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BRIEF REPORT

Brief Report: Parent Verbal Responsiveness and Language Development in Toddlers on the Autism Spectrum

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Abstract This study examined the longitudinal associations between parent verbal responsiveness and language 3 years later in 34 toddlers with a diagnosis of an autism spectrum disorder. Parent–child play samples were coded for child engagement and communication acts and for parent verbal responsiveness. Measures of responsive verbal behaviors were used to predict language gain scores 3 years later. Parent directives for language that followed into the child's focus of attention were predictive of child receptive language gains. Parent comments that followed into the child's focus of attention yielded differential effects depending on initial levels of child language. Children who were minimally verbal at age 2½ benefited from parent comments that followed into the their focus of attention, whereas children who were verbally fluent did not demonstrate such a benefit.

Keywords Autism · Parent responsiveness · Parent–child interactions

Introduction

The social interactionist approach to language development posits that children acquire language through ongoing interactions with communication partners in everyday contexts (Bohannon and Bonvillian 2005). According to this theory, language learning results from transactional interactions between a child's linguistic and cognitive capacities and the child's social language environment. Within the child, biological organization of the brain directly impacts thinking and experiencing which, in turn, shapes learning and development of skills (Chapman 2000). Child abilities and behaviors, such as attention to objects, nonverbal communication, and verbal communication influence the way in which parents interact with and respond to the child and the type of linguistic input they provide. The dynamic interaction between the child and the parent leads to specific quantity and quality of linguistic input. For example, children who initiate joint attention frequently (e.g., by pointing to an object and looking to the parent) will likely have parents who provide contingent labels that relate to the child's focus of attention more often than parents of children who do not produce frequent communication acts. In this way, there is interplay between child characteristics and the social language environment provided by the parent.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that impacts several domains of cognition and language. Previous studies have identified differences in both structural and functional aspects of brain organization in individuals with ASD (Barnea-Goraly et al. 2004; Sparks et al. 2002). Such differences have implications for the ways in which information is processed and how learning occurs in individuals with ASD. At a behavioral level, deficits in attention, language, and social interaction skills may impact the child's ability to use skills in one domain to support the development of skills in a different domain. Thus, child abilities influence the quality of children's earliest interactional experiences, which exert a significant and cumulative influence on subsequent development, especially in the area of spoken language

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acquisition (Hart and Risley 1992). Early language abilities and language learning opportunities are especially important given that the development of verbally fluent spoken language during the preschool years is a strong prognostic indicator of long-term outcomes in children with autism spectrum disorders (ASD; e.g., Howlin et al. 2000). However, relatively little is known about the impact of different forms of parental linguistic input on later language abilities in this population.

Only a handful of studies have considered the contribution of different types of parent verbal input to later language abilities in children with ASD. The few published studies in the extant literature have found support for the role of responsive and contingent verbal input from parents in facilitating language development in children with ASD (Haebig et al. 2013; McDuffie and Yoder 2010; Siller and Sigman 2002, 2008); however, these studies have been limited by the assessment of a limited number of predictor variables and the analysis of short-term longitudinal data (e.g., 6 months in time).

Responsiveness to the Child's Focus of Attention

Verbal input from responsive parents is thought to facilitate earlier stages of word learning by providing labels that follow into or map directly onto the object or activity to which the child is attending (Baldwin 1995; Tomasello and Farrar 1986). This type of input, which we term "follow-in commenting," is considered to follow the child's lead by corresponding to the child's current focus of attention. Parents who provide verbal input that follows into their child's focus of attention assume the responsibility of ensuring that both the child and the parent are jointly focused on the same referent (i.e., supported joint attention; Adamson et al. 2004). Parent responsiveness to the child's focus of attention is particularly important for children with ASD given their known deficits in both initiating joint attention (i.e., IJA; Mundy and Newell 2007) and responding to others' bids for joint attention (i.e., RJA; Leekam et al. 1998; Mundy et al. 1986). Deficits in responding to joint attention have been found to negatively impact language learning (Luyster et al. 2008). Relative to typically developing children and 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 use their own focus of attention, rather than referencing the speaker's focus of attention, when learning new words (Baron-Cohen et al. 1997; Preissler and Carey 2005). Parents who consistently follow into their child's focus of attention may decrease mapping errors and decrease the cognitive and affective demands on the child to coordinate attention to both people and objects (Adamson et al. 2004).

