TODDLER VERBAL SKILL AND MOTHER-TODDLER DISCOURSE AS PREDICTORS
OF THE LATER UNDERSTANDING
OF EMOTION REGULATION STRATEGIES IN 3-YEAR-OLDS

A Thesis in
Psychology
by
Caroline K. Pemberton

© 2008 Caroline K. Pemberton

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

December 2008
The thesis of Caroline K. Pemberton was reviewed and approved* by the following:

Pamela M. Cole  
Professor of Psychology  
Thesis Adviser

Ginger A. Moore  
Assistant Professor of Psychology

Daniel J. Weiss  
Assistant Professor of Psychology

Carol A. Miller  
Associate Professor of Communication Sciences and Disorders

Melvin M. Mark  
Professor of Psychology  
Head of the Department of Psychology

*Signatures are on file in the Graduate School.
This thesis investigated the role of early language development as a contributor to the development of understanding emotion regulation strategies. Specifically, during the period of increased child negative emotion episodes, toddler linguistic complexity was predicted to facilitate children’s early recognition and generation of effective emotion regulation strategies. In addition, this thesis hypothesized that the facilitative process is mediated by maternal discourse to child language. Longitudinal data (child age from 30 to 36 months) from 124 families was used to examine child linguistic complexity and maternal connectedness to child speech as a mediating factor for the development of children’s strategy understanding at 36 months. Strategy understanding was assessed using a puppet procedure that provides examples of children in situations eliciting both sad and angry emotions and asks children to recognize effective emotion regulation strategies (forced-choice procedure) and to verbally generate their own strategies (open-ended procedure). Gender and aspects of children’s verbal abilities measured by the WPPSI-III predicted concurrent emotion regulation strategy understanding beyond other measures of intelligence, supporting the importance of using verbal skills to convey knowledge for understanding the most effective ways to manage emotions. Contrary to predictions, toddler linguistic complexity and maternal connectedness did not account for later strategy understanding.
Table of Contents

List of Tables........................................................................................................... v
List of Figures........................................................................................................... vi

Chapter 1. INTRODUCTION...................................................................................... 1
Chapter 2. METHOD.................................................................................................. 27
Chapter 3. RESULTS................................................................................................ 41
Chapter 4. DISCUSSION......................................................................................... 59
References .............................................................................................................. 72
Appendix A: Puppet Procedure Script................................................................. 89
Appendix B: Coding Manual for Emotion Regulation Strategy Understanding........ 94
Appendix C: Coding Manual for Discourse Coding.............................................. 100
List of Tables

Table 1. Percentage and Number of Participants according to Ethnic/Racial Identity, Education, and Employment .................................................................30

Table 2. Means, Standard Deviations, Actual Ranges, and Possible Ranges for Main Variables ........................................................................................................42

Table 3. Correlations for Main Variables........................................................................................................45

Table 4. Means, Standard Deviations, and T-tests of Gender differences .........................47

Table 5. Regression Coefficients for Models Predicting Sadness Strategy Recognition...50

Table 6. Regression Coefficients for Models Predicting Anger Strategy Recognition……..52

Table 7. Coefficients for Models Predicting Strategy Generation .................................54

Table 8. Post-Hoc Follow-Ups of Recognition Regression Models.................................56

Table 9. Post-Hoc Follow-Ups of Generation Regression Model.................................57
List of Figures

Figure 1. Hypothesized model for emotion regulation strategy understanding ......................7

Figure 2. Information by gender interaction for strategy generation .................................58
Chapter 1. INTRODUCTION

The first three years of a child’s life are characterized by rapid growth and change within the physiological, emotional, cognitive, and behavioral domains. Integration across domains is thought to underlie both social and academic competence (Blair, 2002). The pathway to such integration is best conceptualized as a transactional developmental process (Sameroff, 1975), in which developmental outcomes are a result of the interacting influences of child characteristics and experiences. Given the widespread appeal of the transactional model of development and repeated calls for studying both child and parental effects on children’s development (e.g., Baumrind, 1993; Bell & Harper, 1977; Crockenberg & Leerkes, 2003), it is surprising how rarely child characteristics are studied (Crouter & Booth, 2003).

The ability to self-regulate emotional responses, an ability that is central to the development of socio-emotional and academic competences, is believed to be facilitated by both parental and child characteristics (Kopp, 1982). Kopp points out the importance of children’s cognitive and language development to the emergence of self-regulation. Nonetheless, there has been a dearth of research examining the integration of language and emotional development and how language development comes to influence self-regulation. The aim of this project is to examine child and parenting characteristics – particularly the role of linguistic complexity – during the toddler years as predictors of a specific aspect of preschool-age emotion regulation, i.e., understanding effective regulatory strategies.

Evident among the many aspects of developmental changes in early childhood that might contribute to child outcomes is the exponential change in language acquisition. The fundamental development of receptive and expressive language in young children transforms parent-child interaction in a way that raises mutual expectations and complexity of interaction within the
parent-child dyad. Language development in the early years is typified by a growing vocabulary and the ability to create short strings of words to communicate. This linguistic skill facilitates parent-child communication about information, emotion, and thoughts. In addition, language development during this age is marked by large individual differences in the timing of the rapid growth in vocabulary and grammar (Gleason, 2005). These individual differences in the linguistic complexity that the dyad can bring to their interactions, particularly during a period when there is an increase in emotionally negative interactions between toddlers and parents, may influence the degree to which a child understands that emotions can be regulated and how they can be regulated effectively.

Imagine a household with two 24-month-olds who both want to play with a toy that is out of reach. One child has few words and cannot communicate this need verbally (e.g., label the object, say “want”). This child communicates with gestures toward the shelves, but also with emotion, expressing distress as a way of signaling a need and then becoming visibly frustrated when mother offers the wrong object. The mother says, “But I don’t know what you want.” Imagine now that the other 24-month-old does have expressive language. That child names the object in a two-word utterance, such as “Ball mine.” The mother says to this child, “The ball? This ball? You want the ball? Here, try to catch it!” With arms outstretched to catch the toy, the child grins and yells, “Ball! Catch!” The mother cannot give the child without expressive verbal skills what is wanted. Conversely, she is successful at understanding the verbally expressive child’s desires and engages in a conversation about the child’s interest in the ball that elaborates on the child’s language as well as verbalizes about the child’s experience.

This comparative illustration makes several points. First, the use of expressive language allows mother and child to communicate with a newfound ease and to use a more precise system
that reduces the need to rely on emotional signals alone. While the mother may attempt to soothe the child without language with another toy to distract from the frustration, she may give the verbal child what the child has requested, or use explanation, logic, and collaboration to soothe the verbal child’s frustration if not allowed to play with the desired toy. The child without verbal abilities remains frustrated and is reliant on mother’s inference about the gestures, but the verbal child successfully communicates desire and can use language and interaction with the mother to navigate emotions and construct experience in a way that is understandable for both the child itself and those in the child’s environment. Second, the child’s use of expressive language creates tangible moments for communication and learning between parent and child, providing an opportunity for the mother to embellish on the child’s experience and language. The mother simplifies her speech to correspond with the child’s linguistic level and then elaborates on that child’s more simplistic utterance, connecting the actions in the environment to the child’s own words. Her connected utterance introduces complexity to the child’s utterance in terms of vocabulary, grammar, and associated meaning. Conversation affords the opportunity for the child to use his or her own words in conjunction with the parent’s to construct experience.

The specific focus of this thesis research was to investigate the conjoint influences of a child’s early expressive language skill and the quality of discourse mothers have with the child in predicting the child’s understanding of effective emotion regulation strategies. It is established that emotion regulation is an essential aspect of a child’s overall well-being, social competence, and mental health (e.g., Cole, Michel, & Teti, 1994; Eisenberg & Fabes, 1992). Thompson (2004) defined emotion regulation as consisting of the “extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one’s goals” (p. 27). The literature on the
development of emotion regulation has grown considerably during the past 25 years, focused primarily on the emergence of regulatory strategies (Denham, 1998), individual differences in emotion regulation and their relation to different psychological, physiological, and behavioral factors (Calkins & Johnson, 1998; Cole, 1986; Grolnick, Bridges, & Connell, 1996), and relations between aspects of parenting and child emotion regulation (e.g., Eisenberg, Cumberland, & Spinrad, 1998).

The literature from the past 25 years has similarly expanded in its study of what children understand about their emotions, linking emotion understanding to later socio-emotional competence (see Denham, 1998; Saarni, 1999). For example, emotion knowledge has been associated with children’s ability to regulate displays of disappointment (Garner & Power, 1996). Beginning around age 3, children demonstrate knowledge in labeling facial expressions that correspond with certain emotions, identifying probable causal agents of emotions, and understanding that emotions can influence their own and others’ behaviors (Denham & Couchoud, 1990b; Denham & Zoller, 1991; Harris, 1994; Lagattuta, Wellman, & Flavell, 1997). While extensive research has been conducted on children’s understanding of emotions, there has been less research focused upon the development of the understanding of strategies for emotion regulation. Little is known about whether and how strategy understanding has implications for children’s abilities to regulate their emotions, although models have been proposed that suggest cognitive understanding of such strategies plays a critical role in emotion regulation competence (Crick & Dodge, 1994; Lemerise & Arsenio, 2000).

This proposal assesses early emotion regulation strategy understanding using children’s responses to a puppet procedure (Cole, Dennis, Smith-Simon, & Cohen, in press). In this task, puppets become very sad or angry, and they ask the child, “What can we do to stop feeling so
angry/sad?” Children’s original suggestions to the puppets and choices from pairs of options for how to feel less emotional will be used to assess their ability to generate potential strategies as well as to recognize the better strategy given a set of options. Using this procedure, recent research found a developmental progression in children’s emerging understanding of strategies and that children’s understanding of strategies predicted children’s behavior in a frustrating situation when help was not present (Cole, Dennis et al., in press). Additionally, recognition of strategies was related to more alternative problem-solving and less support-seeking, which suggests that those children who recognized effective strategies were independently better able to generate solutions to a frustrating situation than those who had fewer strategies available. There are still many unanswered questions about the roles of generating and recognizing strategies for behavior, because the ability to use such cognitive understanding likely varies by child contributions, situation, intensity, and other factors specific to the emotional event. While it is plausible that children can engage in appropriate self-regulatory behavior without necessarily understanding strategies (Cole, 1986), being aware of strategies may arguably aid emotion regulation strategy effectiveness and flexibility. Whether the understanding or behavior develops first, or whether each contribute to the other in a more reciprocal, transactional manner, an understanding of regulatory strategies is key to much of the clinical intervention work aiming to teach young children strategies for use in future situations where negative emotion is elicited (e.g., Domitrovich, Cortes, & Greenberg, 2007; Greenberg, Kusché, Cook & Quamma, 1995; Izard, 2002). Prediction of emotion regulation strategy understanding could therefore better elucidate strategy understanding’s role as an effective teaching tool for children with behavior problems, as well as explicate the specific role of cognitive factors, such as language, in emotion regulation.
Almost 20 years ago, Kopp (1989) suggested that language serves as a mediating factor in the development of emotion regulation as children use words to state their feelings to others, get verbal feedback about the appropriateness of their emotions, and hear and think about ways to manage the emotions. It is through language in social interactions that “children learn causal associations about words, acts, positive and negative emotions, and social sanctions and proscriptions about emotion feelings and expressions” (p. 349). This is widely accepted as logical, and while the relationship between language and self-regulation has been established concurrently (Ayduk, Rodriguez, Mischel, Shoda, & Wright, 2007; Stansbury & Zimmerman, 1999), the mechanism of that association has not been specified. The focus on language in the study of emotional development has been on the semantic content of child and parent-child speech (e.g., internal state language) to the neglect of Kopp’s point that linguistic complexity should play a role. Child language ability also has unique variance in predicting mental state understanding (e.g., Fine, Izard, & Trentacosta, 2006), theory of mind (Cutting & Dunn, 1999; de Rosnay, Pons, Harris, & Morrell, 2004), emotion knowledge (Trentacosta, Izard, Mostow, & Fine, 2006), and positive self behaviors (Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003). One mechanism for this relation may be that language skills help children understand their experiences (Cole, Armstrong, & Pemberton, in press), and child-caregiver discourse may be important in contributing to the understanding of emotion experience, including how to regulate negative emotions. The thesis research therefore addresses the role of linguistic complexity as part of a project-wide attempt to build a model for predicting aspects of effective emotion regulation as children transition to school age. In the thesis project, I proposed to examine the degree to which child expressive language, specifically the child’s linguistic complexity, and mother-child discourse predict the later understanding of emotion strategies. In
addition, child gender is considered as a potential moderator, given both gender differences in early child expressive language development and potential gender differences in the socialization of language. A number of other factors (e.g., child temperament, maternal affect, semantic content of discourse) will be discussed in the larger framework of the proposed question, although they are not the focus of this particular study. This thesis then focuses on child linguistic complexity and mother-child discourse as predictors and gender and sensitivity as moderators. In sum, Figure 1 represents a larger model toward which our research is building with the specific components of the proposed thesis in bold font.

Figure 1. Hypothesized model for emotion regulation strategy understanding. The thick, horizontal, filled arrow at the bottom represents Time. Other arrows represent direct and indirect effects. One arrow is dotted to show a mediated path.

Inherent to the proposed model is the assumption that language is essential in its role as a facilitator of advanced cognitive processes (Zelazo, 1999). Language allows for more complex
thinking and the ability to represent phenomena in a qualitatively different way than would be possible without language (Nelson, 1996). This research is novel because it examines the unique weight of linguistic complexity as a facilitator of strategy understanding, rather than the more commonly studied semantic components of emotion talk and internal state language. The research on emotion language demonstrates its clear significance in the development of emotion processes (e.g., Denham, 1998), and yet evidence for effects gained from the role of language itself as a facilitator are largely unknown.

As noted previously, the literature acknowledges that language abilities must be influential in the development of skillful emotion regulation, but evidence of how language development influences emotion regulation is sparse (Cole, Armstrong et al., in press). Important changes in emotion regulation occur between ages 1 and 4 years, a period of extraordinary language development (Kopp, 1982). As children acquire increasingly sophisticated language abilities, this ability to use words should influence their understanding of emotion and strategies for emotion regulation (Denham, 1998). Language development, influenced by both the child’s own characteristics and the input of the environment, should play a pivotal role in emotion regulation (Kopp, 1989). Moreover, the period of rapid language development coincides with a period in which there is marked peak, followed by a decline in emotionally negative interactions with parents (the “terrible twos”; Bridges, 1932; Kopp, 1989), but much remains to be understood about individual differences in how parents and children interact during this period and the factors that account for different interactional patterns, particularly the role of child characteristics (Karreman, van Tuijl, van Aken, & Dekovic, 2006; Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007). Arguably, during this period of emotion-eliciting interaction resulting from the ability of the child to communicate verbally, the increase in parent-
child discourse could enhance the early development of self-regulation, including a child’s implicit or explicit understanding that emotions can be regulated.

*Language Development*

Both language and emotions are communicative. Before infants speak, emotions fulfill the function of communicating with others (Barrett & Campos, 1987). Infants convey their needs through emotionally expressive, nonverbal signals. As children first begin to speak they label objects, actions, and people that they know best (e.g., “daddy”, “up”) (Gleason, 2005). Markedly, emotion words (i.e. terms describing emotional states) are absent from children’s first language words. As they are first acquiring spoken words, they have difficulty coordinating their emotional expression with their expressive language (Bloom & Capatides, 1987), suggesting that these two domains of development require time and experience to become integrated. When children use words as part of a response to emotionally evocative events, the young child’s speech typically does not contain the emotion labels that older children and adults use to communicate how they feel (Bloom, 1993).

Language development in children from 18 to 36 months of age, a period marked by accelerated emotion regulation development, is characterized by increased understanding of words, a rapidly growing vocabulary, the emergence of grammatical understanding, and the ability to express ideas in increasingly complex ways (Goldin-Meadow, Seligman, & Gelman, 1976; Jackendoff, 1994). Research has shown a large amount of variation in the rate of language development during this age range, a variation that correlates significantly with socioeconomic status (Hart & Risley, 1995). Economic advantage is associated with faster rates of growth in linguistic ability, as well as larger and more diverse vocabularies later in life. Along with these emerging abilities during this period, the skills that contribute to increased autonomy
additionally contribute to an increase in child negativity and parent-child conflict (Belsky et al., 1996; Crockenberg, 1985). For example, toddlers can move away from a parent, refuse to do what is asked, and say, “No!” Children can use their language and advancing communicative skills to facilitate their growing autonomy with the newfound ability to verbally express wishes (Bloom, 1993).

Recall that in the earlier proposed vignette, the verbal child’s expressive language afforded an opportunity for mother-child verbal interaction, in contrast to the child who could not verbally express needs. Typically, a receptive vocabulary develops before expressive ability. That is, before a child uses a word, the child understands the word (Bates et al., 1994). However, in the vignette, even if both children comprehend their mother’s language, the fact that one child can verbalize a need permits a distinctly different type of parent-child communication. Although the acquisition of expressive capabilities generally reflects receptive ability (Bates, Dale, & Thal, 1995), parent-child transactions are enriched by the verbal communications that become possible once children have expressive vocabulary. In addition, once children begin to acquire expressive language abilities, children’s receptive and expressive abilities are typically correlated constructs throughout development (e.g., Bates, Dale, & Thal, 1995; Hirsch, McCleery, Flax, & Benasich, 2000). The correlation of the two constructs does not imply that they reflect a unified dimension, yet the measure of productive abilities is one method for assessing how a child’s language interacts with the environment and is particularly useful for analyses studying language in a transactional fashion.

