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TEMPERAMENT, JOINT ENGAGEMENT, AND LANGUAGE SKILLS IN TODDLERS

by

NICOLLE C. ANGELI

Under the Direction of Lauren Adamson

ABSTRACT

This study investigated how emotion-regulation would moderate the relationship between shyness and joint engagement and how joint engagement would mediate the relationship between shyness and language skills.

Fifty-three mother-child dyads were observed in the laboratory according to the Communication Play Protocol (Adamson & Bakeman, 1999) when the toddlers were 24 and 30 months of age. Mothers completed the Temperament Behavior Assessment Questionnaire-Revised (Rothbart & Goldsmith, unpublished). Toddlers also completed the Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997) and Expressive Vocabulary Test (EVT; Williams, 1997).

The relationship between shyness and the percentage of time spent in non-symbol-infused coordinated joint engagement was moderated by a toddler's ability to self-soothe. Shyer toddlers had significantly lower receptive language scores than less shy toddlers, and this relationship was partially mediated by the percentage of time toddlers spent in symbol-infused supported and coordinated joint engagement states.

INDEX WORDS: Temperament, Shyness, Emotion-regulation, Language Skills, Joint Engagement

TEMPERAMENT, JOINT ENGAGEMENT, AND LANUGAGE SKILLS IN TODDLERS

by

NICOLLE C. ANGELI

A Thesis Submitted in Partial Fulfillment of Requirements for the Degree of

Master of Arts

Georgia State University

2005

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Master of Arts

by

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1st: B = mean shy + SD, 0 = mean shy, S = mean shy – SD

2nd: + = mean symbol-infused supported joint + SD, – = mean SISJ – SD

3rd: + = mean symbol-infused coordinated joint + SD, – = mean SICJ – SD……... 30

List of Abbreviations

PPVT: Peabody Picture Vocabulary Test

EVT: Expressive Vocabulary Test

SISJ: Symbol-Infused Supported Joint Engagement

SICJ: Symbol-Infused Coordinated Joint Engagement

SD: Standard Deviation

Chapter 1: Literature Review

Multiple researchers have found that shyer children tend to have poorer language skills than less shy children (Rezendes, Snidman, Kagan, & Gibbons, 1993; Slomkowski, Nelson, Dunn, & Plomin, 1992; Spere, Schmidt, Theall-Honey, & Martin-Chang 2004). There is, however, no clear consensus why this relationship exists. Further, researchers have suggested that a child's sociability (e.g., level of shyness) may influence interactions between the parent and child (Wells, 1986). In addition, research and theory suggest that parent-child interactions are important for language development (Adamson, Bakeman, & Deckner, 2004; Tomasello & Farrar, 1986). Typical parent-child interactions can include states of joint engagement between the parent, child, and an object or event. Building upon this research, as Wells (1986) has suggested, states of joint engagement may be influenced by a child's level of shyness, and in turn, that these states may affect language skills.

Shyness has been studied in relation to other temperamental dimensions, such as emotion-regulation, and many aspects of early childhood development including attachment, joint engagement, and language development. Given the multitude of developmental changes and milestones that occur during early childhood, it is useful to investigate how early behavioral tendencies such as shyness and emotion-regulation (i.e., soothability and inhibitory control) and states of joint engagement, are associated with language skills. This study adds to the literature on child development by examining these relationships within the framework of a conceptual model (see Figure 1).

First, this study examined how a toddler's ability to regulate emotions moderated the relationship between shyness and the percentage of time spent in various joint engagement states. Second, this study explored how the percentage of time spent in various engagement states mediated the relationship between shyness and later language skills.

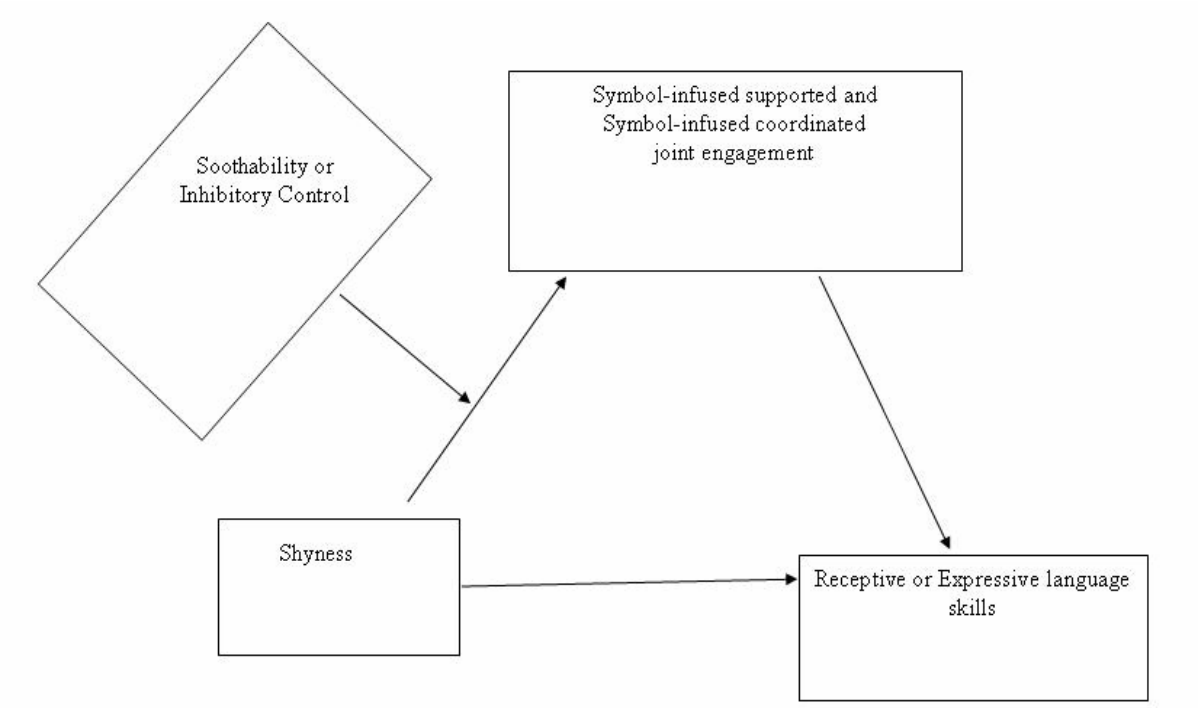

Figure 1. Conceptual model of the influence of behavioral tendencies and joint engagement on language skills.

Shyness

Temperament can be viewed as constitutionally based individual differences in behavioral tendencies such as anger, sadness, and pleasure (Goldsmith, Buss, Plomin, Rothbart, Thomas, Chess, et al., 1987). Another dimension of temperament, fear, has been differentially labeled by researchers. This study focused mainly on one behavioral characteristic frequently measured by temperament questionnaires: social fear. Social fear, behavioral inhibition, wariness, introversion and finally shyness, have all been used synonymously to refer to this

dimension of temperament that is readily apparent within the first year of life (Bronson, 1972; Sroufe, 1977). Some indicators of this dimension of temperament, shyness, include feeling uncomfortable in social situations, responding to others in a way that reduces the likelihood of continuing the interaction, and hesitating when: approaching new people, engaging in new situations, making spontaneous utterances (Crozier, 2000, 2001; Goldsmith, 1994).

An early study that investigated how shyness affected a child's interactions with other people was conducted by Bronson (1972). He found that some infants as young as 4 months of age displayed some negative reactions (e.g., crying) to unfamiliar adults. Another study found that an infant's shyness tended to intensify the closer and more intrusive an unfamiliar person was with the infant (e.g., picking up the infant; Sroufe, 1977). More recently, Denham and Lehman (1995) found that parent reported shyness in social situations showed a linear increase from 6 weeks to approximately 2 years of age (means ranged from 2.2 to 3.2 on a 1 to 7 point rating scale) with the greatest increases occurring between 4 and 9 months of age and 9 and 19 months of age. Therefore, not only does a child's shyness influence the quality of his interactions with other people, shyness has also been shown to remain stable from the time children are 2 until they are 4-years-old (Lemery, Goldsmith, Klinnert, Mrazek, 1999).

