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The Contribution of Two Categories of Parent Verbal Responsiveness to Later Language for Toddlers and Preschoolers on the Autism Spectrum

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Abstract

Purpose—Longitudinal associations between two categories of parent verbal responsiveness and language comprehension and production one year later were examined in 40 toddlers and preschoolers with a diagnosis of an autism spectrum disorder (ASD).

Method—Parent-child play samples using a standard toy set were digitally captured and coded for child engagement with objects and communication acts and for parent verbal responses to play and communication.

Results—After controlling for parent education, child engagement and initial language level, only parent directives for language that followed into the child's focus of attention accounted for unique variance in predicting both comprehension and production one year later. A series of exploratory analyses revealed that parent comments that followed into the child's focus of attention also accounted for unique variance in later comprehension and production for children who were minimally verbal at the initial time period.

Conclusions—Child developmental level may warrant different types of linguistic input to facilitate language learning. Children with ASD who have minimal linguistic skills may benefit from parent language input that follows into the child’s focus of attention. Children with ASD who are verbally fluent may need more advanced language input to facilitate language development.

Keywords

autism spectrum disorder; parent responsiveness; parent-child interactions

According to a social interactionist approach to language development, children acquire language through ongoing interactions with conversational partners in everyday contexts (Bohannon & Bonvillian, 2005). For children who face language learning challenges, as do children with ASD (American Psychiatric Association, 1994), the contribution of the parent may be especially important in determining the progression of language acquisition. Previous research has provided support for the role of contingent verbal input from parents in supporting language development for children at risk for or experiencing developmental delays (Brady, Marquis, Fleming, & McLean, 2004; Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998; Landry Smith, & Swank, 2006; Yoder & Warren, 1999), including children with ASD (McDuffie & Yoder, 2010; Siller & Sigman, 2002, 2008). This study extends the current literature by examining the longitudinal associations between two broad categories

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of responsive verbal input provided by parents and language skills 12-months later in a group of toddlers and preschoolers with a diagnosis of an autism spectrum disorder (ASD).

The hallmark of parent responsiveness is that parents follow into the child's focus of attention and respond contingently to child acts of play and communication. Parent verbal responsiveness, according to certain theoretical perspectives, is thought to facilitate word learning by providing adult labels that map directly onto the object or activity to which the child is attending (Baldwin, 1995; Tomasello & Farrar, 1986). When parents follow into the child's focus of attention, they assume the burden of ensuring that both the child and parent are jointly focused on the same referent, creating a state of shared engagement during which parental language input is more likely to be attended to and learned from by the child (e.g., supported joint engagement; Adamson, Bakeman, & Deckner, 2004).

Joint Attention in Children with Autism

Following into the attentional focus of a communication partner, often termed attention following or responding to joint attention, represents a core deficit in children with ASD (Leekam, Hunnisett, & Moore, 1998; Mundy, Sigman, Ungerer, & Sherman, 1986). Indeed, many correlational studies have replicated the predictive association between attention following and later language development for children with ASD (McDuffie, Yoder, & Stone, 2005; Mundy, Sigman, Ungerer, & Sherman, 1986; Sigman & Ruskin, 1999; Siller & Sigman, 2008). Theoretically, the process of attention following allows children to learn the meanings of new words when the adult's referential focus does not correspond with the child's. When there is a discrepancy between the adult's focus of attention and that of the child, the child must notice and respond to adult cues, such as gaze shifts and pointing gestures, to correctly identify the adult's intended referent. Only then can a correct mapping between novel label and object referent be established. Relative to children with cognitive delays without ASD, experimental studies have shown that children with ASD produce more incorrect mappings between novel labels and objects because they utilize their own focus of attention, rather than that of the speaker, when acquiring new words (Baron-Cohen, Baldwin, & Crowson, 1997; Preissler & Carey, 2005). Thus, children with ASD often need increased scaffolding during the process of word acquisition. Parent verbal responsiveness can potentially provide needed support to help the child correctly associate new labels with their referents.

The Role of Parent Responsiveness

Parent responsiveness may be defined as a broad category of behaviors through which parents provide prompt, affectively positive, and contingent responses to child acts of communication and play (Landry, Smith, Miller-Loncar, & Swank, 1997; Tamis-Lemonda & Bornstein, 2002). Parents who consistently use responsive verbal language input may decrease the cognitive and affective demands on the child to coordinate attention to both people and objects (Adamson, Bakeman, & Deckner, 2004). Two categories of parent verbal responsiveness were examined: responsiveness to the child's focus of attention and responsiveness to child communication acts.

Responsiveness to the child's focus of attention

Verbal input that follows into the child's focus of attention provides labels for objects and events to which the child is actively attending. The facilitative role of follow-in verbal input from parents was considered by Tomasello and Todd (1983) who examined the relationship between early joint attention and language development in typically developing one-year-olds. These children learned more object labels when mothers followed into and talked about their child's focus of attention (Tomasello & Todd, 1983; Landry et al., 1997). In fact,

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within episodes of joint attention, the frequency of labels provided by mothers predicted the child's later spoken vocabulary (Tomasello & Farrar, 1986). This study assessed three types of parent verbal responses to the child focus of attention: follow-in commenting, follow-in directives, and parent descriptions of their own actions.

Follow-in comments are statements that describe objects within the child's focus of attention or with which the child is actively engaged, without conveying an expectation that the child respond to the parent or change his or her current activity. Previous research indicates that follow-in comments predict later language for children with ASD (McDuffie & Yoder, 2010; Siller & Sigman, 2002, 2008). In contrast, follow-in directives – while relating to the child's ongoing attentional focus – convey an expectation that the child change his or her ongoing activity in some way (e.g., "Throw the ball."). We consider these types of directive utterances to be follow-in directives for behavior. While Siller and Sigman (2002) found no correlation between follow-in directives for behavior and later language, McDuffie and Yoder (2010) found that follow-in directives for behavior and follow-in comments each contributed unique variance to predicting later vocabulary for a group of toddlers with ASD who produced, on average, less than ten spoken words at the initial study visit.

Following the reasoning of McCathren, Yoder, and Warren (1995), McDuffie and Yoder (2010) suggest that follow-in directives have the potential to facilitate a mapping between labels and objects or events in a manner similar to follow-in comments, presumably because these types of directives also refer to the child's current focus of attention. However, McDuffie and Yoder (2010) only assessed follow-in directives aimed at changing the child's behavior. Thus, the role of follow-in directives for language (e.g., "What color is that car?") in supporting later language requires additional clarification. Follow-in directives, which maintain shared focus between parent and child, should be distinguished from redirects; that is, directives which seek to change the child's focus of attention to correspond to that of the adult. Redirects have been shown to be negatively or nonsignificantly associated with later language (McCathren, Yoder, & Warren, 1995; McDuffie & Yoder, 2010).