As children navigate the increase of negative emotional experiences and opportunities and desire for autonomy, linguistic abilities should aid children in communicating with their caregiver and making meaning out of every-day events. For this reason, the proposed thesis
hypothesized that linguistic complexity during the time period of increased negative emotional experiences (30 months) is more predictive of later understanding of emotion regulation strategies than is the child’s concurrent linguistic ability at the time strategy understanding is tested (36 months). Although concurrent linguistic ability is likely a component of the process, this thesis proposed that higher levels of complexity earlier in development would give children an accumulated advantage for later understanding. This accumulation of experience with using language to facilitate a greater understanding of emotion and emotion regulation was hypothesized to be dependent on the influential role of parent’s transactional interactions on the child’s early attempts with language.

*Parental Role in Developing Language*

There is evidence that parental language has an influence on children’s development of productive language. Language development is influenced by the available linguistic input in the contiguous environment, as evidenced by longitudinal work demonstrating that the amount of parental expressive language is associated with child expressive language (Hart & Risley, 1992; 1995). Language input varies widely by environment, particularly in terms of family income (Hart & Risley, 1995) and parental education (Hoff-Ginsberg, 1994; Rowe, Pan, & Ayoub, 2005) such that more advantaged parents talk more and more complexly with their young children. Thus, the verbal skills that children use to communicate with the environment around them are shaped by the wide-ranging quantity of available language in that environment.

Not all parental talk is the same. Hart and Risley (1995), in their extraordinarily detailed longitudinal study, found that in addition to amount of parental talk, quality of parental input differed importantly between parents. These differences resulted in significant differential cumulative effects in children’s later variety of words, number of multi-clause sentences, amount
of past and future verb tense use, number of declaratives, and number of questions. Parents also differed in amount of affirmative feedback and amount of responsiveness. The parents who had higher proportions of more complex and varied speech in their talk to their children were those in the higher socioeconomic group. Parents in the lowest socioeconomic status (SES) group (on welfare) not only spoke to their children less (providing children in families on welfare less than half of the language experience in each hour of their lives than children in working-class families), but the language input was of lesser quality, contained more prohibitions, and far less affirmative feedback. Such socioeconomic differences also emerge in cross-cultural comparisons of parental emotion language with young children, such that ethnic, racial, or cultural differences disappear once socioeconomic status is considered in most (e.g., Eisenberg, 1999) although not all studies (Heath, 1983). When looking at middle-class families alone, cross-cultural studies in number of linguistic utterances and diversity of vocabulary demonstrate that Italian-speaking mother-child dyads, who use more utterances and more variety in their speech than English-speaking dyads, had children who used more utterances and more variety than their English-speaking counterparts (Girolametto, Bonifacio, Visini, Weitzman, Zocconi, & Pearce, 2002).

Variations in language experience are also evident when parents are differentiated by education level. Recent research found maternal education to relate to children’s vocabulary (Pan, Rowe, Spier, & Tamis-Lemonda, 2004). In a longitudinal study spanning a time period of children’s accelerated language growth (14 to 30 months), caregivers’ educational levels, which was associated with complexity of caregiver speech, predicted stable and long-lasting speech differences transferred to their children (Huttenlocher, Vasilyeva, Waterfall, Vevea, & Hedges, 2007). Close examination of discourse during storybook reading suggests that all parents adjust their speech in accordance with the child’s developmental level, but this parental adaptation
differs in its quality. Mothers with higher levels of education are more likely to relate the story to the child’s own life, as well as to be more elaborate in their discourse than mothers with lower levels of education (Mendonza, 1995). Mothers with more education have additionally been shown to produce more conversation-eliciting talk, to produce less directive talk, and to show more lexical diversity during interaction with their toddlers than those with less education (Hoff-Ginsberg, 1994; Rowe et al., 2005).

It is widely held that language depends upon environmental language input. Although there is some evidence that children can acquire language through exposure to the environment and not direct interaction alone (Floor & Akhter, 2006), young children mainly acquire knowledge about language forms and the meaning of words through discourse (Nelson, 1996). In fact, recent research on media “substitutes” for parent interaction in the form of DVDs and videos suggests that during a crucial age of language development (8-16 months in this study), such substitutes are detrimental to vocabulary growth, even when demographics are controlled (Zimmerman, Christakis, & Metzolff, 2007). This suggests that parental interactions provide unique maintenance and facilitation for children’s vocabulary growth trajectory. Whereas differential levels of exposure to language have been associated with children’s later language abilities, children’s interaction with available linguistic input relevant to the child’s own language level is likely a mechanism in language development (Nelson, 1996). For instance, it has been shown that parental elaboration of a child’s utterances plays a role in promoting child language acquisition (Goldfield, 1987; Hampson & Nelson, 1993).

One method of measuring parent-child discourse is “connectedness” (Brown, Donelan-McCall, & Dunn, 1996; Ensor & Hughes, 2008; Slomkowski & Dunn, 1996). Dunn and colleagues have measured connectedness defined as “the frequency with which each speaker’s
utterances are semantically related to another speaker’s prior utterance” (Gottman, 1983). As children’s ability to remain on topic during conversation increases with age (Brinton & Fujiki, 1984), the nature of parent-child interaction shifts from a mode of communication founded primarily on child mood state and emotional signals to a mode that can use language. Parents can use their language to expand and organize children’s own verbalized conception of their experience. Mothers’ frequency of semantically connecting their utterances to their child’s prior utterance relates to later false-belief and social understanding (Dunn & Brophy, 2005; Ensor & Hughes, 2008). This aspect of language development is reminiscent of Vygotsky’s (1962) theory that envisions development as a process of experts scaffolding learner’s skill acquisition through social interaction. Vygotsky emphasized the importance of language as the mechanism through which skill and even thought is developed. That is, through the transactional nature of expert-learner interaction, a child acquires new skills, particularly when the expert adapts information using the “zone of proximal development,” i.e., near the child’s level but extending the skill. It is the transactional interaction between children’s own emerging cognitive capabilities and others’ developed language that allows the emerging capabilities of speech to gain sophistication and complexity. Since the literature suggests language contributes to understanding the emotions of self and others (Cole, Armstrong et al., in press), we expect that when mothers expand on children’s experience using connected conversation, they facilitate children’s abilities to use their own language to mentally construct and understand emotional experiences. This thesis proposed that parental connectedness to child speech better serves as a mechanism for the facilitating role of child’s linguistic ability in the development of emotion regulation strategies than the linguistic complexity of parental language input alone.
Language and Emotional Development

The literature on children’s use of language in the context of emotion regulation highlights semantic aspects of child-parent discourse to the neglect of considering the role of linguistic complexity. In general, there is consensus that language development contributes to the acquisition of emotion terms during the toddler years, and therefore the development of skill at self-regulation (e.g., Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986; Denham, 1998; Dunn, Bretherton, & Munn, 1987; Kopp, 1989; Thompson, 1994), but empirical evidence for the latter premise is limited. The child who understands experience should have greater emotion understanding (Denham, 1998; Gottman, 1986: Saarni, 1999). Therefore, language should be one contributing influence in the child’s ability to process and understand experience, which in turn should increase the capacity to regulate emotion. Quality of child-parent discourse about emotion is related to social competence (Denham, Zoller & Couchoud, 1994; Dunn, Brown, Bearsall, 1991). Yet, the contribution of a child’s linguistic ability may also be an important factor. Even when emotions are not specifically labeled, the words a young child hears to describe experiences give meaning to experience, including experiences that elicit emotions (Bloom, 1993). The emergence of expressive and receptive language skills, for instance, may encourage parents to talk about emotional events with young children, and this in turn should contribute to the child’s emerging understanding of emotion regulation strategies.

Kopp (1982) theorized that language, as well as other aspects of cognition, contributes importantly to the development of self-regulation, including the capacity to modulate distress and negative emotions (1989). It follows that language would also contribute to emergent understanding that emotions can be regulated and how they are regulated as children learn about causality and the appropriate social sanctions communicating and managing emotion. Therefore,
language development may be important in the development of a child’s ability to communicate understanding of regulatory strategies. Not only would language influence the ability to understand questions and to produce answers in an assessment of regulatory strategy understanding, but early language status, particularly in the presence of parental connectedness to child utterances, should contribute to the understanding of strategies.

The contribution of linguistic abilities to understanding and using effective emotion regulation strategies stems from an enhanced ability to communicate feelings to others, gain responses about the appropriateness of emotional behavior, and to hear and think about ways in which emotions can be controlled through a greater understanding of causal associations between experience and emotions (Kopp, 1989). Empirical studies have demonstrated that language ability correlates with internal states such as emotion understanding and theory of mind (e.g., Cutting & Dunn, 1999). One particular area in which the development of language skills has been shown to contribute to emotion regulation is in children’s progressively more sophisticated understanding of emotions (Denham, 1998). Children’s ability to verbally and nonverbally label emotions increases from 2 to 4 1/2 years (Denham & Couchoud, 1990b). As children reach 4 or 5 years of age, they are able to describe causes and consequences of emotions in puppet shows that ask children to identify themselves with the puppets (Denham & Zoller, 1991). The use of emotion terms, although not necessary to describe emotional situations, must serve a role in creating clarity of thought and speech, facilitating ease of communication in emotional situations, and forming self-knowledge and understanding of emotional triggers through an association of remembered events with emotion terms.
Parental Discourse about Emotion Experiences

The ability to understand and use speech affords new dimensions in child-parent interactions that influence how the child handles emotional reactions and facilitates the parent’s role in the child’s emotional development, including learning how one can regulate emotion. As families navigate this developmental period, a child’s language skill comes into play during emotional events (e.g., Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986). Both positive and negative emotional events are therefore learning opportunities for the integration of language skills into the development of emotion regulation. The bidirectional influences of child language ability with parental linguistic input and socialization of emotion could likely influence the way a child’s own linguistic skills are integrated into emotion regulation skill.

Parental talk about emotion does not necessitate an inclusion of emotion words in their speech content. Detailed naturalistic observations have shown that when mothers interact with their toddlers and preschoolers, the use of emotion terms is relatively rare (Capatides & Bloom, 1993). Instead, parents are more likely to react to their children’s emotion with talk about the event, the child’s goals, and potential responses to the situation (Capatides & Bloom, 1993; Kopp, 1989; Rogoff, 1993).

In accordance with the Piagetian theory of cognitive construction, it has been suggested that the actions and interactions with children’s primary caregivers are central to building children’s knowledge and enabling them to create generalizations of patterns and organizations of their experiences (Nelson, 1996). This theory has been brought to practice in the development of emotion regulation with research suggesting that parents can facilitate children’s development of understanding of feelings and solutions by “emotion coaching” (Gottman, Katz, & Hooven, 1997). Parents who are aware of their children’s emotions, see the emotion as an opportunity for
learning, listen and validate feelings, help the child label emotions, and set limits while problem-solving are more likely to have children who are socially skilled and emotionally mature when school-aged (Gottman et al., 1997). Direct exploration and instruction during emotional events creates complex functions of parental discourse with children, and one way in which this can happen is through verbal communication, thus creating a more advanced meaning of the emotion (Saarni, 1987).

Talking about emotions and emotional events and viewing such events as learning experiences are beneficial to children’s development (Denham, 1998). Examination of naturally occurring discourse between mothers and their 18- to 36-month-old children demonstrates that maternal emotion language plays a role in children using emotion language themselves (Brown & Dunn, 1991; Dunn & Munn, 1985). Very young children, between the ages of 24 and 36 months (Brown & Dunn, 1991), begin to talk about feelings, and emotion-filled talk is associated with transactional conversations with family members about feelings (Brown & Dunn, 1992). Denham and colleagues demonstrated that child-initiated discourse about feelings is not simply a quantitative association with amount of parental emotion language but instead relates to the structure of interaction itself (Denham, Cook, & Zoller, 1992). Children whose mothers ask questions about emotions use more emotion words in their own explanations. This process is transactional, and develops over time. 18-month-old children who hear mothers and older siblings discuss emotions are more likely to talk about emotions when they themselves are 24 months of age (Dunn, Bretherton, & Munn, 1987). Importantly, this bidirectional feeling state talk at 36 months is related to understanding of emotions when children are 6 years old (Dunn, Brown, & Beardsall, 1991).
Parental talk about emotion events is also dependent on the context within which the talk occurs. Synchrony, the mutuality and reciprocity of the mother-child relationship, has been correlated with children’s vocabulary level and mean length of utterance (Skuban, Shaw, Gardner, Supplee, & Nichols, 2006). Higher levels of mother-child synchrony were associated with greater child expressive language development in two-year-old children. Parental affect attunement to child affect is associated with language achievements in the second year, higher child verbal IQ, and child’s use of internal state words (Nicely, Tamis-LeMonda, & Bornstein, 1999; Feldman & Greenbaum, 1997), and synchrony in parent-child emotional expression predicts self-control at two years (Feldman, Greenbaum, & Yirmiya, 1999). Recent research has shown attachment security and maternal depression at age 2 to be predictive of child emotion understanding and mother and child references to emotion at age 3 (Raikes & Thompson, 2006). Interestingly, maternal depression at age 2 had a strong negative relation to child emotion understanding at age 3, but maternal depression at age 3 was not related to understanding at age 3. This underscores the earlier discussed importance of the time period of growing autonomy and negative emotion experiences during the “terrible twos” (Bridges, 1932; Crockenberg, 1985). In addition, this research demonstrated secure dyads to use more emotion conversation within the dyad and emotion conversation to promote emotion understanding. Whereas this work does not look at the role of linguistic complexity in these interactions, it does highlight the need to incorporate aspects of the nature of the parent-child relationship. For this reason, this proposal used global measures of parent sensitivity, a measure shown to contribute to aspects of the child-parent relationship and child emotion regulation (see Cassidy, 1994), to capture the nature of the environment of the parent-child discourse. This thesis hypothesized that connectedness in the
context of sensitive interactions is more likely to facilitate understanding of emotion regulation strategies than those connections in the context of generally insensitive input from the parent.

Although feeling state talk is noteworthy and clearly associated with later outcomes related to emotion, the relation of linguistic ability, which can be associated with toddlers’ ability to make meaning of their experiences in their environment, to later conceptualizations of emotion, emotion regulation, and ability to act on that knowledge remains unexamined. Focusing on linguistic ability as a whole does not negate the importance of emotion words, but the ability to use words to create meaning out of events is potentially an underlying process that could be strongly influential for the understanding of the emotion experience.

**Gender**

The relation between language and emotional experience has many potential moderating factors. The child’s gender has been suggested to influence this relation both in terms of child effects and in terms of parental socialization. In a meta-analysis reviewing the literature on parents’ speech to their children, Leaper, Anderson, and Sanders (1998) found that mothers were more talkative with their daughters than with their sons, suggesting that parents, for reasons still unknown, talk to girls and boys in differing amounts. Between-parent differences have also been found, where mothers were more talkative than fathers when interacting with their children (Leaper et al., 1998).

In addition to differences in amount of linguistic input, differential coaching of emotion is evident in parental speech. Overall, parents and older siblings talk about emotion more to young girls than to young boys (Dunn et al., 1987; Fivush, 1989). Not only do parents use more emotion words with daughters than sons, but they also use a greater variety of emotion words with their 3-year-old daughters than sons (Adams, Kuebli, Boyle, & Fivush, 1995). However,
this finding, when broken down into discrete emotion categories, becomes less one-sided. When mothers speak with their 2 1/2- to 3-year-old toddlers, Fivush (1989) has found that mothers discussed anger more with their sons but discussed sadness more with their daughters. These differing quantities of input could lead to the hypothesis that parents give girls an advantage in verbal ability; however, a more transactional approach would reason that adults and children mutually influence the other’s amount of talking (e.g., Riegel, 1976).

Not only do young girls receive more linguistic input than young boys, but there are also gender differences residing at the level of overall verbal ability. In a meta-analysis of gender effects on verbal ability across the life span, a small effect size (d=0.33) was found favoring females over males in tests that examined verbal production (Hyde & Linn, 1988). This differs for type of speech, in that Leaper and Smith (2004) found in their meta-analysis that while girls were more likely to use affiliative speech, boys were more likely to use assertive speech. Additionally, girls acquire language at an earlier age than boys (Gleason & Ely, 2002).

Research has furthermore shown girls to have an advantage in emotion understanding (Brown & Dunn, 1996). This finding was significant when children were 3 and 6 years of age, suggesting that it is a stable difference over time. Gender differences persist into the literature on high-risk and clinical populations, where prevalence rates of disorders for females and males vary widely. Generally-speaking, girls are more likely to present with internalizing disorders and boys are more likely to present with externalizing disorders (see Mash & Barkley, 2003). The roots for these findings reside in empirical work showing high-risk preschool girls to use overregulated expressions of negative emotions in reaction to a disappointing event, whereas high-risk boys showed more negative emotions (especially anger) than the low-risk populations (Cole, Zahn-Waxler, & Smith, 1994). The question concerning the causal pathway for these
differences remains an open one, and research on the developmental process of understanding emotion regulation strategies could elucidate the biological and sociological influences contributing to later gender differences.

