desire, motivation, affective, cognition) revealed the same pattern.

To examine whether perspective diversity in maternal MSL totals that referenced story characters and that referenced child and mothers' mental worlds are related to children's normativity scores, perspective diversity in story character and child-mother referenced MSL were entered as predictors in the second step. Results revealed that the second model did not improve the first model significantly (F (2, 67) = 0.140, p = .87, adjusted R^2 = .18). Analysis with traditional scores revealed the same pattern.

Finally, to test whether perspective diversity in maternal MS categories by referent type is related to children's normativity scores, two hierarchical analyses were conducted for perspective diversity in child-mother referenced and story character referenced MS categories. Child-mother referenced MS categories were examined first. Analysis with perspective diversity in child-mother referenced traditional MS

categories (i.e., desire, emotion, and cognition) revealed that second model failed to improve the first model significantly (F (3, 66) = 0.032, p = .99, adjusted R^2 = .24). In parallel to these results, regression analysis with perspective diversity in child-mother referenced comprehensive MS categories (i.e., perception, physiological, desire, motivation, emotion, and cognition for both lexical and suffix levels) as predictors revealed that the second model did not improve the first model significantly (F (6, 63) = 0.404, p = .87, adjusted R^2 = .27).

Following, two hierarchical regressions were conducted with perspective diversity scores in story character referenced MS categories. Similarly, analysis with traditional scores were run first and then comprehensive scores. Analysis with perspective diversity scores in story character referenced traditional MS categories revealed that second model did not improve the first model significantly (F (3, 66) = 0.260, p = .85, adjusted R^2 = .18). Our regression analysis with comprehensive scores paralleled previous results with second model failing to improve the first model (F (6, 63) = 0.797, p = .58, adjusted R^2 = .19).

Overall, our results suggested that maternal perspective diversity in storytelling discourse did not predict children's normativity scores when controlled for other cognitive variables (i.e., EF and total language abilities), children's age, and other maternal MSL variables. However, our analyses showed that children's EF scores were a significant predictor of children's normativity scores, suggesting that children with higher EF abilities were more likely to have higher normativity scores.

3.3.4.2. Analyses with Diversity Scores

A separate regression analysis was conducted with children's diversity scores as the outcome variable. The following variables were entered as predictors: children's age

in months, EF and total language abilities in the first step, and maternal perspective diversity in comprehensive MSL total in the second step. Our first model was not statistically significant (F (3,69) = 2.101, p = .11, partial η2 = .04). In addition, the second model did not improve the first model significantly F (1, 68) = 2.003, p = .16, adjusted R^2 = .06). Analysis with perspective diversity score in traditional MSL total revealed the same pattern.

Following, to examine whether maternal perspective diversity in MS categories (i.e., perception, physiological, desire, motivation, affective, cognition) is related to children's diversity scores, a hierarchical regression analysis was conducted by entering maternal perspective diversity in traditional MS categories (Desire, Emotion, and Cognition) as predictors in the second step. Results revealed that the second model did not improve the first model significantly (F (3, 66) = 0.560, p = .64, adjusted R^2 = .03). Analyses with comprehensive scores (i.e., perception, physiological, desire, motivation, affective, cognition) revealed the same pattern.

To investigate whether perspective diversities in maternal MSL totals that referenced story characters and that referenced child and mothers' mental worlds are related to children's diversity scores, these scores were entered as predictors in the second step of regression analysis. Results revealed that the second model did not improve the first model significantly (F (2, 67) = 0.041, p = .96, adjusted R^2 = .19). Analysis with traditional scores revealed the same pattern.

To investigate whether perspective diversity in maternal MS categories by referent type is related to children's diversity scores, two hierarchical analyses were conducted for perspective diversity in child-mother referenced and story character referenced MS categories. Analysis with perspective diversity in child-mother

referenced traditional MS categories (i.e., desire, emotion, and cognition) revealed that second model failed to improve the first model significantly (F (3, 66) = 1.025, p = .36, adjusted R^2 = .05). In parallel to these results, regression analysis with perspective diversity in child-mother referenced comprehensive MS categories (i.e., perception, physiological, desire, motivation, emotion, and cognition for both lexical and suffix levels) as predictors revealed that the second model did not improve the first model significantly (F (6, 63) = 0.854, p = .53, adjusted R^2 = .03).