Follow-in comments, which describe the child's focus of attention without conveying an expectation that the child respond to the parent in some way have been found to predict later language abilities in children with ASD (McDuffie and Yoder 2010; Siller and Sigman 2002, 2008). In a one-year follow-up study, the current authors demonstrated that follow-in comments have differential effects on children with ASD according to the child's initial language level (Haebig et al. 2013), warranting further investigation of these predictive associations.

In addition to follow-in comments, follow-in *directives* also correspond to the child's focus of attention and can be divided into two categories: follow-in directives for language (e.g., "What color is that?") and follow-in directives for behavior (e.g., "Push the car down." when the child holds a car). Unlike follow in comments, these types of follow in parent utterances convey an expectation that the child respond either behaviorally or communicatively to the parent's immediately preceding utterance. Siller and Sigman (2008) found that follow-in comments alone and a composite variable including both follow-in comments and follow-in directives both related to later language ability in a group of 28 preschoolers with ASD (no description of initial language was provided). McDuffie and Yoder (2010) found that follow-in comments and follow-in directives for behavior each independently accounted for unique variance in predicting later vocabulary for a group of toddlers with ASD who produced, on average, less than ten spoken words at the initial study visit. To our knowledge, the unique contribution of follow-in directives for *language* have been assessed only in one prior study (Haebig et al. 2013) and were found to be positively related to language gains.

Responsiveness to Child Communication Acts

Contingent parent verbal responses to child communication acts include linguistic mapping, repetitions, and expansions. Linguistic mapping occurs when a parent linguistically encodes or puts into words the child's immediately preceding act of nonverbal intentional communication. While both types of parent verbal input do follow into the child's focus of attention, linguistic mapping and follow-in comments are mutually exclusive and can be distinguished by whether or not a child communication act precedes the parent response. If the child is productively engaged and the parent describes the child's ongoing focus of attention, the parent is considered to have used follow-in commenting. If the child directs a nonverbal communicative bid to the parent (e.g., a show or give), and the parent responds contingently (i.e., within 3 s) to this child act, the parent is considered to have used linguistic mapping. Thus, the critical difference between the two types of responsive

verbal language input is that follow-in commenting does not require that the child actively direct a communication bid to the parent. Parents can provide language input by using follow in commenting even when their child uses very few communication acts. The current authors have, in fact, previously demonstrated that this type of verbal language input facilitates language growth in young children with ASD who are infrequent communicators (Haebig et al. 2013). The opportunity for a parent to provide language input by using linguistic mapping is determined by the frequency with which the child produces, and the parent recognizes, acts of nonverbal intentional communication.

Similarly, repetitions and expansions are parent responses that are provided contingent upon a child's verbal communication act. Expansions include part or all of the child's verbal communication act with an additional word or two, thus providing models of developmentally advanced language that map directly onto the child's own productions (Scherer and Olswang 1984). Repetitions include part or all of the child's communication act, without adding additional linguistic information. McDuffie and Yoder (2010) found that parent expansions, but not repetitions, uniquely predicted vocabulary abilities measured 6 months later in a group of minimally verbal children with ASD, even after controlling for the number of child communication acts. Presumably, repetitions may acknowledge what the child has said, but do not provide additional language input which can scaffold subsequent language growth. Children who are frequent communicators provide parents with consistent opportunities to respond with contingent linguistic mapping or expanding. Theoretically, one might posit that children who produce more frequent communication acts not only have more motivation to communicate but elicit more development enhancing verbal input from parents, contributing to subsequent gains in language ability over time. Siller and Sigman (2002, 2008) only assessed the contribution of parent utterances that were synchronous with or mapped onto the child's focus of attention. They did not assess the contribution to later language of parent responses to child communication acts, which have been shown to be an important source of language support for young children with ASD as they develop verbal language ability (Haebig et al. 2013; McDuffie and Yoder 2010).

To date, the available studies on the contributions of parent verbal responsiveness to later language are limited in generalizability due to small sample sizes, narrowly focused samples of parent–child interaction, and short-term longitudinal data. In the present study, we sought to replicate and expand our previous findings (Haebig et al. 2013) over a longer time period. Clinically, this line of research is important as it can inform the content of parent mediated intervention programs that target the use of empirically-based language facilitation strategies that can be used by parents when they interact with their children during play and other daily routines. Our specific research questions include:

1. Does parent language input that follows into the child's focus of attention significantly predict gains in receptive and expressive language 3 years later?
2. Does parent language input that responds contingently to child communication acts significantly predict gains in receptive and expressive language 3 years later?