This thesis proposed that gender moderates the relations between linguistic complexity and strategy understanding. The relation between child’s linguistic complexity and parental connectedness to child language may be stronger for girls because not only are girls talking at an earlier age and talking more, but also parents talk more to their daughters than their sons, thus affording more opportunities for connected utterances. The gender differences in emotion understanding discussed above justify the hypothesis that the relation between both child linguistic complexity and strategy understanding and parental connectedness and strategy understanding is stronger for girls than for boys. The advantages of having language and more connectedness at a younger age could give girls more resources with which to facilitate greater understanding of emotion regulation strategies at a later age.

Proposed Study

Using data from the Development of Toddlers Study (D.O.T.S.; Cole, Crnic, Nelson, & Blair, 2000), this thesis explored relations among toddler linguistic skills, parental linguistic input and discourse, and the child’s emergent understanding of emotion regulation strategies by age 36 months. The participants are families who are economically strained, an important sample to study because they are the primary consumers of public assistance community mental health services in rural and semi-rural communities. Moreover, economic status is known to be associated with language development (Hart & Risley, 1995; Hoff-Ginsburg, 1991) and should likely yield large variation in linguistic development.
I examined linguistic complexity growth at 30 months of age as a predictor of child understanding of emotion regulation strategies at 36 months of age. I also examined parental connectedness to child speech at 30 months. Specifically, I proposed that during the period of higher child negative emotion episodes, toddler linguistic skill, mediated by the parental connectedness to child language, would predict children’s early understanding of effective emotion regulation strategies.

I expected that the higher linguistic ability at 30 months would predict more spontaneous generation of effective emotion regulation strategies and aid children in choosing the most effective emotion regulation strategy when given two options. I included child gender as a moderating factor and controlled for child intelligence, which could account for better performance on the emotion regulation strategy task, and for child shyness, a factor that might lead a child to be less verbally expressive. I also included parent sensitivity as a moderating factor, which could impact the parent-child interaction on many levels (see Cassidy, 1994). At 30 and 36 months I used mean length of utterance (MLU) based on natural speech samples from home visits as the main child language measure. Parent connectedness was derived from speech in parent-child discourse from the natural speech samples. To assess emotion regulation strategy understanding, I used children’s responses to a puppet procedure that was administered at the 36-month lab visit to assess their ability to generate potential strategies as well as to recognize the better strategy given a set of options (Cole, Dennis et al., in press).

This data set and thesis are unique in several ways: (1) the sample is economically strained, providing a wide range of language ability at any given age and likely interesting variation in language growth, (2) the literature on emotion understanding has not examined regulatory strategy understanding as much as emotion accuracy, (3) most language development
studies have small sample sizes unlike the 124 child participants in the D.O.T.S. data set, and (4) few studies examine basic linguistic ability, focusing instead on emotion word use.

Given the multi-determined nature of child’s emotional competence (Saarni, 1999), the complex pathways that lead to such a set of skills (Halberstadt, Denham, & Dunsmore, 2001), and the view that such competence reflects integration across domains (Blair, 2002), we take a stepwise approach to model building. The thesis therefore does not address components that are likely additional influences. For example, child temperament could influence strategy understanding from many levels. Effortful control, a dimension of temperament involving the ability to use attention flexibly and to inhibit action, is likely to play a role in language development, as well as the ability to self-regulate emotional responses (e.g., Dixon & Smith, 2000; Fox & Calkins, 2003). A second dimension of temperament, negative emotionality, might also play a role. Children with high negative affectivity will have more emotional experiences, potentially giving them more opportunities to learn about self-regulation of emotion and to communicate about experience, although one could also argue that the children with the highest negative emotionality might have a kind of emotional interference that compromises the integration of language into self-regulation. Similarly, there is a variety of contextual factors that directly influence emotion self-regulation as well as the integration of language and emotional development. In regard to the development of strategy understanding, the target outcome of this project, parental sensitivity or emotional support is a correlate and perhaps a determinant of child strategy understanding (Cole, Dennis, et al., in press). Moreover, the quality of the parent-child relationship is likely related to how sensitively a parent speaks to a child and how readily the child accepts parental input (e.g., Raikes & Thompson, 2006).
Appreciative of the complexity of the pathways to strategy understanding, the proposed thesis focuses on a select group of factors that need to be understood in the interest of model-building. Specifically, the thesis focuses on the mother as the primary agent of socialization, because for children of this age in this demographic context, the children spend most of their time with the mother. In addition, the work focuses on a select group of maternal characteristics, specifically maternal-child discourse, maternal linguistic complexity, and sensitivity. Finally, the work focuses on select child characteristics, specifically, child linguistic complexity and child gender, controlling for child shyness and child intelligence.

The specific predictions tested were as follows:

1. The more skill a toddler has verbalizing as a toddler (30 months of age), the more likely the child will be to have understanding of regulatory strategies at the early age of 36 months. Moreover, it is not concurrent linguistic complexity alone that accounts for strategy understanding at 36 months, but the benefit of being able to communicate verbally with more complex utterances about earlier experiences that contributes to early strategy understanding at 36 months. Therefore, linguistic complexity at 30 months was predicted to account for significant variance in strategy understanding at 36 months.

2. Assuming a relation between child linguistic complexity and strategy understanding, parental language input at 30 months was predicted to mediate the relation. Specifically, a child’s linguistic complexity cannot contribute to strategy understanding without parental support. The nature of that support, as argued in this study, is parental connectedness to child utterances, which provides a verbal scaffold for the understanding of experience. Therefore, the frequency of parental connectedness to child utterances was predicted to
account for the relation between toddler MLU and strategy understanding at 36 months. As a second aim, I planned to test this mediator against another mediator, parental MLU.

3. Gender was hypothesized to moderate the relation between child MLU and parental input and the relation between parental input and strategy understanding. Specifically, relations should be stronger for girls because (a) girls advance linguistically more quickly than boys in early childhood and (b) parents engage in emotion talk with girls more, thereby giving girls and their mothers more opportunities to engage in conversations about child experience, and (c) girls appear to have an advantage in emotion understanding in early childhood.

4. Similar to the moderation of gender, parental sensitivity was expected to moderate the relations between child linguistic complexity and maternal connectedness to child communications and between connectedness and strategy understanding. The relations were hypothesized to be stronger for mothers who are sensitive because sensitivity, attachment security, and synchrony are associated with child language development, parental emotion talk, and child emotion understanding.
Chapter 2. METHOD

The present study uses data from the prospective, longitudinal Development of Toddlers Study (D.O.T.S.; Cole, et al., 2000). Families participating in D.O.T.S. participated in nine visits, including both home and laboratory visits (Home: 18, 30, 36, and 42 months; Laboratory: 18, 24, 36, 48, and 60 months). The proposed thesis focuses on selected measures from the 30-month home visits (naturalistic speech samples) and 36-month laboratory visits (speech samples during laboratory free play periods, the WPPSI-III administration, and the puppet procedure). Only measures relevant to the current study are described in this proposal.

Recruitment Procedures

Families living within a half hour radius of State College, Pennsylvania, were recruited to participate in the Development of Toddlers Study. To be eligible, the family had to meet two inclusion criteria: (1) they had to have a child who would be in the target enrollment age of 18 months at the start of their participation and (2) the household family income had to be above the U.S. government defined poverty threshold but not greater than the national median income for the family’s size. Families that met these criteria were recruited using liaisons in community services (health providers, licensed day care, church groups, letters from birth announcements in the paper, and other community resources). Letters were followed by phone calls inviting the family to participate. Families received periodic project newsletters between visits in addition to receiving small gifts for the children and financial compensation during visits. Compensation was distributed using a “savings incentive” method; the amount of compensation increased over the course of the study with an additional 50% saved for the family and paid after the final session. The total sum paid for 9 visits, extending from child age 18 months through age 5 years, was $540 per family.
Enrollment Procedures

If families expressed interest during recruitment, inclusion and exclusion criteria were assessed during a phone interview. There were no constraints on ethnicity, birth order, number of parents living in a household, or marital status of the target child’s parents. Families were constrained to those in which the target child had been continuously in one parent’s care since 3 months of age and in which the child had no history of developmental or neurobiological impairments. When both parents lived within the child’s household, both were asked to participate. When the child lived with only one parent, the second parent remained involved in the child’s life, and there was no second caregiver residing in the household, the nonresiding parent was asked to participate in the questionnaire procedures only. If the second parent had no involvement with the child, and there was no second caregiver in the household, the data collection was limited to one parent only. Additionally, families did not continue if they planned to move from the area.

During the initial phone interview to determine eligibility, families were asked several questions regarding family and demographic status (family composition, family racial/ethnic status, child daycare history, parental educational level, religious affiliation, parental employment, and salary information). Contact information from two additional individuals who would know how to get in contact with the enrolled family was also collected to enhance probability of continuity in the longitudinal study.

At the conclusion of recruitment, a total of 128 families were enrolled. Of this initial group, three families did not meet financial criteria, and one family withdrew before completing the 18-month visits.
Participants

The study sample includes 124 families with 18-month old children. Table 1 displays the percentage of participants in each demographic category for ethnicity, education, and employment. The sample identified predominantly as White (94% Caucasian, 6.5% mixed race), which is equivalent to the racial distribution the 2000 U.S. Census data for Central Pennsylvania. The mean age of mothers was 30.86 years old (SD = 5.63), and the mean age of fathers was 32.57 years old (SD = 6.20). There were 68 boys and 56 girls in the sample at Time 1 (18 months). In terms of birth order, 43.5% of these children were first-born, 39.5% were second-born, 12.1% were third-born, and 4.8% were the fourth- or later-born.

The mean annual income for mothers was $11,587.06 (SD=11,935.88), and for fathers was $28,576.94 (SD=13,661.56). Including all sources of income, the average household annual income when the child was age 18 months was $40,502.94 (SD=14,480.727). The income-to-needs ratio for the sample, which is an index of household income relative to national norms, was 2.37 (SD = 0.94), indicating that the family was economically strained. A middle income family would have a ratio index of 3.0, and by definition, an income-to-needs ratio of 1.0 indicates the family income is equal to the poverty threshold (see Table 1 for more detail).
Table 1. Percentage and Number of Participants according to Ethnic/Racial Identity, Education, and Employment

<table>
<thead>
<tr>
<th>Ethnic/Racial Identity</th>
<th>Mothers(^a)</th>
<th>Fathers(^b)</th>
<th>Children(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglo</td>
<td>99.2</td>
<td>98.4</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>n=123</td>
<td>n=120</td>
<td>n=124</td>
</tr>
<tr>
<td>Latino</td>
<td>0.8</td>
<td>1.6</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>n=1</td>
<td>n=2</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>97.6</td>
<td>98.4</td>
<td>93.5</td>
</tr>
<tr>
<td></td>
<td>n=121</td>
<td>n=120</td>
<td>n=116</td>
</tr>
<tr>
<td>African American</td>
<td>0.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>n=1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td>0.0</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>n=1</td>
<td></td>
<td>n=8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Some high school</td>
<td>2.4</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=3</td>
<td>n=5</td>
<td></td>
</tr>
<tr>
<td>Completed high school</td>
<td>18.5</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=23</td>
<td>n=39</td>
<td></td>
</tr>
<tr>
<td>Some vocational school</td>
<td>5.6</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=7</td>
<td>n=2</td>
<td></td>
</tr>
<tr>
<td>Completed vocational school</td>
<td>9.7</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=12</td>
<td>n=9</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>21.8</td>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=27</td>
<td>n=29</td>
<td></td>
</tr>
<tr>
<td>Completed college or advanced degree</td>
<td>41.9</td>
<td>30.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=52</td>
<td>n=37</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>0.0</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed/homemaker</td>
<td>29.0</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=36</td>
<td>n=7</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>30.6</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=38</td>
<td>n=2</td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>40.3</td>
<td>91.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=50</td>
<td>n=112</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>0.0</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) n = 124. \(^b\) n = 122. \(^c\) n = 124.

Home Visit Procedure

The proposed study uses data from one of the three home visits (30 months). Home observations were 90-120 minute visits conducted by trained research assistants. The lab coordinator scheduled the visits for a time during which most family members would be present and the child would most likely be alert. Families were encouraged to act normally and research
assistants limited interaction and attempted to be as unobtrusive as possible. Upon arriving at the home, the observer explained the procedure and answered any questions about that day’s visit. Then the observer obtained written consent. The observer graduate assistant observed and coded family behavior for 90 minutes (six 10-minute coding intervals with six 5-minute breaks separating the intervals and at the conclusion of the last interval). Specific socialization of emotion behaviors and interactions were coded during the 10-minute intervals, and global behavior was coded during the 5-minute breaks. Additionally, the trained assistant noted and recorded details of emotional events, which family members were present, which events were associated with both positive and negative emotion, and family member’s reactions to the child’s behavior during emotional events.

Interrater reliability was determined by having two home observers conduct a small number of visits at each age. In previous research, interrater reliability estimates were all in the acceptable to excellent range (94% for identification of events; kappas between .69 and .85). The graduate assistant was wearing an audiocassette recorder to record the speech samples from naturally occurring situations within the home. Speech samples were later used by trained transcribers to produce the narratives used to assess linguistic complexity. At the conclusion of the visit, families were financially compensated and given questionnaires to bring into the upcoming laboratory visit.

Laboratory Visit Procedure

The lab visits during which strategy understanding was assessed were 2 to 3 hours in length. These took place at the Child Study Center at The Pennsylvania State University. The lab visits included assessment of child intellect and language skill using standardized tests, assessment of child emotion regulation using common procedures designed to elicit child
frustration, and a series of non-challenging tasks that were interspersed with the challenging procedures. The non-challenging tasks included activities like mother-child book reading, free play, and snack in order to ensure that children had sufficient time to emotionally recover from previous events. All tasks were videotaped through a one-way mirror. Mothers were financially compensated and children were given an assortment toys and prizes at the conclusion of the visit.

Language from 36 months will be analyzed from speech and discourse occurring during the reading, free-play, and clean up procedures. During the reading task, mothers read to their children from wordless picture books. During free play and clean-up, mothers and their children were provided with a variety of toys to play with for 10 minutes without any further instructions and then asked to clean up when a signal was given to the mother.

Child understanding of effective emotion regulation strategies was assessed using a puppet procedure that was designed to tap the emerging understanding of young children. Puppets have been used effectively in several domains of child understanding although no procedure specifically assessed understanding of effective strategies. In the project, this procedure was implemented during lab visits when the child was 36 months old, 48 months old, and 5 years old. The puppet procedure was designed to optimize children's willingness to engage in pretend play activities with puppets and has yielded evidence of age-related differences and predictive validity inasmuch as children with greater understanding of strategies engage in higher quality self-regulation in a standardized lab task designed to frustrate young children (Cole, Dennis et al., in press).

In this procedure (see Appendix A for the complete script), children watch and listen to three puppets as they enact two different emotional vignettes, one about sadness (their puppy is lost) and one about anger (they argue about a toy). Two research assistants work with the child;
one of the assistants is the puppeteer, enacting the vignettes and the questions and the other aids the child, helping the child remember the instructions and the vignettes and questions. In both vignettes a mother puppet tells the children they must “stop” being so sad or angry. This phrasing was chosen based on evidence that 3- and 4-year-old children grasp the concept of self-regulation if the words “stop feeling” are used (Denham, 1997).

At the end of each enacted vignette, the puppets face the child participant and ask, “What can we do to stop feeling so (angry or sad)?” The research assistant, following the child’s lead, helps the child recall the vignette and why the puppets need to reduce their sadness or anger. The procedure therefore is designed to elicit a child’s spontaneous verbalization to the puppets open-ended question.

After the child has an opportunity to speak spontaneously to the puppets, the puppets state their ideas about how to stop feeling sad or angry. After each pair of choices, the assistant repeats each puppet’s idea and then asks the child, “Which is the best way to stop feeling (angry/sad)?” In each pair, one strategy is purportedly effective (based on the research literature) and the other is not. One pair involves an effective behavioral distraction, one an effective cognitive distraction, and one an effective instrumental problem-solving behavior (for details, see Appendix A).

Research Assistants

Research assistants who conducted procedures in the home and laboratory were trained undergraduate and graduate students. For each type of visit, they received extensive training and once data collection was underway participated in weekly meetings to maintain skill and handle questions that arose. For practical reasons, there was not systematic variation of assistants across ages and procedures. Nonetheless, with the large amount of data collection and the sample size,
it was often the case that the child interacted with different assistants at each visit. The home
visitors were advanced undergraduate and graduate research assistants who received
approximately three months of training, which included instruction, demonstrations, use of
videotapes from the other studies, and practicing live observations. All observers were unaware
of the study aims.

Measures

*Mother and child linguistic complexity.* Linguistic complexity was assessed using
spontaneous sampling procedures (e.g., Miller, 1981), which captured unconstrained speech
during natural interactions between parent and child in the home or during the unstructured free
play in the laboratory. The index of linguistic complexity derived from transcriptions of this
natural speech was the Mean Length of Utterance (MLU). The MLU is a measure of syntactic
complexity, first introduced by Brown (1973), and is computed as the average number of
morphemes in a child’s utterances. Morphemes include each word in the sentence (including
repetitions), as well as affixes or grammatical inflections such as *un-* , *-s* , *-ed*. Each morpheme
represents linguistic knowledge, and thus children with similar number of morphemes per
utterance are thought to have language at the same level of complexity or maturity (Gleason,
2005). MLU begins to lose value as an index of language development at about the time children
begin preschool and thus is not be used as an index of complexity after 36 months of age.