Finally, a hierarchical regression was conducted by entering perspective diversity scores in story character referenced MS categories as predictors in the second step. Analysis with perspective diversity scores in story character referenced traditional MS categories revealed that second model did not improve the first model significantly (F (3, 66) = 0.301, p = .83, adjusted R^2 = .01). Our regression analysis with comprehensive scores paralleled previous results with second model failing to improve the first model (F (6, 63) = 0.386, p = .89, adjusted R^2 = -.01).

To conclude, our results for diversity scores revealed that neither maternal perspective diversity in mothers' storytelling discourse nor the other child variables (i.e., EF, total language abilities, and children's age) predicted children's performance in ToM tasks that were thought to measure diversity in belief (i.e., Diverse Belief) and desire (i.e., Diverse Desire).

3.4. Additional Analyses with Children's Composite ToM Score

Despite the main analyses were conducted with the two composite scores (i.e., Normativity and Diversity Scores), to be able to compare the current study's results with the previous literature, all main analyses were also conducted with children's total ToM scores. This new composite score consisted of children's performance in

all ToM tasks, except EFB (max. score = 5). The results of these analyses were reported as additional analyses to the main results and presented below.

First, with a univariate analysis on children's composite ToM scores, it was examined whether there were age or gender related differences in ToM performance. Our analysis revealed a significant main effect of age (F (2, 68) = 4.794 p = .011, partial η^2 = .12) and a trend-level gender effect (F (1, 68) = 3.611, p = .06, partial η2 = .05). Pairwise comparisons showed that 5-year-olds performed significantly better than 3-year-olds ($M_{5\text{-}year\text{-}olds}$ = 2.96, $M_{3\text{-}year\text{-}olds}$ = 2.13, p = .014) and 4-year-olds performed better than 3-year-olds only at trend level ($M_{4\text{-}year\text{-}olds}$ = 2.76, p = .07). There was no difference between 4- and 5-year-olds (p = 1.00). As for gender, girls performed better than boys although the difference was at trend level (M_{Girls} = 2.83, M_{Boys} = 2.40, p = .06).

3.4.1. Relations Between Composite ToM Score and Cognitive Control Variables

To examine the relations between children's ToM performance and cognitive control variables (i.e., EF and language), bivariate and partial correlations were calculated. Children's composite ToM score was positively correlated with children's age in months (r = .37, p = .001), EF (r = .44, p < .001), receptive language (r = .43, p < .001) and expressive language (r = .37, p = .001). When age was controlled for, children's composite ToM scores were positively related to children's EF scores (r = .34, p = .003) and receptive language abilities (r = .25, p = .03) while expressive language was no longer related to children's ToM scores.

3.4.2. Relations Between Composite ToM Score and Maternal MSL Variables

To examine the relations between children's ToM performance and maternal MSL variables, first correlational analyses and then regression analyses were conducted and presented in order.

3.4.2.1. Correlational Analyses

The relations between maternal MS categories and children's composite ToM scores revealed that only maternal reference to their own and their children's emotion was related to children's ToM abilities at trend level (r = .21, p = .07). This relation was ceased when the effect of children's age was controlled for.

To investigate the relations between maternal MSL variables and children's ToM performance, Bivariate and partial Pearson's correlational analyses were conducted with the totals of maternal MSL by referent types, functions of visual perception terms and children's composite scores (See Table 11). Our analyses revealed that only mothers' use of visual perception terms to provide the literal meaning of the term was correlated to children's ToM performance at trend level and this relation was ceased when the effect of child age was controlled for.

