NELSON, ERIK D., M.A. Contextual Effects and Early Theory of Mind Skill Development. (2009)
Directed by Susan D. Calkins. 54 pp.

This study examines the impact of maternal use of mental state language and maternal report of emotional expressivity in the family during a critical age in theory of mind development. Participants included 263 3.5 year-old children whose theory of mind skills and verbal abilities were assessed; mothers reported on their emotion socialization practices and mothers and children were observed during parent-child interaction tasks. Positive associations between emotional expressivity in the family, maternal use of mental state language and general theory of mind development were hypothesized. No relation was found between mental state language use or expressed emotion in terms of predicting theory of mind development at any level. Results are discussed in terms of implications for theory of mind research.

CONTEXTUAL EFFECTS AND EARLY THEORY OF MIND SKILL DEVELOPMENT

By

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A Thesis Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Greensboro
2009

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CHAPTER I

INTRODUCTION

The development of early cognitive skills has been shown to be influenced by several factors, such as: age (Hughes, Happe, Jackson, Taylor, & Caspi 2000), language development (Dunn & Brophy, 2005), and executive functioning (Cole & Mitchell, 2000). To date, the strongest predictor of a child's cognitive development is age (Hughes, Dunn, & White, 1998), but research has shown that chronological maturation alone does not account for the individual variation observed in the development of early cognitive skill sets. Benefits associated with the early emergence of cognitive skill sets, especially theory of mind (ToM), include: improved social adaptability (Repacholi & Slaughter, 2003), higher peer and teacher ratings in school settings (Liddle & Nettle, 2006), and better working memory and executive functioning skills (Cole & Mitchell, 2000). Because of the role ToM plays in social development, researching the development of these cognitive skills may prove beneficial in the future planning of programs designed to prepare children for entrance into kindergarten. In light of several studies identifying factors in the family environment that impact ToM development (Meins, Fernyhough, Wainwright, Gupta, Fradley, & Tuckey, 2002; Peterson, 2000; Symons, Peterson, Slaughter, Roche, & Doyle, 2005), this study attempts to clarify the role of language and familial styles of expression on the early emergence of ToM skills. Although previous research has identified language, specifically mentalistic

language, as influencing ToM, the current study attempts to explain the role of language in the context of visual and conceptual perspective taking, ToM skills found earlier on the developmental timeline.

Theory of Mind

Theory of Mind (ToM) refers to the attribution of mental states to the self and to others (Premack & Woodruff, 1978). According to ToM, the understanding of another's mind can be classified into five distinct levels of development (Astington, Harris, & Olson 1988). Level 1 is described as simple visual perspective-taking and refers to a core understanding that different people are capable of seeing the same things differently. Research has shown this skill to be generally well developed by age 2 (Flavell, Shipstead, & Croft, 1978). This understanding is indicated by a child's capacity to recognize that objects within their own field of vision may or may not be seen by another person dependent upon their perspective. Generally to assess the presence or absence of this skill, a child is presented with a card that has one picture on one side and a different picture on the other side. The card is then placed between the child and experimenter so each is capable of only viewing one side of the card. The child is then asked to identify what the experimenter sees, thus providing insight into whether or not the child is capable of adopting the visual perspective of another individual.

Level 2 consists of complex visual perspective-taking. Unlike simple perspective-taking, with level 2 understanding, children are capable of seeing the same object another person sees, but recognizes that how an object appears, may depend upon the point from which it is being viewed. A picture card of an animal is placed between

the child and experimenter, but laid flat so that both are looking at the same side of the card but from opposite ends of the table. Again the child is asked what the experimenter sees. To correctly answer the question the child will need to understand that two people may see the same thing differently (Astington et al., 1988). Level 2 theory of mind does not develop until 3-4 years of age (Flavell et al., 1981).

Level 3 ToM represents the understanding that seeing leads to knowing and develops within a similar time frame between 3 and 4 years of age, though not before level 2 (Astington et al., 1988). This ability requires a child to recognize the capacity for different individuals to be in divergent informational states. To assess this insight an experimenter places an object in a box while a child is not looking, then asks the child to guess what is in the box. Children able to make this distinction will respond to the question by stating they do not know because they did not see what was put in there.

Level 4 ToM requires both an understanding of the informational states as described by level 3 and the additional capacity to predict the actions of others based on their true beliefs. A practical example of this would be a child witnessing his mother preparing to leave. If she stated she had forgotten her keys, a child capable of level 4 perspective-taking would anticipate the parent's movement to where the keys are normally kept. Thus the child understands that his mother can only know what she has seen, and act based on that premise. Most children develop this skill set closer to 4 years of age and in close proximity to level 5.

The final level of theory of mind, level 5, requires the child to make similar predictive statements about the actions of others; however, at this level children can make

predictions, on the basis of false beliefs. It is not until around 4 years of age that children reliably pass tests of false beliefs (Wimmer & Mayringer, 1998). In the example of a parent searching for their keys, even if the child was aware that the parent's keys had been moved to a different location, the child capable of level 5 understanding would still expect the parent to act according to the false belief that the keys are in their normal location, and check there before going to where they were actually left. Tasks assessing false belief are considered the most difficult ToM tasks, because they require the understanding that someone's mental perspective impacts their actions causally and that a person's perspective that deviated from what the child knows to be true, will direct them towards a different set of actions based on that false belief.