In the project on which this thesis is based, speech samples were transcribed from home
visits when the child was 30 months of age and in the lab when the child was 36 months.
Previous research has shown MLU to be reliable across home and laboratory settings at 24
months (Bornstein, Haynes, Painter, & Genevro, 2000). Moreover, for the sample being used in
this study, MLU is reliable across settings, as evidenced by a significant relation between the 30
month home visit and 36 month lab visit, suggesting that MLU is related across setting and time for these ages, \( r(99) = .52, p < .001 \).

The transcribers used the CLAN system for transcribing in order to use a computerized computation of MLU. At 30 months of age, the home visit involved 4 10-minute epochs of speech. All speech in the home was transcribed. The transcribers were given a set order of the epochs in order to capture epochs with the most emotion and the least emotion. They transcribed those epochs and then continued through epochs until they reached 50 utterances. For the laboratory visit (36 months), mother and child speech was transcribed from the reading, free play, and clean-up observations. A graduate student trained in CLAN supervised transcription and checked 100% of the narratives for accuracy.

The mean length of utterance for each mother and each child was calculated using CHAT, a language analysis software package (MacWhinney, 2000).

**Child Emotion Regulation Strategy Understanding.** Two measures were derived from the puppet procedure. Children’s responses to the puppets’ open-ended questions about stopping sadness or anger yielded a measure of effective strategy generation. Children’s responses to the puppets’ choices yielded a measure of effective strategy recognition.

**Strategy generation.** Children’s responses to the open-ended questions were transcribed by undergraduate assistants into a Microsoft Word file while viewing the videotape of the procedure. These responses were coded by a team of graduate and undergraduate assistants (including the author). Coding involved a series of decisions:

1. Did the child produce a discrete response to the puppets’ question? Yes or no.
2. If yes, was the response a strategy? Yes or no.
3. If yes, was the strategy novel for this vignette? In other words, was this the first time the child had suggested this particular strategy to help the puppets stop feeling sad or angry?

If the answer to the above questions were all yes, the following variables were coded: how many strategies were produced, number of effective strategies, use of problem-focused or other-focused strategies, use of behavioral, mentalistic, or support-seeking strategies, the social appropriateness of each strategy, effectiveness of each strategy, elaboration of each strategy, flexibility in type of strategy, and overall child social appropriateness and engagement during the story.

Effective strategies are those that would purportedly reduce feelings of sadness or anger. Effective strategies garnered from the emotion regulation and coping literature include (but are not limited to): distracting oneself by thinking differently or by doing something pleasant, trying to solve a problem if it is solvable, asking an adult for help, and engaging in socially skillful effort to work with others. One method of classifying types of strategies is using the focus of the strategy. Problem-focused strategies are those that are aimed at thinking about, attempting to fix, or gaining assistance with the reported problem, while other-focused strategies are aimed at an activity or thought that does not involve the problem (e.g., going somewhere else to play or to think about something nice). An alternate way of distinguishing strategies is to classify the method of carrying out the strategy. Behavioral strategies involve an action (e.g., getting another toy, looking for the lost puppy, smiling, playing outside); mentalistic strategies involve thinking or feeling internally (e.g., thinking about something nice, thinking about how your angry friend might not understand the situation); and support-seeking strategies involve getting another person’s assistance (e.g., telling Mom you’re mad, going to Dad to feel better). Children who
generate more than two or more different types of strategies will be classified as flexible, whereas children who generate multiple strategies that do not differ (e.g., in order to not feel so sad, eating some pizza or eating some ice cream) will be classified as perseverant. Please see the complete coding manual for a more detailed description of the coding system (Appendix B). For the purposes of this study, number of effective strategies was used as the dependent variable.

In addition to training coders to a 90% standard of accuracy against a master coder for all codes, the coders also met weekly during coding to maintain skill and address questions. A reliability estimate was based on 20% of the cases that were double-coded. Transcriptions to be double-coded cases were randomly selected, with the exception of insuring there were an even number of each gender and age. Coders were unaware of which cases were double-coded and of other coders’ work. Cohen’s κ was calculated for the following codes: strategy/not a strategy, focus, social appropriateness, and effectiveness, and ranged from .74 to 1.0.

*Strategy recognition.* Children’s choices based on the puppets’ forced choice pairs yielded three responses per vignette. These responses were recorded at the time of administration. The total number of effective strategies selected was the variable used to assess strategy recognition at age 36 months. Children can recognize 0 to 6 of the purportedly effective strategies, limiting the range of their scores from 0 to 6.

*Child Temperament.* For these analyses, children’s social fearfulness is considered to control for child shyness during the puppet task. Child temperament was assessed annually using the age-appropriate versions of temperament questionnaires completed by the primary caregiver: the Toddler Behavior Questionnaire (TBAQ-R; Goldsmith, 1996). The TBAQ-R is an 105-item questionnaire assessing temperament-related behavior. The primary caregiver rates how often she has observed her child engage in certain behaviors, rating the frequency on a 7-point scale
(ranging from never to always). The TBAQ-R yields 14 subscales: activity level, anger, attentional focusing, attentional shifting, high pleasure, impulsivity, inhibitory control, low pleasures, perceptual sensitivity, pleasure, positive anticipation, sadness, social fearfulness, and soothability. Internal consistency reliability estimates (alphas) for the three factors range from .77 to .81. Only social fearfulness will be used in these analyses.

Child Intellectual Status: Children’s concurrent intellectual status was included as a control. Child IQ was assessed at 36 months during the laboratory visit using the Wechsler Preschool and Primary Scale of Intelligence-III (WPPSI-III; Wechsler, 2002). The WPPSI-III is composed of 14 subtests, of which four were conducted at the laboratory visit: Block Design, Information, Receptive Vocabulary, and Object Assembly. Block Design (timed reconstruction of a design using blocks) and Object Assembly (timed arrangement of pieces of a puzzle to form a meaningful whole) comprise the Performance IQ. Information (response to verbal questions about general knowledge) and Receptive Vocabulary (identification of spoken vocabulary word from four pictures) comprise the Verbal IQ. For the purposes of this proposal, the four subtests of the WPPSI-III were included in the regression model separately. This decision was made because of the reliably distinct nature of the four subtests (Wechsler, 2002), and is supported by findings presented at the International Conference on Infant Studies (Pemberton & Cole, 2008) that suggest the subtests from the Verbal IQ, but not the Performance IQ, are associated with emotion regulation strategy recognition and generation.

Parent Measures

Maternal Mean Length of Utterance. Maternal MLU will be analyzed in the same manner as child MLU (see description of Child Mean Length of Utterance). It is not used as an index of
maternal linguistic ability but instead as a measure of the complexity of speech mothers are using in the presence of their children.

Maternal Connectedness. Using the transcriptions acquired during the 30 month home visits (see description of Child Mean Length of Utterance), the discourse between mother and child was analyzed. Discourse was coded to quantify the quality (frequency and type) of speech parents and children direct towards one another (see Appendix C). This coding scheme was adapted from Brown, Donelan-McCall, and Dunn (1996) and Ensor & Hughes (2008). The conversation turns (each maternal reply to a child utterance and each child reply to an adult utterance) were exported from CHAT to Excel files for ease of coding and summation purposes. Only conversation between parents and the target child were coded. Coders listened to the audio MP3s of the home visits while coding to increase accuracy and knowledge of context. A conversation turn was defined as the utterance of one speaker bounded by another speaker’s utterances, or by a significant silence. The following categories were distinguished: 1) connected (the speaker’s utterance was semantically related to the other speaker’s previous turn), 2) initiation (the speaker initiated a new topic that was unrelated to the previous utterance and was successful in eliciting a semantically related response from the other speaker), 3) failed (the speaker directed an utterance to the other speaker but did not elicit a semantically related response), 4) conflict (the speaker’s utterance included prohibition, threat, or insult), and 5) unclear (the coder was unable to hear or understand the utterance, or was unable to sufficiently determine whom the speaker was addressing). A trumping system was used such that turns that could be categorized as either conflict or connected were always coded as connected. A 6th code was created, Starting, that was is a sum of initiations and failed turns, indicating the frequency with which a speaker attempted to begin a conversation. Connected utterances were the variable
of interest in this thesis because of previous work demonstrating that connectedness predicts understanding of other’s minds and emotions (Brophy & Dunn, 1996; Ensor & Hughes, 2008). Discourse variables were summed across two 10 minute epochs. Coders met weekly during coding to maintain skill and address questions and were trained against a master coder for all codes to a 90% standard of accuracy for connected, initiation, failed, and conflict codes. A reliability estimate was based on 20% of the cases that were double-coded. Coders were unaware of which cases were double-coded and of other coders’ work. Cohen’s κ was 0.82 for connected, initiation, failed, and conflict codes.

Maternal Sensitivity. Sensitivity ratings will be derived from the global ratings that the observer made during the home visit of the dyadic interactions between target child and mother. The ratings were a 1-5 scale rating the degree to which the parent was attuned to the child and manifested awareness of the child’s needs, moods, interests, and capabilities, and allowed the awareness to guide the interaction with the child. Ratings were conceptualized as falling on a continuum of low to high levels of sensitivity; insensitivity is not necessarily on the same continuum and is captured in other coding systems in the project. In order to reduce variables for the analyses, a mean sensitivity score will be created for each mother representing the average ratings across all six epochs. Coders were trained in regular meetings and used a manual to support their work. To estimate inter-rater reliability, 20% of the cases were double-coded to insure reliability; coders, who were unaware of which cases were double coded, achieved an inter-rater agreement on exact matches of 70% and for agreement within 1 scale point, 97%.
Chapter 3. RESULTS

Overview of data analyses

Prior to conducting the main analyses, several preliminary steps were taken. First, the distributions and inter-correlations of all study variables were examined for their appropriateness in the analyses. Next, hierarchical multiple regressions (SPSS 16.0) were conducted to test the main study hypotheses involving strategy recognition. Given the skewed distribution of the strategy generation variable, logistic regressions were substituted for models testing this aspect of regulatory strategy understanding. Post-hoc regression analyses were used to evaluate trimmed models that might yield more parsimonious accounts of variance in ER strategy understanding.

Descriptive statistics

The grand means, standard deviations, and ranges for each of the study variables are presented in Table 2. Although maternal connectedness was the focal discourse variable, Table 2 includes the raw frequencies of other discourse codes for comparison and context.
Table 2. Means, Standard Deviations, Actual Ranges, and Possible Ranges for Main Variables

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Possible Range</th>
<th>Actual Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>30 Month Home Visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>3.87</td>
<td>0.74</td>
<td>1 - ∞</td>
<td>2.52-6.32</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>2.99</td>
<td>0.81</td>
<td>1 – 5</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Initiatory Turns</td>
<td>12.00</td>
<td>7.71</td>
<td>0 - ∞</td>
<td>1-30</td>
</tr>
<tr>
<td>Connected Turns</td>
<td>35.36</td>
<td>23.73</td>
<td>0 - ∞</td>
<td>0-117</td>
</tr>
<tr>
<td>Failed Turns</td>
<td>26.81</td>
<td>18.94</td>
<td>0 - ∞</td>
<td>0-101</td>
</tr>
<tr>
<td>Conflictual Turns</td>
<td>2.23</td>
<td>3.83</td>
<td>0 - ∞</td>
<td>0-16</td>
</tr>
<tr>
<td>Starting Turns</td>
<td>38.81</td>
<td>24.04</td>
<td>0 - ∞</td>
<td>2-123</td>
</tr>
<tr>
<td>Total Child-Directed Turns</td>
<td>76.40</td>
<td>43.81</td>
<td>0 - ∞</td>
<td>6-207</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>1.85</td>
<td>0.47</td>
<td>1 - ∞</td>
<td>1.02-3.29</td>
</tr>
<tr>
<td>Fearfulness</td>
<td>3.61</td>
<td>0.99</td>
<td>1 – 7</td>
<td>1.38–5.90</td>
</tr>
<tr>
<td>Initiatory Turns</td>
<td>16.22</td>
<td>9.65</td>
<td>0 - ∞</td>
<td>0-45</td>
</tr>
<tr>
<td>Connected Turns</td>
<td>44.48</td>
<td>29.04</td>
<td>0 - ∞</td>
<td>1-160</td>
</tr>
<tr>
<td>Failed Turns</td>
<td>16.20</td>
<td>11.38</td>
<td>0 - ∞</td>
<td>0-53</td>
</tr>
<tr>
<td>Conflictual Turns</td>
<td>0.16</td>
<td>0.75</td>
<td>0 - ∞</td>
<td>0-6</td>
</tr>
<tr>
<td>Starting Turns</td>
<td>32.42</td>
<td>18.64</td>
<td>0 - ∞</td>
<td>2-93</td>
</tr>
<tr>
<td>Total Parent-Directed Turns</td>
<td>77.07</td>
<td>42.44</td>
<td>0 - ∞</td>
<td>5-224</td>
</tr>
<tr>
<td><strong>36 month Lab Visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>4.15</td>
<td>0.79</td>
<td>1 - ∞</td>
<td>1.96-6.70</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>2.39</td>
<td>0.55</td>
<td>1 - ∞</td>
<td>1.20-3.78</td>
</tr>
<tr>
<td>WPPSI-III Information*</td>
<td>10.29</td>
<td>2.69</td>
<td>1-20</td>
<td>3-16</td>
</tr>
<tr>
<td>WPPSI-III Vocabulary*</td>
<td>11.34</td>
<td>3.26</td>
<td>1-20</td>
<td>1-19</td>
</tr>
<tr>
<td>WPPSI-III Block Design*</td>
<td>8.90</td>
<td>3.39</td>
<td>1-20</td>
<td>1-19</td>
</tr>
<tr>
<td>WPPSI-III Object Assembly*</td>
<td>9.69</td>
<td>3.29</td>
<td>1-20</td>
<td>1-19</td>
</tr>
<tr>
<td>Child Strategy Recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>1.79</td>
<td>0.87</td>
<td>0 – 3</td>
<td>0 – 3</td>
</tr>
<tr>
<td>Anger</td>
<td>1.66</td>
<td>0.99</td>
<td>0 – 3</td>
<td>0 – 3</td>
</tr>
<tr>
<td>Child Strategy Generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>0.39</td>
<td>0.94</td>
<td>0 – 8</td>
<td>0 – 7</td>
</tr>
<tr>
<td>Anger</td>
<td>0.36</td>
<td>0.81</td>
<td>0 – 8</td>
<td>0 – 5</td>
</tr>
</tbody>
</table>

N=99 (51 males, 48 females); *WPPSI-III Scaled Scores presented
**MLU.** Child MLU increased from 30 to 36 months, \(t(98) = 10.68, p < .001\). Maternal MLU also increased, though by a smaller amount, between these same ages, \(t(98) = 2.96, p < .005\), a change that most likely reflects the fact that mothers make longer utterances as their children’s grammatical complexity develops. The average child and mother MLU at each age are presented in Table 2.

**Discourse.** As noted, discourse was coded from two 10 minute epochs from the audio record of the home visit. Discourse coding focused on instances when the mother and the child connected (continued) conversations that remained on the partner’s topic. Table 2 shows the mean, standard deviation, and range for each type of conversation turn described in the method section and Appendix C. Mothers started and connected conversations with relatively equal frequency (Starting Turns \(M = 38.81\), Connected Turns \(M = 35.36\), \(t(98) = 1.61, ns\)). Children, however, started conversations less frequently than they connected conversations (Starting \(M = 32.42\), Connected \(M = 44.48\), \(t(98) = 4.96, p < .0001\)).

When mothers started a conversation, children were more likely to fail to respond than to connect to the mother’s conversation topic. Therefore, by this coding system, mothers’ topics ‘failed’ to elicit a continued conversation more often than they ‘initiated’ a continued topic, \(t(98) = 9.17, p < .0001\) (see method or Appendix C for coding details). Maternal connectedness, i.e., the frequency with which mothers linked their utterances to their children’s topics, is the key predictor variable in the present study.