Given that a child's degree of shyness affects reactions in novel social situations, it is surprising how little research has focused specifically on the potential effect of shyness on close relationships. One study explored the relationship between parents' ratings of their infant's temperament and the emotional tone that was observed in mother-child interactions (Kochanska, Coy, Tjebkes, & Husarek, 1998). These researchers found that fathers who rated their infants as high on the "Affectively Negative" component (i.e., distress to limitations and distress to sudden or novel stimuli) of the Infant Behavior Questionnaire (Rothbart, 1981) also were rated as having

a lower positive emotional tone (i.e., joy) and a higher negative tone (i.e., sad, fearful, angry) during the mother-child interactions. Apart from this study, most of the research in this area has been done on mother-child attachment styles. For example, Stevenson-Hinde (2000) found that behavioral inhibition, which is a broader term for shyness, in 30-month-old children, was related to an ambivalent attachment pattern. Kochanska (1998, 2001) found that children classified as avoidant (i.e., not bothered by the separation from their mothers) were less wary than children classified as resistant who were bothered by the separation (i.e., difficulty settling and poor exploration). She also found that infants who were classified as securely attached were less fearful when they were 33 months of age (Kochanska, 2001). Another study found that fearful children were more likely to want to be close to their mothers when they returned after a brief separation but that this was accounted for by the child's level of distress during the mother-child separation (Kochanska & Coy, 2002).

Overall, researchers have found that warier children have different attachment patterns than less wary children. These studies have demonstrated that a child's degree of wariness can affect interactions not only with unfamiliar but also familiar people, but it is not clear whether specific temperamental dimensions, such as shyness and emotion-regulation, affect other specific types of parent-child interactions and developmental achievements.

Emotion-Regulation

Regulatory behaviors such as inhibitory control and soothability have been studied along with other aspects of temperament (Goldsmith, 1994). As infants develop from 3 to 12 months of age, they increase their ability to internally regulate their emotions by looking or turning away from something to soothe themselves (Rothbart, Ziaie, & O'Boyle, 1992). Between the ages of 18 and 24 months, toddlers begin to regulate their emotions by complying with external controls

(e.g., responding to warnings; Kopp, 1982). From 24 to 36 months of age, toddlers show evidence of self-control suggesting that they are able to postpone their actions when requested to do so and are able to behave according to caregiver demands and social expectations. When infants become toddlers, they are more capable of obeying external rules to control prohibited actions and complying with requests to control their statements and emotional expressions (Bronson, 2000). Though toddlerhood may be fraught with defiance and temper tantrums, these behaviors may also be potential signs of increased internal control in toddlers as they are attempting to manage themselves but are unable to do so effectively at that time.

Studying the effect of the expression of shyness on social interactions is incomplete without also investigating how well a child is able to regulate emotions. Research suggests that the ability to regulate the expression of emotions may change how shyness affects social interactions. Kagan and Snidman (1991) describe shy children as more physiologically "stress reactive" and as potentially having a more difficult time regulating their emotions than less shy children. Additionally, maternally reported toddler shyness has been found to be negatively related to a child's level of compliance on a clean-up task (Lehman, Steier, Guidash, & Wanna, 2002). However, in a different study, parent ratings of shy school-age children were correlated with a lack of impulsivity (Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998). Though the research findings are mixed, parent-rated inhibitory control of children has been found to be stable from toddlerhood to primary school age (Kochanska, Murray, & Coy, 1997; Posner & Rothbart, 2000). Though there is some inconsistency regarding the link between shyness and emotion-regulation, exploring the interactive aspect of these dimensions of temperament may help clarify the nature of the relationship between shyness and emotion-regulation and the effect that these dimensions have on parent-child interactions.

Joint Engagement

Joint engagement, which occurs during parent-child interactions, can be succinctly defined as a "meeting of minds." (Bruner, 1995, p. 6). More concretely, it can be defined as the coordination of attention between the self, another, and a mutual interest in objects or events (Adamson, Bakeman, & Deckner, 2004; Bakeman & Adamson, 1984). A child's ability to coordinate engagement between people and objects is regarded as a major milestone in development because, as Bruner (1995, p. 5) emphasizes, within this context children not only learn how to communicate but also "learn about the culture, its conventions, and its codes." Adamson and Bakeman (1991) have described these episodes as opportunities for the child to learn about communicative intentions. Joint engagement's importance can also be highlighted by the losses that occur if there is a failure to develop joint engagement skills. When it does not properly develop, it may be more difficult for a person to deduce what is on another's mind during a social interaction (Bruner, 1995). Researchers have also argued that joint engagement serves as the foundation for representational skills apparent in young children's theory of mind (Wellman, 1993). In general, joint engagement serves to help one create and coordinate the "shared social realities" of everyday life.

Development of joint engagement. The foundation for the development of joint engagement begins early in life. By the time an infant is approximately 6 months of age, a parent and infant can share a focus on objects within a social interaction but the infant is not explicitly referencing the mother, what Adamson and colleagues' term *supported joint engagement* (Adamson & McArthur 1995; Bakeman & Adamson, 1984). In more general terms, engagement between a mother and child is characterized as supported when the mother and child have a shared focus and the mother is scaffolding the interaction (e.g., a mother reading a book

with her toddler). By nine months of age, an infant may begin to develop what Adamson and colleagues' term *coordinated joint engagement* wherein the infant is able to simultaneously engage with objects and people. More specifically, the infant proactively seeks to engage with his/her mother and objects (Adamson & Bakeman, 1991). Furthermore, at this time, infants can not only respond to but also initiate bids of joint engagement (Mundy, 1995). Though these two states of joint engagement may begin to develop at an early age, their consistent use by the child does not occur until late infancy. For instance, on average, 15-month-old toddlers spent 11% of a 10-minute play interaction in a state of coordinated joint engagement with their mothers; however, a few toddlers were not observed in that state until their follow-up visit when they were 18 months of age (Bakeman & Adamson, 1984).

Since toddlers were just beginning to be observed consistently in coordinated states of joint engagement at 18 months of age, researchers need to investigate how the development of joint engagement may change in slightly older toddlers as well. In particular, research on symbol development and use suggests that there may be a transformation of shared attention that occurs as symbols infuse interactions and allows communication about past or future events (Adamson, et al., 2004). Though it is difficult to determine exactly when symbols begin to infuse episodes of joint engagement, distinct examples of the way symbols become incorporated into episodes of shared attention is evident during the 2nd year of life (Adamson et al., 2004). The incorporation of symbols into and the way symbols alter episodes of shared attention is evident when a child follows through on a command from the parent. Adamson, Bakeman, and Deckner (2004) have examined the developmental trajectory of supported and coordinated joint engagement in 18 to 30-month-old children. Furthermore, they examined how symbols (i.e., receptive or expressive language, gestures, and pretend play) infuse supported and coordinated

joint engagement states during toddlerhood. They found that 18-month-old typically developing toddlers were just beginning to infuse symbols into both supported (6 % of the time) and coordinated (3 % of the time) joint engagement states. From 18 to 30 months of age, the overall average percentage of time toddlers spent in *symbol-infused joint engagement* states increased from 9% to 49% of the 40-minute session. Since these joint engagement states are still developing into toddlerhood, it is important to investigate their relationship with behavioral tendencies such as shyness and emotion-regulation as these dimensions of temperament continue to develop and influence social interactions.

Joint Engagement and Temperament

Researchers have suggested that parental perceptions of child characteristics may affect common parent-child interactions. For example, Mundy and Willoughby (1998) suggest that the frequency of joint engagement behaviors in children may be related to a parent's perception of a child's positive social behaviors (e.g., responding to another person's affect and developing friendships). This investigation of parental perceptions is an important first step in examining how parent perceptions and parent reports of a toddler's behavioral tendencies affect social interactions. More recently, researchers have continued and refined their investigation of the effect of various temperamental dimensions on the joint engagement states between a child and parent. Morales, Mundy, Delgado, Yale, Neal, and Schwartz (2000) found that parent reported "duration of orienting" (Rothbart, 1981) was related to a 6-month-old child's ability to respond to joint engagement. Vaughn (2001) found that "distress to novelty" and "smiling and laughter" (Rothbart, 1981) predicted that an infant would make spontaneous eye contact with a social partner regarding an object of interest at 9 and 12 months of age. The results of this study are based on the frequency with which an infant was able to make eye contact with a social partner

while manipulating a toy, exchange glances between a toy and the partner, or show a toy to the partner. Both of these studies highlight the relationship between various behavioral tendencies and the frequency with which an infant enters into joint engagement states; however, neither study investigated how temperamental dimensions affect the amount of time spent in joint engagement states or what these relationships are like in toddlers.