Table 11. Bivariate and Partial Correlations Between Maternal MSL Variables and Children's Composite ToM Scores

	Composite ToM Score
MSL Traditional Total	-.00 (.04)
MSL Comprehensive Total	.10 (.12)
MSL Traditional SC Total	.01 (.03)
MSL Traditional CM Total	-.02 (.02)
MSL Comprehensive SC Total	.00 (.02)
MSL Comprehensive CM Total	.10 (.11)
Function 1: Redirecting Attention	-.09 (-.08)
Function 2: Changing the Focus	-.12 (-.15)
Function 3: Emphasizing	-.15 (-.07)
Function 4: Literal Meaning	.22† (.15)

Note. Partial correlation after children's age was controlled for reported in parentheses.

$^{\dagger}p < .10$, * $p < .05$, ** $p < .01$, ***$p < .001$

Finally, relations between maternal perspective diversity scores and children's ToM performance were investigated. None of the maternal perspective diversity scores (totals, SC and CM totals in lexical and comprehensive levels) correlated to children's composite ToM scores.

3.4.2.2. Regression Analyses

To investigate **(RQ1)** whether mothers' total MSL was related to children's ToM performance, two hierarchical regression analyses were conducted with composite ToM score as the outcome variable. Children's age, EF, and total language scores were entered as predictors in the first step and maternal MSL total was entered in the second step for traditional and comprehensive scores, respectively. Our first model was significant, F (3, 69) = 8.068, $p < .001$, adjusted $R^2 = .26$. Results revealed that only EF (B = 0.06, SE = 0.02, $p = .008$, $\beta = .31$) emerged as a significant predictor while children's total language abilities appeared as a predictor at trend level (B = 0.01, SE = 0.006, $p = .08$, $\beta = .28$). For the maternal MSL comprehensive total, we found that the second model did not improve the first model significantly F (1, 68) = 0.509, p = 48, adjusted $R^2 = .27$. The same pattern was replicated in the hierarchical regression analysis with traditional maternal MSL total. Since total maternal MSL did not significantly predict children's composite ToM scores. Hence, we reject our first hypothesis.

Following, to investigate **(RQ2)** whether maternal MS categories (i.e., perception, physiological, desire, motivation, affective, cognition) are related to children's ToM performance, a hierarchical regression analysis was conducted by entering traditional MS categories (Desire, Emotion, and Cognition) as predictors in the second step. Results revealed that the second model did not improve the first model significantly

F (3, 66) = 0.230, p = .88, adjusted R^2 = .27. Analyses with comprehensive scores (i.e., perception, physiological, desire, motivation, affective, cognition) revealed the same pattern where neither the second model improve the first model, nor any maternal MSL variables emerged as significant predictors. Hence, second hypothesis was rejected.

To investigate **(RQ3)** whether maternal MSL totals that referenced story characters and that reference child and mothers' mental worlds are related to children's ToM abilities, maternal MSL totals that referenced story characters and that reference child and mothers' mental worlds were entered as predictors in the second step. Again, the second model did not improve the first model significantly for comprehensive scores (F (2, 67) = 0.593, p = .56, adjusted R^2 = .27) and for traditional scores (F (2, 67) = 0.281, p = .76, adjusted R^2 = .27). Therefore, our third hypothesis was rejected.

To investigate (**RQ4**) whether the functions of visual perception terms relate to children's ToM performance, a hierarchical regression analysis was conducted. In the second step, all four functions were entered as predictors. The second model failed to improve the first model (F (4, 61) = 0.628, p = .64, adjusted R^2 = .32).

Since additional analyses were conducted on maternal perspective diversity scores for the other composite scores, same analyses were conducted and reported for children's composite ToM score as well. The regression analysis with children's composite ToM score as outcome variable revealed that when maternal perspective diversity scores for story character referenced MSL and child-mother referenced MSL included as predictors in second step, the second model did not improve the first model (F (3, 67) = 0.627, p = .54, adjusted R^2 = .27).

Overall, the analyses with a composite ToM score revealed that (a) EF was related to children's ToM abilities when other child variables (i.e., age and language) were controlled for; and (b) children's composite ToM score was not related to any of the maternal MSL variables when the effect of child age was controlled for. Similar to the results with diversity and normativity scores, our analyses with composite ToM score failed to replicate the previous literature's findings, suggesting a relation between maternal MSL total and children's ToM performance.

