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Does Developmental Social Pragmatic Intervention for Children with Autism Influence Parent Language Use?

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Does developmental social pragmatic intervention for children with autism influence
parent language use?

A final report submitted in fulfillment
of the course Scholar's Electives 3305E

by

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Abstract

Parents and primary caregivers provide a key source of linguistic input for children early in the developmental process. The Milton and Ethel Harris Research Initiative Treatment (MEHRIT) is a developmental social pragmatic intervention that trains parents on supporting their child's communication development. This study investigated whether MEHRIT training was associated with changes in parent language use following treatment. Preschool-aged children with ASD and their parents participated in a randomized controlled trial. Twenty-five minute parent-child interactions were videotaped pre-treatment and post-treatment, twelve months apart, and each parent utterance was assigned a code indicating its main communicative function. Parents in the MEHRIT group outperformed the control group post-treatment in the use of skills taught by MEHRIT, using a significantly higher proportion of comments and responses, as well as a significantly lower proportion of directives. Results of this study offer support for parent-implemented therapies, suggesting that parents have the potential to apply strategies obtained from coaching in the facilitation of communication with their children.

161 words

Keywords: autism spectrum disorder, developmental social pragmatic intervention, DIRFloortime®, Milton and Ethel Harris Research Initiative (MEHRI), language functions, parent coaching, child development

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Background & Rationale

Autism spectrum disorder (ASD) is a complex neurodevelopmental condition that impacts the domains of cognition and language, affecting 1 in every 68 children (CDC, 2014). The prevalence of ASD has been reportedly increasing in recent years, likely due to the combined effects of earlier detection by parents and healthcare professionals, as well as expanded classification criteria for diagnosis (Boyle et al., 2011). Defining traits of autism include (a) deficits in social communication and social interaction, and (b) restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Several studies have shown that children on the spectrum learn language at significantly slower rates than typically-developing children (Austin, 1962; Capps, Kehres, & Sigman, 1998; Le Couteur et al., 1989), and that more than a quarter do not produce adequate speech to meet their daily needs (Weitz, Dexter, & Moore, 1997). However, children with autism who do manage to acquire meaningful verbal communication tend to achieve better long-term outcomes as adults, making spoken language abilities at the pre-school age a key target in therapeutic intervention (Gillberg & Steffenburg, 1987; Howlin, Goode, Hutton, & Rutter, 2004; Venter, Lord, & Schopler, 1992).

While standardized assessments focusing on language form (grammar, syntax) can be used to measure language abilities in children with autism, they are often ineffective at identifying deficits related to social communication (Botting, Conti-Ramsden, & Crutchley, 1997; Condouris, Tager-Flusberg, & Meyer, 2003; Dunn, Flax, Sliwinski, & Aram, 1996; Koegel, Koegel, & Smith, 1997; Tager-Flusberg, 2000). A functional approach to assessing language better accounts for the underlying intent to

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communicate, by reflecting the purpose of an utterance (e.g., to obtain information, to direct, or to protest). Developing mastery over the use and comprehension of a range of functions is central to effective social communication (Folger & Chapman, 1978; Ninio & Bruner, 1978).

Considering the amount of time spent interacting with their children, parents and primary caregivers provide a key source of linguistic input early in the developmental process. In particular, activities in the context of play are instrumental in children's acquisition of communicative competencies upon which higher level language is founded (Holdgrafer & Dunst, 1990; Talbott, Nelson, & Tager-Flusberg, 2015). The effects of parent behaviors and speech directed towards typically developing¹ children has been well documented. Constructive aspects such as following the child's attentional focus and engaging responsively facilitate greater child engagement, while excessive use of imperatives and commands are linked to non-compliance (Blount, 1990; Hampson & Nelson, 1993; Thiessen, Hill, & Saffran, 2005). However, there is a paucity of knowledge concerning how functions of parental language influence the trajectory of language learning in children with autism. A longitudinal study by McDuffie and Yoder (2010) associated parent verbal responsiveness with greater spoken vocabulary gains in children diagnosed with ASD. In a similar study, Siller and Sigman (2002) identified that the most salient predictor of improved standardized language test scores was the proportion of parent utterances contingent to the child's focus of attention. A pilot study demonstrated that, with adequate coaching from a speech language pathologist, parents were able to learn and apply verbal techniques associated with improved child language outcomes (Venker, McDuffie, Ellis Weismer, & Abbeduto, 2012). These studies provide support

¹ A child who possess the skills that is typically expected in children of his or her age.

