PARENT INTERACTIVE BEHAVIORS AND LANGUAGE DEVELOPMENT IN CHILDREN WITH AUTISM SPECTRUM DISORDER, FRAGILE X SYNDROME, AND NO DISABILITY

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Abstract

GENNA DURANTE: Parent Interactive Behaviors and Language Development in Children with Autism Spectrum Disorder, Fragile X Syndrome, and No Disability (Under the direction of Rune Simeonsson)

Language and communication deficits are key features of both autism spectrum disorder (ASD) and fragile X syndrome (FXS). Previous literature has identified parent interaction behaviors as a potential predictive factor in language development for children with and without disabilities, but the relationship between variables is largely unknown for school-age children. In this study, the relationship between parent interactive behavior and language gains was assessed for 66 school-age boys with ASD, FXS and ASD, FXS only, and no disability. Parents interacted with their child in a free play activity and parent behaviors were rated from videotape on the domains of warmth, sensitivity, responsiveness, encouragement of initiative, stimulation value and elaborativeness. Results indicated that parental warmth was a significant predictor of later language gains, while the other domains were not. These results support the linkage of parent interactive behaviors to developmental outcomes during the school-age years.

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Introduction

The language deficits experienced by children with autism spectrum disorder (ASD) and fragile X syndrome (FXS) can significantly impact their social development, academic achievement, and overall global functioning. While many of these children will have difficulty with language and communication skills throughout their lives, researchers have uncovered a number of factors that are predictive of better language outcomes. One of these factors is the responsive and sensitive behavior of parents during parent-child interactions (Siller & Sigman, 2008; Wheeler, Hatton, Reichardt, & Bailey, 2007; Warren, Brady, Sterling, Fleming, & Marquis, 2010). While researchers have studied the benefits of parent interactive styles with younger children extensively, there exists a gap in the current literature regarding the influence of parent interactive styles on school-age children's development, for children with and without disabilities. It is essential for the research community to provide parents and educators with evidence-based information that can help them to best support children's language development and help them to achieve optimal outcomes.

Review of the Literature

The relationship between parent interactive behaviors and children's global developmental gains has been well documented in the literature in typical development (Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003; Landry et al. 2006). For children with disabilities, such as ASD and FXS, the effects of parenting behaviors on development are of particular interest due to the prevalence of skill deficits and

developmental delays, as well as increased parental dependence throughout childhood and, in some cases, into adulthood. It has been well documented in the literature that parent interactive behaviors can predict subsequent language development in young children with FXS and ASD (Siller & Sigman, 2008; Wheeler, et al., 2007; Warren et al., 2010), but little is known about the influence of parenting on the language development of school-age children with these disabilities. To examine this issue, a review of the literature will address (a) the language and communication deficits specific to ASD, to FXS, and to children with both ASD and FXS, (b) maternal interactive behaviors associated with positive developmental outcomes, (c) parent and child characteristics that influence maternal interaction, and (d) evidence for parent interactive behaviors as a predictor of language gains. In addition, I will identify limitations in the previous literature and provide rational for the present study.

Language and Communication Deficits in Children with ASD and FXS

Language and communication deficits are key features of ASD (Mash & Wolfe, 2007). Children with ASD vary widely in their language abilities, with approximately half developing no functional language (Mash & Wolfe, 2007). While some children with ASD have structural language skills within the normal range, they experience deficits in pragmatic language (Volden & Phillips, 2010). For example, children with ASD often struggle to develop spontaneous speech, use nonverbal communication to regulate social interactions, initiate conversation, ask questions to clarify or gather information, maintain a topic of conversation and take turns appropriately (Volden & Phillips, 2010; Mash & Barkley, 2007; Koegel, Koegel, Green-Hopkins, & Barnes, 2010). In addition to pragmatic deficits, some children with ASD show unusual speech patterns, such as

echolalia, perseveration and pronoun reversals (Mash & Wolfe, 2007). Deficits are common in receptive and expressive language in children with ASD, and they typically experience more communication breakdowns than their typically developing peers (Hudry et al., 2010; Keen, 2004).

Multiple genetic disorders have been found to be co-morbid with autism (Cohen et al., 2005). One of these disorders is FXS, a genetic disorder that is the result of a mutation in the *FMR1* gene located on the X chromosome (Mash & Wolfe, 2007). Individuals with FXS can experience little or no symptoms of the disorder or have a full mutation and experience a variety of cognitive, social, and language deficits over the course of their development (Abbeduto, Brady, & Kover, 2007). Between 20 and 50 percent of boys with FXS meet the criteria for autism, and approximately 67 percent meet the criteria for autism spectrum disorder (Hatton et al., 2006; Clifford et al., 2007; Philofsky et al. 2004).

Researchers have identified several speech and language impairments in children with FXS, including challenges with language comprehension, speech, delayed lexical development, perseveration, and a slower rate of expressive language acquisition compared to receptive language (Price, Roberts, Vandergrift & Martin, 2007; Rice, Warren, & Betz, 2005; Abbeduto & Hagerman, 1997), although individuals with FXS vary widely in their abilities (Roberts, Mirrett, & Burchinal, 2001). A review by Abbeduto and colleagues (2007) found that children with FXS have impaired cognitive skills necessary for language and communication, including auditory short-term memory, processing of sequential information, and sustained attention. However, researchers still

lack a comprehensive understanding of the language deficits experienced by individuals with FXS.

Some studies have begun to untangle the complex profiles of children with both FXS and ASD (Abbeduto et al., 2007; Lewis et al., 2006). With regard to language, the literature suggests that children with both disorders suffer greater impairments than children with FXS alone (Abbeduto et al., 2007). Children with both FXS and ASD have lower non-verbal IQs, weaker vocabularies, weaker receptive language and expressive language, and greater deficits in theory of mind compared to children with FXS alone (Abbeduto et al., 2007; Lewis et al., 2006). In addition, differences have been found in their communicative abilities (Roberts et al., 2007). Roberts and colleagues (2007) found that boys with both FXS and ASD engage in less contingent discourse compared to boys with only FXS. Less is known regarding differences in language impairments in children with both FXS and ASD and ASD only.

Parental Interactive Behaviors

Due to the potentially severe impact of language deficits on the lives of children with developmental disabilities, a considerable amount of studies have focused on identifying potential predictors of better language outcomes. For example, nonverbal cognitive ability, joint attention, and imitation skills have been identified as factors predictive of language development in children with developmental disabilities (Mundy, Sigman, & Kasari, 1990; Stone & Yoder, 2001, Thurm, Lord, Lee, & Newschaffer, 2007). Parenting behaviors have been found to be another predictor of language outcomes for children with and without disabilities (Warren & Brady, 2007; Landry, Smith, Swank, Assel, & Vellet, 2001; Landry, Smith, & Swank, 2006; Siller & Sigman,

2008). In particular, parent's responsiveness, sensitivity and warmth when interacting with their children have been identified as particularly important for their development (Jennings et al., 2008). In the literature, these behaviors are often examined as a composite and referred to in a number of ways, including maternal responsivity, maternal sensitivity, or maternal synchronization. It must be noted that while the term "maternal" is used primarily in the literature, fathers or other caregivers demonstrate these behaviors as well.