**Emotion regulation strategy understanding.** As described in the method section, the puppet procedure provided two different measures of strategy understanding. The findings are presented first for strategy recognition and then for strategy generation.
Strategy Recognition. In terms of strategy recognition, almost all children (95.96%) correctly identified at least one effective strategy. However, given the procedure provided three pairs of choices for each story, a score of 1.5 for a story could reflect a chance level of accuracy. For the sad story, children recognized an average of 1.79 of three possible effective strategies, which is significantly greater than chance, $t(98) = 3.30, p < .001$. For the angry story, children recognized slightly less, an average of 1.66 strategies, which does not differ from chance, $t(98) = 1.64, ns$ (see Table 2). It should be noted that the angry and sad story recognition means did not differ, $t(98) = 1.28, ns$, and the recognition scores for sad and angry stories were correlated, $r(99) = .46, p < .0001$ (see Table 3).
Table 3. Correlations for Main Variables

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 month Home</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. MLU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sensitivity</td>
<td>.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Connectedness</td>
<td>.11</td>
<td>.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Gender</td>
<td>.14</td>
<td>.23</td>
<td>.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. MLU</td>
<td>.32</td>
<td>.22</td>
<td>.22</td>
<td>.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Fearfulness</td>
<td>.08</td>
<td>-.04</td>
<td>-.23</td>
<td>.19</td>
<td>-.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 month Lab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. MLU</td>
<td>-.05</td>
<td>.05</td>
<td>.08</td>
<td>-.05</td>
<td>.07</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. MLU</td>
<td>.14</td>
<td>.17</td>
<td>.12</td>
<td>.11</td>
<td>.52</td>
<td>-.24</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. WPPSI-III Information*</td>
<td>.23</td>
<td>.12</td>
<td>.07</td>
<td>.11</td>
<td>.40</td>
<td>-.07</td>
<td>.13</td>
<td>.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. WPPSI-III Rec. Vocab.*</td>
<td>.14</td>
<td>.18</td>
<td>.11</td>
<td>-.06</td>
<td>.27</td>
<td>-.06</td>
<td>.13</td>
<td>.10</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. WPPSI-III Block Design*</td>
<td>-.10</td>
<td>.05</td>
<td>-.19</td>
<td>.14</td>
<td>.30</td>
<td>-.09</td>
<td>-.07</td>
<td>.18</td>
<td>.36</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. WPPSI-III Obj. Assem.*</td>
<td>.02</td>
<td>-.05</td>
<td>-.11</td>
<td>.03</td>
<td>.14</td>
<td>-.01</td>
<td>.03</td>
<td>.10</td>
<td>.33</td>
<td>.29</td>
<td>.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Recognition Sad</td>
<td>-.01</td>
<td>.08</td>
<td>.03</td>
<td>-.14</td>
<td>.13</td>
<td>.04</td>
<td>.12</td>
<td>.08</td>
<td>.31</td>
<td>.16</td>
<td>.13</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Recognition Anger</td>
<td>-.07</td>
<td>.15</td>
<td>.06</td>
<td>-.21</td>
<td>.06</td>
<td>-.02</td>
<td>-.02</td>
<td>-.12</td>
<td>.28</td>
<td>.35</td>
<td>.13</td>
<td>.17</td>
<td>.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Generation Sad*</td>
<td>-.16</td>
<td>.02</td>
<td>.05</td>
<td>-.14</td>
<td>-.03</td>
<td>-.08</td>
<td>-.01</td>
<td>.05</td>
<td>.23</td>
<td>.10</td>
<td>.10</td>
<td>.06</td>
<td>.11</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>16. Generation Anger*</td>
<td>.04</td>
<td>.11</td>
<td>-.08</td>
<td>-.15</td>
<td>-.02</td>
<td>-.08</td>
<td>-.09</td>
<td>.06</td>
<td>.34</td>
<td>.22</td>
<td>.11</td>
<td>.21</td>
<td>.09</td>
<td>.14</td>
<td>.50</td>
</tr>
</tbody>
</table>

**Bold** = significant at $p < .05$ (one-tailed)
N=99 (51 males, 48 females)
*WPPSI-III scaled scores presented
*Based on variables that were logarithmically transformed
**Strategy Generation.** Given the children’s young age (just turning three years of age) and their limited language skills, strategy recognition was expected to be easier than strategy generation, which required not only producing but verbalizing an effective strategy. Indeed, at 36 months of age, only 35.35% (N=35) of children generated an effective strategy, causing a skewed distribution that even transformations could not improve (given the high number of 0 scores). Therefore, strategy generation was examined categorically, i.e., comparing children who generated at least one effective strategy to those who produced none. When examined categorically, strategy generation is related across the two stories, \( \chi^2(1, N = 99) = 27.87, p < .0001 \), indicating that children who generated a credible effective strategy for one story were likely to do so for the other story.

Finally, although recognition scores and generation scores were each correlated across emotion stories, there was no evidence of consistency across measures within a given story (i.e. for a specific emotion). Children who generated a strategy for sadness were not more likely to recognize strategies for sadness, \( F(4, 94) = .67, ns \). Neither were children who generated a strategy for anger more likely to recognize strategies for anger, \( F(4, 94) = .57, ns \).

**Correlations between predictors, moderators, and control variables**

The planned models investigated three predictors of strategy understanding: child linguistic complexity (MLU), child ability to verbally communicate acquired knowledge (WPPSI-III Information subtest), and maternal discourse connectedness. Gender and maternal sensitivity at child age 30 months were examined as predicted moderators. Child social fearfulness at 30 months of age was included as a control variable in case shyness inhibited performance. Before constructing the regressions, the zero-order correlations of all of these
variables and the outcome variables were examined (see Table 3) to check collinearity. For gender, t-tests were conducted (see Table 4).

Table 4. Means, Standard Deviations, and T-tests of Gender differences

<table>
<thead>
<tr>
<th></th>
<th>Girls</th>
<th></th>
<th>Boys</th>
<th></th>
<th>t</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>30 Month Home Visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>3.97</td>
<td>0.76</td>
<td>3.77</td>
<td>0.71</td>
<td>-1.41</td>
<td>ns</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>3.18</td>
<td>0.78</td>
<td>2.81</td>
<td>0.81</td>
<td>-2.30</td>
<td>.05</td>
</tr>
<tr>
<td>Connected Turns</td>
<td>40.38</td>
<td>26.82</td>
<td>30.65</td>
<td>19.50</td>
<td>-2.07</td>
<td>.05</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>1.96</td>
<td>0.52</td>
<td>1.74</td>
<td>0.39</td>
<td>-2.37</td>
<td>.05</td>
</tr>
<tr>
<td>Fearfulness</td>
<td>3.81</td>
<td>0.95</td>
<td>3.43</td>
<td>1.00</td>
<td>-1.92</td>
<td>.10</td>
</tr>
<tr>
<td><strong>36 month Lab Visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLU</td>
<td>4.11</td>
<td>0.67</td>
<td>4.19</td>
<td>0.89</td>
<td>0.53</td>
<td>ns</td>
</tr>
<tr>
<td>WPPSI Information*</td>
<td>2.45</td>
<td>0.58</td>
<td>2.33</td>
<td>0.53</td>
<td>-1.10</td>
<td>ns</td>
</tr>
<tr>
<td>WPPSI Vocabulary*</td>
<td>11.58</td>
<td>2.40</td>
<td>10.02</td>
<td>2.94</td>
<td>-1.04</td>
<td>ns</td>
</tr>
<tr>
<td>WPPSI Block Design*</td>
<td>9.38</td>
<td>3.03</td>
<td>8.45</td>
<td>3.66</td>
<td>-1.36</td>
<td>ns</td>
</tr>
<tr>
<td>WPPSI Object Assembly*</td>
<td>9.71</td>
<td>3.45</td>
<td>9.45</td>
<td>3.15</td>
<td>-0.39</td>
<td>ns</td>
</tr>
<tr>
<td>Child Strategy Recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>1.66</td>
<td>0.95</td>
<td>1.91</td>
<td>0.77</td>
<td>1.41</td>
<td>ns</td>
</tr>
<tr>
<td>Anger</td>
<td>1.45</td>
<td>1.07</td>
<td>1.86</td>
<td>0.86</td>
<td>2.11</td>
<td>.05</td>
</tr>
<tr>
<td>Child Strategy Generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>0.26</td>
<td>0.64</td>
<td>0.51</td>
<td>1.15</td>
<td>1.36</td>
<td>ns</td>
</tr>
<tr>
<td>Anger</td>
<td>0.26</td>
<td>0.78</td>
<td>0.45</td>
<td>0.82</td>
<td>1.21</td>
<td>ns</td>
</tr>
</tbody>
</table>

N=99 (51 males, 48 females)

**Bold** = significant at p < .05 (one-tailed)

*WPPSI-III Scaled Scores presented First, social fearfulness was related to several variables.

Girls were rated as more fearful but children with higher MLU (at both 30 and 36 months), and children whose mothers engaged in more discourse connectedness (at both 30 and
36 months) were less fearful. Second, maternal sensitivity was associated with more maternal connectedness and higher maternal MLU at 30 months, as well as with higher child MLU at both 30 and 36 months (see Table 3). Finally, there were additional gender related findings. Girls recognized fewer strategies for anger and had higher MLU scores (at 30 but not 36 months) than boys, and girls’ mothers were more sensitive and made more connected turns than boys’ mothers (see Table 4 for means and standard deviations by gender).

The zero-order correlations were also examined to determine if the conditions for testing the mediation hypothesis were met. This hypothesis proposed that maternal connectedness mediates the relation between child linguistic complexity at 30 months and child emotion regulation strategy understanding at 36 months. The first required step for mediation (Baron & Kenny, 1986) was not met. Specifically, child MLU at 30 months was not correlated with any index of strategy understanding. Consequently, mediation could not be tested. As seen in Table 3, the WPPSI-III Information score was related to all ER strategy indices, and could be considered as an alternative child verbal ability predictor. However, maternal connectedness was not significantly related to any aspect of emotion regulation strategy understanding, such that the indirect path in the mediation could not be tested.

Prediction of child strategy recognition

The degree to which child and mother factors accounted for child strategy recognition at 36 months was tested using hierarchical linear regression. As a full model would include more predictors than could be tolerated with an N of 99, the zero-order correlations were examined to determine whether certain variables could be eliminated. As shown in Table 3, strategy recognition was not related to several planned moderator and control variables: child concurrent
(36 month) MLU, child social fearfulness, mother MLU (at 30 and 36 months), and maternal sensitivity. All were therefore excluded from analyses.

The resulting hierarchical regressions for each emotion (sadness and anger) were constructed in the following manner. On the first step, the standard scores of the four WPPSI-III subtests were entered to control for concurrent intellectual functioning. The second step included child factors expected to influence strategy recognition, child gender and child MLU at 30 months. Although maternal connectedness could not be examined as a mediator, its influence on strategy recognition was examined as a main effect on the third step. Finally, the fourth step included four interactions: 1) child MLU at 30 months with maternal connectedness, 2) child MLU at 30 months with child gender, 3) maternal connectedness with child gender, and 4) the three-way interaction of child gender, child MLU at 30 months and maternal connectedness.

Sadness Recognition. As shown in Table 5, Step 1 of the model (concurrent WPPSI-III subtest scores) was significant, $R = .33$, Adj. $R^2 = .07$, $F(4, 94) = 2.91$, $p < .05$. Of the four indices of intellectual functioning, only the Information subtest was a significant predictor, $\beta = .36$, $p < .001$. Through all four steps, it continued to account for significant variance although, contrary to prediction, none of the subsequent steps were significant (all $\Delta R^2$s = .04, $ns$). It was noted, however, that in each additional step, child gender had a significant $\beta$ (ranging from -.21 to -.25, all $p$’s < .05). The results indicate that child gender and WPPSI-III Information score are significant predictors of recognition of strategies for regulating sadness at age 36 months.
Table 5. Regression Coefficients for Models Predicting Sadness Strategy Recognition

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (WPPSI)</td>
<td>Information</td>
<td>0.12</td>
<td>0.04</td>
<td>0.36</td>
<td>2.82</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.05</td>
<td>-0.40</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Block Design</td>
<td>0.02</td>
<td>0.03</td>
<td>0.06</td>
<td>0.54</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Object Assembly</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.12</td>
<td>-1.11</td>
<td>ns</td>
</tr>
<tr>
<td>Step 2</td>
<td>Information</td>
<td>0.13</td>
<td>0.04</td>
<td>0.39</td>
<td>2.92</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.10</td>
<td>-0.78</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Block Design</td>
<td>0.02</td>
<td>0.03</td>
<td>0.08</td>
<td>0.75</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Object Assembly</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.12</td>
<td>-1.13</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-0.35</td>
<td>0.18</td>
<td>-0.21</td>
<td>-2.03</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Child MLU at 30 months</td>
<td>0.08</td>
<td>0.20</td>
<td>0.04</td>
<td>0.38</td>
<td>ns</td>
</tr>
<tr>
<td>Step 3</td>
<td>Information</td>
<td>0.13</td>
<td>0.04</td>
<td>0.39</td>
<td>2.93</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>-0.03</td>
<td>0.04</td>
<td>-0.11</td>
<td>-0.87</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Block Design</td>
<td>0.03</td>
<td>0.03</td>
<td>0.10</td>
<td>0.88</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Object Assembly</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.12</td>
<td>-1.08</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-0.38</td>
<td>0.18</td>
<td>-0.22</td>
<td>-2.10</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Child MLU at 30 months</td>
<td>0.05</td>
<td>0.21</td>
<td>0.03</td>
<td>0.25</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Maternal Connectedness</td>
<td>0.00</td>
<td>0.00</td>
<td>0.06</td>
<td>0.56</td>
<td>ns</td>
</tr>
<tr>
<td>Step 4</td>
<td>Information</td>
<td>0.15</td>
<td>0.05</td>
<td>0.47</td>
<td>3.30</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>-0.03</td>
<td>0.04</td>
<td>-0.13</td>
<td>-0.96</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Block Design</td>
<td>0.03</td>
<td>0.03</td>
<td>0.10</td>
<td>0.82</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Object Assembly</td>
<td>-0.04</td>
<td>0.03</td>
<td>-0.13</td>
<td>-1.20</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>-0.43</td>
<td>0.19</td>
<td>-0.25</td>
<td>-2.29</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Child MLU at 30 months</td>
<td>-2.00</td>
<td>0.32</td>
<td>-0.11</td>
<td>-0.63</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Maternal Connectedness</td>
<td>0.00</td>
<td>0.01</td>
<td>0.11</td>
<td>0.46</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MLU by Connectedness</td>
<td>0.02</td>
<td>0.02</td>
<td>0.26</td>
<td>0.89</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MLU by Gender</td>
<td>0.40</td>
<td>0.40</td>
<td>0.17</td>
<td>0.99</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Connectedness by Gender</td>
<td>-0.00</td>
<td>0.01</td>
<td>-0.08</td>
<td>-0.35</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Connectedness by MLU by Gender</td>
<td>-0.01</td>
<td>0.02</td>
<td>-0.09</td>
<td>-0.32</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. **Bold** = p < .05

Step 2 was not significantly improved from step 1, ΔR² = .04, R² = .39, Adj. R² = .09, F(6, 92) = 2.06, ns.
Anger Recognition. As seen in Table 6, Step 1 was also significant for anger recognition, $R = .36$, Adj. $R^2 = .10$, $F(4, 94) = 3.60$, $p < .01$. In this case, however, a different IQ subtest predicted recognition. The Receptive Vocabulary subtest was the only significant predictor of the four WPPSI-III subtests, $\beta = .29$, $p < .05$. In addition, the unique variance predicted by child factors in Step 2 approached but did not reach significance, $\Delta R^2 = .04$, $R = .42$, Adj. $R^2 = .12$, $F(6, 92) = 2.40$, $p < .10$, attributed to the addition of child gender, $\beta = -.21$, $p < .05$. Contrary to prediction, child MLU did not account for significant variance in anger recognition, $\beta = -.02$, $ns$. Also contrary to prediction, no unique variance was explained by the final two steps, Step 3 $\Delta R^2 = .01$, $ns$; Step 4 $\Delta R^2 = .07$, $ns$. In sum, for anger strategy recognition, child gender and WPPSI-III Receptive Vocabulary scores are significant predictors, and child gender remained significant for all steps in the model. Note also a nonsignificant trend for the interaction of child MLU and child gender.
Table 6. Regression Coefficients for Models Predicting Anger Strategy Recognition

<table>
<thead>
<tr>
<th>Step</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step1 (WPPSI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.04</td>
<td>0.05</td>
<td>0.10</td>
<td>0.77</td>
<td>ns</td>
</tr>
<tr>
<td>Vocabulary</td>
<td><strong>0.87</strong></td>
<td><strong>0.04</strong></td>
<td><strong>0.29</strong></td>
<td><strong>2.28</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Block Design</td>
<td>-0.01</td>
<td>0.03</td>
<td>-0.03</td>
<td>-0.27</td>
<td>ns</td>
</tr>
<tr>
<td>Object Assembly</td>
<td>-0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.46</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Step2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.05</td>
<td>0.05</td>
<td>0.15</td>
<td>1.13</td>
<td>ns</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>0.07</td>
<td>0.04</td>
<td>0.24</td>
<td>1.87</td>
<td>.10</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.00</td>
<td>0.03</td>
<td>0.01</td>
<td>0.08</td>
<td>ns</td>
</tr>
<tr>
<td>Object Assembly</td>
<td>0.01</td>
<td>0.03</td>
<td>0.04</td>
<td>0.41</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td><strong>-0.41</strong></td>
<td><strong>0.20</strong></td>
<td><strong>-0.21</strong></td>
<td><strong>-2.10</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Child MLU at 30 months</td>
<td>-0.05</td>
<td>0.22</td>
<td>-0.02</td>
<td>-0.02</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Step3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.06</td>
<td>0.05</td>
<td>0.15</td>
<td>1.16</td>
<td>ns</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>0.06</td>
<td>0.04</td>
<td>0.21</td>
<td>1.64</td>
<td>ns</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.01</td>
<td>0.03</td>
<td>0.04</td>
<td>0.35</td>
<td>ns</td>
</tr>
<tr>
<td>Object Assembly</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.49</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td><strong>-0.45</strong></td>
<td><strong>0.20</strong></td>
<td><strong>-0.23</strong></td>
<td><strong>-2.25</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Child MLU at 30 months</td>
<td>-0.09</td>
<td>0.23</td>
<td>-0.04</td>
<td>-0.40</td>
<td>ns</td>
</tr>
<tr>
<td>Maternal Connectedness</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.91</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Step4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.07</td>
<td>0.05</td>
<td>0.19</td>
<td>1.40</td>
<td>ns</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>0.07</td>
<td>0.04</td>
<td>0.24</td>
<td>1.89</td>
<td>ns</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.01</td>
<td>0.03</td>
<td>0.04</td>
<td>0.38</td>
<td>ns</td>
</tr>
<tr>
<td>Object Assembly</td>
<td>0.01</td>
<td>0.03</td>
<td>0.03</td>
<td>0.29</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td><strong>-0.55</strong></td>
<td><strong>0.21</strong></td>
<td><strong>-0.28</strong></td>
<td><strong>-2.67</strong></td>
<td><strong>.01</strong></td>
</tr>
<tr>
<td>Child MLU at 30 months</td>
<td>0.34</td>
<td>0.35</td>
<td>0.16</td>
<td>0.95</td>
<td>ns</td>
</tr>
<tr>
<td>Maternal Connectedness</td>
<td>0.01</td>
<td>0.01</td>
<td>0.12</td>
<td>0.50</td>
<td>ns</td>
</tr>
<tr>
<td>MLU by Connectedness</td>
<td>0.02</td>
<td>0.02</td>
<td>0.25</td>
<td>0.86</td>
<td>ns</td>
</tr>
<tr>
<td>MLU by Gender</td>
<td>-0.78</td>
<td>0.44</td>
<td>-0.29</td>
<td>-1.76</td>
<td>.10</td>
</tr>
<tr>
<td>Connectedness by Gender</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>0.53</td>
<td>ns</td>
</tr>
<tr>
<td>Connectedness by MLU by Gender</td>
<td>-0.00</td>
<td>0.02</td>
<td>-0.02</td>
<td>-0.08</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Note.** Bold = p < .05
Step 2 significantly improved the model, \( \Delta R^2 = .04 \), \( R = .42 \), Adj. \( R^2 = .12 \), (6, 92) = 2.40, \( p < .10 \).
Prediction of child strategy generation

As mentioned, at age 36 months, nearly 65% of children did not produce a strategy across both the sad and angry stories. Therefore, generation data were combined for the sad and angry stories and then examined categorically, i.e. contrasting children who verbally produced at least one credible strategy in at least one story with those who did not produce a strategy in either story. As noted previously, strategy generation for anger was significantly related to strategy generation for sadness. Hierarchical logistic regression, a method that predicts probability of group membership from continuous variables, was used to test child verbal skills and mother-child discourse as predictors. The cutpoint for group membership was set at 0.35, the observed probability of being in the group that generates at least one strategy. Cutpoints do not determine goodness-of-fit, but instead anchor the dichotomized prediction and classification table.