Additionally, few researchers have explored the relationship between joint engagement and emotion-regulation. In a recent study, Morales et al. (2000) found a nonsignificant positive trend ($p<.10$) between a 6-month-old infant's ability to respond to joint engagement and the parent reported "soothability" (Rothbart, 1981) of the child. Adamson and Russell (1999) also explored issues surrounding emotion-regulation and the emergence of joint engagement. They suggested that infants from 9 to 12 months of age, when interacting with their social partners, became enticed to engage with an object because the partner lent affect to the object. These researchers suggested that a disruption in an interaction may provoke anger in 12-month-old infants and may increase engagement to a social partner. Alternatively, Eisenberg and Fabes (as cited in Raver, 1996) stated that extremely high arousal might inhibit a child's prosocial actions because the child will become consumed by his own distress. Raver (1996) found that 24-month-old toddlers who spent more time in joint engagement states with their social partners were better able to distract themselves from sources of distress.

Shyness and Language Skills

Studies have also investigated the relationship between shyness and language development, and the results are mixed. For example, Morales et al. (2000) did not find a significant relationship between an infant's shyness and language skills. In contrast, a study found that 2-year-old children who were classified as more extroverted also had greater receptive

and expressive language at 3 years of age than children classified as more introverted (Slomkowski et al, 1992). Spere et al. (2004) found that shy preschool age children scored lower on both receptive and expressive language measures than less shy children. Lastly, a study found that toddlers classified as inhibited took longer to initially say something and also spoke less when they were 5½ years of age than toddlers classified as uninhibited (Rezendes et al., 1993).

Shyness, Language Skills, and Joint Engagement

Wells (1986) suggests that shyness may influence the amount and kind of language a child receives through a conversation. In addition, numerous researchers have investigated the relationship between language acquisition and joint engagement (Adamson et al., 2004; Morales et al., 2000; Mundy & Gomes, 1998; Smith, Adamson, & Bakeman, 1988; Tomasello & Farrar, 1986). For instance, responding to and initiating joint engagement has been significantly correlated with expressive language in toddlers (Mundy & Gomes, 1998). However, researchers have not only demonstrated that there is a general relationship between language and joint engagement but also that there are variations in the development of joint engagement in typically developing children (Adamson et al., 2004) and in children with various developmental disabilities (Charman, Sweetenham, Baron-Cohen, Cox, Baird, & Drew, 1997) or deafness (Prezbindowski, Adamson, & Lederberg, 1998). For example, Adamson et al. (2004) found that toddlers classified into the better language skill group at 18 months of age spent a greater percentage of time in a symbol-infused supported joint engagement state at 18 and 30 months of age than toddlers classified into the average and fewer language skill groups at 18 months of age. When looking at how the amount of time spent in symbol-infused coordinated joint engagement was affected by a child's language group, the researchers found that the same relationship

existed only when the toddlers were 18 months of age. The effect of language group on the percentage of time spent in symbol-infused coordinated joint engagement states, however, was not significant by the time the toddlers were 30 months of age. In a separate analysis, even after statistically controlling for language skills at 18-months of age, the percentage of time toddlers spent in symbol-infused supported joint engagement uniquely predict receptive and expressive language skills at 30-months of age. In contrast, the percentage of time toddlers spent in symbol-infused coordinated joint engagement did not significantly predict language skills at 30-months of age after controlling for language skills at 18-months of age.

As Wells (1986) alluded to, however, understanding joint engagement and its relationship to language development is incomplete without investigating how these relationships may differ in various populations or without considering the affect of individual differences, or temperament, on the development of joint engagement. Prezbindowski et al. (1998) found that deaf toddlers spent significantly more time in states of coordinated joint engagement, but spent significantly less time in overall symbol-infused joint engagement states than hearing toddlers. As previously mentioned, research also suggests that shyness affects states of joint engagement (Vaughn, 2001). These specific areas of shyness, engagement states, and language skills have not yet been combined. Therefore, investigating the influence of shyness and both the type and amount of time spent in joint engagement states on language skills is a necessary next step. Moreover, if toddlers are not attending to or using symbols during states of joint engagement, time spent in joint engagement would have less of an influence on the relationship between shyness and language skills. It is, therefore, also important to focus on the symbol-infused states of joint engagement when investigating the role the states of engagement may play in the relationship between shyness and language skills.

Hypotheses

Several important aspects of early childhood development have been reviewed. Though this study makes individual hypotheses regarding the relationship between behavioral tendencies, joint engagement, and language skills, ideally we would have tested an overall conceptual model (see Figure 1) had we had the statistical power to conduct the analysis**.** Our ratio of participants to each parameter in the conceptual model would have been lower than is recommended (i.e., 10:1), and the results may not have had statistical stability (Kline, 1998). Instead, we examined pieces of the conceptual model in order to get a sense of how these factors related to and influenced one another. Furthermore, the focus of the results from these hypotheses was the unique amount of variance accounted for in each joint engagement state at 24 months of age or language skill at 30 months of age.

Shyness and joint engagement. In order to examine how early childhood factors influenced states of joint engagement, this study first investigated the relationship between shyness and joint engagement. First, we hypothesized that there would not be a significant relationship between the toddler's degree of shyness and the percentage of time spent in non-symbol-infused supported joint engagement at 24 months of age because shy children remain in close proximity to their mothers, and during states of supported joint engagement mothers try to entice a child to interact with objects that are of mutual interest. In contrast, shyer toddlers were not expected to proactively interact with an object and their mothers in a fluid manner as often as less shy toddlers; therefore, our second prediction was that shyer children would spend a significantly smaller percentage of time than less shy children in a non-symbol-infused coordinated joint engagement state.

Toddlers who are shy tend to withdraw from social situations and are hesitant to speak; therefore, our third prediction was that shyer toddlers would spend a significantly smaller percentage of time in a symbol-infused supported joint engagement state than less shy toddlers at 24-months of age. Along these same lines, our fourth prediction was that shyer toddlers would also spend a significantly smaller percentage of time in a symbol-infused coordinated joint engagement state than less shy children at 24 months of age.

Shyness, joint engagement, and emotion-regulation. In an attempt to replicate the finding of a relationship between the amount of time spent in joint engagement states and a child's ability to distract himself (Raver, 1996), our fifth prediction was that toddlers who are good at regulating their emotions would spend a greater percentage of time in all of the joint engagement states than toddlers who were not as capable of regulating their emotions at 24 months of age. Additionally, toddlers who were unable to decrease their expression of shyness because of poor emotion-regulation would have difficulty proactively initiating and maintaining interactions with their mothers and objects because they would be overcome by feelings of needing to withdraw and play quietly by themselves. Our sixth prediction was that emotion-regulation would moderate the relationship between shyness and the percentage of time spent in non-symbol-infused coordinated and symbol-infused supported and coordinated joint engagement states such that there would not be a relationship between shyness and the percentage of time spent in any of these states if a child was good at regulating his emotions. On the contrary, shyer toddlers who were poor at regulating their emotions would spend a smaller percentage of time in non-symbol-infused coordinated and both symbol-infused supported and coordinated joint engagement states than less shy, poor emotion-regulating toddlers.

Shyness, joint engagement, and language skills. The second major aim of this study was to investigate the relationship between shyness, symbol-infused joint engagement states, and language skills. As an attempt to replicate previous findings (e.g., Slomkowski et al., 1992), our seventh prediction was that shyer toddlers would have significantly poorer receptive and expressive language skills than less shy toddlers at 30 months of age. Additionally, this study examined whether the overall percentage of time spent in both symbol-infused supported and coordinated joint engagement states would mediate the relationship between shyness and language skills at 30 months of age. Since it was hypothesized that a significant relationship between shyness and the percentage of time spent in both symbol-infused supported and coordinated joint engagement states existed, and it was hypothesized that there was a significant relationship between shyness and language skills at 30 months of age, and since studies have found a relationship between language abilities in toddlers and the time spent in symbol-infused joint engagement states (Adamson et al., 2004), our eighth prediction was that the percentage of time spent in symbol-infused supported and coordinated joint engagement states would mediate the relationship between shyness and language skills at 30 months of age.

Chapter 2: Method

This study drew data from an archive that was developed to research the development of joint engagement in typically developing toddlers and is funded by Georgia State University's Research Enhancement Program and by the National Institutes of Health, NICHD (R5 HD 3562 and R01-HD35612). In this longitudinal investigation, mother-child dyads came to Georgia State University's child development laboratory for five visits over the course of one year.

Participants

Fifty-three full-term, typically developing toddlers and their mothers, drawn from a sample of 56 dyads, participated in this study. This sample was recruited from a pool of new parents who received and responded to a letter inviting them to participate in research studies being conducted by faculty members from the developmental psychology program at Georgia State University. The parents (average maternal age was 32.4, range 21 to 42) in the final sample were well educated (all parents had completed high school and 77% mothers and 79% of the fathers had completed at least their bachelor's degree). The gender (26 males and 27 females) and birth order ratios (28 children had no other siblings and 25 had at least one older sibling) were balanced. At the beginning of the study, 23 (43%) of the mothers worked outside of the home either part (17) or full-time (6). The sample consisted of children who are European-American (81%), African-American (13 %), and Hispanic-American (3%).