Parent interactive behaviors high in responsivity, sensitivity and warmth have been documented in the literature as a predictor of many positive outcomes for young children in terms of cognitive, social, emotional, and language development, as well as secure attachment patterns (Landry et al. 2006, Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003). The role of maternal interactive behaviors in infancy has been studied extensively, with a focus on at-risk infants. For example, preterm infants exposed to consistently high levels of maternal responsivity have been found to show faster cognitive growth over time compared to preterm infants with less responsive caregivers (Landry et al., 2001) and moderate the impact of early risk factors on low birth rate infants (Laucht, Esser & Schmidt, 2001). Evidence for the positive impact of maternal responsivity, sensitivity and warmth extends beyond infancy and into childhood. For example, Roberts, Jurgens, & Burchinal (2005) found that responsivity and support in the home environment was the best predictor of children's early language and literacy skills, and that maternal sensitivity was related to children's receptive vocabularies.

While maternal interactive behaviors high in responsivity, sensitivity and warmth have been shown to have positive affects on children's development, children exposed to

very low levels of these behaviors have been found to have sub-optimal outcomes across developmental domains (Warren & Brady, 2007). For example, a study by Egeland, Pianta & O'Brien (1993) found that 6-month old at-risk infants who experienced highly intrusive maternal interactions were found to later have worse outcomes academically, socially, emotionally, and behaviorally in first and second grades compared to children who did not experience highly intrusive interactions.

The Influence of Child and Parent Characteristics on Parental Behaviors

Parents' behaviors exist within the complex context of parent-child interactions, making it difficult to determine a causal and directional relationship between parents' behaviors and their children's outcome (Hungerford & Cox, 2006). As with all social interactions, those between parents and children are determined by the characteristics and qualities of those involved, as well as additional environmental factors. The personality, disposition and temperament of the child, determined by genetics and environmental experiences, elicit differential responses from parents (Ganiban, Ulbricht, Saudino, Reiss, & Neiderhiser, 2011). A baby that babbles, frequently smiles and calls out for attention will elicit more responsive interactions from the parent compared to a baby that does not make eye contact or attempt to interact. A child that asks questions about his environment will elicit more responsive interactions and gain more knowledge from the parent compared to a child that has impaired communication and shows limited interest in his environment. Unfortunately, behaviors resulting from language and cognitive deficits associated with ASD and FXS may impact the ability of children with these disorders to elicit highly responsive parenting (Warren & Brady, 2004).

In addition to the child's disposition and temperament, parents have their own unique personalities, values, and beliefs about their child that likely influence their interactive styles. Demographic variables, including parents' income and education also must be considered, as well as spousal and community support (Hungerford & Cox, 2006). Children affected by genetic disorders may have parents who share their disability, which may further impact parenting styles. Mental health is another factor that has consistently been found to affect parenting behaviors, with numerous studies documenting the influence of maternal depression on interaction behaviors (Wheeler et al., 2007; Gondoli & Silverberg, 1997; Goldsmith & Rogoff, 1995). Unfortunately, mothers of children with disabilities experience more depression and stress compared to parents of typically developing children (Dumas, Wolf, Fisman, & Cullingham, 1991). Parents of children with ASD also report greater difficulties keeping a job and have more difficulty finding childcare (Blanchard, Gurka, & Blackman, 2003). Overall, it is clear that parents of children with disabilities face increased challenges, which can negatively affect their interactions with their children.

Regardless of the specific factors influencing maternal behavior, research has shown that mothers make adjustments to their communication and behaviors based on their child's developmental level (Guralnick, Neville, Hammond, & Connor, 2008). While this can most clearly be seen in the differential interactions between parents with their babies and parents with older children, it can also be seen in interactions between mothers and same-age children with and without developmental disabilities. Mothers have been found to use more directives and fewer statements with children with lower cognitive and language abilities (Guralnick et al., 2008; Marfo, 1993). Guralnick and

colleagues (2008) found that as children with disabilities develop more skills over time, mothers exert less control over interactions, decrease their total communication, and increase their use of imperative directives. More studies that address parent interactive behaviors with children with and without disabilities are needed to provide more information on differences in interactive behaviors.

Parent Behaviors as a Predictor of Language in Young Children with ASD and FXS

A limited number of studies have examined the effects of parent interactive behaviors on language in children with ASD and FXS. However, these studies have found evidence for the importance of parental responsivity and sensitivity. Siller and Sigman (2008) conducted a longitudinal study to examine predictors of language abilities in children with autism between the ages of 31 and 64 months. Data was collected in four waves, approximately 12 to 20 months apart. In this study, maternal responsivity was defined by the mother's synchronized behavior with the child's attention and actions. During the initial data collection period, the experimenters videotaped a mother-child interaction episode during a home visit and coded mothers indicating behaviors and verbalizations. On a separate pass-through, the coders determined if the behavior or verbalization was synchronized with the child's actions and/or attention. The interaction episode lasted approximately fourteen minutes, and consisted of the mother and child engaged in free play with a standard set of toys. At each of the four data collection waves, language skills were measured using one of three standardized scales dependent on the child's age. Results from this study found that parents' responsivity was predictive of children's language gains, with children who had highly responsive parents gaining language skills at a faster rate over time compared to children with less responsive

parents. The authors also found that while children's responsiveness was also predictive of their language gains, the two predictors were independent from one another.

Baker, Messinger, Lyons, and Grantz (2010) examined maternal behaviors and subsequent language development in young children with emergent ASD and typically developing children. They selected participants who had either an older sibling who was typically developing or an older sibling with an ASD diagnosis. Children at risk of developing ASD were later assessed at 36-months to see if they met the criteria for an ASD diagnosis. In this study, 18-month-old infants and their mothers were asked to play with a standardized set of toys. Examiners rated the mother's behavior using the parenting sub-scales of the NICHD Early Child Care Network scale based on five behaviors, including responsiveness, respect for child's autonomy, positive regard for the child, structuring, and hostility. Each behavior was rated on a 7-point scale. Children's expressive and receptive language abilities were assessed at later data collection periods when the children were 24 and 36 months old. The authors found that maternal behaviors were positively related to the language gains in children with emergent ASD, but not in typically developing children, suggesting that parenting may be an especially important contributor to the development of young children at risk for ASD.

Wheeler and colleagues (2007) examined maternal responsivity during interactions with their children ages 18 to 71 months with FXS. They examined responsivity by coding frequencies of maintaining and directive behaviors during a 60-minute naturalistic observation, where mother and child performed typical daily routines around the home, and a 10-minute play session with toys provided by the researcher. The mother's verbal and nonverbal behaviors that were responsive to the items or activities

the child was visually or physically attending to were coded as maintaining behaviors. The mother's requests that communicated expectations for her child were coded as directive behaviors. Children's receptive language was assessed at the same data collection period as the observations. The authors found children's receptive language skills to be related to higher rates of maternal maintaining behaviors. While this study was not longitudinal and therefore cannot offer evidence of maternal behaviors as a predictor of language growth, it does provide evidence for the relationship between maternal behaviors and receptive language in young children with FXS.