For the combined story strategy generation, the first step was not significant, $\chi^2(4, N = 99) = 4.58$, ns. Child factors (gender, 30 mo MLU) entered on the second step approached, but did not reach, significance, $\chi^2(6, N = 99) = 10.85$, $p < .10$. Steps 3 and 4 were not significant. Strategy generation was significantly predicted by individual predictors although no step achieved significance. WPPSI-III Information had a significant standardized regression coefficient in Steps 2 through 4, child gender approached significance in Step 2 and was significant in Step 3, and Receptive Vocabulary approached significance in Steps 2 through 4 (see Table 7). The second step of the model, which approached significance, correctly classified 60.9% of those who failed to generate a strategy and 68.6% of those who produced a strategy. Finally, there was a significant interaction of child MLU and child gender on Step 4, although that step was not overall significant.
Table 7. Coefficients for Models Predicting Strategy Generation (vignettes combined)

<table>
<thead>
<tr>
<th>Step 1</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>0.22</td>
<td>0.11</td>
<td>3.79</td>
<td>.10</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>-0.12</td>
<td>0.09</td>
<td>1.84</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Block Design</td>
<td>0.04</td>
<td>0.07</td>
<td>0.29</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>-0.05</td>
<td>0.08</td>
<td>0.37</td>
<td><em>ns</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td><strong>0.30</strong></td>
<td><strong>0.12</strong></td>
<td><strong>6.13</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>-0.16</td>
<td>0.09</td>
<td>2.99</td>
<td>.10</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.08</td>
<td>0.08</td>
<td>1.06</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>-0.06</td>
<td>0.08</td>
<td>0.61</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.91</td>
<td>0.48</td>
<td>3.68</td>
<td>.10</td>
</tr>
<tr>
<td>Child MLU at 30 mo.</td>
<td>-0.63</td>
<td>0.56</td>
<td>1.25</td>
<td><em>ns</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td><strong>0.30</strong></td>
<td><strong>0.12</strong></td>
<td><strong>6.26</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>-0.17</td>
<td>0.10</td>
<td>3.35</td>
<td>.10</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.10</td>
<td>0.08</td>
<td>1.45</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>-0.06</td>
<td>0.08</td>
<td>0.53</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td><strong>-1.00</strong></td>
<td><strong>0.50</strong></td>
<td><strong>4.07</strong></td>
<td><strong>.05</strong></td>
</tr>
<tr>
<td>Child MLU at 30 mo.</td>
<td>-0.71</td>
<td>0.58</td>
<td>1.50</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Maternal Connectedness</td>
<td>0.01</td>
<td>0.01</td>
<td>0.52</td>
<td><em>ns</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td><strong>0.35</strong></td>
<td><strong>0.13</strong></td>
<td><strong>6.98</strong></td>
<td><strong>.01</strong></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>-0.19</td>
<td>0.10</td>
<td>3.79</td>
<td>.10</td>
</tr>
<tr>
<td>Block Design</td>
<td>0.10</td>
<td>0.08</td>
<td>1.27</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>-0.06</td>
<td>0.08</td>
<td>0.57</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Gender</td>
<td>-1.05</td>
<td>0.55</td>
<td>3.69</td>
<td>.10</td>
</tr>
<tr>
<td>Child MLU at 30 mo.</td>
<td>-1.33</td>
<td>0.94</td>
<td>1.99</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Maternal Connectedness</td>
<td>0.01</td>
<td>0.03</td>
<td>0.11</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>MLU by Connectedness</td>
<td>0.03</td>
<td>0.05</td>
<td>0.29</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>MLU by Gender</strong></td>
<td><strong>1.00</strong></td>
<td><strong>1.15</strong></td>
<td><strong>0.76</strong></td>
<td><strong>.005</strong></td>
</tr>
<tr>
<td>Connectedness by Gender</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>Connectedness by MLU by Gender</td>
<td>-0.03</td>
<td>0.06</td>
<td>0.20</td>
<td><em>ns</em></td>
</tr>
</tbody>
</table>

Note. **Bold** = p < .05

No steps were significant.

Post hoc Analyses

Verbal subtests of the WPPSI-III consistently predicted child strategy understanding.

Because these were not hypothesized to be predictors, none of the interactions between these
indices of verbal ability and other predictors had been tested. Due to their roles in predicting strategy understanding, follow-up analyses were conducted to examine the two WPPSI-III verbal subtests (Information and Receptive Vocabulary), gender, and the interaction of each subtest with gender. The choice of which verbal subtest to include was based on the findings from the main analyses.

The follow-up model for predicting sadness recognition included the Information score on the first step, gender on the second step, and the interaction between the two predictors on the third step. This trimmed model was significant for the first step. The additional variance accounted for by gender approached but did not reach significance, $\Delta R^2 = .03, p < .10$. The interaction of Information and Gender on the third step was not significant, $\Delta R^2 = .02, p < .15$ (see Table 8).

The follow-up model for predicting anger recognition included the Receptive Vocabulary score on the first step, gender on the second step, and the interaction between the two on the third step. This trimmed model was significant for the first step. In addition, child gender contributed significant unique variance on the second step, $\Delta R^2 = .04, R = .40, Adj. R^2 = .14, F(2, 96) = 4.06, p < .05$. The interaction on the third step was not significant, $\Delta R^2 = .00, ns$ (see Table 8).
Table 8. Post-Hoc Follow-Ups of Recognition Regression Models

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sadness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.10</td>
<td>0.03</td>
<td>0.31</td>
<td>3.21</td>
<td>.005</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.31</td>
<td>0.17</td>
<td>-0.18</td>
<td>-1.84</td>
<td>.10</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>0.11</td>
<td>0.03</td>
<td>0.33</td>
<td>3.43</td>
<td>.001</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.31</td>
<td>0.17</td>
<td>-0.18</td>
<td>-1.90</td>
<td>.10</td>
</tr>
<tr>
<td>Information by Gender</td>
<td>0.10</td>
<td>0.06</td>
<td>0.19</td>
<td>1.54</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Anger</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>0.11</td>
<td>0.03</td>
<td>0.35</td>
<td>3.71</td>
<td>.0001</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.37</td>
<td>0.18</td>
<td>-0.19</td>
<td>-2.02</td>
<td>.05</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>0.10</td>
<td>0.04</td>
<td>0.32</td>
<td>2.68</td>
<td>.0001</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.37</td>
<td>0.19</td>
<td>-0.19</td>
<td>-2.00</td>
<td>.05</td>
</tr>
<tr>
<td>Receptive Vocabulary by Gender</td>
<td>0.02</td>
<td>0.06</td>
<td>0.04</td>
<td>0.30</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. **Bold** = p < .05
Sadness: Step 2 marginally improved the model, $\Delta R^2 = .03$, $R = .36$, Adj. $R^2 = .11$, $F(2, 96) = 3.38$, $p < .10$
Anger: Step 2 significantly improved the model, $\Delta R^2 = .04$, $R = .40$, Adj. $R^2 = .14$, $F(2, 96) = 4.06$, $p < .05$.

For strategy generation, post hoc analyses used the categorical variable based on the combined strategy generation for both stories and the cutpoint for the logistic regression was set at .35. The model for predicting strategy generation included the Information and Receptive Vocabulary scores on the first step, gender on the second step, and the interaction between each WPPSI-III subtest and gender on the third step. The trimmed model was not significant for the first step, $\chi^2(2, N = 99) = 4.05$, ns. Child gender contributed significantly on the second step, $\chi^2(3, N = 99) = 8.57$, $p < .05$. Finally, the third step was also significant, $\chi^2(5, N = 99) = 13.20$, $p$
< .05 (see Table 9). The interaction of Information and gender was significant, Wald = 3.84, p < .05, whereas the Receptive Vocabulary and gender interaction approached but did not reach significance, Wald = 2.79, p < .10. Specifically, whereas only 46.9% of the children who failed to generate a strategy were correctly classified, 77.1% of those who verbalized an effective strategy were correctly classified.

Table 9. Post-Hoc Follow-Ups of Generation Regression Model

<table>
<thead>
<tr>
<th>Step</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>0.21</td>
<td>0.11</td>
<td>3.81</td>
</tr>
<tr>
<td></td>
<td>Receptive Vocabulary</td>
<td>-0.11</td>
<td>0.09</td>
<td>1.81</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td><strong>0.26</strong></td>
<td><strong>0.11</strong></td>
<td><strong>5.21</strong></td>
</tr>
<tr>
<td></td>
<td>Receptive Vocabulary</td>
<td>-0.15</td>
<td>0.09</td>
<td>2.81</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td><strong>-0.96</strong></td>
<td><strong>0.46</strong></td>
<td><strong>4.31</strong></td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>0.10</td>
<td>0.13</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>Receptive Vocabulary</td>
<td>-0.04</td>
<td>0.11</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td><strong>-1.30</strong></td>
<td><strong>0.54</strong></td>
<td><strong>5.74</strong></td>
</tr>
<tr>
<td></td>
<td>Information by Gender</td>
<td><strong>0.54</strong></td>
<td><strong>0.28</strong></td>
<td><strong>3.84</strong></td>
</tr>
<tr>
<td></td>
<td>Receptive Vocabulary by Gender</td>
<td>-0.35</td>
<td>0.21</td>
<td>2.79</td>
</tr>
</tbody>
</table>

**Bold** = significant at p < .05
The third step contributed significantly, $\chi^2(5, N = 99) = 13.20, p < .05$

The significant Information by Gender interaction for strategy generation yielded an unexpected finding. Girls with lower Information scores were more likely to generate an effective strategy than girls with higher Information scores, whereas Information subtest performance did not affect the likelihood that a boy would generate a strategy (see Figure 2).
Figure 2. Information by gender interaction for strategy generation of both stories combined. When split into high/low scores, the Information subtest was predictive of girls’ strategy generation, but not boys’.
Chapter 4. DISCUSSION

The present findings provide support for the hypothesis that a child’s verbal skill contributes to strategy understanding, although not in the manner expected. Individual differences in both the ability to demonstrate understanding of word meanings and to verbally communicate knowledge of general information predicted very young children’s strategy understanding whereas linguistic complexity did not. Because tests that rely less on verbal processing, i.e., performance processing subtests, did not predict strategy understanding, it appeared that verbal skill is an important factor. Yet, specific verbal skills related differently to each type of strategy understanding and for each emotion. In addition, child gender, a factor that related to children’s early linguistic complexity and maternal discourse connectedness, contributed to children’s strategy understanding. Again, the findings were unexpected; boys showed better strategy understanding than girls. Finally, contrary to predictions, maternal discourse did not appear to account for individual differences in children’s strategy understanding. Taken together, the results offer new perspectives on the role of language in children’s early emotion understanding and challenge the thinking that led to the hypotheses of the present study. Although language has been associated with other types of emotion understanding (e.g., emotion recognition, theory of mind), this is the first study to show concurrent relations between any aspect of verbal skill and a child’s understanding of strategies purported to be effective for regulating anger and sadness.

Derived from the idea that language skills help children understand their experiences (Cole, Armstrong, et al., in press), linguistic complexity (as indexed by MLU) was predicted to facilitate the development of strategy understanding. What remains unclear is which aspects of child linguistic ability contribute to the development of emotion understanding, and how child
verbal ability comes to influence emotion regulation. The present study is a first step at
addressing these questions. Although preschool-age children’s linguistic complexity (MLU)
predicted their ability to verbally generate strategies for regulating anger in one study (Cole,
Dennis et al., in press), the relation was not found in the present study of 36-month-olds. The
present study focused on children right at their third birthday and not the entire age range
between ages 3 to 5 years. This may explain why the 36-month-olds’ average scores for both
strategy recognition and generation were lower than those of Cole, Dennis et al.’s study, in
which strategy understanding scores were related to concurrent age and language. Perhaps, at the
third birthday, emotion regulation strategy understanding requires more skills than linguistic
complexity. Language ability however did relate to strategy understanding. Although initially
regarded as a control factor, aspects of verbal intellectual functioning, and notably not nonverbal
aspects, predicted strategy understanding. The relations, however, were complex. Both
Information and Receptive Vocabulary were predictive of aspects of children’s concurrent
emotion regulation strategy understanding. Each of these is considered next.

*Verbal Skills and their Relations to Emotion Regulation Strategy Understanding*

Linguistic complexity at 30 months of age was predicted to contribute to strategy
understanding at 36 months of age, after intellectual functioning was considered. Instead, two
indices of a child’s concurrent verbal ability related, in different ways, to children’s strategy
understanding. That is, the findings supported the view that verbal skills contribute to strategy
understanding. The findings could reflect the influence of concurrent verbal ability on
performance or on children’s strategy understanding.

The Receptive Vocabulary subtest of the WPPSI-III measures the size of a child’s
vocabulary by having children show, rather than verbalize, the picture that matches a word
(Wechsler, 2002). In the present study, this aspect of verbal ability predicted one index of strategy understanding, recognition, and only for one emotion, anger. Children with larger vocabularies may have understood the puppet task instructions better. It is also possible, and does not exclude the previous hypothesis, that children with better receptive language are better able to learn from discourse and their ability to understand family conversations about emotional events may therefore prompt earlier understanding of regulatory strategies. Research has not examined receptive language skills and their relation to regulatory strategy understanding, but concurrent relations have been reported linking receptive vocabulary, measured by different tests, to children’s false belief and emotion understanding (e.g., Cutting & Dunn, 1999) and to children’s later emotion understanding and academic competence (de Rosnay & Harris, 2002; Izard, Fine, Schultz, Mostow, Ackerman, & Youngstrom, 2001). In one study, receptive vocabulary predicted 27% of the variance in child emotion understanding from 4 to 11 years (Pons, Lawson, Harris, & de Rosnay, 2003). These longitudinal findings support the hypothesis that early advantages in receptive language contribute to the development of emotion understanding generally, including perhaps emotion regulation strategy understanding.

In contrast to Receptive Vocabulary, the WPPSI-III Information subtest predicted strategy generation for anger and sadness, and predicted strategy recognition, but only for sadness. This test is intended to assess a child’s general knowledge (Wechsler, 2002). Although the first few items only require receptive language skill (children point to items given prompts such as “Show me your nose. Touch it.”), most of the items require the child to verbalize a response (e.g., “What do people use to keep dry in the rain?”). The scoring reflects not only the accuracy of the child’s response but also the verbal complexity. Therefore, Information and the puppet task used to assess strategy generation both require a child to understand the verbal
instructions and to demonstrate knowledge verbally. That is, the ability to express knowledge verbally should enhance test performance in each procedure. However, if task demands were the sole explanation for the present finding, the ability to verbally communicate knowledge should predict strategy recognition and generation for both emotions and for boys or girls with greater verbal ability. Another explanation could be that the ability to use verbal skills to convey knowledge, over time, allows children to learn about emotional experiences through interaction with caregivers, to organize memories coherently, and to use their verbal skills to express appropriate responses about similar emotional experiences later. Indeed, infant gestures and toddler talk stimulate parental mental state language and this dyadic process appears to contribute to children’s later use of mental state terms (Taumoepeau & Ruffman, personal communication, August 20, 2008).