ToM literature has suggested the progression of these skills from simple visual-perspective taking to understanding false belief occurs sequentially (Astington et al., 1988). This progression is cumulative, such that earlier skills act as prerequisites for the development of more complex understanding. These skills build upon each other, resulting in the level 5 false belief understanding that constitutes well-developed ToM (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004). This sequential progression is important in conceptualizing the influence of contextual factors at points along this continuum of development.

Recent studies have identified some general chronological milestones of ToM development (Flavell, 2000). Chronological milestones are difficult to define due to differences in the representation of ToM, either as a global skill or as one of the component accessory skills that combine the overall ability (Astington, 1993), and

because of individual differences in the time of emergence of ToM skills (Jenkins & Astington, 1996). Despite these variations, some generally accepted average ages for skill development have been noted. For instance, research indicates that infants show a preference for and are sensitive to the human face at birth (Morton & Johnson, 1991) and are also capable of picking up cues such as eye movements, voice, and facial expression of emotions for use as social cues (Hood, Willen, & Driver, 1998; Walker-Andrews & Lennon, 1991). Imitation of facial features could be viewed as a precursor of ToM because such a skill requires infants to cross-modally detect the equivalence of the caregiver's actions with their own and equate that perceived body as similar to their own (Meltzoff, 1999). Although this clearly does not represent a fully developed ToM, it may be possible to draw some comparisons between these early abilities and higher order introspective behaviors (Astington, Pelletier, & Homer, 2002).

Justification for infants as mental agents cannot be based on the recognition of social cues alone, but the appearance of other capacities around 18 months are more indicative of the child's ability to discern between their own mental states and those of others. Specifically, around one and a half years of age many children begin to show an ability to equate their own mental states with the states they have projected to occur in others, namely they begin to understand that seeing leads to knowing (Poulin-Dubois, 1999). Therefore, the skills observed at age three and four can be observed, in part, in children before the age of two (Marvin, Greenberg, & Mossler, 1976). Such research begs the question of what processes are involved in the transition from a stage of awareness to a more integrated stage allowing for ToM skills to develop.

According to theory, the earliest ToM skills expected to develop are perspective taking skills (level 1) (Astington et al., 1988). These skills include the ability to recognize the mental states of others, to comprehend those mental states in terms of underlying motives, and then to assume another's perspective for the purpose of predicting future behaviors of that person (Flavell et al., 1981). Given previous findings on the development of perspective taking skills, identified as being developed as early as two years of age in some children (Flavell, 2000), it is expected that a window of opportunity exists to study the development of both perspective taking skills and higher order ToM in children three to five years of age (Mitchell & LaCohee, 1991).

ToM literature has shown that the inability of children at age three to properly identify the wrong beliefs of others can most likely be attributed to their inability to properly represent their own false beliefs (Gopnik, 1993). Given that false belief understanding is also developed between the ages of three and four, it follows that belief-based responses to questions concerning the actions of another person are also not observed until after the age of three for most children. Despite the normative developmental timeline described in the ToM literature, individual differences in development are still observed.

The implication of understanding the factors associated with ToM development reach beyond the simple end goal of level 5 false-belief understanding. It is accepted that most children will eventually develop ToM skills and most within a small window of time prior to age 5, but significant differences across other domains have been observed for those children developing these skills early. Although the mechanism is unclear,

improved long-term outcomes in social adaptability (Repacholi & Slaughter, 2003) and better working memory and executive functioning skills (Cole & Mitchell, 2000) have been linked to earlier development of ToM skills. By impacting multiple trajectories ToM development offers a unique point of intervention with the added benefit of a definitive window of opportunity for impact.

Individual differences in ToM development are also important within the study of this domain, because they provide insight into factors that may facilitate perspective taking behaviors. Factors such as maternal mental state language, family emotional expressivity, and language development may influence this developmental timing. This expectation stems from the role these factors play in establishing socially appropriate relationships. Clarifying the relationship between social competency and ToM skill development will help to inform the extent to which these developmental processes rely on each other.

Contextual Factors

Development is influenced by many factors related to both the child and their environment. Although aspects of temperament and executive functioning have been previously addressed as impacting ToM, the current study focused on contextual variables as the impetus for ToM development. At the age during which ToM skills develop the most influential environment is often considered to be the family. Early interactions with family members are thought to provide the model by which children develop their own patterns of social interaction. Aspects of the home environment and factors associated with family dynamic and communication are of particular interest.