Warren and colleagues (2010) conducted a longitudinal study to examine maternal responsivity as a predictor of language in young children between the ages of 11 and 48 months with FXS. In this study, maternal responsivity was composed of mother's use of gestures, requests for verbal compliance, use of comments, and verbal interpretations of child's communication attempts. At the first data collection period, videos were filmed of mother and child dyads engaged in three 5-minute interaction episodes in their home. These interaction activities included reading a book together, preparing and eating a snack together, and playing with toys of their choice. In addition, a 30-minute naturalistic interaction sample was filmed in which the dyad was instructed to engage in everyday activities and routines. The three 5-minute interactions, and two additional 5-minute clips extracted from the naturalistic sample, were coded for maternal responsivity. After controlling for autism symptoms, the results of this study found that maternal responsivity predicted language outcomes at 36 months, including receptive and expressive language development. When additionally controlling for developmental

level, maternal responsivity also predicted the number of words children used during the observed interaction and total communication.

Limitations of the Previous Research

While the previous research has provided evidence for the importance of parent interactive behaviors in the language development of young children with and without disabilities (Landry et al., 2001, Siller & Sigman, 2008; Baker et al., 2010; Wheeler et al., 2007; Warren et al., 2010), very little is known about the impact of continued responsive and sensitive parenting on the language development of school-age children. Much of the literature examining parent interactive behaviors have focused exclusively on children under the age of six. Research has found that typically developing and at-risk children exposed consistently to highly responsive parenting throughout early childhood have better outcomes than children exposed to only later or earlier responsive parenting (Landry et al., 2001). This evidence shows that a critical period for responsive parenting in early childhood has not been determined (Warren & Brady, 2007) and suggests a possible extension of the benefits of interactive behaviors beyond early childhood.

There are a few possible reasons why previous studies have focused exclusively on young children. First, it is well known that typically developing children make their greatest language gains during early childhood. However, children with disabilities, such as ASD and FXS, are likely to acquire language at a slower rate than typically developing children and may have unusual patterns of language gains (Mash & Wolfe, 2007; Roberts, Mirrett, & Burchinal, 2001). It is possible that a 9 or 10-year-old child with ASD or FXS could have expressive or receptive language abilities equivalent to the level of a 3 or 4-year-old typically developing child. Thus, studies focused on only very young

children with autism and FXS may be missing important periods of language acquisition for these children.

Another possible explanation for the gap in the literature may be based on the assumption that as children grow older, they spend less time with parents and therefore their interactions may no longer strongly influence their development. However, numerous studies have found positive affects for parenting behaviors on adolescents and young adults in various social and emotional domains (Bogenschneider & Pallock, 2008; Yang & Schaninger, 2010; Wearden, Peters, Berry, Barrowclough, & Liversidge, 2008). In addition, school-age children with disabilities, such as ASD and FXS, are likely to still spend significant amounts of time with their parents due to social deficits and increased dependence.

There are additional limitations of the previous literature addressing predictors of language gains in children with ASD and FXS. While many studies have compared characteristics of children with autism to characteristics of children with FXS, few studies have also compared a third group of children who have both autism and FXS. Since approximately 67 percent of males with FXS also meet criteria for ASD (Clifford et al., 2007) a third comparison group must be created for these children to better understand their unique profile. Finally, while the literature suggests that parents use more directives towards young children with lower cognitive and language abilities (Marfo, 1992; Guralnick et al., 2008), it is unclear if this interactive style also exists with older children. It is important to continue investigating differences in parent interactive behaviors based on disability status to better understand the experiences and development of children with and without disabilities.

The Present Study

The purpose of the present study is to examine the relationship between parent interactive behaviors and language development in school-age children with ASD, FXS, both ASD and FXS, and children who are typically developing. This topic has yet to be sufficiently addressed in the literature, and doing so could potentially lead to positive outcomes, such as gaining a better understanding of the impact of parenting behaviors on the development of children with disabilities, and learning more about the experiences of school-age children with ASD and FXS. In addition, the present study can provide data to inform effective interventions that can benefit the children and families affected by these disorders.

The present study aims to address the specified limitations of the previous research as follows. First, this study will investigate the relationship between parent interactive behaviors and language growth in children with disabilities beyond the age of six. Second, this study will use diagnostic tools to effectively separate participants with ASD only, FXS only, and ASD and FXS. Third, this study will compare patterns of parent interactive behaviors between groups based on the diagnostic status of school-age children.

The present study will address two research questions: (a) Are parents' interactive behaviors significantly predictive of their children's pragmatic language gains? (b) Do the interactions of parents with their children significantly differ as a function of the child's diagnostic status? Based on the review of the previous literature, I hypothesize that parents' interactive behaviors will predict later language gains and interactions will differ by diagnostic group.

Method

Participants

Participants were drawn from an existing dataset for a larger study at the University of North Carolina's Communication and Neurodevelopmental Disability Project. Participants included boys with FXS with and without ASD, boys with ASD without FXS, and typically developing (TD) boys. In addition, one parent of each child participated in the parent-child interactive play activity. Child participants displayed similar nonverbal mental-age levels, as measured by the Leiter International Performance Scale-Revised (Leiter-R; Roid & Miller, 1995). Boys who did not speak English as their primary language or failed a hearing screening were excluded from this study, as well as boys who had a minimum length of utterance of less than 3.0. Descriptive statistics for the child participants are shown in Table 1. All participants from the large longitudinal dataset that met this study's diagnostic criteria were initially eligible for this study, but were excluded if they did not have a language score on the *CASL* Pragmatic Judgment subtest at data collection time 1 and time 2, if they did not have a parent-child interaction video available for the free play activity at time 1, if they had a sibling that had already been selected for study, or if the video was determined by the author and second coder to be uncodable (criteria for uncodable videos are described in the procedure). A total of 66 participants were eligible for participation. Eleven out of the 66 parents that participated in this study were fathers. Parent education ranged from a high school diploma to a graduate level degree. Approximately 60 percent of parents reported their age at the time of their participation, which ranged from 25 to 49 years.

Table 1

Descriptive Statistics by Diagnostic Group for Child Participants

	FXS only (n = 10)	FXS and ASD (n = 25)	ASD only (n = 17)	TD (n = 14)
	Chronological age at first data collection period (in years)			
M	9.65	10.37	9.38	4.73
SD	2.81	2.81	2.35	1.46
Range	6.06 - 14.98	6.58 - 10.37	4.17 - 12.77	3.26 - 8.78
	Leiter-R developmental age at first data collection period (in years)			
M	5.36	5.06	5.76	5.24
SD	.60	.50	1.14	1.57
Range	4.42 - 6.33	4.00 - 6.00	3.92 - 7.25	3.58 - 9.17

Fragile X syndrome without autism spectrum disorder (FXS-O). Ten boys with FXS who did not have ASD participated in this study, and were between six and 14 years at the first data collection period. All boys were Caucasian. FXS status was confirmed by DNA analysis completed as part of another study, and all boys had the full mutation. Boys with FXS were excluded from this group if they ever received a score on the Autism Diagnostic Observation Schedule (*ADOS*; Lord, Rutter, DiLavore, & Risi, 2002) that met criteria for an autism spectrum disorder at any data collection period for the larger longitudinal study from which this dataset was derived.