Methods

Participants

Thirty-four parent–child dyads (6 children were female) participated in the current study as part of a larger longitudinal investigation. Comprehensive evaluations were conducted annually and the current study examines data collected at Visit 1 (mean age = 31.35 mo, SD = 4.48) and Visit 4 (mean age = 66.91 mo, SD = 5.71). All children received an ASD diagnosis at Visit 1 from an experienced psychologist. On average, Visit 4 evaluations occurred 36.4 months after Visit 1. Descriptive characteristics of the participants are presented in Table 1.

Assessments and Measures

Autism Status

Each child received a best estimate clinical diagnosis of either autism (n = 14) or autism spectrum (n = 20) from an experienced 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 ADI-R Toddler version (unpublished assessment; see Lord et al. 2006). The ADI-R and ADOS represent the current gold standard for assigning a diagnostic classification of autism for research. Following the first visit, the children's autism diagnosis was confirmed at each yearly study visit by an experienced psychologist utilizing the appropriate module of the ADOS, cognitive and language testing, and background information from parents. All of the children in the current study met diagnostic criteria for autism at all time points.

Table 1 Participant Characteristics

Visit 1 measure	Total sample (N = 34)			MEL subgroup (n = 19)			VF subgroup (n = 15)		
	M	SD	Range	*M*	SD	Range	*M*	SD	Range
CA[a]	31.35	4.48	24–39	29.32	4.31	24–37	33.93	3.28	27–39
ADOS Severity	7.32	1.82	4–10	7.84	1.92	5–10	6.67	1.50	4–10
NVMA[b]	24.32	4.91	16.5–34	21.38	3.51	16.5–31	27.47	3.64	22–34
PLS-4 AC[c] RS[e]	21.09	6.48	10–42	17.84	2.50	10–22	25.20	7.66	18–42
PLS-4 AC[c] SS[f]	60.41	14.75	50–116	56.52	6.07	50–75	65.33	20.48	50–116
PLS-4 EC[d] RS[e]	25.35	6.28	16–40	20.89	2.71	16–25	31.00	4.74	24–40
PLS-4 EC[d] SS[f]	71.91	10.68	56–97	66.21	6.87	56–79	79.13	10.41	62–97
Parent YOE[g]	13.97	2.15	12–19	13.68	2.00	12–19	14.33	2.35	12–18
Visit 4									
PLS-4 AC[c] RS[e]	47.00	13.41	17–62	40.11	13.43	17–59	55.73	6.75	42–62
PLS-4 AC[c] SS[f]	80.03	25.67	50–129	69.11	20.14	50–113	93.87	24.82	50–129
PLS-4 EC[d] RS[e]	48.71	13.55	23–67	41.11	11.87	23–67	58.33	8.57	44–67
PLS-4 EC[d] SS[f]	77.41	24.86	50–122	65.47	20.02	50–116	92.53	22.41	55–122

[a] Chronological age

[b] Only 30 participants had valid data for NVMA (nonverbal mental age)

[c] Auditory comprehension

[d] Expressive communication

[e] Raw score

[f] Standard score

[g] Years of education

Language and Cognition

Language abilities were assessed by a certified speech-language pathologist using the Preschool Language Scales, 4th edition (PLS-4; Zimmerman et al. 2002). Nonverbal cognitive abilities were assessed at Visit 1 by an experienced psychologist using the Visual Reception and Fine Motor subscales of the Mullen Scales of Early Learning (MSEL; Mullen 1995).

Procedure

Play Session

A 15-min parent–child play session was completed at Visit 1. Parents were instructed to play with their child as they would normally. Two developmentally appropriate toys (Mr. Potato Head and a Fisher-Price farm set) were provided for the play session. A student research assistant recorded the play sessions with a hand-held digital video recorder.

Coding

The first 10 min of each play sample was coded using a frequency based coding procedure with ProcoderDV (Tapp 2003). The following child and parent variables were coded: child engagement, parent responses to the child's focus of attention, child communication acts, and parent responses to child communication acts. Following coding, data files were exported into MOOSES software (Tapp et al. 1995) to calculate cumulative frequencies of each code.