Mental state language refers to the use of language that specifies the thoughts, beliefs and emotions of others. General tasks assessing a mother's use of mental state language, otherwise described as the frequency and variety of emotional and cognitive terms, are often addressed by using a variety of parent-child interaction tasks. The importance of maternal use of mental state language hinges on the idea that children not only model the communication style of their mother, but that they also benefit from introspection and the exposure to the feelings of others provided by such discourse. Studies have found positive correlations between the use of mental state language during these tasks and level of performance on false belief tasks (Adrian, Clemente, Villanueva, & Rieffe, 2005; Ruffman, Slade, & Crowe, 2002; Symons, 2004;). Additional support comes from the influence of mental state language in the area of attachment (Cahill, Deater-Deckard, Pike, & Hughes, 2007; Symons et al., 2005). The primary implication is that the quality of the parent-child interaction plays an important role in ToM development. Mothers who engage in more meaningful communication with their child provide a model for the child's interactions with peers and siblings, bolstering these social interactions (Ruffman et al, 2002). One hypothesis that has been put forward explains that mentalistic language enables the child to explicitly form meta-representations of situations (Astington & Baird, 2005). Based on these previous findings a relationship between exposure to mother's use of mental state language and performance on ToM tasks is hypothesized. However, this influence on ToM in previous literature has focused primarily on false belief tasks and level 5 ToM skills. Because of the strength of the relationship identified between language and these false belief skills,

one may also expect to find a strong correlation between mental state language and performance on level 5 tasks, significantly stronger perhaps than the link between mental state language and level 1 and 2 perspective taking skills that have been shown in previous research to rely more heavily on working memory (Cole & Mitchell, 2000).

It is also possible that other family dynamics could be impacting the process by which ToM development occurs. One variable that has seen little attention within the field of ToM is family emotional expressivity, which refers to family dynamics that provide the direction for how children learn rules about what to feel and how to express feelings (Cassidy, Parke, Butkovsky, & Braungart, 1992). This set of rules is widely thought to develop through the modeling, interpretation, and coaching inherent in everyday family functioning. Often studied in social development, this construct may influence ToM development and its impact on general social functioning (Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995). Associations between emotional expressivity and prosocial responding have been interpreted as more reciprocal communication leads to higher quality relationships (Garner, Jones, & Miner, 1994). Additionally, emotional expressivity has been shown to influence children's understanding of emotion display rules (Dunsmore & Halberstadt, 1997), non-verbal judging skills (Camras & Sachs, 1991), and popularity for children (Boyum & Parke, 1995). Given its ties to general social functioning (Wood, 1988), and the implication that social functioning is also impacted by the development of a set of ToM skills (Feinfeld, Lee, Flavell, Green, & Flavell, 1999) a relationship between expressivity and ToM could be hypothesized. This relationship would be theoretically driven by children's greater opportunity to practice

prosocial behavior and exposure at higher rates to the outward display of internal states, both verbal and non-verbal. It would be expected that through exposure children would gain a better appreciation for how others' actions are impacted by internal states as well as being introduced to the language associated with such phenomena. Furthermore, if children are encouraged, through increased exposure to such expressions, to read non-verbal cues and anticipate others' actions then they are more likely to be able to accommodate peers in a social setting (Wood, 1988). Additionally, conflict resolution and discussion of mental states provide exposure that expedites the development of these skills (Ruffman et al., 2002). It could be supposed that, in a family where there is a higher level of comfort in discussing internal states, one might find this increased exposure to be linked to ToM development. Exposure to these mental states through higher emotional expressiveness, both positive and negative, may be linked to earlier understanding of ToM.

Confounding Factors

Although these context variables are the primary focus for the current study, previous research within this domain dictates that other factors be considered in terms of their contribution to individual variation in ToM development. In order to better interpret findings related to individual differences, the current study will control for both child receptive vocabulary as a measure of language development and SES.

The effect of language development on ToM progression has been examined in a number of studies. Language is essential in developing ToM skills because it provides a platform for discussing one's point of view and distinguishing it from that of others

(Astington & Baird, 2005). Dunn & Brophy (2005) describe the impact of language as a direct function of communication with others and contend that children who take part in genuinely reciprocal conversations with close dyadic relationships are more likely to perform well on ToM tasks. Clarifying this relationship further, O' Neill (2005) describes a reciprocal relationship between language and ToM through a study in which children were better able to learn the meaning of novel adjectives by taking the perspective of an experimenter gesturing to highlight an interesting dimension of a toy rather than simply pointing to the toy. Because of the linkage in the literature between ToM and receptive language ability (Lewis & Osborne, 1990), the present study will account for children's current language ability. By using the child's current language functioning as a control, the relationship between mental state language and ToM performance will become clearer.

Socioeconomic status (SES) impacts the lives of children in countless ways. A number of studies suggest how SES affects many outcomes including social development (Wood, 1988), academic performance (German & Leslie, 2000), parent-child attachment (Adrian et al., 2005), and cognitive abilities (Pillow, 1995). Research has supported the use of this predictor as a basis for comparing relative strengths and weaknesses of the home environment, such that SES serves as a proxy for the level of support and opportunity afforded an individual within that environment. In previous studies where SES was addressed in ToM literature there have been difficulties in interpreting results obtained from diverse SES populations (McAlister & Peterson, 2007). Most notably, much of the research on the impact of the family on ToM was originally noted in upper to

middle class white populations (Perner, Ruffman, & Leekam, 1994). Studies attempting to verify these results in lower income populations found that no such relationship emerged. Due to the complex nature of associations to SES, implications for the role of SES in impacting development are important to investigate as a prelude to more in depth exploration of other proximal factors. Considering SES as a potential control variable reduces the risk of misinterpreting the function of other family and child factors.