Fragile X syndrome with autism spectrum disorder (FXS-ASD). Twenty-five boys with FXS who also met criteria for ASD participated in this study, and were between the ages of six and 10 years at the first data collection period. Four percent of

participants were Asian, four percent were Biracial, and the remaining were Caucasian. FXS status was confirmed by DNA analysis completed as part of another study, and all boys had the full mutation. Boys with FXS were assigned to the FXS-ASD group if they met criteria for ASD on the *ADOS* during any data collection period from the larger longitudinal study from which this dataset was derived. Four of the participants that were assigned to the FXS-ASD group did not score in the ASD range on the *ADOS* during the two-year span of the current study, but had record of at least one *ADOS* score that met the threshold for ASD during other data collection periods for the larger study from which this dataset was derived.

Autism spectrum disorder (ASD-O). Seventeen boys with ASD who did not have FXS participated in this study and were between the ages of four and 12 years at the first data collection period. Eleven percent of participants were African American and the remaining were Caucasian. Ethnicity data was not available for one participant. Participants were assigned to the ASD-O group if they did not have FXS, as determined by genetic testing, and had a score on the *ADOS* that met the threshold for ASD. All participants met criteria for ASD at the first data collection period of the current study except for one participant who met criteria at another data collection period that was part of the larger study from which this dataset was derived.

Typically developing (TD). Fourteen boys who were typically developing and were between the ages of three and eight years at the first data collection period participated in this study. Seven percent of participants were African American, seven percent were Biracial, seven percent were Hispanic, and the rest were Caucasian. They obtained scores on the Leiter-R that were similar to the participants with FXS and ASD.

TD boys could not have ASD, developmental disability, hearing loss, speech or language difficulties, or be receiving speech or language therapy at the start of the study to participate.

Assessments

Language gains. Children's pragmatic language was assessed with the Pragmatic Judgment subtest of the Comprehensive Assessment of Spoken Language (*CASL*; Carrow-Woolfolk, 1999) administered at data collection periods 1 and 2. The *CASL* is a standardized valid and reliable measure of children's spoken language (Carrow-Woolfolk, 1999). Language gain scores were computed for each child participant by subtracting his age-equivalent score in years at the first data collection period from his score at the second data collection period.

Parent behaviors. Parent behaviors were assessed during a free play activity using a modified version of the *MULTI-PASS* video coding system (Marfo, 1992). While the *MULTI-PASS* coding system was designed to assess both parent and child behaviors, only the parents' behaviors were coded in this study (Pass Four), following the procedures of Roberts, Jurgens, and Burchinal (2005). The following domains of maternal behaviors were rated on a five-point likert scale: warmth, sensitivity, responsiveness, encouragement of initiative, stimulation value, and elaborativeness. Warmth is the extent to which the parent expresses positive affect and affection for the child. Sensitivity is the extent to which the parent shows awareness of the child's interests and frustrations and reads his verbal and nonverbal cues. Responsiveness is measured by how well the parent responds promptly and consistently to the child's behaviors, invitations for interaction, and interests. Encouragement of initiative is the

extent to which the parent allows the child to be self-directed and in charge of the activity and follows his lead in exploring the toys. Stimulation value is measured by the extent to which the parent's behavior provides cognitive and linguistic stimulation to the child. Elaborativeness is measured by how much the parent elaborates on the child's verbal and nonverbal behaviors, and encourages the child to elaborate on his thoughts and actions.

Before using the *MULTI-PASS* coding system for this study, the author established a minimum of 80 percent within one-point agreement on the scale for each behavioral category with a trained *MULTI-PASS* coder on five videos that were used for a previous study. The *MULTI-PASS* coding system was modified from the version used by Zeisel and Roberts (2006) to better reflect the age of participants in this study. Specific coding descriptions used for this study can be found in Appendix A. The *MULTI-PASS* coding system has been used previously in the literature to assess parent-child interactions (Marfo, 1992; Roberts, Jurgens, & Burchinal, 2005; Wallace, Roberts & Lodder, 1998).

Procedure

This study used data from two data collection periods, approximately one year apart, that were part of a larger study examining pragmatic language through the Communication and Neurodevelopmental Disabilities Project at the University of North Carolina at Chapel Hill. Parent-child interaction videos were filmed during the first data collection period, and the *CASL* Pragmatic Judgment subtest was administered at year 1 and year 2. Trained examiners met with the child at his home (or preferred location, such as school) and administered a number of assessments at times one and two. Sessions lasted between two and six hours depending on the child's age and stamina, and often

spanned over two days. The parent-child interaction session lasted approximately 25 minutes, and required the dyad to engage in four activities. The activity analyzed in this study was the free play interaction, which lasted approximately 5 minutes. In this activity, the parent and child were given a bin of toys and were told to talk about the toys as they played with them. The examiner left the room or retreated to another part of the room while the dyad played. Many of the toys provided were open-ended, and required exploration and communication to figure out how they worked. The box of toys was the same for each dyad.

***MULTI-PASS* coding procedure.** The author of this paper coded all of the videos, and was not a part of the original data collection procedures when the videos were recorded. The author trained a second coder in the modified version of the *MULTI-PASS* coding system used for this study for the purposes of establishing interrater agreement. Prior to coding for reliability, the second coder completed training by establishing 85 percent within one-point agreement on the author's codes for six videos across the four original parent-child interaction activities.

Data for this study were extracted from the entire free play activity, or the first 6 minutes of the interaction if it exceeded 6 minutes. Videos that were less than 4 minutes in duration were excluded because the coders agreed that they were too difficult to score. Behaviors were coded from the frame after the examiner's last utterance directed to the parent-child pair to the frame when the examiner gave the first utterance upon returning. Therefore, the parent's behavior during interactions with the examiner was not coded. Following the procedures of Wallace and colleagues (1998), notes were taken on the parent's behaviors while viewing the video. Once the complete interaction had been

viewed, each of the six *MULTI-PASS* behaviors were assigned a numerical rating from one to five based on the definitions provided in the modified *MULTI-PASS* coding system (see Appendix A). Typically, a code of 1 indicated very little expression of the targeted behavior and a 5 indicated a very high amount of the behavior. If behaviors were unable to be coded after the initial viewing, the videos were viewed a second or third time.

A small number of videotapes were determined by the author and second coder to be uncodable and were not used in this analysis as part of the 66 interactions. These included videos that were of poor sound quality that caused the majority of the parent's verbalizations to be unintelligible, and interactions in which the parent made more than five utterances to the examiners or someone else in the room besides the child. The reason for this decision was because it was too difficult to determine whether the parent was truly behaving in a way that was insensitive to the child or if he or she simply did not understand the directions for the activity. In addition, interactions in which the examiners had to constantly reenter the interaction to redirect the child to stay seated were excluded because it was too difficult to assess the parent's behavior independent of the examiner's behavior. Interactions where the wrong toys were used were also not coded.

Interrater agreement was calculated based on 17 videos using interclass correlation coefficients for exact agreement. These videos represented 30 percent of the FX-O group, 24 percent of the FX-A group, 24 percent of the ASD group and 27 percent of the TD group. Exact interrater agreement intercorrelation coefficients for each domain were as follows: warmth = .82, sensitivity = .46, responsiveness = .25, encouragement of initiative = .60, stimulation value = .69, elaborativeness = .65. Due to the low interrater

agreement for the domains of sensitivity and responsiveness, it was determined that these should be eliminated from analysis. All videos coded for reliability were later consensus coded by both the author and the second coder. During consensus coding, the author and second coder watched the videos together and decided on the most appropriate score based on the definitions provided in the modified *MULTI-PASS* coding manual. The consensus codes replaced the author's original codes in the final data set for each of these videos. Due to time constraints, it was not possible to consensus code all of the videos. The author was blind to diagnostic status when coding independently, but it was not possible for the author to be blind during all cases when consensus coding. The second coder was always blind to diagnostic status, and did not know which videos were being used for reliability purposes.