Finally, parents' descriptions of their own actions also can be considered to provide linguistic information about actions that parents are modeling within the child's focus of attention. If children are actively attending to the parent models, it should be possible to make an association between the parents' actions and the verbal language parents are producing. No previous study, however, has evaluated the contribution of parents' descriptions of their own actions to later language for children with ASD. Examination of this relationship is important as it is likely that parents often may use descriptions of their own actions while engaged in play with their child.

Responsiveness to child communication acts

Child acts of nonverbal and verbal communication clearly indicate the child's focus of attention to the adult. Two types of parent responses to child communication acts were examined, linguistic mapping (Yoder & Warren, 2001) and expansions (Scherer & Olswang, 1984). The adult may respond to nonverbal communication acts by linguistically encoding the child's presumed message (McDuffie, Yoder, & Stone, 2005; Siller & Sigman, 2002; Yoder & McDuffie, 2006) or may respond to verbal communication acts by providing additional semantic or grammatical information. During linguistic mapping, the adult provides a noun, verb or function word that corresponds to the object, action or event about which the child is communicating. In a similar manner, expansions provide opportunities for children to hear developmentally advanced language forms that map directly onto the child's own productions. In addition to providing follow-in language input, linguistic mapping and expansions acknowledge the child's attempts to communicate and may encourage the child to communicate more frequently in subsequent interactions. Yoder and Warren (1999) found

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that maternal linguistic mapping mediated the relationship between child intentional communication and later language for a group of children with developmental delays. For a group of minimally verbal children with ASD, McDuffie and Yoder (2010) found that parent expansions were a unique predictor of later vocabulary size, even after controlling for the frequency of child communication acts.

In summary, certain categories of parent language provided in the context of parent-child interactions (i.e., verbal responsiveness to the child's focus of attention and verbal responsiveness to child communication acts) have been found to facilitate later language for children with ASD. It is important, however, to acknowledge that opportunities for parent's to provide responsive verbal language input is somewhat reliant upon child behaviors (i.e., child active engagement and communication acts). As several studies have shown, children with ASD may display a restricted repertoire of play behaviors leading to less productive engagement with objects (McDuffie, Lieberman, & Yoder, 2011) and may initiate communication acts less frequently than children who are typically developing as well as children with other developmental delays (Mundy, Sigman, Ungerer, & Sherman, 1986). Thus, parents may face challenges in having sufficient opportunities to provide responsive verbal language input that responds to child engagement or communication acts. Clinically, this line of research is important as it can inform the content of parent mediated intervention programs which encourage parents to use empirically based language facilitation strategies when interacting with their children.

The extant literature provides only three published studies examining the relationship between parent verbal responsiveness and subsequent language development for children with ASD (McDuffie & Yoder, 2010; Siller & Sigman, 2002, 2008). Moreover, two of those studies (Siller & Sigman, 2002, 2008) did not examine the role of parent verbal responses to child communication acts in facilitating later language. In addition, Siller and Sigman (2008) used a composite metric to represent parent responsiveness. This variable included all maternal utterances that were synchronized with the child's focus of attention (i.e., both follow-in comments and follow-in directives) while another variable included only maternal utterances that were synchronized with the child's focus of attention and action (i.e., follow-in comments). Thus, Siller and Sigman (2008) did not independently evaluate the role of follow-in directives in predicting either language levels or rate of growth in language over time. In addition, McDuffie and Yoder (2010) examined language outcomes after only 6 months in time using a parent report measure of vocabulary comprehension and production. McDuffie and Yoder (2010) also used a composite variable that collapsed across parent descriptions of their own actions and follow-in comments and only coded follow-in directives for behavior and did not examine the potential contribution of follow-in directives for language. We expanded upon these previous studies by using a more nuanced and inclusive coding scheme and by examining longitudinal associations between parent language input and child language outcomes over a period of one year.

Research Questions

The following research questions were addressed in a group of toddlers and preschoolers on the autism spectrum:

1. Does parent language input that follows into the child's focus of attention significantly predict gains in expressive and receptive language one year later?
2. Does parent language input that responds to child communication acts significantly predict gains in expressive and receptive language?

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Method

Overview of Design and Procedures

This study utilized a longitudinal design. Parent responsivity was coded from videotapes of naturalistic parent-child play samples collected at Time 1 (the initial annual visit of a larger study). Autism status as well as language and cognitive ability were measured at Time 1 and are reported in this paper to provide descriptive information about the participants. Although children in the sample demonstrated a range of performance on standardized measures of language and cognition, the mean performance on all measures was in the below-average range. The difference scores (i.e., difference of raw scores between Time 1 and Time 2, on average 12 months later) from standardized tests of language comprehension and production served as the outcome measures. Parent education was taken into account in all analyses.

Participants

Forty parent-child dyads were selected at random from participants in a larger study examining trajectories of language development in toddlers and preschoolers with ASD. Participants in the larger study were recruited from Wisconsin. All 40 toddlers and preschoolers received a clinical diagnosis of an autism spectrum disorder from an interdisciplinary team of experienced professionals which was led by a licensed psychologist. Of the 40 participants selected, 33 were males. The age range of the participants at Time 1 was from 24–39 months. All children came from families of native English speakers. Thirty-four of the children were Caucasian, one was Hispanic, two were African American, and three were classified as “other” with respect to racial/ethnic background. Descriptive characteristics of the participants are presented in Table 1.

Parents who participated in the play sample procedure consisted of 33 mothers and 7 fathers. Parent education ranged from 12 years to 19 years, with an average of 14 years (SD = 2.04).

Assessments and Measures

Autism Status—All participants received a best estimate clinical diagnosis of either autism (n=17) or autism spectrum (n=23) from a licensed psychologist who utilized multiple sources of information including cognitive and language testing, as well as either the original or toddler version of the Autism Diagnostic Observation Schedule (ADOS–G; Lord et al., 2000; ADOS-T; Luyster et al., 2009) and the Autism Diagnostic Interview-Revised (ADI-R; Le Couteur, Lord, & Rutter, 2003). The ADI-R and ADOS represent the current gold standard for assigning a diagnostic classification of autism for research purposes.