The Current Study

The current study examined contextual factors including exposure to mentalistic language and expressivity regarding internal mental states, and addressed their influence on different levels of ToM development. Mental state language and family emotional expressivity were addressed in terms of their possible relationship with the early emergence of ToM skill sets. Three separate measures representing two distinct levels of ToM were used to determine the differential impact of mental state language and family emotional expressivity on the developmental process. In this manner, the study aimed to clarify the role of mental state language and the influence of the family on ToM development. It was hypothesized that a link would be established between both mental state language and family emotional expressivity with respect to false belief theory of mind tasks. It was further hypothesized that although perspective taking skills would be linked to emotional expressivity, no relationship between mental state language and perspective taking would be found.

CHAPTER II

METHODS

Participants

Participants for this study were drawn from an ongoing longitudinal study designed to investigate cognitive and emotional control and the role they play in academic readiness and social development. Although data was collected from participants of this larger study at three time points, ages 3.5, 4.5, and 5.5, the current study examined only those data from the first year of collection. Children ranged in age from 37 to 47 months old. The sample was generated through a varied recruitment approach, primarily focused on local child care centers, especially those associated with the Head Start Program. The sample for this study consists of 263 three-and-a-half year old children who are racially and economically diverse. 61% of mothers self-identified as White, 31% as African American, 1.5 % Hispanic, 1% Asian, and 5% biracial or other. The sample also represented a variety of family backgrounds (74% married and living together). The sample was 52% female with 36% of families having an income to needs ratio less than two, indicating low income.

Procedure and Measures

Families were contacted to participate in the study based on their expressed interest through replies to the recruitment strategies. Upon receipt of initial interest, families were contacted and scheduled for a lab visit to last approximately two hours.

They were told they would be compensated $40 for their participation. Some families received additional compensation for travel and babysitter needs upon request.

Laboratory assessments for the larger study consisted of a set of sixteen measures administered to the child, lasting approximately two hours, and a set of twenty-three questionnaires completed by the mother during the course of the visit. For the purposes of the current study, the tasks included the Conceptual Perspective Taking task, an Unexpected Locations (UL) task, Unexpected Contents (UC) task, as well as a mother-child book reading episode and mother-child game which were used to generate counts of mental state language use by the mother. Self-Expressiveness in the Family Questionnaire (SEFQ) and demographic information was provided by the mother through the form of questionnaire packets completed during the visit.

Reliability for coder training. Research assistants were trained to be reliable on a set of tasks by assessing scores on a set of reliability training masters. Kappas greater than .8 were achieved by all research assistants before coding subsequent visits. Reliability was also assessed for drift intermittently during the coding process. Coders were trained on all simple coding tasks at once, including both tasks utilized in this study, and coding was completed concurrently with the collection of data.

Conceptual perspective taking. The Conceptual Perspective Taking task is designed to assess the child's ability to distinguish between their own perspective and another person's perspective. The child was presented with three level 2 tasks (turtle, pig, book), which tested the ability to interpret an object simultaneously viewed by the child and an experimenter as representing two distinct visual perceptions. The cards were

placed on the table one at a time alternating whether they are right side up to the child or to the experimenter. The child was asked his/her perspective and the experimenter's perspective on the cards and then this was repeated with the book. A level 1 task only requires the child to non-egocentrically infer what picture is seen by the experimenter and which one is not. One level 1 task was administered with a card that has a cat on one side and a dog on the other. It was placed vertically between the subject and experimenter and the child was asked to name the animal he/she sees and the animal that the experimenter sees. All scores on this task were coded as one for correct responses or zero for incorrect responses with a possible total of seven points. The only scores added to the total sum were the score of the questions concerning if the child can accurately express how the experimenter views the card or book. The original task was much longer (Flavell et al., 1981); however, the task was shortened due to the constraints of time and for the sake of validity of administration. Justification for this shortening was made by assessment of pilot data on this same task that indicated a fewer number of items predicted an equal distribution of scores in comparison to the original task. The original task exceeded the time allotted for the measure and to retain the attention of a three-and-a-half-year-old participant for more than two hours, the validity of such a measure may be scrutinized.

False belief understanding. The Unexpected Locations (UL) task was used to assess children's ability to predict a person's behavior that is based on a mistaken belief about the location of a hidden object (e.g., whereabouts of a toy moved from one box to another in the absence of second person). The task was designed to measure the child's ability to comprehend the mental states of others and apply that understanding to

predicting the future behavior of the person being deceived. The child moved the object from one box to another while a second experimenter, who was being tricked during the task, was out of the room. Child's involvement in moving the object was encouraged because research suggests that when children are actively involved with the deception, they perform better on the task (Chandler & Hala, 1994). Otherwise administration of this task followed the original use of the task by Hala, Chandler, & Fritz (1991). UL assesses a different aspect of perspective taking than the conceptual perspective taking in as much as it does not depend upon visual perspective taking, but instead addresses the child's understanding of false beliefs of the experimenter. Two trials were presented. Children earned a score of "1" for each correct judgment of a false belief (i.e., possible scores range from zero to six). This task has been used in published studies with children ranging from at least three to six years of age.