Responsiveness to the Child's Focus of Attention

Coding for follow-in commenting and follow-in directives for language required two passes through the videotape. First, child active engagement in play was coded for each 1-s interval of the play sample. Intervals were coded as *engaged* (e.g., actively manipulating, visually attending to or communicating about an object in a play context), *not engaged* (e.g., walking around the room without manipulating, visually attending to or communicating about an object, crying, engaging in self-stimulatory behavior such as peering at spinning wheels on a toy car), or *uncodable* (e.g., child is off screen). Following this, responses to the child's focus of attention were coded during engaged intervals only, using the following four subcategories: *follow-in comments, parent description of his/her own action, follow-in directives for language,* and *follow-in directives for behavior*. Control variables included: *redirects* and *other talking*. The parent did not need to be visible on screen for a follow in response to be coded as

long as the parent's utterance was understandable and the coder could identify the child's focus of attention.

Responsiveness to Child Communication Acts

Child acts of intentional verbal and nonverbal communication were coded. Nonverbal communication acts included gestures or nonword vocalizations that were produced with coordinated attention between the parent and an object or event (e.g., child reaches for a toy the parent is holding and looks up to the parent). Verbal communication acts included real words or word approximations that were directed to the adult. Verbal communication acts related to the immediate interactive context and could serve multiple communicative functions, including requests, comments, responses to questions (e.g., "help", "cow", "bye–bye"); however, protests were not coded as communication acts (e.g., child screams "no").

Following the identification of a child communication act, parent responses that occurred within 3 s of the communication act were coded. Parent responses that accurately interpreted the child's nonverbal communication act in words were coded as *linguistic mapping*. Responses that added lexical or grammatical information to the child's verbal communication acts were coded as *expansions*. Parent repeats of all or part of the child's verbal communication act were coded as *repetitions.* There were no uncodable parent verbal utterances. If the parent utterance did not correctly correspond to the presumed topic of the child's verbal or nonverbal act, it was not coded. If the parent utterance described the child's focus of attention but was not contingent upon a child communication act, it was coded as a follow in comment or directive (depending on the expectation of a child response). If the parent utterance did not map onto the child's current focus of attention but did correspond to some other aspect of the interactive context, it was coded as a redirect.

See Table 2 for code descriptions and examples. Additional details and the coding manual are available by contacting the first author.

Reliability

Reliability was computed by having a separate independent coder recode 20 % of the play samples that were randomly selected. Interobserver reliability was calculated using intraclass correlation coefficients (ICC), reflecting 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 and Webb 1991). Values were above .95 for all values except for "other talking," which had an ICC value of .77; values of .6 or higher are acceptable (Suen and Ary 1989).

Results

Data Analysis

Analyses included variables that had theoretical and empirical evidence supporting their association with enhanced child language outcomes. Parent years of education were included in the analyses as an index of SES due to previous research indicating an association between SES and child language development (Hart and Risley 1992, 1995). Previous research has also found an association between the number of hours of therapy and later language abilities (Bono et al. 2004; Stone and Yoder 2001). The information concerning child intervention services gathered for the current study was not detailed enough to draw strong conclusions with regard to the influence of intervention on language outcomes; therefore, a dichotomous variable was derived to differentiate children who had ever received intensive autism intervention (i.e., 20 or more hours a week) over the course of the four year study. Separate analyses including child intensive autism therapy also were conducted. In addition, it was necessary to control for child engagement as parents only had the opportunity to provide follow-in comments or directives when while the child was actively engaged. Thus, a proportion was created using the parent follow-in variable as the numerator and child engagement as the denominator (e.g., frequency of follow-in comments divided by frequency of one-second intervals in which the child was engaged in active play). Similarly, opportunities for the parent to respond contingently to child communication acts were limited by the number of such acts. Thus, a proportion was created in which parent responses to child communication acts comprised the numerator and child communication acts served as the denominator (e.g., frequency of parent expansions divided by frequency of child verbal communication acts).

Because there were several metrics of parent verbal responsivity, examination of bivariate correlations was used to guide the selection of variables entered into the subsequent hierarchical multiple regression analyses. These preliminary correlational analyses assessed the association between all predictor variables measured at Visit 1 and language gain scores. Gain scores were computed by subtracting raw scores from the PLS-4 administered at Visit 1 from those measured at Visit 4 (e.g., Visit 4 PLS-4 Expressive Communication (EC) raw scores minus Visit 1 PLS-4 Expressive Communication (EC) raw scores).