The ADOS consists of a series of activities and materials, presented with systematic prompts and used to elicit a sample of an individual’s social and communication behaviors. There are four ADOS modules, each designed for a particular developmental and language level, ranging from no expressive language in preschool-aged children to verbally fluent adults. This system of organization allows the observation to take place within the context of an interaction appropriate for the individual’s expressive language level. The revised ADOS diagnostic algorithms were used, as specified by Gotham and colleagues (Gotham, Risi, Dawson, Tager-Flusberg, Joseph, Carter, et al., 2008; Gotham, Risi, Pickles, & Lord, 2007). These module-specific algorithms consist of a Social Affective domain (comprised of items representing reciprocal social interaction as well as communication) and a Restricted, Repetitive Behaviors domain. Scores for these domains are summed and the total score is compared to thresholds resulting in an ADOS classification of autism, autism spectrum, or nonspectrum. To provide additional descriptive information about the participants, autism severity scores were calculated from ADOS total score according to Gotham, Pickles, and Lord (2009) and based upon each participant’s chronological age, language status, and

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ADOS module the participant had received. ADOS severity scores range from 1 to 10, with scores of 1 - 3, 4 - 5, and 6 - 10 indicating mild, moderate and severe degree of autistic impairment, respectively (Gotham et al., 2009). The diagnosis of an autism spectrum disorder includes individuals who function along a continuum of abilities. To adequately represent this population, participants were not excluded based upon scores from language or cognitive measures.

Language and Cognition—The MacArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 2007) is a widely used parent report instrument used to assess vocabulary comprehension and production. The Words and Gestures subscale (CDI:WG) contains a vocabulary checklist of 396 words typically acquired by children exposed to American English between 8 and 16 months of age. The Preschool Language Scales, 4th edition (PLS-4; Zimmerman et al., 2002) is a standardized test of receptive and expressive communication abilities in children ranging from 2 weeks through 6 years of age. Difference scores, computed using Time 1 and Time 2 raw scores for the Auditory Comprehension and Expressive Communication subscales of the PLS, were used as the outcome measures in all analyses. Although it may be difficult to capture change with a standardized measure of global language ability, use of the PLS-4 provided a metric of language comprehension and production that was independent of the contribution of the parent. In order to utilize a more sensitive measure of change over time, raw scores from the PLS-4 were used rather than age equivalent or standard scores. Nonverbal cognitive level was assessed with the Visual Reception Subscale of the Mullen Scales of Early Learning (MSEL; Mullen, 1995). The MSEL provides a measure of cognitive functioning for infants and children ranging in ages from birth to 68 months.

Procedures

A 15 minute parent-child play session was completed at the first visit. During this play session, the child and a parent engaged in play with two different toddler toys (Mr. Potato Head and a Fisher-Price farm set) that were provided by the research team. Before each play sample, the parent was instructed to play with the child as he/she normally would. A student research assistant recorded the play sessions with a hand-held digital video recorder.

Coding and Reliability

Play session videos were coded with ProcoderDV (Tapp, 2003). A frequency based coding procedure was used to code the beginning ten minutes of each parent-child play sample. The following child and parent variables were coded: child engagement, parent verbal responses to the child's focus of attention, child communication acts, and parent verbal responses to child communication acts. The following paragraphs provide details of the coding process. Additional details and the coding manual are available from the first author. After coding, data files were exported into MOOSES software (Tapp, Wehby, & Ellis, 1995) for calculation of cumulative frequencies.

Responsiveness to the Child's Focus of Attention—Parent responsiveness to the child's focus of attention can be considered part of a transactional process in that the child's active engagement with toys sets the occasion for the parent to provide language that describes the child's focus of attention. Thus, coding this category of parent verbal responsiveness required a two-step process: a) intervals of child engagement were identified in the play session video; and b) parent verbal responses that were relevant to the child's focus of attention were coded.

Child engagement: During the first pass through the media file, each 1-second interval was coded for child active engagement with objects using a mutually exclusive and exhaustive

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coding system. Intervals were coded as *engaged*, *not engaged*, or *uncodable*. One-second intervals coded as *engaged* displayed the child actively manipulating an object or visually attending to an object. Active manipulation of an object was defined as purposeful movement of the object and did not include passive holding. Attention to an object was evident if the child looked at an object or verbalized about an object. The child also was considered to be actively engaged if he/she visually attended to the parent's use of an object.

Verbal responses to the child's focus of attention: During the second pass through the media file, instances of parent verbal responsiveness to the child's focus of attention were identified and coded. Verbal responsiveness to the child's focus of attention included four subtypes of parent spoken utterances: a) *follow-in comments; b) parents describe their own action; c) follow-in directives; and, d) three control variables (redirects, introductions, and other talking).* Intervals with continued talking, no talking, or containing unintelligible parent utterances were identified. Each parent utterance was counted only a single time even if the utterance continued across subsequent intervals.

Follow-in comments: The parent was considered to use a *follow-in comment* if the parent utterance was produced while the child was actively engaged and the comment described the child's focus of attention. A *follow-in comment* did not: a) follow a child communication act; b) tell the child what to do; or, c) request the child to communicate about his/her focus of attention. For example, the parent could say "You're pushing the tractor" or "There's the cow, moo moo."

Parent describes his or her own actions: A parent was credited with *describing his or her own action* if the parent performed a play action and described this action to the child while the child was attending to what the parent was doing. This type of parent verbal utterance had to be accompanied by a play model; that is, the parent had to demonstrate an action with the toys to which the child was attending (e.g., "Eyes on" as the parent puts the eyes on Mr. Potato Head).

Follow-in directives: Parent directives consisted of parent linguistic input that directed the child: (a) to change his/her behavior; or, (b) to communicate in response to a question. Therefore, follow-in directives included two subtypes of utterances: *follow-in directives for behavior* (i.e., requests to change a play behavior or toy; e.g., "push the tractor") and *follow-in directives for language* (i.e., requests to label an object; e.g., "What's this?" or "What does the cow say?").

Control Variables: Control variables were included to demonstrate that not all types of parent verbal utterances would be supportive of language growth. Verbal *redirects, introductions,* and *other talking* (utterance that did not provide linguistic information about the child's focus of attention, were not directed toward the child, or did not serve as a redirect or introduction; e.g., "oh" or "mm hm") were used as control variables.

Responsiveness to Child Communication Acts—Coding this category of parent verbal responsiveness required a two-step process: a) acts of child gestural or verbal communication were identified in the play session video; and b) parent verbal utterances provided subsequent to (within 3 seconds) the child communication act were coded.

Child communication acts: Child acts of intentional communication were identified during the first pass through the media files. Child communication acts were defined using the conventions from the Communication and Symbolic Behavior Scales: Developmental Profile (CSBS DP) by Wetherby and Prizant (2002). Intentional communication acts could

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be verbal (i.e., a word or sign) or nonverbal (i.e., communicative gesture or a vocalization with eye gaze). Once child acts of intentional communication were identified, they were categorized as verbal or nonverbal communication acts.