During the Unexpected Contents (UC) task, children were asked to guess the contents of two separate boxes, a band-aid box containing stickers and, a crayon box containing spoons. After the child guessed incorrectly, they were shown the contents of each box and then asked two questions. First they were asked what they thought was in the box before they had seen the actual contents. Next, they were asked what a third party, who had not looked inside the boxes, will think is inside the boxes prior to being shown their contents. Each item was scored as either a one for a correct response or a zero for an incorrect response. This task is a modified version of one presented to children by Flavell et al. (1981). The modification of this task was based on findings during pilot testing. It is also similar to UL, but it provides some additional insight into

children's ability to understand the beliefs of other mental beings whose beliefs are currently based on false information without requiring the additional prediction of their behavior.

Mental State Language. An index for Mental State Language (MSL) was generated using two tasks encouraging parent-child interaction. The first task was a parent-child book reading episode and the second task was a planning game played as a joint effort between parent and child. Each task was intended to generate communication and the index is a total count of MSL used by the mother during these episodes. This score was generated as a composite of four separate counts of cognitive, desire, positive emotion and negative emotion indices. The count included any language referring to the mental states of others, including words such as: like, think, and feel (Adrian et al., 2005). Coding was performed by graduate students, trained separately on the scoring of this task. Kappas greater than .8 were achieved to ensure inter-rater reliability.

Demographic information including income-to-needs ratio (total family income divided by the poverty line for a particular family size), parental education level, gender, and race were collected at the time of the laboratory visit as reported by the mother.

Family emotional expressiveness. The *Self-Expressiveness in the Family Questionnaire* (SEFQ) assesses the manner in which families communicate their emotions. This measure attempts to identify the predominant style of exhibiting expressions within a family through a measure of the mother's emotional experience and expressive patterns. For the purposes of this study, the short form of the SEFQ was used, which consists of 24 items, rated on a 9-point scale (1 = *not at all frequently*; 9 = *very*

frequently). Of these 24 items, 12 load onto a positive self-expressiveness scale and the other 12 load onto a negative scale. Mixed into each scale are both verbal and non-verbal communication styles. An example of a positive verbal item would be "telling family members how happy you are." A non-verbal negative item used in the short form of the scale is "sulking over unfair treatment by a family member." The SEFQ has demonstrated strong internal reliability, alphas ranged from .82 to .88 for the positive, negative, and total scales, all of which also correlated at .95 or greater with the full-length SEFQ scales (Halberstadt et al., 1995). Internal reliabilities (Cronbach's alphas) in the current sample for the positive and negative dimensions were .86 and .81, respectively.

CHAPTER III

RESULTS

Missing Data

Data points were missing for 13 cases within the data set. Measures for maternal mental state language and expressiveness in the family were missing from one participant. Data were missing from 10 participants for each of the three theory of mind tasks. In terms of demographic variables, data were missing from eight participants for maternal race and marital status and eleven participants for income-to-needs ratios. According to values for Little's MCAR chi-square test, data were found to be missing systematically. The NORM software package (Schafer, 1997) was used to impute this relatively small amount of missing data (1.65%). Multivariate continuous data under a normal model was used to generate this single imputation.

Preliminary Analyses

In order to determine if statistical assumptions of normality, linearity, and independence were met for the purposes of statistical manipulations, preliminary analyses were conducted. Both graphical and statistical methods of preliminary analyses were used, including the examination of frequencies and distributions of all study variables. Descriptive statistics including means, standard deviations, and ranges for study variables were calculated (See Table 2).

Bivariate Correlations

Correlations were run to examine simple relationships between study variables (SeeTable 3). Further correlations were run between study variables and demographic data to confirm the necessity for controlling variables within regression models (See Table 4). Independent sample t-tests were conducted with relation to study variables, gender and minority status. No significant differences emerged between males and females. Additionally, no significant differences were observed across minority status with relation to outcome variables.

It is important to note here that several variables found to be related in previous studies were not correlated within the current study. Despite expectations that conceptual perspective taking abilities precede false belief understanding, no correlation was found between CPT scores and scores on false belief tasks. These results may stem from lack of variability in responding on these tasks as few children showed mastery of these concepts. Within this sample, only 30% of children answered more than half of the items correctly for the CPT. As may have been anticipated to some degree, based on the age of participants this number drops to only 10% on false belief tasks, despite previously successful use of this measure with children in this age range. Interestingly, of the 26 participants responding correctly on more than half of the false belief items, only 10 of these participants showed a similar level of mastery on the CPT. Although such variability was sufficient to detect some stronger relationships, such as between false-belief and general language abilities, smaller effect sizes may have been impacted by these numbers.