CHAPTER IV

DISCUSSION

The current study explored the relations between maternal MSL and children's ToM abilities. Overall, the findings indicated three important points. First, no maternal MSL variables, except for the pragmatic uses of visual perception terms related to children's ToM measures. Second, while there were no relations found between maternal MSL and children's ToM in general, the comprehensive coding emerged as a reliable practice, as the relations within traditional and comprehensive scores mirrored each other. And finally, in line with the literature (Chan et al., 2020; Ilgaz & Bürümlü-Kısa, 2021; Tompkins et al., 2021), coding referents of MSL is important to explore maternal MSL during storytelling contexts. In this section, each point will be discussed further.

4.1. Children's ToM Understanding

This study assessed 3- to 5-year-old Turkish children's ToM understanding with the classical ToM battery. One important finding of this study regarding children's ToM

understanding is the inconsistent patterns of age-related changes. For diversity scores, the sum of scores in DD and DB tasks, there was no age-related change, which was in line with Ilgaz and colleagues' finding (in prep) that there was no age-related improvement in DD and DB tasks. However, our results revealed that as children get older, they had higher normativity scores, the sum of scores in KA and CFB. In addition, the relations between children's ToM scores and language and EF performances were found to be inconsistent. For instance, while the normativity score was related to EF, expressive and receptive language abilities, only EF remained to be related to children's normativity score when controlling for age. Similarly, the relations between children's performance in ARE task and expressive and receptive language scores ceased when age was controlled for. However, children's diversity score was related to their receptive language only when age was controlled for. Based on these inconsistencies, one can question whether the underlying reasonings or the required cognitive abilities are similar in these tasks. For instance, Ilgaz and colleagues (in prep) discuss the possibility that children's reasoning for these tasks, specifically DD and DB, might be different than the general assumption that these require an understanding of the diversity in perspective.

4.2. Maternal MS Discourse and ToM Understanding

Our results failed to produce a positive relation between children's ToM understanding and the total of maternal MSL (Devine & Hughes, 2018; Tompkins et al., 2018), and more specifically maternal cognitive MSL (Tompkins et al., 2018). One important reason for this finding could be the measurement of ToM abilities. The most common practice in this literature is to assess children's ToM

understanding with FB measures (Adrian et al., 2005; Chan et al., 2020, Ruffman et al., 2002). When examining the studies that explored this relation, Taumoepeau and colleagues (2019) were one of the groups who examined this relation by using five tasks from the ToM battery. In contrast to their findings, our results failed to show significant relation between the total of maternal MSL and children's ToM for traditional and comprehensive coding. Because neither the traditional nor the comprehensive coding revealed significant relation, the possibility that this is due to the language-specific coding of MSL in Turkish mothers' storytelling discourse can be eliminated. In addition, using the same coding scheme, Ilgaz and Bürümlü-Kısa (2021) reported that the total of maternal MSL that referenced mothers and children and story characters was related to Turkish preschoolers' ToM understanding which was assessed with FB measures (i.e., change of location, 1st and 2nd order FB, and appearance-reality task). Hence, this non-significant relation is interpreted as a result of the assessment tools and how they capture the culture-specific thinking about minds.

4.2.1. The Importance of Comprehensive Coding: MS Categories and Levels of Analysis

To demonstrate the importance of investigating different aspects (MS categories) of the mental world, this study explored the organization of maternal discourse in terms of MS content. When examined the MS categories in total (both story character and mother-child referenced), the results revealed that mothers talked about what one sees and hears more than what one thinks and feels. This was also true when the analyses were conducted on MS categories by referent types: mothers talked about what the story characters see and hear significantly more than what these characters

feel, and they talked about what they and their children see and hear significantly more than what they think. The finding that mothers talked about perception more than other categories in total, story character, and mother-child referenced MSL, is considered as supportive evidence for the importance of a detailed investigation of maternal MSL. Mothers devote a significant proportion of their storytelling discourse to how one perceives their surroundings (e.g., seeing, hearing, smelling). While previous research has not coded perception (for exceptions, see Adrian et al., 2005; Bozbıyık, 2016) because these terms are also used as attention-getters, our study shows that this practice might result in a partial understanding of maternal storytelling discourse since perception is the most frequently used category in mothers' discourse for both story character and child-mother referenced MSL. If the use of perception terms is to direct and maintain attention mainly, the patterns of order should be different for story character referenced and mother-child referenced MSL (see Limitations for a possible factor in the use of story character referenced perception MSL).