Data Analysis

Means, standard deviations, and range of scores for the six *MULTI-PASS* domains and language gains were computed as well as intercorrelations. Regression analyses were calculated to determine if the parent behaviors assessed through *MULTI-PASS* (excluding sensitivity and responsivity due to poor interrater agreement), were significantly predictive of children's later language gains**,** as measured by age-equivalent gain scores on the Pragmatic Judgment subtest of the *CASL*. Follow-up regressions for the three disability groups were conducted excluding the participants who were typically developing. Finally, ANOVAs were computed to determine if there were significant differences in parents' behaviors between the four diagnostic groups on the four *MULTI-PASS* domains.

Results

Descriptive Statistics for MUTLI-PASS Domains and Language Gains

Means, standard deviations, and ranges for the six *MUTLI-PASS* domains are presented by diagnostic group in Table 2. Mean ratings for each domain show that scores of parent behavior were negatively skewed, meaning that parents were rated higher than average on the *MULTI-PASS* scale on all six domains. Stimulation value was rated as particularly high across groups. Range values show that it was uncommon to receive a score of 1 for any of the six domains, although it did occur for parents of children in the FXS-ASD and ASD-O groups. These results indicate that the range of scores that parents received was restricted, and that parents generally behaved in predictable ways across domains and diagnostic groups.

Means, standard deviations, and range of scores for language gain on the *CASL* Pragmatic Judgment subtest are presented by diagnostic group in Table 3. Mean scores suggest that TD boys gained more language skills over the course of the year, which was to be expected. Negative gain scores indicate a loss of skills between data collection periods. Range scores indicate that all groups except for the TD group had at least one individual that received a lower language score at the second data collection period than at the first. One participant in the FXS-ASD group and two participants in the ASD-O group did not receive a language gain score because they scored a 0 at either the first or second data collection period. A score of 0 is difficult to interpret, so these participants were excluded from all analysis involving language gains.

Table 2

Mean, Standard Deviation and Range for Parent Behaviors by Diagnostic Group

	Elaborat-iveness	Encourag-ement of Initiative	Respons-iveness	Sensitivity	Stimula-tion Value	Warmth
FXS only (*n*=10)						
M	3.90	3.50	3.80	3.90	4.20	3.60
SD	.88	.71	.92	.88	.79	.84
Range	3.00-5.00	2.00-4.00	3.00-5.00	3.00-5.00	3.00-5.00	3.00-5.00
FXS and ASD (*n*=25)						
M	3.84	3.20	3.76	3.84	4.32	3.44
SD	.85	1.05	.93	.94	.80	.96
Range	2.00-5.00	1.00-5.00	2.00-5.00	2.00-5.00	2.00-5.00	2.00-5.00
ASD only (*n*=17)						
M	3.65	3.35	3.59	3.76	4.12	3.29
SD	1.00	1.06	1.06	1.10	.86	1.16
Range	2.00-5.00	1.00-5.00	1.00-5.00	2.00-5.00	3.00-5.00	1.00-5.00
TD (*n*=14)						
M	4.14	3.64	4.43	4.21	4.43	3.71
SD	1.10	.84	.65	.89	.76	.73
Range	2.00-5.00	2.00-5.00	3.00-5.00	3.00-5.00	3.00-5.00	3.00-5.00

Table 3

Language Gains by Diagnostic Group

	Language Gains (in years)
FXS only (*n*=10)	
M	.47
SD	.97
Range	-1.17-.2.00
FXS and ASD (*n*=24)	
M	.18
SD	.78
Range	-1.58-1.50
ASD only (*n*=15)	
M	.54
SD	.67
Range	-.33-1.75
TD (*n*=14)	
M	1.62
SD	.96
Range	.58-3.42

Intercorrelations Among *MULTI-PASS* Variables and Child Language Gain

Intercorrelations were calculated to examine the overlap between the six *MULTI-PASS* variables and language gains. The correlations in Table 4 show that *MULTI-PASS* variables were related, with the exception of stimulation value and encouragement of initiative, which is a pattern that has been documented previously in the literature (Wallace, Roberts, & Lodder, 1998). Correlations among *MULTI-PASS* variables ranged from .24 to .84. Sensitivity and responsiveness were strongly correlated, indicating they were likely measuring the same behaviors. Language gains were related to only

responsiveness and warmth. Correlations among language gains and *MULTI-PASS* domains ranged from .13 to .26. All correlations were rounded to the nearest hundredth.

Table 4

MULTI-PASS Variables and Language Gain Correlations for All Participants (N=66)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years) *n*= 63
Elaborativeness	_	.59**	.71**	.79**	.69**	.59**	.18
Encouragement of Initiative		_	.50**	.63**	.24	.57**	.15
Responsiveness			_	.84**	.56**	.56**	.26*
Sensitivity				_	.62**	.61**	.24
Stimulation Value					_	.56**	.13
Warmth						_	.26*
Language Gain (years) *n*=63							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Table 5 shows correlations among *MULTI-PASS* variables and language gains for the TD boys. Here, the only *MULTI-PASS* domains that were not significantly correlated were warmth and encouragement of initiative. Correlations between *MULTI-PASS* domains ranged from .45 to .91. Language gains were not significantly correlated with any of the *MULTI-PASS* domains, with correlations ranging from .05 to .26.

Encouragement of initiative had a negative relationship to language gains, although it was not significant.

Table 5

MULTI-PASS Variables and Language Gain Correlations for TD Boys (n=14)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years)
Elaborativeness	_	.64*	.88**	.91**	.75**	.63*	.26
Encouragement of Initiative		_	.59*	.62*	.62*	.45	-.26
Responsiveness			_	.90**	.54*	.61*	.12
Sensitivity				_	.77*	.70**	.12
Stimulation Value					_	.66*	.21
Warmth						_	.05
Language Gain (years)							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Table 6 shows correlations among *MULTI-PASS* variables and language gains for the ASD-O boys. Here, the only *MULTI-PASS* domains that were not significantly correlated were encouragement of initiative and stimulation value. Correlations between *MULTI-PASS* domains ranged from .16 to .88. Language gains were not significantly

correlated with any of the *MULTI-PASS* domains, with correlations ranging from .22 to .37.

Table 6

MULTI-PASS Variables and Language Gain Correlations for ASD-O Boys (n=17)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years) *n*=15
Elaborativeness	_	.72**	.68**	.78**	.64**	.85**	.27
Encouragement of Initiative		_	.64**	.73**	.16	.73**	.22
Responsiveness			_	.88**	.54*	.66**	.25
Sensitivity				_	.50*	.65**	.32
Stimulation Value					_	.59*	.29
Warmth						_	.37
Language Gain (years) *n*=15							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Table 7 shows correlations among *MULTI-PASS* variables and language gains for the FXS-O boys. Here, encouragement of initiative was not significantly correlated with any of the *MULTI-PASS* domains, and warmth was not significantly correlated with elaborativeness. Correlations between *MULTI-PASS* domains ranged from .19 to .94.