The mother-child pair was seen 5 times, for one year, beginning when the child was 18-months-old, with 3-month intervals in between each visit. Most of the completed observations of

the dyad were made within 2 weeks of each age point. One of the observations made at 24 months of age fell outside of that window.

Recording sessions

Observational Procedure. Upon arriving for the laboratory visit, the mother and child entered a carpeted playroom, which was 4.6 x 3.1 m^2 and contained a child size table and chairs, large pillows, and, at alternating visits, a dollhouse or play farm. This room had two one-way mirrors on opposite walls behind which were the video cameras and equipment.

Each visit was scheduled at the mother's convenience and lasted approximately two hours. Before the visit, the mothers completed various questionnaires depending on the particular laboratory visit including, at the 24-month visit, the Temperament Behavior Assessment Questionnaire-Revised (Rothbart & Goldsmith, unpublished). At the beginning of the visit, the researchers told the mother that they were interested in how her child was currently communicating. After the mother and child were settled, play observations were made. These observations lasted approximately 40 minutes. After taking a short break, the remainder of the session was devoted to collecting demographic information and standardized cognitive, social, and language assessments.

Observational Conditions. Mothers and their toddlers were guided to interact according to the Communication Play Protocol (Adamson & Bakeman, 1999). This protocol encourages the mother and child to engage in a broad range of communicative acts under semi-structured conditions. More specifically, the mother and child interacted in eight, 5-minute conditions that were designed to encourage social interacting, requesting, narrating, and commenting.

Video recording. The same VITC time code was placed on two recorded videotapes from each visit so that coders working on the tapes could select which camera provided the best view of the mother and the child.

Coding Schemes

The coding scheme was a modification of the state-based coding scheme devised by Bakeman and Adamson (1984). It was developed to characterize the infant's engagement to objects and people by coding the child's engagement states. An engagement state is defined as a period of at least 3 seconds in duration in which the child is actively engaged with people and/or objects and events. The coder determined if the child and mother were actively engaged with the same object or event; if this was the case then the state was called *joint.* Coders were primarily concerned with making the distinction between *joint* and *non-joint* engagement states. Additionally, they also determined whether the toddler was engaged with some facet of the symbolic realm, and if so, they classified the engagement state as *symbol-infused*. Children's engagements were commonly characterized as symbol-infused when they were speaking. Otherwise, a child could demonstrate the use of receptive language by following his mother's statement to him. Children's engagement was also classified as symbol-infused when they were engaged in imaginary play with an object such as using a plastic banana as a telephone. Lastly, children could also use symbolic gestures such as moving their fingers like a spider and be characterized as in a symbol-infused state.

Categories

This study focused on four different engagement states common in toddlers: *(a) Non-Symbol-Infused Supported Joint*: The mother and child are involved with the same object or event, but the child does not explicitly acknowledge the mother. *(b) Non-Symbol-Infused*

Coordinated Joint: The child and mother are involved with the same object or event, and the child is acknowledging the mother's participation in the activity. (c) *Symbol-Infused Supported Joint Engagement:* The mother and child are involved with the same object or event and there is evidence that the child is attending to symbols, but the child does not explicitly acknowledge the mother. *(d) Symbol-Infused Coordinated Joint Engagement:* The child and mother are involved with the same object or event, the child is attending to symbols, and the child is acknowledging the mother's participation in the activity. For a complete description of all possible engagement states, see Adamson et al. (2004).

Coding Procedures

Nine people were trained to code the engagement states over the course of this study. To ensure uniformity of the coding, coders worked in teams of two. Additionally, to decrease the difference between teams, visits were divided in half and randomly assigned to teams until the coding was complete.

Coders completed two tasks as they were viewing the sessions. They identified "seams" between different engagement states (Newtson, 1973) and characterized the engagement states using the categories named above.

Interobserver Reliability

Two teams coded approximately 16% of the tapes for reliability purposes; teams were unaware of which tapes were used for reliability. Interrater reliability was calculated with Cohen's kappa (Cohen, 1960), and the values for the engagement states used in this study ranged from .70 to .80.

Temperament Questionnaire

Participants were sent the Toddler Behavior Assessment Questionnaire-Revised (TBAQ-R, Rothbart & Goldsmith, unpublished) right before their third visit (24 months of age) to the laboratory. The mother was asked to complete this questionnaire and bring it into the laboratory when she and her child came in for their next visit. Three mothers did not complete the questionnaire; therefore, none of their toddler's data was included in our study. Since the TBAQ-R was not frequently used in laboratories and does not have any published reliability or validity, we decided to use only the items from the 78-item TBAQ (Goldsmith, 1994). For a thorough explanation of the reliability and validity of the TBAQ, see Goldsmith (1996).This questionnaire was devised for use with children from the age of 16 to 36 months of age. Mothers rated their child's behavior in the last month on a Likert scale from 1 to 7 (never to always and 8 was not applicable). The questions were associated with seven content scales including: activity level, anger, social fear, pleasure, interest, soothability, and inhibitory control (see Appendix for a sample of questions). The higher the score on the content scale, the more the child was being characterized as high on that dimension by the mother. Each content scale consisted of approximately ten items. Of the seven possible content scales, *social fear* was selected as a measure of shyness due to the person-focus of the questions on this scale, *inhibitory control* was chosen as an approximation of the child's ability to comply with parental requests, and *soothability* was chosen as an approximation for a child's ability to independently regulate his emotions. The internal consistencies for social fear (n=38), inhibitory control (n=45), and soothability (n=47) were .78, .75, and .68 respectively (adjusted for items not completed by most mothers).

Language Measures

When the toddlers were 30 months of age, they were given The Peabody Picture Vocabulary Test-III (PPVT; Dunn & Dunn, 1997), which is a measure of a child's receptive language abilities. The toddlers were also given the Expressive Vocabulary Test (EVT; Williams, 1997), which is a measure of a child's expressive language abilities. These instruments were developed for individual administration with individuals aged 2½ to 90 years of age. The PPVT-III consists of 204 items, but only a subset of the items needs to be administered so items 1 through 108 were administered in this study. One of the original 56 toddlers failed to achieve a formal basal, which indicates that this test was appropriate for this age group. There are 190 items on the EVT, but only a subset of items needs to be completed by an individual so items 1 through 60 were administered. All of the toddlers in this sample achieved a formal basal on the EVT. For the analyses including these measures, an additional five scores were removed from the final sample (N = 53) because of missing language scores. The final sample for these analyses included data from 48 mother-child dyads.

Chapter 3: Results

Descriptive Statistics

The means, standard deviations, and ranges for the study variables are presented in Table 1.

Table 1.

Mean (and SD) and range scores for toddlers of each measured variable

Measured variable	Mean (SD)	Range
24 months (n =53)		
Shyness	3.52 (1.05)	2.006.14
Soothability	5.13 (.67)	3.116.22
Inhibitory Control	4.41 (.76)	2.785.88
Non-symbol-infused Supported	31%(12%)	9%59%
Symbol-infused Supported	21%(12%)	0%59%
Non-symbol-infused Coordinated	8%(7%)	0%30%
Symbol-infused Coordinated	13%(10%)	0%36%
30 months (n = 48)		
Receptive Language	100.44(13.18)	70126
Expressive Language	105.02(11.44)	75129

None of the variables were highly skewed; therefore, no transformations were performed. Two correlation matrices, one for each sample, were run to determine which variables were associated with each other (see Tables 2 & 3).

Table 2.

Correlations among the variables for the shyness, self-regulation, and engagement state analyses (N=53)

Measured Variable	1.	2.	3.	4.	5.	6.	7.
1. Shyness	__						
2. Soothability	-.30*	__					
3. Inhibitory Control	-.24	.41**	__				
4. Non-Symbol-Infused Supported	-.10	.04	-.04	__			
5. Symbol-Infused Supported	-.21	.22	.24	-.60**	__		
6. Non-Symbol-Infused Coordinated	.28*	-.04	-.16	-.07	-.36**	__	
7. Symbol-Infused Coordinated	.22	-.27*	-.16	-.73**	.28*	.10	__

Note. **$p < .01$, *$p < .05$.

Table 3.

Correlations among the variables for the shyness, engagement state, and language skills analyses (N=48)

Measured Variable	1.	2.	3.	4.	5.
1. Shyness	__				
2. Symbol-Infused Supported	-.30*	__			
3. Symbol-Infused Coordinated	.19	.24	__		
4. PPVT	-.30*	.40**	.26	__	
5. EVT	-.25	.56**	.36*	.64**	__

Note. **$p < .01$, *$p < .05$.