In addition, as discussed previously, perception is one of the ways to acquire knowledge. For instance, if one sees their cup is on their desk, that means they know its location or if one hears their friend laughing, they know that the person is happy. Such inferences about the state of others can be made through perceiving the surrounding. Hence, referring to one's perception can imply that person having a particular body of knowledge about the world. Accordingly, examining maternal MSL with a narrow focus on certain MS categories would provide an incomplete picture of the maternal MS discourse.

Apart from the differences in the proportion that mothers devoted to each MS category in their discourse, different MS categories are found to be related to children's ToM performances. Particularly, mothers' references to story characters' emotions are positively related to children's normativity score while mothers' references to story characters' motivations are negatively related to children's performance in ARE task when children's age was controlled for. Moreover, albeit marginal, children's ARE task performance was positively related to mothers' references to story characters' physiological states and their own and their children's motivations while negatively related to mothers' references to story characters' desires at both lexical and morphological levels when age was controlled for. These findings also support the need of investigating other MS categories in maternal discourse since apart from the emotion category, no other traditionally coded categories were found to be related to children's ToM performance.

Another purpose of this study is to provide evidence for investigating references to the mental world beyond mental state terms. Supporting this, coding both lexical and morphological uses of MSL revealed a slightly different pattern in maternal MS discourse as compared to coding lexical level MSL. When morphological structures were included, mother-child referenced desire MSL became the third category that was used the most, following perception and cognition MS references while desire references had similar uses as emotion references when morphological structures were not included. In addition, although the pattern of order in maternal use of MS categories did not change, when cognitive MS at both lexical and morphological levels were included, mothers' cognitive MSL became equivalent to perception MSL. These findings support Ilgaz and Allen's critique (2020) that examining MS

referenced at the lexical level (i.e., MS terms) might leave out important parts of perspectival talk.

Furthermore, it should be noted that comprehensive coding allows better comparison between the literature and this study, especially for cognition MSL. In Turkish, modulation of assertions (e.g., might, maybe, must), which were positively related to children's ToM performance and MSL cross-sectionally and longitudinally (Ruffman et al., 2002) can be expressed with certainty suffix (i.e., "*(y)Abil*") or auxiliary verb ("*ol-*") instead of lexical items (Göksel & Kerslake, 2005). To capture these uses in Turkish, it is necessary to adopt comprehensive coding.

4.2.2. Referents

Our maternal MS discourse analyses revealed that although the total of mothers' references to MSL did not differ by children's age and gender, there was a significant difference in the total of mothers' MSL by referent types. Particularly, mothers talked about story characters' mental states significantly more than they talked about their own and their children's mental states. This finding replicated Chan and colleagues' (2020) results where mothers talked about story characters' mental states more than they talked about their own and their children's mental states.

Moreover, the total of maternal story character referenced MSL in traditional coding was negatively related to the total of maternal mother-child referenced MSL both in traditional and comprehensive coding while positively related to the total of maternal story character referenced MSL in comprehensive coding. These positive relations within the same referent categories and negative relations between referent categories support our coding. Even though no significant relations emerged between totals of story character or mother-child referenced MSL and children's ToM

abilities in our analyses, Ilgaz and Bürümlü-Kısa (2021) reported that the total of maternal MSL that referenced to mothers and children was negatively related to children's ToM understanding while the total of maternal MSL that referenced to story characters was positively related to children's ToM. This further emphasizes the importance of examination of referent types as mothers' use of these referent types might serve different functions for children's developing understanding of minds.