Language gains were not significantly correlated with any of the *MULTI-PASS* domains, with correlations ranging from .03 to -.35. While not significant, language gains had a negative relationship with elaborativeness, encouragement of initiative, responsiveness and stimulation value.

Table 7

MULTI-PASS Variables and Language Gain Correlations for FXS-O Boys (n=10)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years)
Elaborativeness	_	.63	.80**	.71*	.84**	.39	-.35
Encouragement of Initiative		_	.34	.45	.40	.19	-.18
Responsiveness			_	.94**	.83**	.75*	-.16
Sensitivity				_	.84**	.84**	.03
Stimulation Value					_	.64*	-.03
Warmth						_	.30
Language Gain (years)							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Table 8 shows correlations among *MULTI-PASS* variables and language gains for the FXS-ASD boys. Here, warmth and elaborativeness, warmth and responsiveness, and

stimulation value and encouragement of initiative were not significantly correlated. Correlations between *MULTI-PASS* domains ranged from .10 to .77. Language gains were not significantly correlated with any of the *MULTI-PASS* domains, with correlations ranging from .00 to .26.

Table 8

MULTI-PASS Variables and Language Gain Correlations for FXS-ASD Boys (n=25)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years) *n*=24
Elaborativeness	_	.46*	.64**	.75**	.63**	.40	.17
Encouragement of Initiative		_	.40*	.59**	.10	.55*	.26
Responsiveness			_	.77**	.50*	.36	.20
Sensitivity				_	.57**	.45*	.23
Stimulation Value					_	.46*	.00
Warmth						_	.20
Language Gain (years) *n*=24							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Table 9 shows correlations among *MULTI-PASS* variables and language gains for the FXS-ASD and FXS-O boys combined. Here, the only two *MULTI-PASS* domains that

were not significantly correlated were encouragement of initiative and stimulation value. Correlations between *MULTI-PASS* domains ranged from .15 to .81. Language gains were not significantly correlated with any of the *MULTI-PASS* domains, with correlations ranging from .01 to .22.

Table 9

MULTI-PASS Variables and Language Gain Correlations for FXS-ASD and FXS-O Boys Combined (*n*=35)

	Elaborativeness	Encouragement of Initiative	Responsiveness	Sensitivity	Stimulation Value	Warmth	Language Gain (years) *n*=34
Elaborativeness	_	.49**	.68**	.74**	.68**	.40*	.14
Encouragement of Initiative		_	.39*	.56**	.15	.49**	.22
Responsiveness			_	.81**	.59**	.45**	.16
Sensitivity				_	.63**	.54**	.20
Stimulation Value					_	.49**	.01
Warmth						_	.15
Language Gain (years) *n*=34							_

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Regression Analysis

The first research question, regarding parent behavior as a predictor of language gains, was addressed using regression analysis. Due to poor interrater agreement, responsiveness and sensitivity were left out of all further analyses. Language gains were regressed on each of the four remaining *MULTI-PASS* dimensions (elaborativeness, encouragement of initiative, stimulation value, and warmth). The results were statistically significant for parental warmth (R^2=.065, F[1, 61]=4.240, p=.044) indicating that warmth accounted for approximately 6.5% of the variance in language gain scores. The unstandardized regression coefficient (b) for warmth was .269 (t[61]=2.059, $p < .05$), indicating that for every additional point on the *MULTI-PASS* scale, the child's language gain increased by .269 years. Elaborativeness, encouragement of initiative, and stimulation value were not significant predictors of language gains.

As a follow up analysis, language gains were regressed on parental warmth only for the boys with disabilities (FXS-O, FXS-ASD, ASD-O). These results were not statistically significant (R^2=.014, F[1,49]=.721, p=.400), indicating that the sample may not have been large enough without the TD boys to find differences.

ANOVA

The second research question, regarding differences in parental behaviors by diagnostic status, was addressed using ANOVA. The data were first screened for homogeneity of variance using the Levene's Test to make sure assumptions for ANOVA were met. Controlling for parent education was considered, but parent education was not related to scores on any of the four *MULTI-PASS* domains, so an ANCOVA was not appropriate. Four separate one-way ANOVAs were calculated for each of the four

MULTI-PASS domains. There were not significant differences between diagnostic groups for parent behaviors of elaborativeness (F[3,62]= .709, p=.550), encouragement of initiative (F[3,62)=.569, p=.638), stimulation value (F[3,62]=.441, p=.725), or warmth (F[3,62]=.558, p=.645).

Discussion

The aim of this study was to address two research questions: (a) Are parents' interactive behaviors significantly predictive of their children's pragmatic language gains? (b) Do the interactions of parents with their children significantly different as a function of the child's diagnostic status (FXS, FXS-ASD, ASD, TD)? I found that warmth was a significant predictor of children's pragmatic language gains, which supports my first hypothesis. Overall, children's language gains were greater when parents interacted with their child using high levels of praise, engagement, and affection as well as consistent eye contact and positive vocal tone. This finding extends the current literature because most studies on parental warmth were conducted with much younger child participants, typically infants and toddlers (Landry et al., 2006; Jennings et al., 2008). The remaining three domains of parental behaviors (elaborativeness, encouragement of initiative and stimulation value) were not found to be significant predictors of children's pragmatic language gains.

These findings have important implications for parents, educators, and school psychologists. They support the belief that interaction styles with school-age boys continue to be important for the advancement of language skills, especially with regard to warmth. The continued expression of affection and use of praise, along with positive nonverbal behaviors are important because they communicate to children that they are

loved, accepted, and capable, which provide an important foundation for learning. Parents typically use physical expressions of affection (e.g. hugging, kissing, tickling) with infants and toddlers, but may shy away from these behaviors as their child ages. While some of these behaviors used with young children may not be socially or developmentally appropriate for school-age children, other expressions, such as praise, gentle touch, high-fives, and verbalizing positive feelings about the child, are appropriate and effective ways to communicate affection to the older child. School psychologists can play an important role by encouraging parents and teachers to focus on warmth in their interactions with school-age children and not to shy away from showing affection as long as it is done in an appropriate way that is sensitive to the child's developmental level. It is important to acknowledge that parental warmth as a construct has different meanings cross-culturally, and that the definition of warmth used in this study comes from a western perspective. In some cultures, giving children high levels of praise and openly showing affection are not typical child-rearing practices. Mothers and fathers may also differ in their expressions of warmth toward school-age children, but examination of these differences was beyond the scope of this study.

I conducted a follow-up analysis to examine warmth as a predictor of language gains only for the boys with disabilities (FXS-O, FXS-ASD, ASD-O) but it did not yield significant results, indicating that the sample may not have been large enough to find differences. It must be considered that the TD boys' language gains between time 1 and time 2 were larger than the boys with disabilities, so it is possible that warmth would have significantly predicted language gains in the sample of boys with disabilities if more time elapsed between the first and second data collection periods. The boys with

disabilities had such minimal language increases over the course of the year compared to the TD boys that it is unclear if the present results are an accurate representation of predictors of language gains for the FXS-O, FXS-ASD and ASD-O boys.