Analyses were conducted to determine whether sex or parity was significantly associated with any of the variables in this study. Sex was significantly associated with a toddler's inhibitory control mean score ($F(1,51)=11.20$, $p<.01$), the percentage of time the child spent in a symbol-infused supported joint engagement state ($F(1,51)=5.00$, $p<.05$), and a toddler's EVT score ($F(1,46)=9.33$, $p<.01$) (see Table 4).

Table 4.

Means and (SD) for sex differences found on measured variables

Measured variable	Sex	
24-months (N=53)	Males	Females
Inhibitory Control	4.10 (.63)	4.73(.76)
Symbol-infused Supported	17%(11%)	25%(13%)
30 months (N = 48)		
Expressive Language	100(11.10)	109(9.74)

For the set of regression analyses involving moderation, regressions were run both statistically controlling for and not controlling for sex. The same pattern of results was found both ways; therefore, sex was not statistically controlled for in these regression analyses. For the analyses of the path model, sex was not statistically controlled for even though it was significantly related to a toddler's EVT scores because the slightly larger archive (N=56) that this data was drawn from did not report significant differences in language scores based on sex (Adamson et al., 2004). Therefore, it would have been misleading to control for it with the smaller sample used in this path analysis (N=48). Significant differences were not found on any of the study variables based on the child's birth order.

Shyness, Emotion-Regulation, and Joint Engagement

In order to investigate the relationships between shyness, emotion-regulation (i.e., soothability and inhibitory control), and joint engagement (non-symbol-infused supported, symbol-infused supported, non-symbol-infused coordinated, symbol-infused coordinated) four hierarchical multiple regression analyses were conducted for both emotion-regulation variables. All of the independent variables were centered before running any analyses, and an interaction term was formed by multiplying these centered variables together (shyness x soothability and shyness x inhibitory control).

Shyness, soothability, and joint engagement. In order to analyze whether soothability moderated the relationship between shyness and each of the joint engagement states, four hierarchical multiple regressions were conducted (see Table 5).

Table 5.

Hierarchical multiple regression results for shyness and soothability

	Type of Joint Engagement							
	Non-symbol-infused supported		Symbol-infused supported		Non-symbol-infused coordinated		Symbol-infused coordinated	
	β	Δ R^2	β	Δ R^2	β	Δ R^2	β	Δ R^2
Step								
Shyness	-.09	.01	-.16	.05	.18	.08*	.16	.05
Soothability	.01	.00	.17	.03	-.05	.00	-.23	.05
Interaction	.06	.00	-.10	.01	.36*	.11*	-.03	.00

Note. β are reported from the third step of the regression except when the interaction was significant, $p < .05$.

*$p<.05$

In one regression analysis, there was a significant positive relationship between shyness and the percentage of time spent in non-symbol-infused coordinated joint engagement. This main effect is qualified by a significant interaction between shyness and soothability on the amount of time spent in non-symbol-infused coordinated joint engagement.

In order to probe the direction of this interaction, shyness (shy, average, and bold) and soothability (low, average, and high) were divided into three groups. The toddlers in the shy and low soothability group fell more than 1 standard deviation below the mean on both shyness and soothability. The other 5 groups were formed the same way; there were three shyness groups one which fell more than 1 standard deviation below the mean, one group was average in terms of shyness, and the last group was more than 1 standard deviation above the mean. Soothability was formed the same way. For the significant interaction between shyness and soothability on

the percentage of time spent in a non-symbol-infused coordinated joint engagement state, shyer, highly soothable toddlers spent a greater percentage of time in the non-symbol-infused coordinated state of joint engagement than all of the other toddlers (see Figure 2).

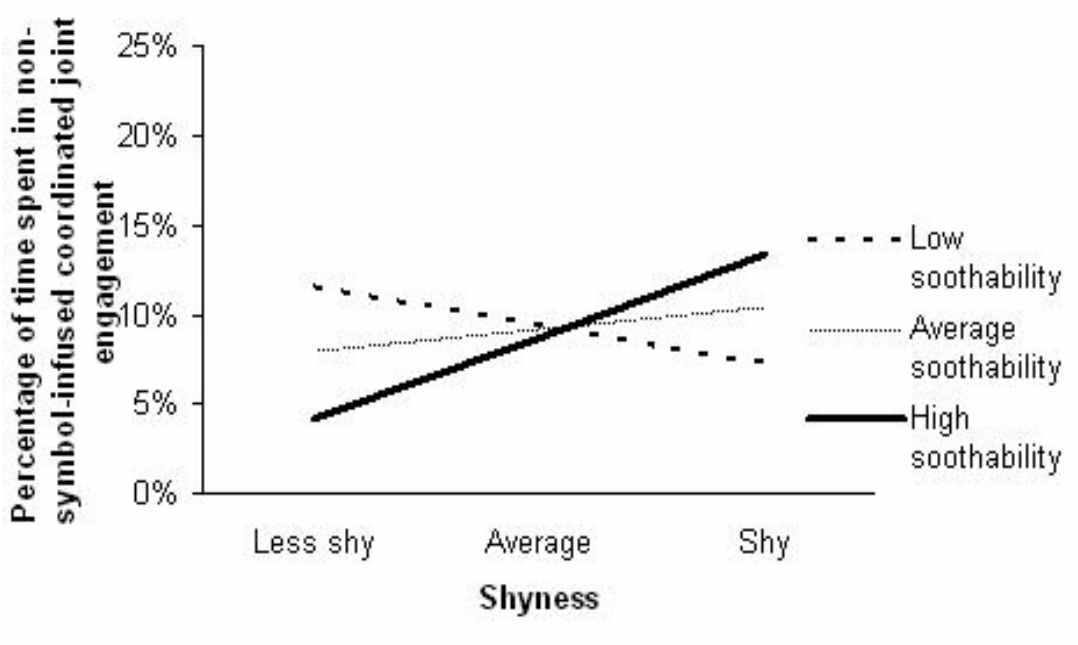

Figure 2. The interaction between shyness and soothability on non-symbol-infused coordinated joint engagement.

Less shy, highly soothable toddlers spent the smallest percentage of time in a non-symbol-infused coordinated state of joint engagement as compared to all of the other toddlers. Less shy, less soothable toddlers spent a greater percentage of time in a non-symbol-infused coordinated state of joint engagement as compared to less shy, highly soothable and shyer, less soothable toddlers but not shyer, highly soothable toddlers.

In the other three regressions, neither shyness, soothability, nor the interaction between the two variables significantly predicted the percentage of time a toddler spent in any of the other joint engagement states (see Table 5). However, there was a trend (p=.12) for shyer toddlers to

spend a smaller percentage of time in a symbol-infused supported joint engagement state than less shy toddlers. Shyer toddlers also tended to spend a greater percentage of time in a symbol-infused coordinated state of joint engagement than less shy toddlers (p=.11).

Shyness, inhibitory control, and joint engagement. Four hierarchical multiple regressions were conducted in order to examine whether inhibitory control moderated the relationship between shyness and each of the four joint engagement states. A toddler's level of shyness predicted the amount of time spent in each joint engagement state the same way it did in the previous regressions (see Table 5). Neither inhibitory control nor the interaction between shyness and inhibitory control significantly predicted the amount of variance in any of the four joint engagement states.

Shyness and Language Skills

In an attempt to replicate previous findings that shyness is significantly and negatively related to both receptive and expressive language skills in toddlers (Slomkowski et al., 1992; Spere et al., 2004), both receptive and expressive language skills were separately regressed on shyness. Shyness was negatively related to receptive language skill, $R^2 = .09$, $p<.05$. Shyness was also negatively related, but not significantly, to expressive language skill, $R^2 = .06$, p=.09.

Shyness, symbol-infused joint engagement, and language skills. In order to investigate whether the percentage of time spent in symbol-infused joint engagement states mediated the relationship between shyness and both receptive and expressive language skills, a path model was constructed (see Figure 1). This model included both symbol-infused joint engagement states in one model, because otherwise the model was not identified. The path model was analyzed using multiple regression techniques detailed by Kline (1998, 113).

The percentage of time spent in symbol-infused supported and coordinated joint engagement states partially mediated the association between shyness and receptive language scores (see Figure 3).