4.2.3. Functions

While there was no relation between maternal perception MSL total (both for story character referenced and mother-child referenced) and children's ToM performance in our analyses, there were significant relations between different uses of perception MSL and children's ToM understanding. Specifically, mothers' use of perception MSL to redirect their children's attention to the book and to change the focus of their children were negatively related to children's normativity score. On the other hand, mothers' use of perception MSL to provide the literal meaning of the terms was positively related to children's normativity score when the age was controlled for. It is important to emphasize that functions are only coded for the perception MSL that referenced to mothers and children. Hence, one might think that the use of perception MS terms to give literal meaning is related to children's understanding of the link between visual perception terms and knowledge. By using perception MSL for this function, mothers might be signalling that what they see is what they know (e.g., *Eng*.: "I saw the frog, it's here!", *Tr*.:" Kurbağayı gördüm, burada!"). In addition, this use was the only maternal MS variable that emerged as a predictor in our regression analyses on normativity score. Accordingly, when age, EF abilities, and

language abilities are controlled for, mothers' use of visual perception term to give its literal meaning predicts children's normativity score concurrently.

4.3. Limitations and Future Directions

Three possible limitations were noted for this study. These are about (a) story and narration characteristics, (b) sample characteristics, and (c) ToM assessments.

4.3.1. Story and Narration Characteristics

One of the limitations of this study is that the investigation is based on mothers' first narration of the story. This is the general practice in the literature, except for limited research on repeated narrations of the same story. In their study where mothers were asked to read the same book three times, Schapira and colleagues (2020) reported that mothers' references to the landscape of consciousness increased from first to last reading while references to the landscape of action decreased. In their investigation of the change in maternal MSL in the repeated narration of the same story, Ilgaz and Bürümlü-Kısa (2021) reported that from first to second narration, while mothers' MSL that referenced to story character did not change, mothers' MSL that referenced to their own and their children's mental states decreased significantly. These results support the socio-cultural perspective's assumption that the language interchange between two persons is a dynamic process where there is an evaluation of others' knowledge about the common ground. Regarding storytelling contexts, this perspective predicts mothers' evaluation of their children's knowledge about the story and modification of their MSL accordingly, as reported by Ilgaz and Bürümlü-Kısa (2021).

In addition, while the organization of mothers' storytelling discourse revealed perception as the most frequently used category, it should be noted that the story of the book might be important for maternal discourse. For instance, the storytelling material in this study was a book about the adventures of a boy and a dog who are searching for a missing frog. Such a story may elicit perceptually rich language in that it is important to discuss what the characters know and learn through their perceptual experiences (e.g., hearing the frog's voice, smelling to follow the frog, or seeing several frogs). Hence, future research should investigate whether the pattern that we observed in mothers' storytelling discourse changes as a function of story characteristics.

4.3.2. Sample Characteristics

Our sample is a homogenous middle SES sample, including highly educated mothers from middle SES. This homogeneity can be both considered a limitation and a strength. It is a strength since this homogeneity allows us to examine this relation without the potential influence of risk factors such as low SES. However, this could also be considered a limitation since it prevents us to generalize these results. As the literature notes (Chan et al., 2020; Devine & Hughes, 2018), maternal education and SES are factors that influence MS discourse and children's FB understanding. Hence, future research needs to be conducted with a more heterogeneous sample to detect similarities and differences in MS discourse of mothers who have different backgrounds.

In addition, similar to the the previous research, the target of the investigation is the mothers. However, LaBounty and colleagues (2008) reported differences in mothers' and fathers' MSL and how it relates to children's ToM understanding. Moreover,

some studies reported differences in MSL between mothers' and teachers' discourse in storytelling (Ziv et al., 2014) and event talk (Andrews et al., 2019). As children have various prominent conversation partners in their lives, specifically in this age group, future research should have more inclusiveness in terms of conversational partners.