Previous research suggests that children may benefit differentially from certain types of parent language input based upon the child's developmental level (Carter et al. 2011; Haebig et al. 2013). Thus, children in the current

Table 2 Parent responsiveness to child's focus of attention and communication acts

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 doggy!" "Run piggy!" (as child moves pig) "Moo moo" (as child plays with the cow)
Parent descriptions of his or her own behavior	Parent describes his/her own action with a toy (provided that the child is attending to the parent's toy)	"I'll put the eyes on." (as parent places eyes on Mr. Potato Head)
Follow-in directives for behavior	Parent directs the child to change his/her behavior	"Put the nose here." "Push the car."
Follow-in directives for language	Parent directs the child to produce a communication act (verbal or nonverbal)	"What's this?" "What does the cow say?"
Redirects	Parent redirects an engaged child	"Look at the dog." or "Here's the dog." (while child is playing with the pig)
Introductions	Parent introduces a toy to an unengaged child	"I have glasses." "See this sheep?"
Other talking	Other talking	"oh" "mhmm"
Linguistic Mapping	Parent puts the child's nonverbal communication act into words	Child: points to the sheep and looks up at the parent Parent: "Sheep"
Repetition	Parent repeats the child's verbal communication act	Child: "Shoe" Parent: "Shoe"
Expansion	Parent repeats part or all of child's verbal communication act and adds additional linguistic information	Child: "Hat" Parent: "Red hat"

sample were categorized into two subgroups based upon their initial language level. The ADOS module administered at Visit 1 was used as a proxy for initial language level. Children were assigned to the minimally expressive language subgroup ($n = 19$) if they produced fewer than 5 words during the administration of the ADOS at Visit 1, while children were assigned to the verbally fluent subgroup ($n = 15$) if they produced more than 5 words or produced simple phrases during the ADOS administration. Based on previous research, the parent responsiveness variables were expected to positively relate to language gains and the control variables (i.e., redirects and other talking) were expected to neutrally or negatively relate to language gains; thus, all analyses were one-tailed.

Bivariate Analysis

Pearson's correlations revealed a positive and significant correlation between parent follow-in directives for language and language gains (comprehension $r = .45$ and production $r = .35$, $ps < .025$). Additionally, other talking ($r = -.38$, $p = .014$) and redirects ($r = -.46$, $p = .003$) were negatively related to gains in language comprehension. Other talking was negatively related to gains in language production ($r = -.44$, $p = .005$). Follow-in comments and responses to child communication acts (expansions, repetitions, and linguistic mappings) were not significantly correlated to language gains. Parental education was not significantly correlated with either language comprehension gain scores ($r = .20$, $p = .132$) or expressive language gain scores ($r = .23$, $p = .10$). Similarly, the dichotomous variable indicating whether each child had ever received intensive autism intervention over the course of the larger longitudinal study was not significantly associated with language comprehension gain scores ($r = -.13$, $p = .228$) or expressive language gain scores ($r = -.26$, $p = .069$).

Hierarchical Multiple Regressions

To further assess the unique contributions of the significant bivariate correlates, hierarchical multiple regression analyses were used to predict language gain scores. Due to the limited sample size (n = 34) of this study, we restricted our analyses to the consideration of three-predictor models. The best three-predictor model of gains in language comprehension consisted of follow-in directives for language, redirects, and parent years of education (grand-mean centered). Parent follow-in directives for language ($t = 2.52$, $p = .009$, B = 231.47, $\beta = .37$, R^2 change = .20) and redirects ($t = -2.65$, $p = .007$, B = −170.66, $\beta = -.39$, R^2 change = .14) accounted for unique variance in

predicting gains in language comprehension. Parent education did not significantly account for unique variance ($t = 1.38$, $p = .089$, B = 1.07, $\beta = .20$, R^2 change = .04). A three-predictor model predicting gains in expressive language consisted of follow-in directives for language, other talking, and parent years of education (grand mean centered). Follow-in directives for language approached significance in accounting for unique variance in expressive language gain scores ($t = 1.54$, $p = .067$, B = 145.41, $\beta = .24$, R^2 change = .10). Parent other talking accounted for unique variance, with a negative impact on expressive language gain scores ($t = -2.91$, $p = .004$, B = −325.39, $\beta = -.46$, R^2 change = .15). Lastly, parent education significantly accounted for unique variance ($t = 2.00$, $p = .030$, B = 1.59, $\beta = .30$, R^2 change = .09).