In addition to low correlations amongst study variables, no significant relation was found with respect to SES and any study variables as was expected. Aside from minority status, only receptive language ability was correlated with any outcome or predictor variable; a significant positive correlation with performance on false belief tasks.

To further compare the correlations generated between mental state language and each of the outcome variables, a Fisher's Z was calculated for each and the significance of the difference between them was calculated. This difference was also found to be non-significant (See Table 5).

Regression Analyses

The relation between mental state language, family emotional expressiveness and false-belief task performance was addressed through linear regression. The current study had hypothesized a positive relationship to exist between MSL and false-belief task performance. No significant relationship was hypothesized between family emotional expressiveness and false-belief task performance. In order to control for demographic variables shown in previous studies to predict false belief understanding, child age, language ability and the family's income to needs ratio were all entered as controls for in the first step of the regression. Neither mental state language nor family emotional expressiveness accounted for a significant amount of variance. Given the large amount of variance accounted for by control variables, a second linear regression was run without control variables in the model. Again no significant relationships emerged (See Table 6).

A second linear regression was run to assess the relationship between mental state language, family emotional expressiveness and conceptual perspective taking. The current study hypothesized significant relationships between each of these predictors and conceptual perspective taking skills. In the regression analysis addressing the relationship between conceptual perspective taking skills and these two context variables, after adding control variables in the first step, no significant relationship was observed (See Table 7).

Additional Analyses

In response to the relatively low rate of correct responses on false-belief and conceptual perspective taking tasks, additional analyses were run to examine differences between split halves of the data in terms of performance on these tasks. Taking in consideration the reduced power in running these analyses the partial correlations, including previously stated control variables, for the participants in the upper half, relationships between mental state language and all outcome variables remained non-significant (See Table 8). Relationships between emotional expressivity were also non-significant within this group although there was a trend with regard to the relationship between conceptual perspective taking and emotional expressivity ($r=.149$, $p=.08$). Partial correlations run on the bottom half of participants in terms of false-belief performance produced no significant correlations (See Table 9).

Similar analyses were run with relation to conceptual perspective taking by splitting participants into high and low response categories due to low rates of correct responses on the task. Including the same control variables, no significant correlations

were observed for the high group, although significance for the relationship between conceptual perspective taking and emotional expressivity was again at the trend level (See Table 10). Analyses on the low group produced no significant correlations with regard to outcome variables (See Table 11).

Similar partial correlations were run with respect to minority status producing no significant relationships for either non-minority participants (See Table 12) or minority participants (See Table 13). Additionally, partial correlation analyses conducted for high SES (See Table 14) and low SES (See Table 15) participants produced no significant correlations with regard to any outcome variables.

CHAPTER IV

DISCUSSION

The aim of the current study was to clarify the relation between theory of mind and specific contextual variables that may impact the time at which theory of mind skills first appear. Two primary factors were hypothesized to influence the timeline of development: mother's use of mental state language and family emotional expressiveness. The study hoped to replicate findings surrounding direct correlations of mental state language and false belief task performance while attempting to explore the impact of mental state language use on earlier developing theory of mind skills. The other contextual variable of interest, family emotional expressiveness, was previously unexplored within this literature. It was anticipated that previous relationships between other aspects of social and emotional development in the family and increase exposure to the thoughts and feelings of others would be predictive of performance on a variety of theory of mind tasks.

In terms of the relationship of mental state language with theory of mind development, previous research has often found a significant influence of specific types of maternal verbal exchange on the presence or absence of false-belief understanding (Symons, 2004; Ruffman et al., 2002). Despite finding significant correlations between false-belief performance and general verbal abilities, the current

study was unable to replicate the previous findings with regard to the use of mental state language. These results may be indicative of a more minor role for specific language types in ToM development. Although it is intuitive that language referencing the mental states of others could be useful for verbalizing thoughts about others' perspectives, it is possible that the complexity of these descriptions would require more advanced language skills in general and knowledge of mental state language alone would not be sufficient for this task. Additionally this data may point to the likelihood of multiple pathways for ToM development. Some children may come to understand the perspective of others through verbal exchange, but simple repeated exposure may provide another mechanism, as posited by social learning theory. Specifically with regard to the hypothesis regarding conceptual perspective taking, the lack of a significant correlation between general language ability and conceptual perspective taking skills implies that such exposure may be particularly important for early perspective taking skills as they may be developing prior to complex language abilities. This theory is further bolstered by the few trends that were observed linking family emotional expressivity to these early perspective taking skills within certain groups of the sample.

Although expressivity may show some utility in describing children's exposure to opportunities to learn about mental state, the current findings also suggest it is not a strong predictor of ToM development by itself. Exploring other factors influencing the effectiveness of such exposure will help in clarifying the mechanism. Previous research on ToM has examined the role of siblings and same age playmates as major contributors to the developmental process (Perner et al., 1994). Revisiting these findings with respect

to exposure, one may argue that while exposure to others' perspectives may be helpful, a similar exposure including a perspective more closely related to your own would better facilitate this understanding. It is possible that the current study clarifying the role of family expressivity, though a first step in understanding, simply was unable to satisfy the conditions of effective exposure as we were unable to measure the quality and quantity of interactions with same age children using the current data set.