My second research question, which addressed whether differences in parent interaction styles were related to the child's disability status, was not supported by my findings. Parents did not differ in their elaborativeness, encouragement of initiative, stimulation value or warmth depending on if their child had TD, FXS-O, FXS-ASD, or ASD-O. This finding is encouraging because it demonstrates that parents are not using less of these behaviors because their child has a disability. I hypothesize that other factors, such as personality and interest in the activity, were influencing parents' interaction styles more than the child's own strengths and weaknesses associated with their disability, but the present study did not directly address this question. It is possible that I did not find significant results because the variables I used did not capture differences in parent behaviors between the groups. For example, Marfo (1993) found that mothers used more directives with children with lower cognitive and language abilities compared to children with higher abilities. In this study, I did not directly assess parents' use of directives, which may explain why I did not find differences between parent interaction styles.

This study had some important strengths. First, boys with FXS both with and without ASD were included in this study and separated by group to gain a better understanding of how autism in FXS affects language gains. Second, participants in this study were mostly school-age children, with mean ages between nine and 10 years old for the boys with disabilities. There is a dearth of research that has focused on parent

interactions with school-age children because the greatest developmental language gains occur during the first few years of the child's life. However, given the atypical development of children with FXS and ASD, it is important to continue to study language development beyond the preschool years. In addition, increased dependence on parents due to having a disability makes parent-child interactions an important area for research. This study fills an important gap in the current literature by providing information about parenting behaviors that promote language gains during the school-age years.

This study also had some limitations. First, the sample was a convenience sample based on data that was available to me from a larger study. The families who agreed to participate in the larger study on pragmatic language may have differed in unobservable ways compared to families who did not agree to participate. Thus, generalizability of my results is limited. Second, sample sizes were small for all groups, which limited statistical power in analyses. However, my sample size, while small, was not unusual for this field of research due to the rare occurrence of FXS (Philofsky et al., 2004). Third, my study was limited by poor interrater agreement, which resulted in having to eliminate two behavior domains from my analyses. Other studies that have used *MULTI-PASS* have analyzed scores as a composite of the six domains, but I was not able to do so because results from interrater agreement indicated that these domains were unreliable. Analysis of individual domains instead of analysis of the composite limits my ability to compare the results of this study with others that have used the *MULTI-PASS* coding system in previous literature. Fourth, the *MULTI-PASS* coding system had to be further revised from the version used by Zeisel and Roberts (2006) in order to be appropriate for the children in this study who were older. It is possible that revisions to the coding system

resulted in a less precise and more ambiguous scoring scheme. Fifth, since I only used Pass Four of the *MULTI-PASS* coding system, I focused exclusively on the parents. I did not observe how the child's behaviors might have affected their parent's behaviors during the interaction.

A final limitation of this study is the use of the global rating system, which is a more subjective method of collecting behavioral data compared to other methods, such as frequency counts. It is possible that parent behaviors are not captured most accurately using global ratings because they do not provide information on the percentage of time a parent interacts using specific behaviors, or exactly how many behaviors they exhibit that is concurrent with a specific *MULTI-PASS* score. Instead, the global ratings are based on the parents' overall behaviors throughout the interaction, and are most easily scored when parents are consistent in their interactive style throughout the activity. It can be very difficult to score behaviors using a global system if the parent suddenly changes the way they interact with the child for a part of the activity (e.g., suddenly become frustrated with the child toward the end) because the global score is suppose to be representative of the parents' overall behaviors. The global ratings in this study were also based on a very small window of observation of the parent and child interacting together, meaning that it is possible that what I observed was not representative of the typical parent-child relationship and that the scores did not capture the parent's true interactive style with the child. It is important to acknowledge that the results I obtained were based on the use of the global scoring system and a 5-minute observation of the parent-child interaction.

Although I did not find evidence that the three remaining *MUTLI-PASS* domains (elaborativeness, encouragement of initiative and stimulation value) were predictive of

language gains, I am confident that I used the right variables to address my research question. It is likely that this study was not powered to find differences due to the small sample size and restricted range of parent behavior scores across the *MULTI-PASS* domains. A combination of obtaining a larger sample size, using a longer time interval between data collection periods, and strengthening the modified *MULTI-PASS* coding instrument may yield significant results for these variables in a future study.

The further development of valid and reliable instruments to assess parent interactive behaviors with school-age children is critical for future research on this topic. Until these instruments are developed, researchers will be limited in their ability to contribute to this field. Development of appropriate instruments for use with school-age children would limit the need to modify existing instruments that are designed for toddlers and preschool children, and thus reduce error caused by modification. Developers of instruments should take into consideration the needs of both typically developing and developmentally delayed school-age children in order to further study parent-child interactions with children with disabilities, such as FXS and ASD. Through the use of new instruments, researchers can build on the present study by continuing to examine factors that are predictive of language gains in children with FXS and ASD to obtain a better understanding of how learning environments can be optimized for developmental growth. Since this study focused exclusively on boys, language development and parent interactions should be explored with regard to girls. It is possible that gender differences may exist in predictors of language gains, and these should be thoroughly investigated.

Appendix A: Modified Version of *MULTI-PASS* Coding System Used in This Study

Adapted from:

Zeisel, S. & Roberts, J. E. (2006). *Qualitative ratings of parental behaviors*. Unpublished manuscript, University of North Carolina at Chapel Hill, Chapel Hill, NC.

Free Play

Warmth

5	Must show a minimum of two open expressions of affection or love in manner appropriate for developmental age. This may mean putting arm around him, gentle touch, high fives, verbalizing positive feelings about child and his contributions (e.g. Good work!) or calling him an affectionate name, etc. Vocal tone is consistently positive Smiles with the child and maintains eye contact consistently Encourages child Pays attention to what child is doing Engages the child so that he/she is interested Displays positive body language Leans in to establish close physical proximity and is actively involved with the activity Is patient with the child Never raises voice at child
4	Expresses affection frequently through vocal tone and/or touch, vocal tone stays positive or neutral even when giving directives Verbalizes terms of endearment (e.g. "You're so smart", "Nice job!") where appropriate OR makes positive statements about the child's choices or behaviors (e.g. "I like that!") May openly display affection once or twice with child Maintains positive body language
3	Displays an overall low intensity positive affect during interaction through vocal tone or occasional touch Makes frequent eye contact May laugh or smile occasionally with child, but displays limited enthusiasm or exuberance Maintains a calm vocal tone with positive or neutral body language most of the time, but may occasionally (e.g. 1-2 brief examples) direct a scowl or stern expression toward child Limited use of verbal endearments or open expressions of affection
2	Low intensity positive affect in vocal tone Makes eye contact occasionally Occasionally smiles at child but does not maintain positive facial expression Occasionally expresses affection through brief touch or vocal tone May occasionally speak to child in tone that is condescending or overly shrill
1	Lacking positive affect Minimal eye contact Minimal positive facial expression (e.g. smile) Uninterested in the activity Cold and reserved Rarely expresses affection through touch or voice