Verbal responses to child communication acts: Following the identification of child acts of intentional communication, the coder determined if a parent verbal response followed each child communication act within 3 seconds of the child act. Assuming that a child produced a nonverbal communication act, a parent verbal response was coded as *linguistic mapping* if the adult labeled a referent or action that was implied by the child's communication act (e.g., child reaches for the toy cow while shifting eye gaze to the parent and the parent says "want cow"). Additionally, assuming that a verbal act of child intentional communication had occurred, a parent verbal response that *expanded* the child's verbal communication act also was recorded (e.g., child says "hat" and the parent expands the child's communication act by saying "blue hat").

Refer to Tables 2 and 3 for examples of coded variables and Table 4 for means, ranges and standard deviations for all coded variables.

Reliability—Reliability was computed by having a separate coder independently recode 20 percent of the play samples which were randomly selected. The primary coder trained the reliability coder through coding of practice videos and a series of consensus discussions. Interobserver reliability was computed using intraclass correlation coefficients (ICC). Intraclass correlation coefficients reflect the proportion of the variability in the reliability sample that is due to between-participant variance in true score estimates of the behavior of interest (Shavelson & Webb, 1991). Values of 0.6 are considered acceptable with *g*-coefficients (Suen & Ary, 1989). Reliability between the two coders was .77 for "other talking" and between .956 and 1.0 for all other categories of coded behavior.

Data Analysis

Preliminary data analysis examined bivariate correlations between the Time 1 predictor variables (follow-in comments, follow-in directives, parent descriptions of his or her own action, linguistic mapping, and expansions), the covariates (child engagement, child verbal and nonverbal communication acts, and parent education), control variables (redirects, introductions, and other talking) and difference scores computed from the language measures at both time points (i.e., Time 2 PLS-4 Auditory Comprehension (AC) raw scores minus Time 1 PLS-4 Auditory Comprehension raw scores; Time 2 PLS-4 Expressive Communication (EC) raw scores minus Time 1 PLS-4 Expressive Communication (EC) raw scores). Difference scores were used to assess the change, or growth, in language scores over time. This is necessary given the high degree of intercorrelation between language scores at both time points (i.e., for comprehension, $r = .788$ $p < .001$; for production, $r = .686$ $p < .001$) and, therefore, needs to be accounted for. These preliminary analyses were followed by a series of hierarchical multiple regression analyses aimed at identifying unique predictors of later language. Significant predictors from each category of parent responsiveness were entered together as predictors of either comprehension or production difference scores to determine a final regression model. In order to control for engagement when evaluating parent variables that responded to the child's focus of attention, a proportion was created using the parent responsiveness variable as the numerator and child engagement as the denominator (e.g., follow-in directives for language divided by child engagement). In order to control for the contribution of child communication acts when evaluating the contribution of parent verbal responses to child communication acts, a proportion was created using a parent responses to child communication acts as the numerator and child communication acts as the denominator (e.g., parent expansions divided

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by child verbal communication acts). Based on previous research, we expected the coded parent responsive variables to positively relate to language gains; therefore, all analyses were one-tailed.

Results

Bivariate Correlations

Parent Responses to Child's Focus of Attention—Examination of bivariate correlations between parent responses to the child's focus of attention measured at Time 1 and difference scores for language comprehension (PLS-4 AC) and production (PLS-4 EC) revealed that follow-in comments were not significantly correlated with language gains. Despite this, significant correlations were found between language comprehension difference scores and parent descriptions of his or her own actions ($r = -.30$) and parent follow-in directives for language ($r = .66$; all $ps < .05$, one-tailed). The negative association between parent descriptions of his or her own actions and later language comprehension was unexpected. Only parent follow-in directives for language were significantly associated with language production difference scores ($r = .67$, $p < .05$, one-tailed). The association between parent redirects and language comprehension difference scores was in the expected direction but failed to reach significance ($r = -.232$, $p = .075$, one-tailed); almost no association was observed for parent redirects and child language production ($r = -.083$, $p = .306$, one tailed).

Parent Responses to Child Communication Acts—Bivariate correlations were examined between parent responses to child communication acts at Time 1 and difference scores for language comprehension (PLS-4 AC) and production (PLS-4 EC). Significant bivariate correlations with comprehension were found for expansions (r = .51, $p < .001$, one-tailed). No significant bivariate correlations were found for language production. (See Table 5 for a summary of all bivariate correlations).

Hierarchical Multiple Regressions—Parent behaviors that emerged as significant correlates of language gains in the previous analyses were entered as predictors into a series of hierarchical multiple linear regression analyses to identify parent behaviors that accounted for unique variance in explaining language gains. We included follow-in comments even though they were not significant correlates of either comprehension or production difference scores because of our hypotheses about the importance of this specific variable. The analyses controlled for parent education and, as previously described, engagement and child communication acts were controlled for through the creation of proportions.

Parent variables that responded to the child's focus of attention—After controlling for parent education, parent follow-in directives for language accounted for significant and unique variance in predicting language comprehension ($t = 3.67$, $p < .001$, one-tailed, B = 232.28, $\beta = .59$, R^2 change = .34) and language production ($t = 3.10$, $p = .003$, one-tailed, B = 131.43, $\beta = .47$, R^2 change = .22), over and above the contribution of follow-in comments and expansions. Contrary to our expectations, follow-in comments emerged as a negative predictor of language gains for both comprehension ($t = -2.231$, $p = .018$, one-tailed, B = −66.157, $\beta = 29.659$, R^2 change = .09) and production ($t = -2.312$, $p = .016$, one-tailed, B = −45.862, $\beta = 19.834$, R^2 change = .09).

Parent variables that responded to child communication acts—After controlling for parent education and child verbal communication acts, parent expansions did not significantly contribute to language gains for comprehension, despite significant positive bivariate associations with language comprehension difference scores.

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Exploratory Analysis

Because the expected pattern of associations with later language was not observed for parent follow-in comments or expansions, exploratory analyses were undertaken. It was noted that there was considerable variability in Time 1 language abilities within the sample of 40 toddlers. The observation of such diversity in language development corresponds with descriptions in the literature suggesting that children with ASD represent a heterogeneous group in the domain of language development (Lord, Risi, & Pickles, 2004).