Similar to the prior analysis incorporating parent education,we included child intensive autism intervention into hierarchical multiple regression models based on previously published research. The three-predictor model for language comprehension gain scores consisted of follow-in directives for language, redirects, and child intensive autism intervention. Parent follow-in directives for language ($t = 2.45$, $p = .010$, B = 236.45, $\beta = .38$, R^2 change = .20) and redirects ($t = -2.55$, $p = .008$, B = −171.86, $\beta = -.39$, R^2 change = .14) accounted for unique variance in predicting gains in language comprehension. Child intensive autism intervention did not significantly account for unique variance ($t = 0.21$, $p = .419$, B = 0.78, $\beta = .03$, R^2 change = .001). The three-predictor model predicting gains in expressive language consisted of follow-in directives for language, other talking, and child intensive autism intervention. Follow-in directives for language failed to reach significance in accounting for unique variance in expressive language gain scores ($t = 1.25$, $p = .110$, B = 124.74, $\beta = .20$, R^2 change = .10). Parent other talking accounted for unique variance, with a negative impact on expressive language gain scores ($t = -2.55$, $p = .008$, B = −289.33, $\beta = -.41$, R^2 change = .15). Lastly, child intensive autism intervention did not account for unique variance in expressive language gain scores ($t = -1.26$, $p = .109$, B = −4.87, $\beta = -.20$, R^2 change = .04).

Subsequently, a regression model was tested to consider the differential effect of parent verbal responsiveness on children with different initial levels of expressive language by including: Group (Minimal Expressive Language, Verbally Fluent), follow-in comments, and the interaction of Group × follow-in comments. The continuous variable representing follow-in commenting was grand mean centered and Group was dummy coded (see Cohen et al. 2003; p. 261). Grand mean centering is recommended to reduce collinearity between the variables that comprise the product term. Parent education was not included in this model because it was not significantly correlated with language gain scores in the bivariate analyses and there was not enough power in the model to allow its inclusion. This model resulted in a significant interaction between initial child language level and parent follow-in comments for gains in both comprehension ($t = -3.96$, $p < .001$, B = −277.67, $\beta = -.81$, R^2 change = .29) and production ($t = -3.40$, $p < .001$, B = −251.32, $\beta = -.75$, R^2 change = .25). Parent follow-in comments accounted for unique variance in comprehension and production gain scores for children who were minimally verbal but not for those who were verbally fluent at the initial assessment (see Fig. 1).

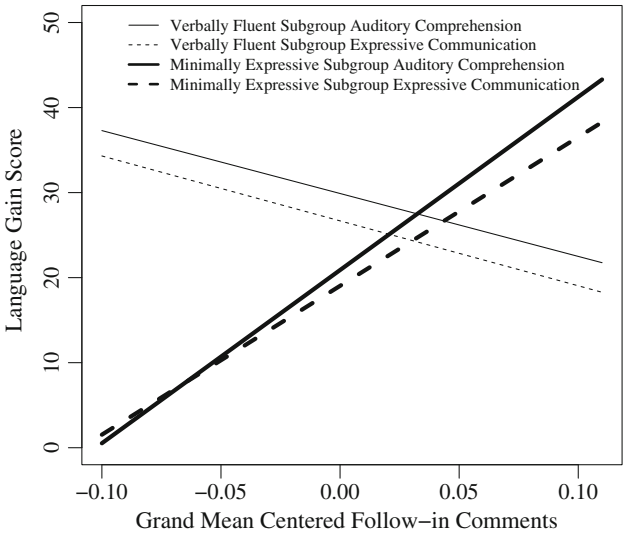

Fig. 1 Interaction between group and follow-in comments when assessing language gain scores. This figure illustrates that children with ASD with minimal expressive language benefit from parent follow-in comments both in receptive and expressive language domains