Sensitivity

5	Consistently cognizant of the child's verbal and nonverbal cues, including more subtle and hard to detect cues Consistently cognizant of child's frustration Pays close attention to child's body language and verbal cues Gives help according to child's interests Recognizes when to stimulate their child because he is getting bored May vocalize observation of child's feelings, such as "I can see this makes you upset" especially if he has limited verbal expression Is aware of when child is going to fast and tries to help him alter his pace
4	Pays attention to the child's interests and frustration, but inconsistently detects more subtle and hard to detect cues from child Acknowledges the child's interests by playing with the same toy or asking questions about it most of the time Recognizes the child's thought process and gives helpful suggestions when the child is stuck with a toy most of the time Will act occasionally without adhering to the child's ability or interest, such as moving on to something else before child is ready
3	Watches and pays attention to the child's behavior most of the time and notices frustration Acknowledges the child's interests briefly, but will quickly move on to another toy Pays attention to explicit cues (e.g. "Look mom!") but misses more implicit cues (e.g. examining a toy to try to see how it works) Seems to be aware of developmental status May not allow the child equal access to the toys
2	Occasionally picks up on child's signal (parent may suddenly notice that child has interest in a toy, but does not discuss it with him or play with it) Shows occasional regard for child's developmental status or current interest Looks at child occasionally to see if he understands and is engaged
1	Seems to ignore child's cues and signals all of the time Hardly ever comments or watches child's behavior/action or interest Often engages in actions without regard for child's developmental status or current interest Does not often look at child to see if he understands Does not listen to child's indication of interest and will simply move on

Responsiveness

5	Promptly and consistently responds to the child's focus of attention, behaviors and interests with the child's developmental ability in mind Consistently responds to child's explicit and implicit invitations and requests Keeps the child on task and promptly responds when the child becomes distracted Observes when child has difficulty and responds appropriately
4	Responds to most of the child's focus of attention, behaviors, and interests Responds consistently, but may not always be prompt Is occasionally inappropriate in his/her response May miss some of the child's interests and less explicit invitations
3	Responds promptly and/or appropriately to about half of all child's focus of attention, behavior and interests. For example, may respond to most utterances, but not interest in play Responds to child's explicit invitations or requests, but misses those that are less explicit May show an implicit sign of frustration with the child
2	Responds promptly and/or appropriately to some of the child's focus of attention, behavior, and interests Responds to child's explicit invitations or requests, but at a level that is well below the child's rate of activity May express occasional explicit frustration with the child
1	Passive in a way that virtually all of the child's initiations and invitations are ignored Preoccupied with parent's own agenda May respond with anger or annoyance

Encouragement of Initiative

5	Consistently allows the child to play on his own while providing guidance Encourages and challenges the child to take charge and come up with his own solutions (e.g. helps him come up with his own solution for turning on the flashlight instead of just trying to fix it herself) Consistently encourages the child's play by playing along with his game and following his direction May ask the child how he wants to play and what he wants to make
4	Allows child to play on his own most of the time while encouraging initiative and following his play Encourages the child's play by playing along with his games and following his direction May ask the child how he wants to play and what he wants to play, but occasionally gives directives such as "put this here" or "give me that" when the child does not need these instructions to complete the activity
3	Creates a 50-50 balance between controlling/directing the child's play and encouraging initiative (e.g. following child's play) If a game is played, takes charge of the "rules" of the game for a moderate amount of time Sometimes gives child directives, (e.g. Put this here, or Give me that) when the child does not need these instructions to complete the activity
2	Gives the child freedom to play independently every once in a while Exerts control over which toys the child plays with and/or how he plays with it, but every once and a while encourages child to take initiative Often gives child directives, such as "put this here" or "give me that" when the child does not need these instructions to complete the activity May try to grab away toy from child when he is focused on it
1	Does not give the child freedom to play independently OR Does not play with the child/plays completely separately Seldom talks to the child, or primarily gives directive instructions (e.g. "Put this here" or "Give me that") when the child does not need these instructions to complete the activity Does not encourage child to try things for himself May grab multiple toys away from child while he is focused on them

Stimulation Value

5	Demonstrates a strong preoccupation with helping the child to acquire cognitive and linguistic skills by taking advantage of nearly every teachable moment and keeping the conversation flowing Takes opportunities to teach child how toys work Consistently asks child questions about the toys, (e.g. "What does this look like?" "Do you know what this is?") when appropriate, misses minimal opportunities to do so Provides explanations to the child's questions, and uses these questions to teach the child something new where appropriate Demonstrates a strong preoccupation with helping the child to acquire cognitive and linguistic skills Gets the child's attention when asking questions and providing instruction Consistently provides cognitive and linguistic stimulation appropriate at the child's developmental level Takes advantage of opportunities for math, science, or artistic talk
4	Demonstrates preoccupation with helping the child to acquire cognitive and linguistic skills by taking advantage of many teachable moments Takes opportunities to teach child how toys work Frequently asks child questions about the toys, (e.g. "What does this look like?" "Do you know what this is?") but does not always get the child's attention OR misses a few opportunities to do so Provides explanations to the child's questions Provides cognitive and linguistic stimulation appropriate at the child's developmental level most of the time, but may sometimes be inappropriate
3	Demonstrates a moderate preoccupation with helping the child to acquire cognitive and linguistic skills Takes advantage of teachable moments about half the time, focuses on having fun half the time Sometimes seizes opportunities to ask child questions about the toys (e.g. "What does this look like?" "Do you know what this is?") Provides cognitive and linguistic stimulation appropriate at the child's developmental level some of the time, but may show a lack of understanding about the child's abilities
2	Demonstrates minimal preoccupation with the need to foster cognitive and linguistic skills/competence Spends limited time helping the child learn Engages in a limited amount of teaching May make comment about a toy that discourages him from exploring it
1	Does not demonstrate any sign of explicit preoccupation with helping the child to acquire cognitive and linguistic skills/competence Does not show interest in helping the child learn Does not take advantage of opportunities to engage child May make frequent comments about toys that discourage child from exploring them ("This is not cool")

Elaborativeness

5	Consistently uses toys in the same manner as the child, and expands on what child is doing with the toys Consistently asks questions that help the child to think more deeply (e.g. "What else do you see?" "What else does it do?") Consistently asks the child questions about the toys after he has discovered a use for them May comment and elaborate on what the child is doing (e.g. "I see that you are spinning the kaleidoscope") If applicable, consistently encourages the child to give more than one word responses to questions
4	Often uses toys in the same manner as the child, and expands on what child is doing with the toys Often asks child about the toys after the child has discovered a use for them (e.g. "What's that for?") Provides thoughtfulness and detail in responses to child's utterances, (e.g. does not simply say "sure" after most of child's utterances) If applicable, encourages the child to give more than one word responses to questions most of the time
3	Uses toys in the same manner as the child about half the time, and may become preoccupied with a toy that is not of interest to the child or insists that child follow along in her game OR doesn't play with the toys but elaborates verbally on what the child is doing Sometimes asks the child about the toys after he has discovered a use for them (e.g. "What's that for?") If applicable, encourages the child to give more than one word responses to questions about half of the time
2	Occasionally uses toys in the same manner as the child Occasionally asks the child about the toys after they have discovered a use for them (e.g. "What's that for?") Responds to child's utterances with minimal detail (e.g. responds often with one word "sure" or simple phrases "why not?") If applicable, is usually satisfied by the child's one word responses to questions
1	Rarely use toys in the same manner as the child, nor do they elaborate on what the child is doing Rarely asks the child about the toys after the child has discovered a use for them (e.g. "What's that for?")

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