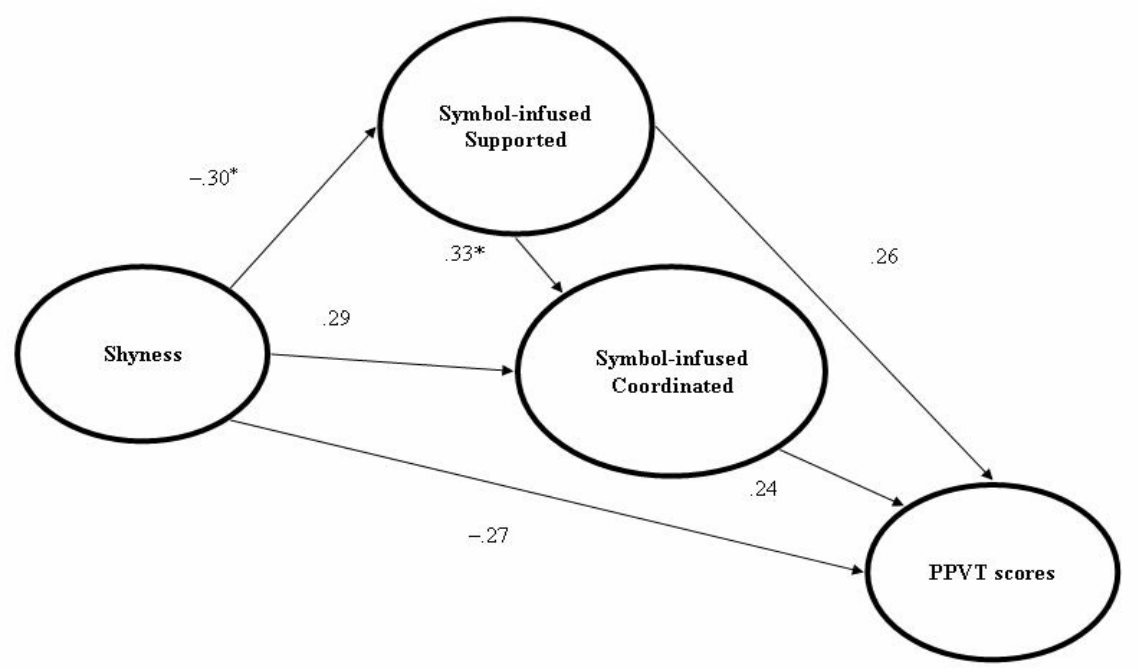

Figure 3. Path model for receptive language.

The direct effect was - .27 (p = .07) but the total effect was -.30 (i.e., 10% of the total effect of shyness on receptive language scores was mediated by the percentage of time spent in both symbol-infused supported and coordinated joint engagement). Furthermore, toddlers who spent a greater percentage of time in symbol-infused states of joint engagement and were less shy had better receptive language skills than shyer toddlers in general, unless the shyer toddlers spent more than an average percentage of time in both symbol-infused joint engagement states (see Figure 5).

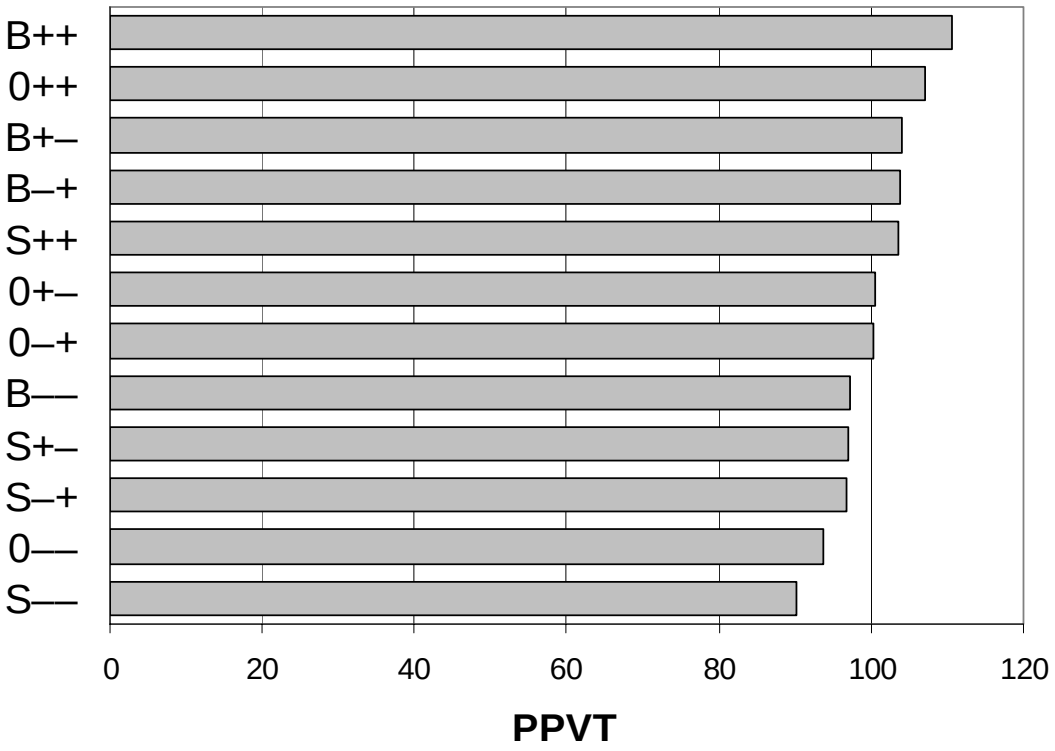

Figure 4. Regression predicted PPVT scores for toddlers 1 SD below, at, and 1 SD above the mean for shyness, and 1 SD above and below the mean for symbol-infused supported and symbol-infused coordinated joint engagement.

1st: B = mean shy + SD, 0 = mean shy, S = mean shy – SD

2nd: + = mean symbol-infused supported joint + SD, – = mean SISJ – SD

3rd: + = mean symbol-infused coordinated joint + SD, – = mean SICJ – SD

For the relationship between shyness and expressive language scores the direct effect was –.17 (*p* = .20) but the total effect was –.25 (i.e., 32% of the total effect was mediated; see Figure 4).

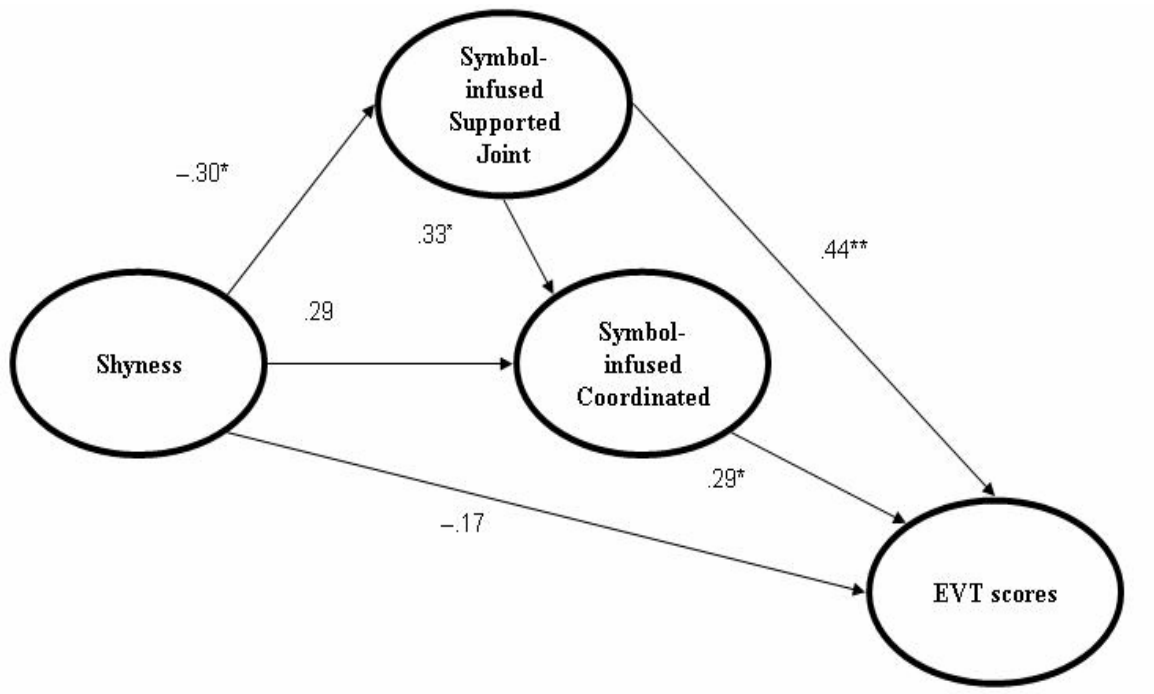

Figure 5. Path model for expressive language.

Furthermore, expressive language scores were best predicted from the percentage of time toddlers spent in symbol-infused states of joint engagement (see Figure 6).