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for the important role played by parents in developing language in their children with ASD. However, each is limited in generalizability because they either rely on small sample sizes (e.g., $n = 7$ in treatment group), convey short-term longitudinal data (e.g., 10 weeks), offer limited scope in the category of parent input (e.g., measuring only responsiveness), or evaluate child language in a confined way (e.g., standardized testing).

The Milton and Ethel Harris Research Initiative Treatment (MEHRIT) program at York University, Canada, is a developmental social pragmatic intervention for children with autism (Casenhiser, Shanker, & Stieben, 2013a; Prizant & Wetherby, 1998). Based upon developmental capacities from the DIRFloortime® program, MEHRIT facilitates language learning through parent-coached, play-based social interaction rather than a pre-determined set of activities specifically targeting language form (Ingersoll, Dvortcsak, Whalen, & Sikora, 2005). MEHRIT therapists encourage parents to promote spontaneous language by making comments about the child's focus of attention, following the child's lead, and responding to the child's communicative attempts, as opposed to eliciting a pre-determined utterance from the child through verbal prompts or metalinguistic questions.² In a previous study, parent-child dyads enrolled in the MEHRIT program were compared with a community treatment control group that did not receive MEHRIT intervention (Casenhiser et al., 2013a). Following 12 months of treatment, children in the MEHRIT group experienced greater gains in social interaction abilities than controls. Additionally, parental behaviors encouraged by the MEHRIT program, such as expression of enjoyment of the child, joining, support of reciprocity, and support of independent thinking, were observed at higher rates in parents who received MEHRIT training compared to those in the community treatment control group. A follow-up study

² A metalinguistic question refers to when the parent already knows the answer to the question being asked.

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evaluated the same subjects' language abilities using language sample analysis. It was found that children in the MEHRIT group outperformed the control group in various categories of language gains (e.g., number and length of utterance, number of responses). They also produced more diverse language functions overall (Casenhiser, Binns, McGill, Morderer, & Shanker, 2015).

In light of the language gains obtained by children in the MEHRIT group, the goal of the present study was to investigate how parent language use compares between the MEHRIT and control groups pre- and post-treatment using a randomized controlled trial.

Hypothesis

Due to the social-interaction-based approach MEHRIT uses for facilitating language learning compared to traditional therapy treatments, parent functional language use is hypothesized to differ between groups. Based on MEHRIT principles, we predict that parents in the MEHRIT treatment group will use more language-promoting functions (comments, open-ended questions, and responses), as well as less language-restricting functions (directives, prompts, and metalinguistic questions) compared to the control group.

Methods

Fifty-one parent-child dyads participated in the study to completion, as shown in Figure 1. All child participants, between 2 years 0 months and 4 years 11 months at start of study, were previously diagnosed with ASD. Parent-child dyads were randomly assigned to the MEHRIT treatment group ($n = 25$) or community treatment (CT) control group ($n = 26$). The treatment group received 2 hours of direct MEHRIT therapy per week which consisted of parent coaching from MEHRIT therapists, while the CT group was not enrolled in the MEHRIT program, but sought other forms of therapy independently (e.g., traditional speech therapy, behavioral intervention, and occupational therapy) averaging 3.9 hours per week. Parents in the MEHRIT group were also instructed to spend at least 3 hours per day interacting with their child.