The present study had predicted that children’s linguistic complexity, as indexed by MLU, would predict child strategy understanding, but this prediction was not supported. One explanation may be that the complex verbal task used to assess strategy understanding, although designed to reduce verbal and attentional demands on children, may require more sophisticated verbal ability than that of being able to link two to four words together in spontaneous speech. Interestingly, although the difference in relations was not significant, children’s linguistic complexity at 30 months was slightly more associated with Receptive Vocabulary at 36 months \( (r=.40) \) than Information \( (r=.27) \). Given that the Information subtest calls on a broader array of skills than Receptive Vocabulary, this may suggest that the Information subtest may measure factors untapped by measures of MLU. This could partially explain the lack of relation with linguistic complexity and the predictive power of Information for strategy understanding. The abilities to recognize words and verbally convey knowledge significantly contribute to the
understanding of strategies for regulating emotion; however, these relations were emotion-specific.

The models for sad and angry strategy recognition differed in intriguing ways. Generally, the literature on emotion regulation and emotional development appreciates that expressing or coping with one emotion does not necessarily translate to other emotions (Buss & Goldsmith, 1998; Zeman & Shipman, 1996); however, it was not expected that specific aspects of verbal skills would predict strategy understanding differently based on the emotion that was the focus of the story. There are both methodological and developmental reasons that might explain this unexpected finding.

One reason that verbal expression of knowledge predicted sadness but not anger strategy recognition may be that children and their parents react differently to child sadness than to child anger. Younger children (5 years) appear to distance themselves from sad emotions more than older children (7 years), but their willingness to endorse anger is not affected by age during this age period (Glasberg & Aboud, 1982). Children also report hiding sadness more often than anger (Zeman & Shipman, 1997). Perhaps sadness is a more uncomfortable emotion and as such, among young children, there may be a tendency to attend to its reduction. Second, parents do not respond to all child emotions the same way. They talk more about negative than positive emotional events (Lagattuta & Wellman, 2002) and use more punitive responses to child anger and more comforting or minimizing with sadness (Eisenberg, Fabes, Shepard, Guthrie, Murphy, & Reiser, 1999; Zeman & Shipman, 1996). Thus both child and parent may be more concerned about and more ready to reduce sadness. Their sensitivity to child sadness may lead to scripted emotion knowledge, which develops near 3 years of age (Lewis, 1989), and this may help children generate information about sadness and its regulation.
A third possibility is that the sad and angry vignettes produce different motivational states for a young child. The angry vignette describes an argument about sharing a toy, a common experience for most children by the third birthday. Very young children may be more focused on how to keep the toy than how to reduce anger, which may account for why 36-month-olds did not perform above chance on this measure. The sad vignette describes a lost puppy, an experience that probes for strategies for feeling better about the lost puppy, without the challenge of contradictory motivations. Therefore, the sad story may have been inadvertently easier than the angry story for the children. For children aged three through almost five years, however, the anger story was easier than the sad story (Cole, Dennis et al., in press).

Overall, the recognition of strategies for sadness and anger were predicted by different aspects of verbal skills, which could be due to how children and parents treat those emotions in early childhood and what verbal skills would be most important for understanding each emotional experience. Strategy generation was examined with both stories combined, but when broken down by story, a parallel pattern of verbal skills did not emerge. This is likely due to the difficult nature of the task and the high proportion of children who did not produce one strategy. The emotion-specificity of each verbal skill will be better tested by examining generation in an age group of children who produce more strategies. The only other study using this procedure only measured MLU, which did predict strategy understanding, in children who were, as a group, older than the children in the present study (Cole, Dennis et al. in press).

Child Gender and Emotion Regulation Strategy Understanding

Strategy recognition and generation were also influenced by child gender, but not in the direction usually shown in the literature, that is, favoring girls (e.g., Brown & Dunn, 1996; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991). In this study, boys recognized more strategies
for regulating both sadness and anger and there was a trend toward boys being more likely to
generate an effective strategy for one or both emotions. This unexpected finding may be due to
age and task differences with other studies or it may be due to the particular demographic
characteristics of the children’s families.

In most studies of young children’s emotion understanding, three-year-olds range from 3
years 0 months to 3 years 11 months. For instance, in Brown and Dunn’s (1996) study, children
were 40 months of age. In the present study, however, children were at their third birthday, 36
months. Therefore, the findings and the lack of findings must be considered in relation to the fact
that the children were young in comparison to many studies of emotion cognition. In addition,
most other studies assess emotion recognition, not recognition of effective regulatory strategies.
Moreover, they typically ask children to simply label emotions, whereas in the present study
children are provided with labels of the emotion and are then asked to think about ways to
regulate that emotion. The one other study employing the same procedures as the current study
found no gender differences for 3- to 5- year-olds (Cole, Dennis et al., in press). Future work
must examine this type of knowledge at multiple ages and with boys and girls to fully understand
the role of gender and language in accounting for strategy understanding.

The demographic characteristics of the children’s families might also provide a context
for the unexpected gender difference. The participants comprise a group that is relatively
understudied in the literature: rural, economically-strained families (Income to Needs Ratio =
2.37, SD = 0.94). The socialization literature supports the important role of context, particularly
economic status, in determining how parenting may differ between daughters and sons (e.g.,
Eccles & Hoffman, 1984; McHale, Crouter, & Whiteman, 2003). For instance, mothers from
families of lower socioeconomic status (SES) were more likely to believe that infants and
toddler had sex-typed characteristics (Brooks-Gunn, 1986). Socialization practices involving sex-typed beliefs could be common in more traditional, rural, and low-income families. Notably, in another project with our sample, mothers used a higher percentage of internal state language with boys than girls (Armstrong & Cole, unpublished master’s thesis), although most studies find that mothers use ISL more with girls than boys (e.g., Adams et al., 1995; Dunn et al., 1987; Leaper et al., 1998). An interesting hypothesis that we will pursue is whether the child gender difference associated with maternal ISL might explain the boys’ precocious understanding of regulatory strategies at 36 months of age. This explanation however does not extend to the interactions found in post hoc analyses.

Post hoc analyses of the interaction of verbal skills and child gender revealed that the ability to verbalize general knowledge at age 36 months predicted strategy generation for girls but not for boys. Generally, the literature reports that girls have greater verbal ability than boys (e.g., Hyde & Linn, 1988). The present study also found that girls’ spontaneous speech in their homes reflected more linguistic complexity than boys’ did at both 30 and 36 months. An advantage in language at earlier ages could afford girls more opportunities for using that language. This advantage is theoretically the most important in early toddlerhood, characterized by a peak of negative episodes followed by a decline of negative during the time of accelerated language development (Bridges, 1932). As mentioned earlier, the linguistic complexity of toddlers who are only 30 months old may be insufficient to capture the skills needed to understand regulatory strategies and may not fully index the range of child skills (such as receptive vocabulary and the ability to verbally communicate knowledge) that, at this age, are necessary to demonstrate regulatory strategy understanding. The idea that different child communicative skills are scaffolded by parents at different ages in ways that predict later
emotion understanding has received some support (Taumoepeau & Ruffman, 2006; 2008; personal communication, August 20, 2008). Future work should examine in detail these processes and how they may differ for boys and girls and for different types of families.

Second, as discussed in the Introduction, the literature has repeatedly shown parents and older siblings talk about emotion more to young girls than to young boys (Dunn et al., 1987, Fivush, 1989), and that parents talk more, are more supportive, and use more and a greater variety of emotion words with their 3-year-old daughters than sons (Adams et al., 1995; Leaper et al., 1998). These differences were also found in the current study, where mothers were more sensitive and made more connected turns with their daughters than did mothers of boys. A mother who connects to her child’s attempts to verbally convey knowledge and who is sensitive to her child’s needs may influence how that verbal skill contributes to later measures of emotion understanding. Moreover, girls were more socially fearful than boys, and maternal input may be more influential for those children who would be unlikely to verbally express their knowledge in novel situations such as the puppet task in this study.

Maternal Discourse

Contrary to prediction, maternal discourse connectedness assessed at child age 30 months failed to explain individual differences in children’s strategy understanding at 36 months. The possible explanations may include a lack of direct link between general discourse and a specific outcome like emotion regulatory strategy understanding, or a methodological issue, namely the timing of the assessments.

Because connectedness and strategy understanding were assessed using standard measures that have shown other concurrent and predictive effects (Cole, Dennis et al., in press; Brophy & Dunn, 1996; Ensor & Hughes, 2008), the failure is probably not due to measurement
problems. However, the timing of assessment may be a methodological issue that explains why the study failed to find relations. The logic of the prediction was that the transactional interaction between parent and child regarding emotional experiences depends to an important degree on a child’s ability to communicate verbally. That is, parents scaffold child social understanding as children provide evidence of emerging skills, such as linguistic complexity. Parents use more internal state language with infants who are attentive (Garrett-Peters et al., 2008), with toddlers who gesture (Taumoepeau & Ruffman, personal communication, August 20, 2008), and children who talk (Armstrong & Cole, unpublished master’s thesis; Taumoepeau & Ruffman, 2008).

For example, more linguistically advanced children (32 months) initiate a greater proportion of conversation topics and elicit more connected utterances from their mothers than less verbally advanced children (26 months; Hoff-Ginsberg, 1987). However, other research finds that once children’s expressive language development is clearly underway, around 30 months of age, parents respond to children less frequently, which may indicate that parents start waiting for children to express themselves and can do so without the adult verbal support that they need at earlier ages (e.g., 18 months; Hart & Risley, 1999). While these two studies seem contradictory, the integrated results may suggest that skills to hold extended conversation increase at 30 months, but the frequency of parental responsiveness to every child initiation decreases. For the less linguistically advanced children, who need greater verbal support to make sense of their experience, connected utterances could be more crucial and lay foundations for the development of emotion understanding. In some ways, this foundation of connectedness is reminiscent of literature on affect attunement in infancy, where parental affect attunement and emotional synchrony predict a multitude of later cognitive and emotional outcomes (Nicely et al., 1999; Feldman et al., 1999). Parental connectedness to a very young child’s speech, a type of
language synchrony, may similarly predict children’s future abilities to make sense of experience and emotional events.

The integration of language and emotional development is likely to take place over a long period of childhood, such that it may also be important to study the hypothesized processes throughout the preschool-age years, especially in this sample of lower income children. As described earlier, the literature clearly shows that income is associated with early language development; lower income is associated with less child-directed parental speech and smaller child vocabularies (Hart & Risley, 1995; Hoff-Ginsberg; 1998). In this study, child linguistic complexity at age 30 months was related to household income, \( r(99) = .25, p < .01 \), and maternal education level, \( r(99) = .24, p < .01 \). If income affects language development, then our sample at 30 months of age may reflect an earlier stage of language development than most samples, suggesting connectedness at later ages may be important as well.

Conceivably, the choice of measurement timing for connectedness should not depend on child age, but rather on child language status. The literature supports a multitude of ways parental language input can be measured and relate to socio-emotional outcomes (e.g., Ensor & Hughes, 2008; Laible, 2004; Taumoepeau & Ruffman, 2006; 2008), and ways maternal awareness of their children’s minds can influence children’s later understanding of others (Meins, Fernyhough, Wainwright, Clark-Carter, Gupta, Fradley et al., 2003). The current data suggest evidence of parental adaptation to child language status, where maternal connectedness is related to child linguistic complexity, and parental linguistic complexity increases with child age. These associations could mean that parents are either explicitly or implicitly aware of their children’s language and cognitive advances and adapt their language input appropriately. Children’s own language status, regardless of child age, might serve as a better basis for
understanding the relative importance of maternal connectedness to later emotion regulation strategy understanding. Although child language status and maternal connectedness did not interact in this sample, it will be further investigated using a wider range of child age for language measures, as well as older ages for emotion regulation strategy understanding.

Limitations and Future Directions

As described in the previous section, there are a myriad of directions the research on language’s contributions to later emotion regulation strategy understanding could progress. Analyses of additional age points for child language status and mother language input, and the relations between those ages, are crucial for understanding the nature of connectedness. The strategy understanding task was difficult for children of this early age, particularly the generation of strategies, where only 35.35% of children produced an effective strategy. Emotion regulation strategy understanding will be examined as an outcome at 48 months and 5 years as well. Given the high number of predictors in the current model, and the increasing number of predictors as age ranges are expanded, it will be necessary to use multi-level modeling to account for missing data and repeated measures. The number of subjects, which was lower due to missing data, in proportion to the number of predictors in the current study was a limitation. A better test of the model would use a larger sample.

Fathers are conspicuously missing from the proposed model. This is not because they are thought to be unimportant, but rather because fathers were not present at the lab visit in the current study. However, fathers were present for the home visits in D.O.T.S., and their connectedness can be analyzed and included in future projects that do not include parent measures during lab visits. An understanding of the conjoint and separate influences of mothers and fathers will better capture the child’s environment as a whole.
The context of the language samples in the current study is relatively unique. Participants were neither in the lab, nor asked to constrain their activity during home visits. While the uniqueness of this model does always not allow for direct comparison to the literature, it does lend a fresh perspective to the reality of everyday life and may capture a more typical sample of both child and parent language. Comparison of parent and child language between home and lab language samples may inform the study of connectedness and the contexts in which child and parent language is important to ER strategy understanding.

This thesis proposed to study the relative contributions of child language and maternal connectedness to emerging child emotion regulation strategy understanding. Child linguistic complexity and maternal connectedness were not predictive in the model. However, children’s concurrent receptive vocabulary and verbal ability to express knowledge did contribute to concurrent strategy understanding beyond nonverbal measures, suggesting the importance of language in understanding the most effective ways to manage emotions.
References


Appendix A

Puppet Procedure Script

The goal of this procedure is to engage 3-, 4-, and 5-year olds in a dialogue with 2 puppets in order to assess the child’s understanding and awareness that emotions can be regulated. After each vignette, the child is queried, first in an open-ended fashion (to assess spontaneous understanding of regulatory strategies), and then in a forced-choice fashion (to assess recognition of effective strategies).

Two RAs administer the puppet show. One is the puppeteer and the other helps out with one more puppet and also helps the child understand the procedure. The MRA sits across from the child and enacts the vignettes in an engaging way, using 2 child puppets (Red & Brownie) and the SRA uses 1 adult puppet (Mom) to enact vignettes (see following pages). The SRA sits beside the child and aids the child in understanding and responding to the puppets. The SRA can cue the MRA to repeat part of the script (e.g., “Hmm. Do you understand? Maybe s/he will say that again so we can understand it”) and can aid in encouraging the child to respond (e.g., “S/he needs our help. Let’s tell him/her something to help her...”). The MRA should move close to the SRA so that s/he doesn’t block videotaping of the child. For the same reason, the puppets should not be held very high above the kiddie table. To convey emotion, the MRA and SRA use standard elements of specific emotions and speak slowly and clearly so a young child can follow the dialogue. They must listen carefully to the child’s utterances, repeating what the child says and adjusting the script to make sure the child understands. The SRA writes down the child’s answers on the Puppet Answer Sheet.

Before the first vignette, the child is introduced to each puppet character:

**Introduce the puppet with long red ears:**
MRA: This is Red. Red is a little boy/girl like you! Can you say his/her name, Red?

**Introduce the puppet with short brown ears:** This is Brownie. Brownie is Red’s sister/brother. Can you say his/her name, Brownie?

SRA: **Introduce the pink puppet.** “This is Red and Brownie’s mother. What do you call your mother? Oh, you call your mother [child’s word]. Well Red and Brownie call their mother “Mom.”

MRA: OK, so this is Red, and this is Brownie,

SRA: and this is Mom.

MRA: Good. You understand everything. Now first Red and Brownie are going to tell us a story. Let’s listen!
Sad Vignette

Red & Brownie are sitting right next to each other, heads down.

Red (sniffing, very sad voice): “Oh, Brownie, our puppy ran away. I am so sad.”

Brownie (voice is small and low and sad, head way down): “I love our puppy.” (Softly crying) “Maybe puppy will never come back.”

Red & Brownie (more sniffing, crying voice, calling off to the side): “Puppy, puppy, please come back!” (Sadly, to child): “Puppy won’t ever come back, [child’s name].”

Red lies down on the table. Brownie is right near Red.

Mom (sees children crying): “Now, now children. Stop crying. It’s time to go outside. I won’t take you outside until you stop feeling so sad.” (Mom exits).

Red sits up but still sad and slumping.
Brownie (whimpering and sniffing, turns to child subject): “What can we do? Please [child’s name], how can we stop feeling so sad?”

OPEN-ENDED QUERIES for Sad Vignette
SRA: “Let’s see, Red & Brownie need your help, [child’s name]. They must stop feeling so sad about their puppy or they can’t go outside. [Child’s name] what’s the best way to stop feeling so sad?”

Pause to give child time to reply. If the child gives a reply, then say:

SRA: “Oh, they could [repeat child’s idea regardless of whether it is good or not]”, then say to the child, “Do you have any other ideas?”

Repeat this until the child is finished with ideas. If the child has no ideas, or when the child is finished with ideas, then say:

FORCED CHOICE QUERIES for Sad Vignette
SRA: “Well, Brownie and Red do you have any ideas?”

MRA: Remember for all the pairs numbered 1, have the puppet place a bubble card showing that mental component to the child.

MRA 1. Brownie: “I should think about something nice I can do tomorrow.”
Red: “I should think about our lost puppy all day.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to stop feeling so sad,”
POINT TO BUBBLE CARDS & REPEAT CHOICES, “remember they want to STOP feeling so sad.”
SRA writes down the child’s response, removes the cards, and then says: “OK, that’s good. Red & Brownie, do you have any other ideas?”

MRA 2. Brownie (sitting down): “I should sit down and cry.” Red (going to toys): “I should go play with my toys.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to STOP feeling so sad? Should they sit down and cry or should they go play with their toys?”

SRA repeats child’s answer, writes down the child’s response and then says: “OK, that’s good. Red & Brownie, do you have any other ideas?”