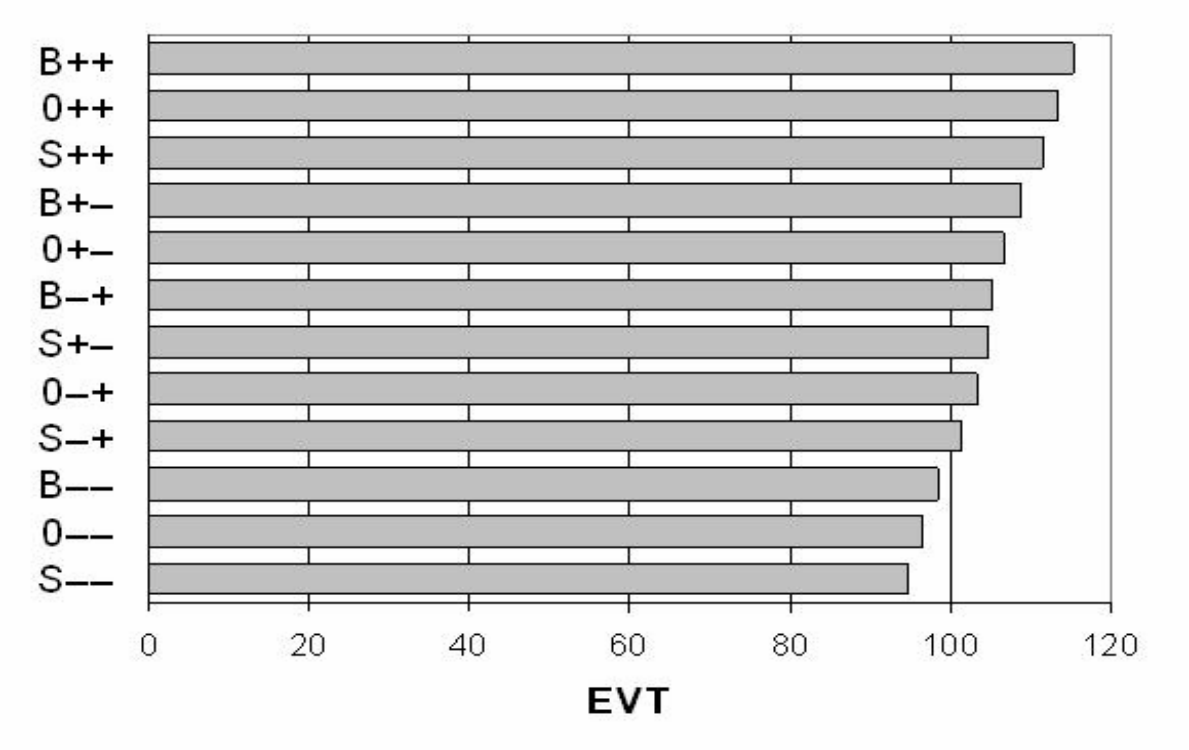

Figure 6. Regression predicted EVT scores for toddlers 1 SD below, at, and 1 SD above the mean for shyness, and 1 SD above and below the mean for symbol-infused supported and symbol-infused coordinated joint engagement.

1st: B = mean shy + SD, 0 = mean shy, S = mean shy – SD

2nd: + = mean symbol-infused supported joint + SD, – = mean SISJ – SD

3rd: + = mean symbol-infused coordinated joint + SD, – = mean SICJ – SD

Toddlers were predicted to have better expressive language skills when they were less shy and spent more than an average percentage of time in both symbol-infused states of joint engagement as compared to the predicted scores for shyer toddlers who spent less than an average percentage of time in both states of symbol-infused joint engagement.

Chapter 4: Discussion

This study has added to the field of child development in that temperamental dimensions, which were not previously and consistently linked to joint engagement and language skills, were hypothesized and found to have meaningful relationships with these important childhood achievements. This study has not only added to the literature on joint engagement but it has also bridged areas of investigation such as temperament and language development with the area of joint engagement by constructing and testing components of a conceptual model (see Figure 1). This model was constructed to investigate how multiple factors affect a toddler's language skills. We have highlighted the importance of investigating multiple influences (i.e., temperamental dimensions) on joint engagement and language skills.

One weakness of this study is that there are too few toddlers to test the presented conceptual model related to how shyness, emotion-regulation processes, and joint engagement all influence a toddler's language skills. In addition, the findings of this study may be somewhat unreliable because of the number of analyses that were conducted on this small sample. Furthermore, the small sample size limited the ability to detect significant findings; therefore, it would be useful to replicate this study with a larger sample.

Shyness and Joint Engagement

With these strengths and limitations in mind, the results of this study suggest that the quality of the interactions of typically developing shyer toddlers is different from that of less shy toddlers. We found that shyness affected the percentage of time toddlers spent in states of joint engagement with their mothers. More specifically, the effect involves the way a toddler balances

attention to a shared event and a social partner. Shyer toddlers spent a greater percentage of time in a non-symbol-infused coordinated engagement state with their mothers than less shy toddlers. In addition, there was a trend for shyer toddlers to devote more time to a symbol-infused coordinated joint engagement state and less time to symbol-infused supported joint engagement state than less shy toddlers. Though investigating the influence of shyness on states of joint engagement is a new area of interest, researchers have found that a toddler's degree of shyness affects how they interact with their mothers. In particular, Vaughn (2001) found that shyness predicted that an infant would make spontaneous eye contact with a social partner regarding an object of interest. In a broader sense, the results of our study are also in line with Stevenson-Hinde's (2000) finding that shyer toddlers tend to be ambivalently attached to their mothers. She suggests that this pattern may occur in part because ambivalently attached children express themselves by over-emphasizing emotions and exuding dependence on their parents, thus appearing more fearful than children with a different attachment pattern. Overall, our study and others have found that a child's degree of shyness affects different types of social interactions even when they occur with one's mother.

The relationship between shyness and the percentage of time spent in non-symbol-infused coordinated joint engagement found in our study is contrary to what was predicted and it suggests that shyer toddlers may utilize states of engagement differently than less shy toddlers. Shyer toddlers may be interacting with their mothers in this novel environment in a way that we call "coordinated joint engagement", but this state may not be operating the same way for shyer toddlers as it does for less shy toddlers. For instance, shyer toddlers may be explicitly referencing their mothers while also maintaining a shared focus in order to decrease their feelings of distress whereas less shy toddlers may be entering into and using states of

coordinated joint engagement to share affect and information about objects. Qualitative observations of more and less shy toddlers are a necessary next step in order to examine if these groups utilize states of joint engagements differently.

Some researchers have examined how shyness influences and changes the nature of social interactions by investigating how individual differences in shyness affect social referencing. Social referencing has been thought of as a way for infants to gain information about a novel situation and adjust their behavior based on that information (Hornik & Gunnar, 1988; Urbano-Blackford & Walden, 1998). However, the findings from research on shyness and social referencing are mixed. For instance, one study indicated that shyer infants and toddlers did not look toward their mothers (i.e., face or body) more often than less shy children, whereas another study found the opposite pattern of results (Hornik & Gunnar, 1988; Urbano-Blackford & Walden, 1998). Hornik and Gunnar's (1988) study found shyer infants looked to their mothers more often than less shy infants, but that this difference dissipated over time. In addition, the researchers found that looks to the mother from an infant, regardless of degree of shyness, increased when the mother was providing the child with information without the child requesting that information. These researchers interpret the latter finding to mean that "unsolicited" information from mothers may suggest to a child that she is available as a source of information. These results and suggestions are interesting given our finding that shyer toddlers tended to spend less time in a more scaffolded interaction than less shy toddlers and spent more time in an interaction where the child was sharing a focus with his mother and also explicitly referencing her. Perhaps the "unsolicited" information during states of supported joint engagement serve as a cue to a shyer child, as compared to a less shy child, that his mother is available as a resource. This cue may lead a shyer child, as compared to the less shy child, to

shift to interacting with his mother in states of coordinated joint engagement where he may ask for and add information to the interaction more easily.

Urbano-Blackford and Walden (1998) have a different interpretation as to why temperamental dimensions may affect social interactions. First, these researchers did not find that shyer infants and toddlers looked to their mothers faces more often than less shy children. However, the researchers found that 11- to 15-month-old children, who were characterized as less shy, avoided a toy more often after the mother gave a fearful facial and verbal message to the child, but shyer infants avoided a toy more often after receiving positive messages from the parent. The shyer infants did not show the same avoidance response to the toy after receiving fearful messages from the mother. However, this interaction was not significant for older 16- to 22-month-old children. The authors suggest that shyness is related to behavior regulation only in younger infants. However, it may be that shyness in older children is not related to approach/avoidance behaviors because the expression of shyness is beginning to be internally regulated by the child in addition to the regulation provided to the child by the mother's messages.