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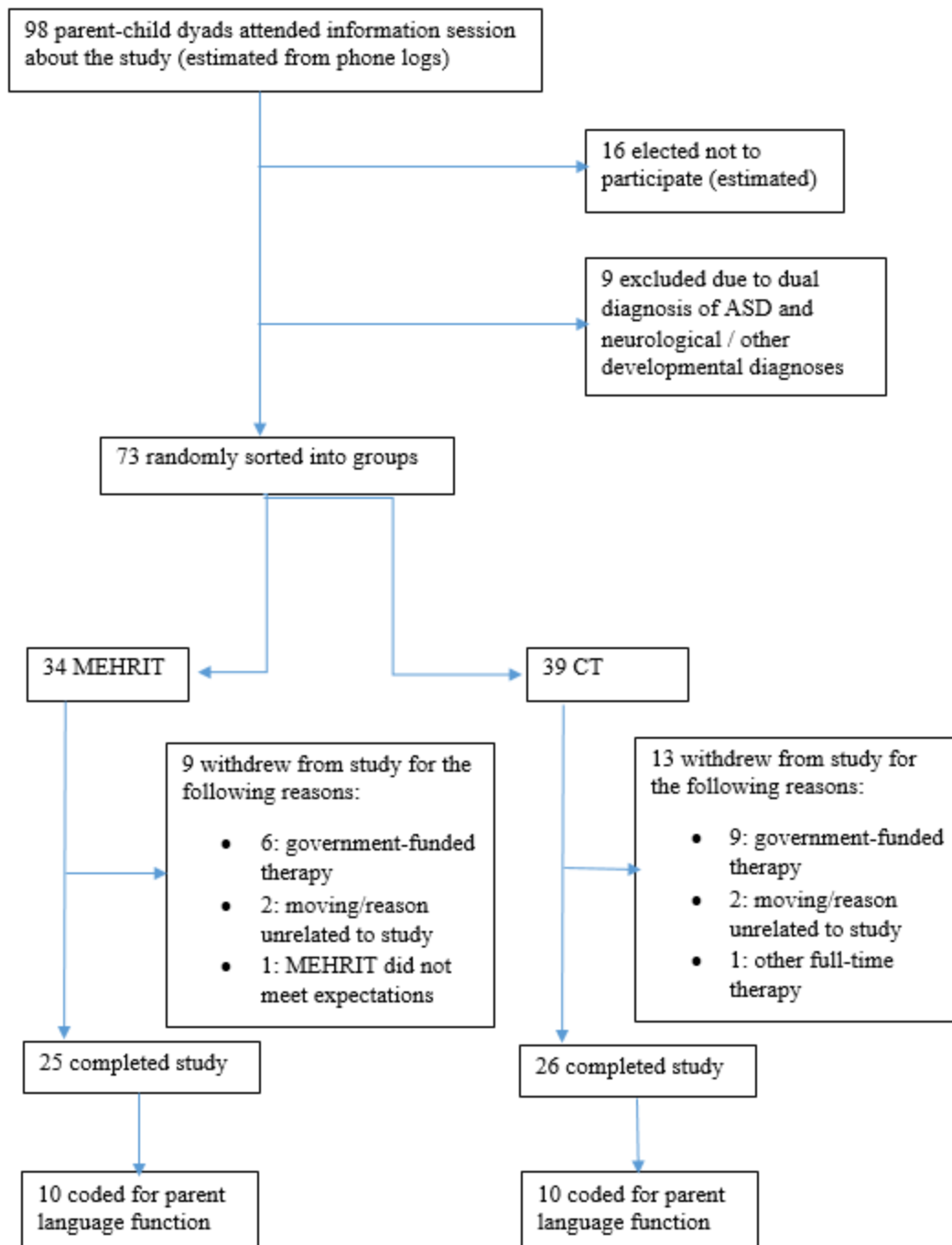


Figure 1. Participant flow through the randomized controlled trial.