One limitation to interpreting the current findings has to do with the relative youth of participants. While some variation was evident in false-belief performance, less than ten percent of participants responded correctly to more than half of the items asked. A number of previous studies examining this relationship have targeted a slightly older population. Meins and colleagues (2002) and Symons (2004) addressed similar topics, but neither sampled children less than 45 months old. In contrast, less than fifteen percent of the current sample would meet requirements for participation in either of those studies. Continued exploration of these constructs with longitudinal data collected on these participants will be important to identifying the appropriate age range for these ToM measures.

A noteworthy difference between this study and much of the previous literature surrounding theory of mind development is the current study's inclusion of a highly diverse sample. In addition to the two previously mentioned studies using older participants, longitudinal studies by Ruffman et al. (2002) and by Dunn (1991) found positive relationships between mental state language and false belief, but only one of them even reported statistics on ethnic background. Meins subject pool was 95%

Caucasian. Participants in the current study were also from far more diversified economic backgrounds as well, where previous research has focused primarily on middle to upper class families and contained, on average, smaller samples. Based on current findings it is unclear whether the developmental influences on theory of mind elucidated in previous studies are consistent across these variables. Although studies conducted with urban populations have failed to replicate a number of findings with relation to theory of mind (McAlister & Peterson, 2007), no significant correlations were found with respect to race or differences in financial background. While smaller group sizes may have made it difficult to detect smaller effect sizes, it is also possible that the mix of differing socialization practices both with respect to minority status and available economic resources generates a more complex picture than would be expected from a more homogeneous sample.

Perhaps the most difficult finding to explain from this study is the lack of correlation between conceptual perspective taking abilities and false-belief understanding. Given the assertion by Astington et al. (1988) that these skills build in progression from one level to the next it is unlikely that children who have yet to master perspective taking would show any capacity for false-belief understanding, but such a low correlation between these variables (.06) implies that differential development was occurring within this sample, such that false-belief understanding may develop independent of early perspective taking skills. Additional scatterplots of these data primarily reveal a lack of mastery with relation to these skills; however, a segment of the population showed differential responding in favor of false-belief understanding despite

poor performance on the lower level theory of mind tasks. One possible explanation is that exposure to social learning opportunities may be sufficient to predict the behavior of others prior to the development of the spatial understanding required to visually assume their perspective.

A number of implications regarding the direction of future research may be drawn from the present study. The overall lack of significant correlations between several study variables is particularly intriguing. A substantial literature base supporting the link between theory of mind development and both mental state language and family interactions may have less generalizability across dimensions of ethnic and social class backgrounds than previously anticipated. Future studies exploring this relationship would be well-advised to include diverse samples, and explore these variables and associated socialization practices as potential moderators of these relationships. Culturally relevant perceptions about socialization may have a tremendous influence on communication patterns within the family (Dices & Socha, 2004) impacting both the use of mental state language and expressivity.

Conceptualization of the environmental context of children within this age range represents a unique challenge because of the varied social experiences encountered both within the family and in daycares and preschools. Future research should address the importance of multiple settings in encouraging the development of theory of mind skill sets. Potential factors such as class size, student/teacher ratios, and time spent in out of home care are possible sources of additional variation in opportunities to learn these skills. While these factors may be closely related to the quality of daycare, they may

provide some insight into the availability of like minds for the purpose of practicing these skills as well.

A more focused approach looking at quality of interactions within the family may provide an alternative perspective to approaches valuing quantity of interaction. Previous research has explored quality of parent-child attachment (Meins et al, 2002) as a predictor of theory of mind. Future attempts may address both the quality of the relationship between parent and child and the quality of their communication. This specific line of research may prove useful in designing parent training programs that encourage such communications as to support social development. Additionally, exploration of the quality and quantity of sibling interaction may play a key role in providing additional scaffolding for theory of mind mastery. Understanding how family context impacts children's development of crucial social understanding is essential both as markers for children's emotional development and in terms of impact on ToM development research as well.

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APPENDIX A. TABLES

Table 1

Descriptive Statistics for Demographic Variables

	%	M(*SD*)
Child Sex (female)	52	
Maternal Race (Non-white)	39	
Maternal Age		33.1 (5.89)
Marital Status		
Married, living together	74	
Married, separated	4	
Not married, living with partner	5	
Not married, not living with partner	16	
Income to Needs Ratio*		2.89 (1.71)
<2	36	
2-5	54	
>5	10	

* Income to needs ratio = total family income/poverty line income

Table 2

Descriptive Statistics for Study Variables

Variables	M	SD	Range
Perspective Taking	.41	.23	0-1.00
False-belief Composite	.50	.46	0-2.00
Positive Expressiveness	50.12	5.7	28-60
Negative Expressiveness	26.84	6.6	12-50
Mental State Language Composite	27.5	19.1	0-117
SEFQ Composite	77.0	8.6	49-108
PPVT	98.4	15.1	53-133

Table 3

Pearson Correlations among Study Variables (N=263)