MRA 3. Brownie (looking off the table): “I should go look for puppy.” Red (putting head down so puppet can’t see): “I should stop looking for puppy.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to STOP feeling so sad? Should they go look for their puppy or should they stop looking for their puppy?”

SRA repeats child’s answer, writes down the child’s response and then says: “OK, [child’s name], that was great. Red & Brownie, can you tell us another story?”

Angry Vignette (props: small toys)

Red & Brownie are happy & content, playing with some toys. Each is playing by him/herself but sitting next to the other. They both reach for the same toy.

Red (looks over at Brownie, speaks with emphatic irritation): I need that toy, Brownie. (Pulls the toy).

Brownie (angrily protesting): HEY, no-oo! I need that toy!

Red (very angry, yells): I NEED IT! (To child subject): [Child’s name], Brownie won’t give it to me!

Brownie (also very angry, loud, jumping up): NOOO!! I NEED IT! (They struggle with the toy, then Brownie says to child subject in a sullen voice): [Child’s name], Red won’t give it to me!!!!!

Red & Brownie (both very angry, loud, jumping up, approaches as if to hit Red): It’s mine!!!!!!!

Brownie (To child): I’m telling Mom. MOOOOM!!
Mom (enters, very angry): You two STOP being so angry! If you do not STOP being angry, I’m taking all the toys away! (Mom marches off.)

Red & Brownie (so angry, both turning to child subject): We are SO angry. Please [child’s name], what can we do to STOP feeling so angry?

OPEN-ENDED QUERIES for Angry Vignette
SRA: “Let’s see, Red & Brownie need your help, [child’s name]. They must STOP feeling so angry or Mom will take away the toys. [Child’s name] what’s the best way to STOP feeling so angry?”

Pause to give child time to reply. If the child gives a reply, then say:

SRA: “Oh, they could [repeat child’s idea regardless of whether it is good or not], then say to the child, Do you have any other ideas?”

Repeat this until the child is finished with ideas. If the child has no ideas, or when the child is finished with ideas, then say:

FORCED CHOICE QUERIES for Angry Vignette
SRA: “Well, Brownie and Red do you have any ideas?”

MRA: Remember for all the pairs numbered 1, have the puppet place a bubble card showing that mental component to the child.

MRA 1. Red: “I should think about what a bad boy/girl Brownie is.”
Brownie: “I should think about something else, like playing with my friend.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to STOP feeling so angry,” POINT TO BUBBLE CARDS & REPEAT CHOICES, “remember they want to STOP feeling so angry.”

SRA Repeats child’s answer, writes down the child’s response, removes the cards, and then says: “OK, that’s good. Red & Brownie, do you have any other ideas?”

MRA 2. Red (looking for another toy): “I should find another toy.”
Brownie (threatening to hit Red): “I should hit Red.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to STOP feeling so angry?

Should they find another toy or should they hit each other?”

SRA Repeats child’s answer, writes down the child’s response and then says: “OK, that’s good. Red & Brownie, do you have any other ideas?”

MRA 3. Red (moving the toy away and turning back): “I should grab Brownie’s toy.”
Brownie (staring at the toy): “I should share the toy with Red.”

SRA: “Now [child’s name], which is the best way for Red & Brownie to STOP feeling so angry? Should they grab each other’s toys or should they share the toys?”

SRA: “Well, [child’s name], that was great. Red & Brownie, are you finished now?”

MRA: Red & Brownie: “Yes, thank you for your help, [child’s name]. Bye-bye” (waving, take puppets off table and hands).
Appendix B

Coding Manual for Emotion Regulation Strategy Understanding

This manual provides directions for coding children’s responses to the D.O.T.S. puppet procedure (see Cole, Dennis, Smith-Simon, & Cohen, 2006 for administration details). The goal of the procedure and this coding is to characterize the number and quality the ER strategies children generate in making suggestions to the puppets about how they can stop feeling so sad or angry. In coding children’s responses, the following decisions must be made:

For each response the child makes:
1. How many discrete responses did the child make?
2. Is each response an attempt to directly help the puppet?
3. Is each response a strategy for regulating emotion?
4. Is each response a novel strategy?
5. What category does each strategy fall under?
6. Is the strategy socially appropriate?
7. Is the strategy purported to be effective?
8. Is the strategy elaborated in a coherent manner?

In addition, for each story told to the child:
1. How flexible was the range of the child’s responses to the story?
2. How engaged was the child in the story?
3. How socially appropriate was the child during the story?

Determining Number of Discrete Responses & Strategies

**Discrete responses (DR)** = total number of separate, unique verbal attempts to answer the questions the experimenter asks.

- Do not focus on the transcript. Instead, pay close attention to how the child speaks on the video tape. Listen for natural breaks in the child’s speech in order to discern what one meaningful response is. If child seems to be starting a new answer to the question, then code this as a new discrete response.
- An elaboration on one thought or idea is not a new discrete response.
- Does not include things the child says that are not attempts to answer the question (e.g., my hat fell off; I like that poster; I have a puppy; That puppy is sad, etc.)
- Only code first 8 discrete responses. If child produces more responses, notate these in the Word file verbatim.
- **Data Entry Note:** If no discrete responses, code 0 for DR and rate whether there was help (see below). Then code 99 up until the flexibility item. If the child had no DRs, code 99 for flexibility as well. If they had at least 1 DR then code the flexibility item. No matter how many DRs, always code the last 2 story ratings (Engagement and Social Appropriateness).
- If the DR is not a novel strategy, code 0s up until flexibility.
If the DR is a novel strategy, code every item.

**Help** = Direct behavioral and/or verbal interventions attempting to change the emotional state of the puppets.
- Code 1 if child verbally attempted to help (e.g., “Don’t worry” or “Share the toy”)
- Code 2 if child behaviorally attempted to help (e.g., pets the puppet, hands the puppet a toy), but no verbalization
- If child does both (behavior and verbalization), code 1.

**Strategies** = total number of verbal responses that appear to be attempts to deal with the problem.
- Some children give long, elaborate responses. If a long, elaborated response remains on the same strategy theme, it is coded as one strategy.
- Make sure the strategy offered is addressing the problem at hand (e.g., in the sad vignette: how to stop feelings sad about a lost puppy). Sometimes kids will offer responses for the wrong vignette—in that case, they will get a Discrete Response, but not a strategy.
- In most cases, discrete responses are also strategies. Here are some discrete responses that are NOT strategies:
  1. I don’t know.
  2. Nonsensical responses, but still attempting to answer the question (e.g., They should go up to the sky.)
  3. Just stop feeling so sad/angry.
  4. Brownie, be happy (This would be coded as a discrete response and verbal help, but not a strategy).
- For each strategy, rate whether it is a novel strategy. A novel strategy is one that has not been used thus far to answer the question.
- If the same strategy is given twice, rate the more elaborated one as novel (regardless of order in which the strategies were said). Only use the following categorization if the discrete response is a novel strategy. If the same strategy is given twice, and they are equally elaborated, rate the first one as novel.

**Categories for Each Novel Strategy**

<table>
<thead>
<tr>
<th>Problem Focused</th>
<th>Behavioral</th>
<th>Mentalistic</th>
<th>Support Seeking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Focused</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Focus of Strategy** (Problem or Other)

**Problem-focused** = strategy aimed at trying to fix, thinking about, or getting help with problem (e.g., looking for the lost puppy, sharing the toys)

**Other-focused** = strategy aimed at activity or thought that does not involve problem (e.g., go somewhere else to play, think about something nice). The child may refer to the actual problem, but simply referring to the problem, does not make the strategy other-focused. If the solution as
a whole is to distract oneself from what one is thinking or doing, then the strategy should be considered other-focused.

**Nature of Strategy** (Behavioral, Mentalistic, or Support-Seeking)

- Decide what the dominant nature of the strategy is. It is possible that a strategy may fit into more than one category, but choose the best fit.
- Example: “Ask mom if you can find the puppy.” We would score this as behavioral, even though they are asking for mom’s help because the strategy seems more aimed at trying to find the puppy (and asking for mom’s help is more procedural).

**Mentalistic** = strategy involves thinking or feeling, if feeling is clearly internal (e.g., I would think about where puppy is, I would think about something nice)

**Behavioral** = strategy involves action (e.g., I would get another toy, I would look for puppy, I would go play and wait, I would smile)

**Support-seeking** = strategy involves getting another person’s help (e.g., I would tell Mom, I would see if Mom was doing something nice)

**Response Ratings:**

*Is the novel strategy socially appropriate?*

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Strategies</td>
<td>Socially Inappropriate</td>
<td>Socially Appropriate</td>
</tr>
</tbody>
</table>

**Socially Inappropriate** strategies are disruptive, unsafe, or rude.

**Socially Appropriate** strategies are acceptable to parents and teachers.

*Is the novel strategy purported to be effective?*

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Strategies</td>
<td>Ineffective</td>
<td>Purportedly effective</td>
</tr>
</tbody>
</table>

**Purportedly Ineffective** strategies do not help reduce anger or sadness or make a person feel more sad or angry (e.g., wait for puppy, forget about it, don’t think about it). Strategies involving avoidance, denial, or repression of the problem are purportedly ineffective. “Stop crying,” is a common strategy given that is purportedly ineffective.

**Purportedly effective** strategies are likely to reduce anger or sadness (based on purported strategies described in literature but can include strategies that children generate that are not addressed in literature). Effective strategies are realistic and among others, can include distracting oneself by thinking differently (e.g., think about something nice, pray), doing something different that is pleasant (e.g., play outside), trying to solve the problem if it is solvable (e.g., find the puppy), asking an adult for help, engaging in socially skillful effort to work with others, etc.
Is the novel strategy elaborated in a coherent manner?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Strategy</td>
<td>Unclear/confused</td>
<td>Clear</td>
<td>Elaborated/coherent</td>
</tr>
</tbody>
</table>

**Unclear, confused** strategies are often brief but even if elaborate are not logical or sensible. **Clear** strategies are straightforward and understandable responses, but without embellishment. **Elaborated, coherent** strategies are ones in which the child explains the strategy by providing new but related information about the use of the strategy (e.g., providing steps, using an if-then concept, taking context into consideration).

**Story Ratings**

Is the child flexible in the types of strategies he/she generated?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Strategies</td>
<td>Perseverant</td>
<td>Neither</td>
<td>Flexible</td>
</tr>
</tbody>
</table>

*Note: Score 0 if only discrete responses made.

A child who is **perseverant** gives at least two responses, but all responses are related to the same strategy.

A child who is **neither** perseverant nor flexible generates only one novel strategy.

A child who demonstrates **flexibility** provides at least two novel strategies.

*Note: Rate engagement & social appropriateness even when no responses are made. Also, consider child’s level of engagement completely separate from the social appropriateness of their engagement—that category will come next.

Is the child engaged in the story being told through the puppet show?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disengaged</td>
<td>Engaged</td>
<td>Highly Engaged</td>
</tr>
</tbody>
</table>

A **disengaged** child does not show interest in the story being told. The child is unable or unwilling to comprehend the plot (e.g., doesn’t understand the task, not fully attending to the puppet show, distracted by something unrelated the show, not making an attempt to stay on task, too distressed to focus on task).

An **engaged** child appears to be listening and their attention is focused on the puppets (e.g., body is oriented toward them). The child is not reaching for the puppets, and is **not leaning into the show or talking to the puppets**. The child’s behavior is engaged, but not to the extent of the highly engaged category.

A **highly engaged** child looks very interested in the story (e.g., gazing intently, looks absorbed) and appears to understand the flow of the story. Their facial expression and/or tone of voice
suggests emotional engagement (the child could look excited or emotionally responsive). In addition, the child might try to become involved in the story (e.g., leans in, reaches out to the puppet, talks to the staff and/or the puppet).

Is the child behaving in a socially appropriate manner during the story?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Socially Inappropriate</td>
<td>Socially Appropriate</td>
</tr>
</tbody>
</table>

A child behaving in a **socially inappropriate** manner does not adhere to the social norms of listening to a story and behaves in a manner that disrupts the flow of the task (e.g., interrupts the story, continues to abruptly provide strategies after the open-ended segment has finished, does not remaining seated during story). Atypical behavior can include excessive crying or needing mom to be in the room in order to complete the task.

*Note*: these behaviors are only coded as socially inappropriate if they disrupt the flow of the task.

A child behaving in a **socially appropriate** manner complies with the instructions given throughout the puppet task. The child does not interrupt the story and may try to interact with the puppets and/or the staff in a non-aggressive way.

**Examples**

**Example 1:**
- *Eat pizza*
- *Eat popcorn*
- *Eat a hotdog*
- *Eat candy*

In this instance, the child stayed with a basic strategy but kept changing how it could be executed. It is therefore 4 separate discrete responses, each of which is a strategy, but only the first would be rated as a novel strategy.

**Scoring:** 4 discrete responses, 4 strategies, 1 novel strategy

Every statement was related to eating and the child did not show the ability to generate any other type of strategy. Therefore, even though four discrete responses were made (i.e., they could all reduce feeling sad or angry), the child would only get credit for 1 novel strategy because every response was within the theme of eating. The novel strategy would be coded as other-focused behavioral, with a 2 on elaboration.

**Example 2:**
- *eat a snack*
- *play*
- *take a nap*
- *find puppy*
A child may give several short responses, but each is a distinctly different thing to do. In this case, each response is a separate, discrete response and each is a novel strategy. Although each response was short and unelaborated, each response was a separate strategy that could conceivably reduce sadness or anger.

Scoring: 4 discrete responses, 4 strategies, 4 novel strategies

Example 3:
- *My hair is yellow* (0 DR, 0 Strategy) - Would not notate in spreadsheet because it is not an attempt to deal with the problem.
- *Don’t be sad* (1 DR, 1 Help, 0 Strategy)
- *They could play outside* (1 DR, 1 Strategy)

Scoring: 2 Discrete Responses, 1 Help, 1 Strategy

In this case, the child made several responses to the question the experimenter asked of them, but only 1 of these (the last one) could be considered a strategy. The first two responses cannot be coded as strategies because they do not appear to be attempts to deal with the problem.
Appendix C

Coding Manual for Discourse Coding

This manual provides directions for coding parent-child discourse during D.O.T.S. home and lab visits from transcribed CHAT files. The coding system is adapted from Brown, Donelan-McCall, and Dunn (1996) and Ensor & Hughes (2008). The goal of this coding system to quantify the quality (frequency and type) of speech parents direct towards young children.

1. Save Chat (.cha) files as Excel (.xls) files and start a new column on the right labeled “Quality”.

2. Only code conversation between target child and parent.

3. Conversational Turns = the utterances of one speaker bounded by another speaker’s utterances, or by a significant silence. Each turn directed to child or child directed to parent was assigned one of five quality codes:

   1) **Connected**: Speaker’s utterance is semantically related to (i.e., on the same topic as) the other interlocutor’s previous turn.

   2) **Initiation**: Speaker initiates a new topic that is both unrelated to the other interlocutor’s previous turn and successful in eliciting a semantically related response from the other interlocutor.

   3) **Failed**: Speaker’s turn is directed (either explicitly or implicitly to the other interlocutor) but fails to elicit a semantically related response.

   4) **Conflict**: Speaker’s utterance includes a prohibition, threat, or insult.

   5) **Unclear**: Speaker’s utterance was inaudible or it was unable to determine if the statement was directed towards a parent/child or it was unable to determine who was speaking and, thus, is not transcribed sufficiently to code.

   * A trumping system was used such that turns that could be categorized as either conflict or connected were always coded as connected.

3. Semantic relatedness was determined using Brinton and Fujiki’s 1984 system for labeling topic:

   Coders were to ask themselves:

   1. What are these speakers talking about?
   2. What seems to be the central concern addressed?
   3. What is the focus or center of attention of these contributions to discourse?
Example:

<table>
<thead>
<tr>
<th>Mom: Would you like some ham now or wait?</th>
<th>Quality of Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>Mom: Don’t touch that.</td>
<td>Conflict</td>
</tr>
<tr>
<td>Mom: Ham now or wait?</td>
<td>Initiation</td>
</tr>
<tr>
<td>Child: Ham now.</td>
<td>Connected</td>
</tr>
<tr>
<td>Child: Please.</td>
<td></td>
</tr>
<tr>
<td>Mom: You look sleepy.</td>
<td>Failed</td>
</tr>
<tr>
<td>Child: Ham now.</td>
<td>Initiation</td>
</tr>
<tr>
<td>Mom: Ok, here it is.</td>
<td>Connected</td>
</tr>
</tbody>
</table>

Note that the child utterance “Please” is not coded. The statement is not a new turn. The turn is defined as an utterance bounded by another speaker or silence, so for this example, “Ham now. Please.” is the entire utterance.

Other coding rules and decisions to note:

1) When a speaker switches from one topic back to a topic that was mentioned previously, the speaker is not coded as connecting to the previous topic. We are measuring the speech that is linked to only the preceding utterance.

2) When speech is unintelligible (cannot make out exact words) code it as “unclear”. However, if it is possible to determine the quality of the statement by catching a few of the words or by clear tone of voice, the turn can be coded for quality.

3) Small utterances such as “Yeah”, “Shh”, and “Oh” can be coded as an utterance in the appropriate context.

4) If the target child asks one parent something, and other parent responds, label the child as failed and the parent as connected.

5) You can connect to the previous utterance through a questions

6) If a speaker connects to another’s utterance after a period of 10 seconds or more, the turn is considered a new initiation.