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Twenty-five minute parent-child interactions were video-recorded pre-treatment (Time 1) and post-treatment (Time 2), 12 months apart. To encompass varying interests and diversify play contexts, three developmentally appropriate types of toys (symbolic, tactile, and gross motor) were available to participants during the play sessions. Videos were transcribed in CHAT format (MacWhinney, 2000) and the main function of each parent utterance was coded. Codes were adapted from the manual developed by Casenhiser et al. (2015) previously used to categorize child utterances and are presented in Table 1.

Table 1. *Functions and examples for parent language codes.*

Major function	Sub-function	Code	Example
Clarifications		CLAR	“You mean ___?”
Comments		CP	“That is a really big ball over there!”
Directives ^a		DPT	
	Explicit	DP	“Help me.”
	Implicit	DPI	“I need some help.”
Labels		LAP	“This is a ball.”
Questions ^a		OI	
	Choice questions	OICH	“Do you want this or that?”
	Open-ended questions	OIO	“What should we play next?”
	Metalinguistic questions	OIQ	“What colour is the lemon?”
	Yes/No questions	OIYN	“Do you want to play?”
Prompts ^a		PR	
	“Fill-in-the-blank” prompts	PRF	“Say broccoli.”
	“Say ___” prompts	PRS	“The doggie says ___.”
Repetitions		REP	“What’s this? What’s this?”
Responses		RESP	“Yes, I can help you.”
Rejects/Protests		RP	“No, don’t do that.”
Social Conventions		SCP	“Thank you.”
Shares		SHP	“I’m hungry.”
Spontaneous social expressions		SSEP	“Wow!”

^a Indicates a major function which includes two or more sub-functions.

Note. Detailed information and extensive examples for each code can be found in the MEHRIT Coding Manual developed by Binns, A. Casenhiser, D. McGill, F. and Wang, M.

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To ensure initial reliability, two researchers double-coded 10 transcripts out of the 40 transcripts used in the analysis. Mean inter-coder agreement was .91 (unweighted Cohen's Kappa). Agreement of individual transcripts ranged from .85 to .95. Following discussion to address any discrepancies, final agreement between coders was 100%. Usage of each code was determined with CLAN software and analyzed in SPSS. To account for differences in how often parents communicated (some parents spoke more than others), usage was expressed as a percentage of parent total utterances in a transcript.

Results

Ten parent child dyads from each group were included in a preliminary analysis. An overall mixed multivariate ANOVA and univariate mixed ANOVAs were conducted on the major functions listed in Table 1. Group (MEHRIT or CT) was a between-groups factor and Time (1 or 2) was a within groups factor. In the case of major functions with sub-functions, follow-up multivariate ANOVAs were performed. Adjustments were made using Holm's (1979) sequential Bonferroni adjustment for post hoc comparisons. If a major function reached significance, independent and paired *t*-tests were performed to determine between group and within group effects, respectively. Results of statistical analysis are described below and presented in Table 2 and Figures 2–6.

First, to visualize the relative use of the major functions, percentage of total parent utterances for each function was graphed as shown below in Figure 2. Overall, comments, directives, and questions were used most often, each accounting for approximately 20% of total parent utterances, followed by repetitions and responses at around 10%, and several less common functions at 5% or less.

Figure 3 illustrates the sub-function proportions for directives, prompts, and questions. Explicit directives and Yes/No questions accounted for the majority of utterances for their respective functions (Figure 3A and C), while the proportions of the two types of prompts were highly variable (Figure 3B).