Previous intervention research has noted that initial child characteristics often moderate the effectiveness of intervention approaches. Carter and colleagues (2011), for example, found that child outcomes following a parent-implemented language intervention for young children with ASD were moderated by child object interest at the pre-treatment (Carter, Messinger, Stone, Celimli, Nahmias, & Yoder, 2011). Children with lower levels of object interest at Time 1 demonstrated language growth, whereas children with higher levels of object interest exhibited attenuated language growth. Child object interest also impacted the effectiveness of different approaches in a randomized comparison of two types of communication interventions (Yoder & Stone, 2006). As initial developmental abilities seem to play a role in language learning (Carter et al., 2011; Yoder & Stone, 2006), it was reasoned that children at different stages of language development might respond differentially to specific types of responsive verbal input from parents. This analysis approach would involve splitting the participant sample into two groups and conducting a regression analysis to determine if there is an interaction between responsiveness (i.e., parent use of follow-in comments) and group (high language, low language).

It was decided that the ADOS administration at Time 1 would provide an objective metric, independent of maternal influence, of the amount of functional spoken language each child used at Time 1. For purposes of the exploratory analysis, children were included in a Minimal Expressive Language Group (n=22; Autism = 6 ASD = 16) if they received the ADOS Toddler Module, or ADOS Module 1 and received a score of 3 or 8 on Item A1, Overall Level of Language. These scores indicate that the child produced fewer than 5 words during administration of the ADOS. Children were included in a Verbally Fluent Group (n=18; Autism = 11 ASD = 7) if they received the ADOS Toddler Module, or ADOS Module 1 and received a score of 1 or 2 on Item A1. These scores indicate that the child produced at least five recognizable single words or occasionally or regularly produced utterances with at least two words during the ADOS administration. In addition, children who received the ADOS Module 2 were included in the Verbally Fluent Group. These children are considered to have the ability to use flexible phrases of at least three words on a regular basis. The MEL subgroup consisted of 17 male and 5 female children and 18 mothers and 4 fathers. The VF subgroup was made up of 16 male and 2 female children and 15 mothers and 3 fathers. Parent education did not differ significantly between the two subgroups ($t(38) = -.619$, $p = .540$, two-tailed). In order to further describe the language ability of participants in these subgroups, we examined expressive vocabulary as reported by parents on the CDI-WG subscale completed at Time 1. Mean expressive vocabulary sizes were 7.09 (SD=9.04, Range 0–37) and 126.33 (SD=112.06, Range 9–384) for the MEL and VF subgroups, respectively, generally corresponding to the assigned subgroup classification.

The following variables were entered into the regression analysis examining the contribution of follow-in comments to difference scores in comprehension and production: parent education, Group (VF, MEL), follow-in comments, and Group x Follow-in comments interaction term. To compute the interaction term, the ratio variable for follow-in comments was grand mean centered and Group was dummy coded (see Cohen, Cohen, West & Aiken, 2003; p. 261). Grand mean centering is recommended to reduce collinearity between the variables that comprise the product term.

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Results of the Regression analyses revealed a significant interaction between Group and parent use of follow-in comments in predicting language comprehension ($t = -2.50$, $p = .009$, one-tailed, B = −105.66, $\beta = 42.32$, R^2 change = .10) and language production ($t = -2.54$, $p = .008$, one-tailed, B = -91.38, $\beta = 35.97$, R^2 change = .11). As Figure 1 depicts, children with minimal expressive language benefited from parent use of follow-in comments after accounting for parent education and child engagement, while children who were verbally fluent at the initial visit did not (also see Table 6).

Discussion

The goal was to examine the contributions of specific categories of parent verbal responsiveness to later language outcomes, for a group of young children with diagnoses on the autism spectrum. The types of responsiveness that were examined were based upon social interactionist theories of early language learning and previous empirical findings which suggested the types of parent verbal input that should facilitate early language development in children who are challenged in using attention following (i.e., response to joint attention). The most interesting finding of this study was that the relationship between parent linguistic input and later language gains may differ according to the child's stage of language development.

Responsiveness to the Child's Focus of Attention

Follow-in Commenting—Although parent follow-in comments (i.e., comments that describe the child's focus of attention without placing demands on the child) were not found to significantly predict later language for the full participant group, the follow-up exploratory analysis revealed an interaction between initial child language levels and parent use of follow-in comments. That is, children who were minimally verbal (in this case, who use less than 5 spoken words during administration of the ADOS), had better language outcomes one year later when their parents used more follow-in comments. Children who could be considered verbally fluent (in this case, who used more than 5 spoken words or talked in multiword utterances), did not benefit from parent use of this type of verbal input, and in fact, showed attenuated language growth.

The positive association between parent follow-in comments and later language in the subgroup with minimal expressive language replicates and adds support to the findings of McDuffie and Yoder (2010) and Siller and Sigman (2002). Furthermore, it appears that participants in the McDuffie and Yoder (2010) study, who are described as having fewer than 10 words during a conversational language sample, had similar language levels to the participants in the MEL subgroup. Conversely, the verbally fluent subgroup, who all were producing flexible (i.e., non-stereotyped) phrase speech and who had an average spoken vocabulary size of 126 words according to parent report, were more competent communicators and may have benefited more from advanced linguistic input from their parents, rather than follow-in commenting. Furthermore, it is possible that parents were providing labels for objects that the verbally fluent subgroup already knew and did not provide sufficient novel verbal information, which may have contributed to the finding of attenuated growth. Carter and colleagues (2011) suggested that children with ASD with more severe impairments also differentially responded to parent input. Like Carter et al. (2011), our findings suggest that distinct categories of parent language input may support language growth dissimilarly for children at different stages of language acquisition.

Children with lower linguistic abilities produce limited nonverbal and verbal communication acts and therefore have fewer ways of eliciting language-facilitating verbal input from their parents. This highlights the importance of having parents who talk about the child's focus of attention (i.e., follow-in commenting). Indeed, this subgroup of children had an average

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spoken vocabulary size of less than 8 words according to parent report. Parent follow-in commenting, in particular, is not contingent upon child communication acts and does not require the child to make an active contribution to the language learning process; instead, the parent actively coordinates his or her own focus of attention and verbal content to match the child's focus. Therefore, parent descriptions of their child's focus of attention may optimally support language development for minimally verbal children on the autism spectrum.

Parent descriptions of his or her own behavior—While McDuffie and Yoder (2010) used a composite variable that included parent descriptions of his or her own actions within the category of parent follow-in comments, the present study examined these two categories of verbal responsiveness separately. We did expect that parent descriptions of his or her own actions while the child was attending to the parent would positively relate to language gains over time. However, we did not find that parent descriptions of his or her actions were related to language gains for this group of children. We speculate that it is not necessarily the case that children will process language input that encodes what the parent is doing, even if it appears that the child is attending to such input. It seems plausible that children with ASD have a more difficult time mapping labels to objects which they are not manipulating themselves and to actions they are not performing even if the child seems to be attending to the action that another person is performing. In addition, while children were judged to be engaged in the interaction during the intervals within which parent descriptions of his or her own actions were observed, it may be difficult to gauge a child's actual degree of engagement unless the child is actively manipulating an object.