Shyness, emotion-regulation, and joint engagement. We found that emotion-regulatory processes, in particular, soothability, changed the relationship between shyness and joint engagement, specifically in the non-symbol-infused coordinated state. Shyer toddlers who were are able to soothe themselves devoted more time to explicitly referencing their mothers as well as maintaining a shared focus with their mothers than shyer toddlers who were not as good at soothing themselves. However, when we examined how this relationship operated for less shy toddlers, we found the opposite pattern of results.

Research on the relationship between these three factors is limited. However, Kagan, Snidman, Zentner, and Peterson's (1999) found that 7-year-old children who had been classified as highly reactive, defined as frequent motor activity along with frequent fussing and crying, at 4 months of age were more likely to have anxious symptoms (i.e., feeling shy with other children and unfamiliar adults as well as being afraid of lightening, thunder, or animals), to be more passive when interacting with unfamiliar adults, and to be more reserved on novel tasks than the children classified as low reactive. Even though this study does not test whether "high reactivity" moderated the relationship between anxious symptoms and passiveness during social interactions, the results seem to indicate that being shy and having difficulty regulating distress negatively affects a child's ability to interact with others. Urbano-Blackford and Walden's (1998) findings suggest individual differences in temperamental shyness affect the way children interpret cues from their mothers and use that information to adjust their behavior. Overall, research findings suggest that in addition to shyness internal and external regulatory factors affect social interactions. However, more research needs to be conducted on how emotion-regulation and shyness affect social interactions.

Shyness, Joint Engagement, and Language Skills

We found that less shy 24-month-old toddlers scored better on measures of receptive language skills at 30 months of age than more shy toddlers, and there was a trend in the same direction for measures of expressive language skills. This result replicates previous findings (Slomkowski et al., 1992; Spere et al., 2004), lending support to the notion that behavioral tendencies do influence important developmental milestones, such as language development, even over time.

A toddler's pattern of joint engagement was found to partially account for the relationship between shyness and language skills; this pattern of results was stronger for receptive than expressive language skills. As a result, both shyness and joint engagement with mothers is necessary to predict language skills. Researchers have found recently that toddlers who can be classified as "early-onset" talkers also tend to spend more time in a symbol-infused supported state of joint engagement as compared to the amount of time they spend in a symbol-infused coordinated state of joint engagement (Adamson et al., 2004). Therefore, the negative relationship we found between shyness and language skills as well as the negative relationship between shyness and the percentage of time spent in a symbol-infused supported joint engagement state is consistent with and extends previous research. Therefore, it seems that spending time in a state of symbol-infused supported joint engagement is uniquely important for acquiring and developing language skills (Adamson et al., 2004).

In a broader sense, researchers have begun to investigate how temperamental dimensions, parenting, and language skills are all related (Karass & Braungart-Rieker, 2003). These authors found that infants who were less shy but had more responsive mothers also had better language skills, but there was no significant association between maternal responsiveness and shyness on language abilities when infants were shyer. Though maternal responsiveness is not equivalent to how mothers interact with toddlers during states of joint engagement, it is important to recognize that researchers are beginning to investigate multiple influences on childhood achievements. These authors suggest that their findings lend support to Bloom and Tinker's (2001) "Intentionality Model" (as cited in Karass & Braungart-Rieker, 2003) of language acquisition, which purports that the expression of emotion conflicts with language development. However, this model is missing a key component in determining what influences how children acquire and

develop language skills, emotion-regulation. Therefore, it is conceptually incomplete. Testing the conceptual model constructed in this study with a large sample of toddlers would address the missing factor in Karass and Braungart-Rieker's study (2003). Furthermore, it is possible that emotional expression hinders language development; therefore, it will be important for future research to examine whether emotion-regulation moderates the relationship between temperamental dimensions and language skills. A revision of our conceptual model could test this hypothesis.

The overarching message of the results from this study is that investigating how multiple developmental factors influence important childhood achievements is essential in order to develop a clearer, more comprehensive picture of the important influences on child development. In this study, we found that a toddler's degree of shyness affected the way that she engaged with her mother but that this relationship was better explained when the child's ability to regulate her emotions was also taken into account. Furthermore, shyer, as compared to less shy, 24-month-old toddlers had poorer language skills at 30-months of age, but this relationship was partially accounted for by the amount of time a toddler spent in symbol-infused states of joint engagement. Lastly, it will be important for researchers to continue to investigate models, such as the model described in this study, in order to determine how relationships between various factors (e.g., temperamental dimensions and states of joint engagement) influence and together predict language skills in toddlers.

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Chapter 6: Appendix

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Toddler Behavior Assessment Questionnaire

Listing of Items by Content Scale

Social Fear (SF) Scale (9 items)

When one of the parents' friends who does not have daily contact with your child visited the home, how often did your child:

1 2 3 4 5 6 7 NA (4) check with parent for assurance?

1 2 3 4 5 6 7 NA (5) talk much less than usual?

When at the doctor's office, how often did your child:

1 2 3 4 5 6 7 NA (7) cry or struggle when the doctor tried to touch her/him?

When your child was being approached by an unfamiliar adult while shopping or out walking, how often did your child:

1 2 3 4 5 6 7 NA (16) show distress or cry?

When s/he saw other children while in the park or playground, how often did your child:

1 2 3 4 5 6 7 NA (28) approach and immediately join in play? [REVERSE SCORED]

When first meeting a stranger coming to visit in the home, how often did your child:

1 2 3 4 5 6 7 NA (41) allow her/himself to be picked up without protest? [REVERSE SCORED]

1 2 3 4 5 6 7 NA (42) "warm up" to the stranger within 10 minutes? [REVERSE SCORED]

When the child knew the parents were about to leave her/him at home, how often did your child:
1 2 3 4 5 6 7 NA (62) cling to the parent?

When first visiting a babysitting co-op, daycare center, or church nursery, how often did your child:

1 2 3 4 5 6 7 NA (71) immediately begin to explore? [REVERSE SCORED]

Inhibitory Control (IC) Scale (9 items)

When asked to wait for something (like dinner), how often did your child:

1 2 3 4 5 6 7 NA (18) wait patiently?

1 2 3 4 5 6 7 NA (19) find something to distract him/herself until it was time?

In a restaurant chair or grocery store cart or other similar situation, how often did your child:

1 2 3 4 5 6 7 NA (23) have trouble sitting still? [REVERSE SCORED]

When asked to do so, how often did your child:

1 2 3 4 5 6 7 NA (26) lower his/her voice?

1 2 3 4 5 6 7 NA (27) have difficulty following instructions? [REVERSE SCORED]

When asked not to play with something, how often did your child:

1 2 3 4 5 6 7 NA (30) play with it anyway? [REVERSE SCORED]

When you said “no”, how often did your child:

1 2 3 4 5 6 7 NA (32) ignore your warning? [REVERSE SCORED]

When near something s/he has been told was dangerous, how often did your child:

1 2 3 4 5 6 7 NA (39) approach slowly and cautiously?

When asked to share or take turns, how often did your child:

1 2 3 4 5 6 7 NA (72) follow your instruction?

Falling Reactivity and Soothability (SO) Scale (10 items)

When your child was upset and needed to be comforted, how often did your child:

1 2 3 4 5 6 7 NA (9) cheer up quickly by her/himself?

1 2 3 4 5 6 7 NA (10) soothe self by distracting to other things (e.g., favorite toy, stuffed animal, blanket)?

Following an exciting event, how often did your child:

1 2 3 4 5 6 7 NA (22) remain excited for a long time?

When put down for a nap, how often did your child:

1 2 3 4 5 6 7 NA (25) settle down quickly?

When being put to bed at night, how often did you child:

1 2 3 4 5 6 7 NA (45) fall asleep within 10 minutes?

When comforting your upset child, how often did s/he:

1 2 3 4 5 6 7 NA (56) cry for more than 5 minutes? [REVERSE SCORED]

After s/he gets a bump or a scrape, how often did your child:

1 2 3 4 5 6 7 NA (58) remain upset for a long time? [REVERSE SCORED]

When you are comforting your upset child, how often does s/he:

1 2 3 4 5 6 7 NA (64) cheer up within 5 minutes?

When frustrated or angry about something, how often did your child:

1 2 3 4 5 6 7 NA (67) calm down within 5 minutes?

When upset, how often did your child:

1 2 3 4 5 6 7 NA (77) change to feeling better within a few minutes?