Discussion

The current study found that certain types of responsive verbal language input provided by parents when their children are toddlers can influence children's language gains when measured 3 years later. Moreover, parent follow-in comments seemed to differentially affect later language in children with ASD. Specifically, children who were minimally verbal (in this case, who used less than 5 spoken words during administration of the ADOS at the initial assessment), had better language outcomes 3 years later when their parents used more follow-in comments. The positive association between parent follow-in comments and later language observed in the current sample

adds support to previous findings (McDuffie and Yoder 2010; Siller and Sigman 2002, 2008) which also reported the language facilitating effect of parent verbal language input that is synchronous with the child's focus of attention and undemanding in terms of suggesting children change their focus of attention or their ongoing activity. Furthermore, the negative associations detected for the role of redirects (i.e., talking that does not map onto the child's ongoing focus of attention) and other kinds of parent talking (i.e., talking that does not provide meaningful linguistic input; e.g., "oh") align with previous research on verbal responsiveness and underscore the importance of parents who provide meaningful linguistic input that describes their child's current attentional focus.

A recent study reporting the effects of a naturalistic parent mediated language intervention has suggested that children with ASD with more severe impairments may differentially respond to parent input (Carter et al. 2011). This proposal is supported by our previous short term longitudinal findings (Haebig et al. 2013) as well as by the current study (excluding six children from the previous study due to attrition) in which parent use of follow-in commenting positively related to language gains children with minimal expressive language after 1 and 3 years in time. The minimally verbal subgroup of children examined in the current study had language levels that were similar to the participants in the McDuffie and Yoder (2010) study, who were described as having fewer than 10 words during a conversational language sample and for whom a positive contribution of parent follow in comments also was detected. Conversely, the verbally fluent subgroup in the current study displayed attenuated language growth with increasing use of parent follow-in comments. It is possible that the verbally fluent subgroup, some of whom were producing flexible phrase speech and who had an average spoken vocabulary size of 126 words according to parent report at age 2½ on the CDI (Fenson et al. 2007), may have benefited from more advanced linguistic input from their parents. It may be that parents who provide overly simplistic language forms that do not appropriately match the language abilities of verbally fluent children do not support their child's language growth as effectively as parents who expand their child's spoken utterances or elicit replies by using follow-in directives for language. More advanced language forms may have better matched the verbally fluent children's language level and provided appropriate scaffolding for language growth.

Regardless of initial linguistic abilities, the current study found that directives for language that followed into the child's focus of attention (e.g., "What's this?", "What color are the shoes?", "Where's his nose?") uniquely explained 20 % of the variance in language comprehension 3 years later, and approached significance, explaining 10 % of the variance, in later expressive language. These types of directives differ from redirects, which were negatively related to language growth. It is possible 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 given that these types of directives also refer to the child's current focus of attention (McCathren et al. 1995; McDuffie and Yoder 2010). Additionally, given known deficits in initiating joint attention, follow-in directives for language may serve as a needed prompt for the use of language that the child has already acquired. Follow-in directives for language can elicit both verbal and nonverbal communication, making them appropriate for children of various communication abilities. With adult scaffolding (e.g., environmental arrangement), the child is more likely to successfully produce a communication act and can therefore be encouraged to engage in reciprocal exchanges and sharing of attention, a strategy found to be beneficial for typically developing children, but potentially more important for children with ASD given their social deficits. Additionally, parents can follow child responses to questions with semantic or grammatical expansions, another empirically supported language facilitation strategy (e.g., McDuffie and Yoder 2010).

The current study has limitations that must be acknowledged. A large number of variables were investigated in the regression analyses, given the number of participants. However, a maximum of three variables were considered within a given model which is in line with statistical guidelines for these types of analyses. In an attempt to adhere to statistical guidelines for regression analyses, we did not include additional variables that could potentially influence child language gains. We included parent years of education, as a proxy for SES, and accounted for child initial language abilities by using language gain scores as our outcome variables, two robust predictors of later language in the extant literature. Additionally, we tested separate three-predictor models including child intensive autism intervention in place of parent years of education, to account for potential intervention effects on child language gains. A broad, dichotomous variable was used to measure child intervention services; thus, future studies should measure speech-language intervention history in a more detailed fashion to assess its contribution to child language outcomes. In addition, while it would have been ideal to capture and analyze a longer sample for each dyad, time did not allow for this during the initial annual visit.

The current study identified responsive techniques that may benefit children with ASD and could prove useful targets in parent mediated intervention programs. The most compelling finding stresses the value of meaningful input for children who have more severe impairments, who may

often be overlooked and considered less "ready to learn" or benefit from therapy. Future intervention studies should teach parents of children with ASD responsive verbal language strategies and assess causal connections between parental language input and gains in child language outcomes.

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