Follow-in directives for language—One difficulty in interpreting the contribution of directives to later language is that previous research often has not distinguished between different types of directives (e.g., redirects, introductions, directives for behavior, and directives for language; McCathren, Yoder, & Warren, 1995). We tested the contribution of four specific types of directives: redirects, introductions, follow-in directives for behavior, and follow-in directives for language.

Follow-in directives for language were significantly and positively associated with later language. Although we found follow-in directives to be facilitative, there remain conflicting suggestions in the literature concerning the contribution of directives to later language. Some propose that use of questions may limit the child to a yes/no response or to producing a label which the child already knows (Whitehurst, Falco, Lonigan, Fischel, DeBaryshe, Valdez-Menchaca, & Caulfield, 1988). Conversely, others have suggested that questions serve as a means to intellectually stimulate children and, by conveying the expectation that the child should respond to the adult, to encourage the child's participation in a conversational exchange (McDonald & Pien, 1982). Follow-in directives for language can scaffold child engagement with both people and objects (Yoder, Davies, Bishop, & Munson, 1994). In fact, Yoder and colleagues (1994) found that children with developmental delays were more than twice as likely to continue a topic after an adult produced a follow-in directive for language than in response to a follow-in comment. Follow-in directives for language may act to promote continuation of the child's focus of attention because they are contingent upon the child's current focus of attention. In addition, follow-in directives for language may prompt the child to use a known word to label a different exemplar of a referent, or to use the word in a different context. This type of generalization may be especially important for children with ASD whose speech is often context bound and for whom words are often not used flexibly (Yoder & McDuffie, 2006). Also, follow-in directives for language may provide a technique that encourages reciprocal exchanges and sharing of attention in children with ASD, a prompt that is needed given these children's known deficits in initiating joint attention (Mundy et al., 1986). Parent questions that elicit a word that is within the child's lexicon can be followed with a semantic or grammatical

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expansion of the child's prompted response (Scherrer & Olswang, 1984; Whitehurst et al., 1988). This point is especially meaningful for our verbally fluent subgroup, who likely had a sufficient amount of verbal skills to successfully respond to parent follow-in directives for language. Children who have minimal expressive abilities also may benefit from directives for language because parents can ask questions to prompt nonverbal communication acts and then linguistically map, or verbally state the child's nonverbal message (e.g., "Where is Mr. Potato Head's nose?" child points, "There's his nose!). Thus, because follow-in directives for language can be used to facilitate language in both verbally fluent and minimally verbal children, it is not surprising that positive associations were seen for the entire participant group.

Follow-in directives for behavior—Because children with ASD have restricted and repetitive behaviors and limited play skills (Tager-Flusberg, Joseph, & Folstein, 2001), parents may have infrequent opportunities to use diverse lexical input when providing follow-in comments that describe the child's focus of attention. Based on the findings of McDuffie and Yoder (2010), it was hypothesized that follow-in directives for behavior would be facilitative of language acquisition because they instruct the child to play with a toy in a new way, or extend current play actions to a new toy. Contrary to our expectations, we did not find a positive association between follow-in directives for behavior and later language. Directives that instruct the child to change his/her behavior may be at odds with the child's intended actions and therefore, the child may be less likely find this type of parent verbal input to be meaningful.

Responsiveness to Child Communication Acts

Linguistic Mapping—While there is both theoretical and empirical support for the facilitative role of linguistic mapping in supporting language in children with other types of developmental delay (e.g., Yoder & Warren, 1999), researchers have not yet demonstrated that children with ASD can benefit from this type of responsive input. A significant positive correlation between linguistic mapping and later language was observed for the combined participant group for language comprehension. However, after controlling for parent education, and accounting for initial child language and frequency of child nonverbal communication acts, linguistic mapping failed to emerge as a significant predictor of later language. Upon closer examination, it was clear that the opportunity for linguistic mapping was extremely limited in both groups. On average, the combined group of participants produced less than one nonverbal communication act every two minutes during the play sample. In addition, only 26 of the 40 parents ever produced an act of linguistic mapping, with 11 parents producing only one instance of this type of response. Thus, children may not have been exposed to sufficient quantities of linguistic mapping to make a positive contribution to later language.

Expansions—Positive bivariate associations with later language comprehension and expansions were detected, a finding in agreement with previous work (e.g., McDuffie and Yoder, 2010). However, such an association did not persist after controlling for parent education, initial child language and child verbal communication acts. The opportunity to expand child utterances is dependent on the verbal communication acts produced by the child. These opportunities also were extremely limited given low frequency of child verbal communication acts. On average, the combined group of participants produced one to two verbal communication acts every minute during the play sample, but there was a large range in performance with about half of the children producing three or less verbal communication acts in the entire play sample.

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Lack of a positive association between parent expansions and later language in children with ASD also may be related to limitations in attention and motivation (Dawson et al., 2004; Lovaas, Koegel, & Schereibman, 1979). These deficits may impede children's ability to compare their own communicative productions with the parents' more linguistically advanced model. Young children with autism learned linguistic skills better in adult recast and prompted child imitation conditions than in adult recast alone conditions (Koegel, Lyons & Koegel, in preparation). Although children with ASD can learn through their interactions with others, they may benefit more from direct prompting than linguistic mapping and expanding alone. Therefore, both direct prompts for language, such as follow-in directives for language and direct prompts for imitations may be required with this population.

Limitations of the Current Study

Several limitations must be acknowledged. A large number of variables were investigated given the number of participants in the regression analyses, though a maximum of four variables were considered within each given model in line with statistical guidelines for these types of analyses. In addition, the PLS-4 is not without drawbacks in measuring child language outcomes. The PLS-4 assesses a more developmentally advanced range of language skills in children. One could argue that parent follow-in comments, along with the other types of parent responsiveness examined in this study (i.e., linguistic mapping) mainly consist of object and action labels, which can be expected to specifically and directly build vocabulary but not grammar. Lexical learning might not be well indexed by the PLS-4. Therefore, it may be that a more comprehensive measure of vocabulary (e.g., the CDI) is more useful when studying children with beginning language skills; however, such a measure was not administered at Time 2. Indeed, some may argue that use of a parent report instrument is not appropriate for a study of parent responsiveness as more responsive parents may systematically differ from less responsive parents when reporting their children's word knowledge. In addition, such a measure may over-estimate functional communication abilities in children with ASD. The PLS-4 might have been most appropriate for the verbally fluent subgroup which, according to the ADOS module administered, was already combining words into phrases or sentences and used an average of over 126 words according to parent report at Time 1.