4.3.3. Assessment of ToM

Another limitation of this study is the use of ToM battery as the sole assessment of children's ToM understanding. One reason that this is considered a limitation is the difficulty in comparing the results with the previous studies. Previous research that investigated the relation between maternal MSL and children's ToM understanding, in general, assessed children's abilities with FB tasks (Devine & Hughes, 2018; Tompkins et al., 2018) while the minority assessed it with the ToM battery only (see Taumoepeau et al., 2019). This leads us to be cautious when comparing the results with the previous studies as the tasks within the ToM battery underlie different components of ToM. Another reason to consider having the ToM battery as the sole assessment as a limitation is the cross-cultural validity of the measure, specifically the DB task. Ilgaz and colleagues (in prep) state that the success rate of Turkish children in the DB task was lower than American and Australian children. The overall percentage of children who succeed in the DB task in our sample is close to theirs (64.9 % and 57%, respectively for this study and theirs). They suggest that this difference might arise from the culture-specific reasonings about mental states, or the underlying reasoning for this task might be a form of associative thinking rather than appreciation of diversity in perspectives.

4.4. Conclusion

To conclude, this study examined the relation between maternal MSL and children's ToM understanding in depth with a comprehensive coding scheme to capture references to mental worlds in maternal storytelling discourse. Adopting a socio-cultural perspective, it was argued that including various MS content and the consideration of language-specific ways of referring to mental worlds are necessary practices for maternal MSL literature since this meaning-making process is more than label-matching but a co-construction of meaning (Ilgaz & Allen, 2020). These practices also enabled us to capture all references to mental worlds that would be missed out with a narrowed focus. While there were important changes in maternal discourse when MS references at the morphological level were included in the analyses, we also noted some trend-level and significant relations between children's ToM performances and different MS categories. These provided further evidence for (a) the inclusion of various MS content that were inconsistently studied and (b) the examination of language-specific MS references through both lexical and morphological structures.

Further, this study investigated whether there were differential relations between the pragmatics of maternal MSL (i.e., referents and functions) and children's social understanding since the socio-cultural perspective emphasizes the importance of the quality of MSL (e.g., pragmatics) rather than the quantity of MSL. Our results supported the socio-cultural perspective by demonstrating significant relations between children's ToM and different uses of visual perception MSL in storytelling context.

One of the pragmatic aspects that was examined in this study was the MSL referents. Through examining the references of MS content, this study focused on a specific

aspect of MSL in storytelling discourse. This examination emphasized the importance of referents whose mental world was discussed. A narration includes both the references to characters' mental worlds and the discussions about the story between the storyteller and the listener. Despite the lack of correlations between referent categories and children's ToM scores, the results supported this division by demonstrating significant negative relations between referent categories (Ilgaz & Bürümlü-Kısa, 2021).

Another pragmatic aspect that was investigated in this study was the functions of MS terms, in particular, mother-child referenced visual perception terms. This focus enabled us to examine the differential uses of visual perception terms (i.e., redirecting attention, changing the focus, emphasizing and literal meaning) in storytelling. Our results were in line with the socio-cultural perspective. While the previous literature considered perception terms as attention-getters but not as "*genuine MS references*", this study provided counter-evidence to previous literature. This was due to the significant relations between different functions and children's ToM abilities. For one, mothers' use of perception terms to provide the literal meaning of the term was positively related to children's ToM. For another, the two functions that could be considered as attention-getters in this coding (i.e., redirecting attention and change of focus) were the ones that showed negative relations with children's ToM. These can be interpreted as support for the inclusion of the perception MS category into MSL coding schemes and support for the idea that these differential uses are instances of maternal scaffolding. For instance, mothers may use simpler level explanations less when their children have better ToM abilities and use more attention-related uses with children who have lower ToM abilities since attention can be considered an easier mental concept for children.

In conclusion, by demonstrating (a) changes in maternal discourse pattern when comparing lexical and comprehensive (i.e., lexical and morphological levels) level analyses, (b) the division of MSL referents in storytelling, (c) significant relations between different functions of perception terms, different MS categories and children's ToM, this study supported the socio-cultural perspective to ToM development.

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