Variables	1	2	3	4	5	6
1. Perspective Taking	-					
2. False-belief Composite	.06	-				
3. Positive Expressiveness	.02	-.05	-			
4. Negative Expressiveness	.09	.06	-.02	-		
5. Mental State Language	-.03	.05	-.01	-.01	-	
6. SEFQ Composite	.08	.02	.64	-.04	-.02	-
7. Child PPVT	.07	.20*	.08	.06	-.05	.10

*$p < .05$

Table 4

Pearson Correlations among Demographic and Study Variables

	Child Age (Months)	Income to Needs Ratio	Child PPVT
Perspective Taking	-.07	.04	.08
False-belief Composite	.02	.11	.20*
Positive Expressiveness	.02	.07	.08
Negative Expressiveness	.14*	-.08	.06
Mental State Language	.05	.04	-.02
SEFQ Composite	.12*	-.02	.10

*$p < .05$

Table 5

Differences Between Study Variable Correlations

	Z value For difference	Significance Level
Mental State Language/ (FB/CPT)	1.25	.21
Family Emotional Expressivity/ (FB/CPT)	.34	.75

Table 6

Summary of Regression Analysis Predicting Conceptual Perspective Taking Performance from Contextual Variables

Predictor	B	SE	β
(Constant)	.78	1.16	
Income to Needs Ratio	.01	.04	.01
Child's Age	-.03	.03	-.07
Child's PPVT Standard Score	.00	.00	.07
Mental State Language	-.05	.06	-.05
SEFQ	.08	.06	.08

*p < .05 **p < .01

Table 7

Summary of Regression Analysis Predicting False-Belief Performance from Contextual Variables

Predictor	B	SE	β
(Constant)	-1.89	1.14	
Income to Needs Ratio	.04	.04	.07
Child's Age	.02	.03	.04
Child's PPVT Standard Score	.01	.00	.18
Mental State Language	.06	.06	.06
SEFQ	.00	.06	.00

*p < .05 **p < .01

Table 8

Partial Correlations among Study Variables for False-Belief High Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	.12	-			
3. Positive Expressiveness	.02	-.08	-		
4. Negative Expressiveness	.18*	.05	.04	-	
5. Mental State Language	-.05	.05	-.06	-.01	-
6. SEFQ Composite	.15	-.02	.66*	.78*	-.05

*$p < .05$

Table 9

Partial Correlations among Study Variables for False-Belief Low Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	.07	-			
3. Positive Expressiveness	.01	.00	-		
4. Negative Expressiveness	.02	-.07	-.08	-	
5. Mental State Language	-.06	-.11	.11	-.07	-
6. SEFQ Composite	.02	-.05	.65*	.71*	.02

*$p < .05$

Table 10

Partial Correlations among Study Variables for CPT High Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	.07	-			
3. Positive Expressiveness	.10	-.10	-		
4. Negative Expressiveness	.12	.17*	.03	-	
5. Mental State Language	.05	.06	.05	.06	-
6. SEFQ Composite	.15	.06	.68*	.76*	.08

*$p < .05$

Table 11

Partial Correlations among Study Variables for CPT Low Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	-.11	-			
3. Positive Expressiveness	-.05	-.02	-		
4. Negative Expressiveness	.02	-.12	-.09	-	
5. Mental State Language	.00	.07	-.04	-.12	-
6. SEFQ Composite	-.02	-.11	.61*	.73*	-.12

*$p < .05$

Table 12

Partial Correlations among Study Variables for Non-Minority Participants Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	.05	-			
3. Positive Expressiveness	.02	-.10	-		
4. Negative Expressiveness	.14	.06	-.11	-	
5. Mental State Language	-.07	.05	.03	-.05	-
6. SEFQ Composite	.13	-.02	.57*	.76*	-.03

*$p < .05$

Table 13

Partial Correlations among Study Variables for Minority Participants Controlling for PPVT Standard Scores, SES, & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	-.01	-			
3. Positive Expressiveness	-.01	-.02	-		
4. Negative Expressiveness	-.08	-.02	.04	-	
5. Mental State Language	-.01	.15	-.02	.03	-
6. SEFQ Composite	-.06	-.03	.74*	.71*	.01

*$p < .05$

Table 14

Partial Correlations among Study Variables for High SES Participants Controlling for PPVT Standard Scores & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	.11	-			
3. Positive Expressiveness	-.04	-.03	-		
4. Negative Expressiveness	.06	.06	-.09	-	
5. Mental State Language	-.04	.07	.04	-.11	-
6. SEFQ Composite	.02	.03	.59*	.76*	-.07

*$p < .05$

Table 15

Partial Correlations among Study Variables for Low SES Participants Controlling for PPVT Standard Scores & Child's Age

Variables	1	2	3	4	5
1. Perspective Taking	-				
2. False-belief Composite	-.09	-			
3. Positive Expressiveness	.13	-.13	-		
4. Negative Expressiveness	.15	.06	.04	-	
5. Mental State Language	-.08	.03	-.02	.06	-
6. SEFQ Composite	.20	-.04	.70*	.74*	.04

*$p < .05$