Finally, coding of the initial parent-child observation was limited to just 10 minutes of a 15-minute interaction, which may not be adequate to represent the nature of parent-child interactions. It could be argued that it would have been ideal to capture and analyze a longer sample for each dyad to provide a more representative picture of the parent-child interaction or to capture the language sample in a more familiar or naturalistic environment . However, previous studies assessing parent verbal responsiveness have coded play samples of similar or shorter durations than those used in the current study (e.g., McDuffie & Yoder, 2010 coded 15 minutes, and Siller & Sigman, 2002 coded 2 minutes) and use of a laboratory based sample allowed standardization of the language sampling procedures. We do recognize, though, that other groups of researchers have collected longer samples or have used brief samples collected across different contexts (e.g., Warren, Brady, Sterling, Fleming, & Marquis, 2010). How much time is needed to collect a representative sample is an empirical question that needs to be addressed through further research.

Clinical Implications

Responsive techniques that may be beneficial for use in clinical practice and as targets in parent mediated intervention programs were identified. The most compelling finding indicated that children may benefit more from particular kinds of parent input during different stages of language development. Specifically, the findings suggest that follow-in comments may be especially beneficial to young children with ASD at the earliest stages of

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language learning. This is particularly important given that many often assume that children with more severe disabilities are less likely to benefit from intervention or stimulating input and, therefore, more vigorous services are sometimes directed toward children with less significant disabilities because they may seem more "ready to learn." Our findings, along with the findings of other research (e.g., Carter et al., 2011; Yoder & Stone, 2006) refute this misconception and stress the value of meaningful input for children who have more severe impairments. In addition, follow-in directives, in the form of questions which the child has the lexical knowledge to answer, may help to support the child's use of their own linguistic knowledge within an interactive context. As discussed by Scherer and Olswang (1984), follow-in directives may be necessary to prompt child verbal communication acts, which subsequently allow opportunities for parents to expand the child's communicative message. When parents ask their child a question, it is important for them to recognize that that the child's response sets the occasion for parents to provide additional language input by expanding the child's response.

Future Directions

This study used child language outcomes that were measured one year following the initial visit. It would be beneficial to assess language outcomes at subsequent points of time through longer term longitudinal studies. Alternatively, treatment studies can teach parents of children with ASD to increase parent responsiveness and assess child language outcomes to demonstrate a causal relationship between the two. Previous studies have shown that parents of children with ASD can learn to use language facilitation strategies (Carter et al., 2011; Venker, McDuffie, Ellis Weismer, & Abbeduto, 2011). Future studies should focus on demonstrating that a causal relationship between a parent-mediated intervention program and child language outcomes is indeed mediated through gains in parent responsivity.

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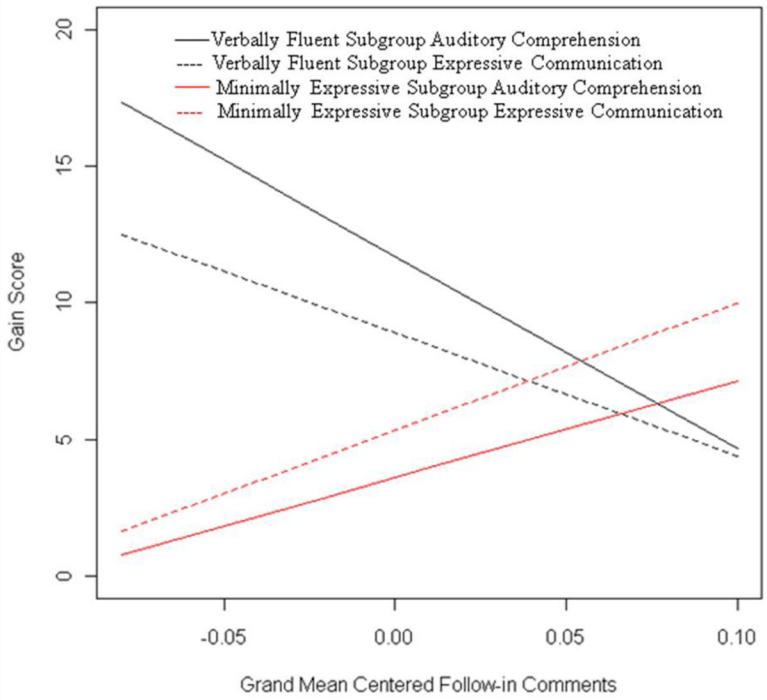

Figure 1.

Interaction between group and follow-in comments when assessing language comprehension and production. This figure illustrates that children with ASD with minimal expressive language benefit from parent follow-in comments both in receptive and expressive domains.

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Table 1

Participant Characteristics at Time 1 and Language Outcomes at Time 2

	Total Sample (*N*= 40)			MEL Subgroup (*n* = 22)			VF Subgroup (*n* = 18)		
Time 1 Measure	***M***	**SD**	**Range**	***M***	**SD**	**Range**	***M***	**SD**	**Range**
CA	31.15	4.37	24–39	29.50	4.18	24–37	33.17	3.79	25–39
ADOS Severity	7.50	1.81	4–10	8.09	1.90	5–10	6.78	1.44	4–10
NVMA[1]	24.24	4.64	17–34	21.36	3.40	17–31	27.47	3.64	22–34
CDI WU	151.75	112.92	1–396	103.41	89.08	1–396	210.83	112.82	50–396
CDI WP	60.75	95.54	0–384	7.09	9.04	0–37	126.33	112.06	9–384
PLS–4 AC RS	20.70	6.13	10–42	17.68	2.38	10–22	24.39	7.28	18–42
PLS-4 AC SS	60.20	14.07	50–116	56.27	5.82	50–75	65.00	19.18	50–116
PLS-4 EC RS	25.18	6.15	16–40	20.82	2.54	16–25	30.50	4.91	24–40
PLS-4 EC SS	72.50	11.38	56–106	66.27	6.38	56–79	80.11	11.64	62–106
Parent YOE	14.00	2.04	12–19	13.82	1.92	12–19	14.22	2.21	12–18
Time 2									
PLS-4 AC RS	28.42	11.05	17–55	21.59	4.44	17–32	36.78	11.02	20–55
PLS-4 AC SS	64.45	21.53	50–126	51.68	3.70	50–61	80.06	24.04	50–126
PLS-4 EC RS	32.53	9.20	19–56	26.36	5.46	19–39	40.06	6.94	31–56
PLS-4 EC SS	70.85	17.66	50–122	61.14	9.01	50–83	82.72	18.55	54–122

[1]Only 34 participants had valid data for NVMA.

Note: MEL = minimal expressive language; VF = verbally fluent; CA = chronological age; ADOS = Autism Diagnostic Observation Schedule; NVMA = nonverbal mental age; CDI = MacArthur–Bates Communicative Development Inventory; WU = words understood; WP = words produced; PLS–4 = Preschool Language Scales, Fourth Edition; AC = Auditory Comprehension; RS = raw score; SS = standard score; EC = Expressive Communication; YOE = years of education.

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Table 2

Parent Responsiveness to Child's Focus of Attention

Code	Definition	Example
Follow-in comments	Parent describes child's action or focus of attention without directing the child to change his or her behavior	"You have the piggy!" "Run horsey!" (as child moves horse) "Moo moo" (as child plays with the cow)
Parent descriptions of his or her own behavior	Parent describes his or her own action with a toy (provided that the child is attending to the parent's toy)	"I'll put the lips on." (as parent places lips on Mr. Potato Head)
Follow-in directives for behavior	Parent directs the child to change his/her behavior	"Put the eyes here." "Push the tractor."
Follow-in directives for language	Parent directs the child to produce a communication act (verbal or nonverbal)	"What is this?" "What does the pig say?"
Redirects	Parent redirects an engaged child	"Look at the cow." or "Here's the cow." (while child is playing with the pig)
Introductions	Parent introduces a toy to an unengaged child	"I have a hat." "See this pig?"
Other talking	Other talking	"oh" "ok"

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Table 3

Parent Verbal Responsiveness to Child Intentional Communication Acts

Code	Description	Example
Linguistic Mapping	Parent puts into words the presumed message of the child's nonverbal communication act	Child: reach for toy cow + eye gaze to adult Parent: "Cow" or "Want cow"
Expansion	Parent repeats what the child said, but adds additional linguistic information	Child: "Horse" Parent: "Yellow horse"

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Table 4

Mean Frequencies of Child Engagement, Child Communication Acts, and Parent Responsiveness

	MEL Subgroup (*n* = 22)			VF Subgroup (*n* = 18)		
Code	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
Child Engagement in Seconds						
Engaged	529.00	80.87	297–600	533.89	100.51	315–600
Not engaged	66.50	79.27	0–298	52.11	79.51	0–224
Parent Responses to Child Focus of Attention						
FI comments[1]	55.36	24.48	26–111	46.17	28.43	11–128
Describes action	8.82	5.88	1–24	5.06	4.84	0–17
No talking	313.73	95.30	137–473	299.94	100.56	151–493
Other talking	17.36	9.02	3–42	14.28	7.53	3–29
FI directives (Lang)[1]	6.09	5.00	0–18	18.28	11.73	2–42
FI directives (Beh)[1]	12.64	11.00	0–41	16.22	11.11	3–47
Parent gestures	10.32	8.53	1–36	13.89	9.32	2–37
Redirect	31.27	17.11	11–78	32.50	16.39	10–88
Introduction	8.77	12.56	0–57	7.89	11.15	0–37
Child Communication Acts						
Verbal	1.23	2.11	0–8	33.39	18.39	1–62
Nonverbal	3.18	3.43	0–12	6.22	6.29	0–20
Parent Responses to Child Communication Acts						
Linguistic mapping	1.36	1.84	0–6	2.94	3.11	0–11
Repetition	.91	1.69	0–6	9.61	9.06	0–33
Expansion	.09	0.29	0–1	4.67	3.27	0–12

[1]Follow-in

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Table 5

Bivariate Intercorrelations (N = 40)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. C-Engagement	-	.35*	.16	.30*	.03	.17	.33*	−.03	.18	−.84**	.39**	.01	.01	.31*	.05
2. C- Nonverbal com acts		-	.48**	.32*	.16	−.004	.41**	.03	−.20	−.37**	.74**	.39**	.40**	.42**	.20
3. C- Verbal com acts			-	−.15	−.18	−.20	.67**	.20	−.18	−.13	.36*	.82**	.12	.67**	.26
4. P- Follow-in comments				-	.55**	.31*	.09	.03	.05	−.24	.52**	−.01	.40**	−.13	.09
5. P- Descr. talk of own beh.					-	.23	−.05	.09	−.05	−.04	.28*	.02	.23	−.30*	-.16
6. P- Other talking						-	−.13	.17	.38**	−.02	.14	−.14	.21	−.23	−.26
7. P- Directives for lang.							-	.36*	−.09	−.21	.42**	.51**	−.05	.66**	.40**
8. P- Directives for beh.								-	−.08	−.002	.12	.01	−.085	.14	.15
9. P- Redirects									-	−.14	−.06	−.14	.04	−.23	−.08
10. P- Introductions										-	−.38**	.01	−.004	−.14	−.02
11. Linguistic mapping											-	.34*	.24	.15	−.01
12. Expansion												-	.11	.51**	.18
13. P- Years of education													-	.06	.43**
14. PLS AC difference														-	.50**
15. PLS EC difference															-

* $p < .05$.

** $p < .01$.

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Table 6

Results of Multiple Regression Analyses Predicting Language Gain Scores

	Language Outcomes							
	Language Comprehension [1]				Language Production [2]			
Step	ΔR^2	**B**	**SE B**	β	ΔR^2	**B**	**SE B**	β
Step 1	.00				.18**			
Parent Years of Education		.22	.58	.06		1.22	.42	.43**
Step 2	.34**			.09*				.34**
Parent Years of Education		.01	.48	.00		1.14	.40	.40**
Group		8.48	1.93	.59**		3.55	1.62	.31*
Step 3	.02				.002			
Parent Years of Education		.25	.53	.07		1.20	.45	.42**
Group		7.91	2.00	.55**		3.41	1.70	.30*
Follow-in Comments		−25.72	24.34	−.16		−6.46	20.74	−.05
Step 4	.10**				.11**			
Parent Years of Education		−.06	.51	−.02		.93	.43	.33*
Group		8.09	1.87	.56**		3.56	1.59	.31*
Follow-in Comments		35.33	33.40	.22		46.34	28.38	.39
Group X Follow-in Comments		−105.66	42.32	−.47**		−91.38	35.97	−.51**

Note. Parent years of education and follow-in comments were grand mean centered. Ratio values for follow-in comments were used to account for child engagement.

[1] PLS-4 Auditory Comprehension difference score.

[2] PLS-4 Expressive Communication difference score.

* $p < .05$.

** $p < .01$.