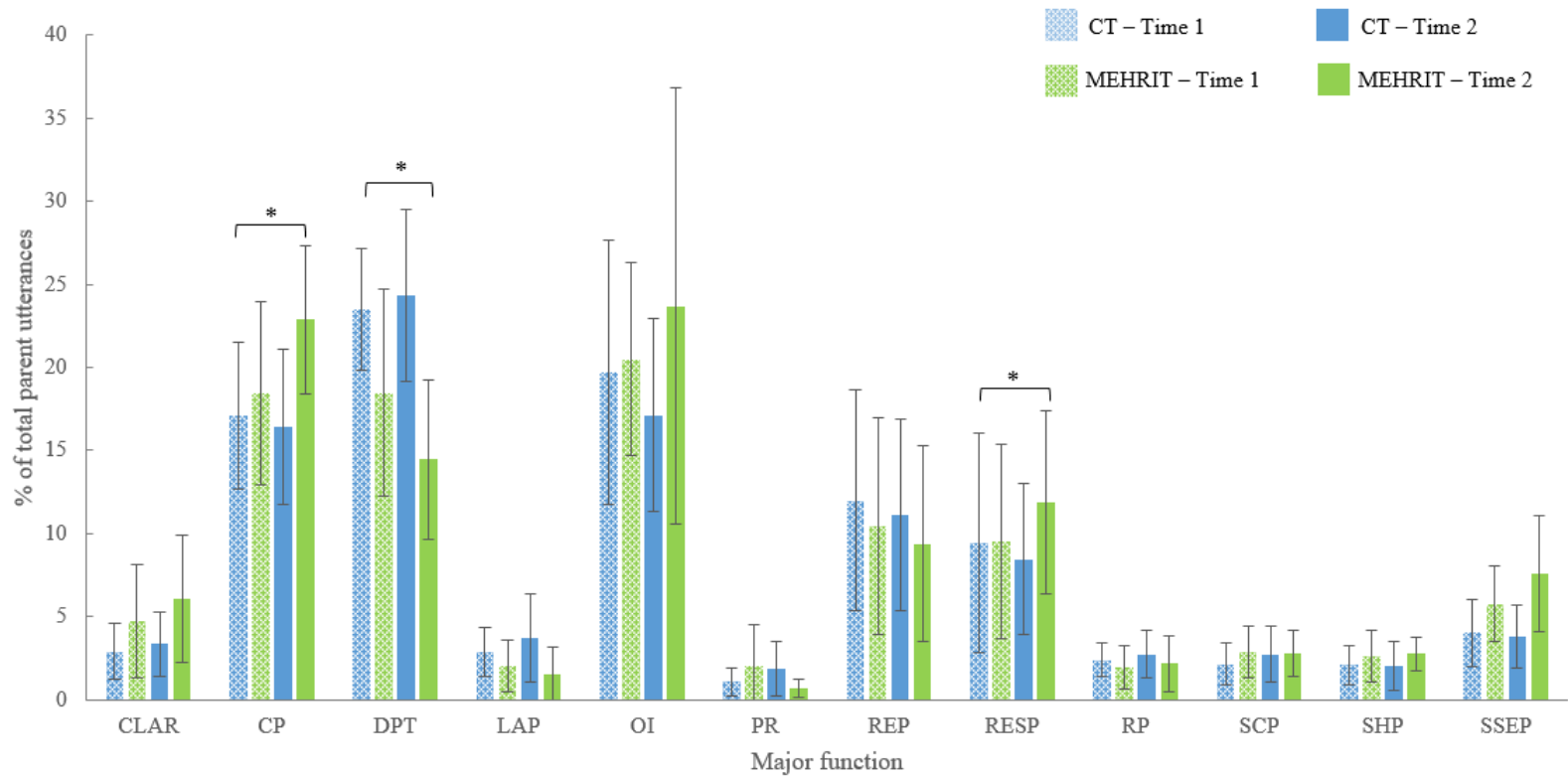


Figure 2. Major functions and the mean percentage of total parent utterances for CT and MEHRIT groups at Time 1 (pre-treatment) and Time 2 (post-treatment). DPT = total directives, OI = questions, CP = comments, REP = repetitions, RESP = responses, SSEP = spontaneous social expressions, CLAR = clarifications, SCP = social conventions, LAP = labels, SHP = shares, RP = rejects/protests, PR = prompts.

* Indicates a function with significant Group \times Time interaction ($p < 0.05$).

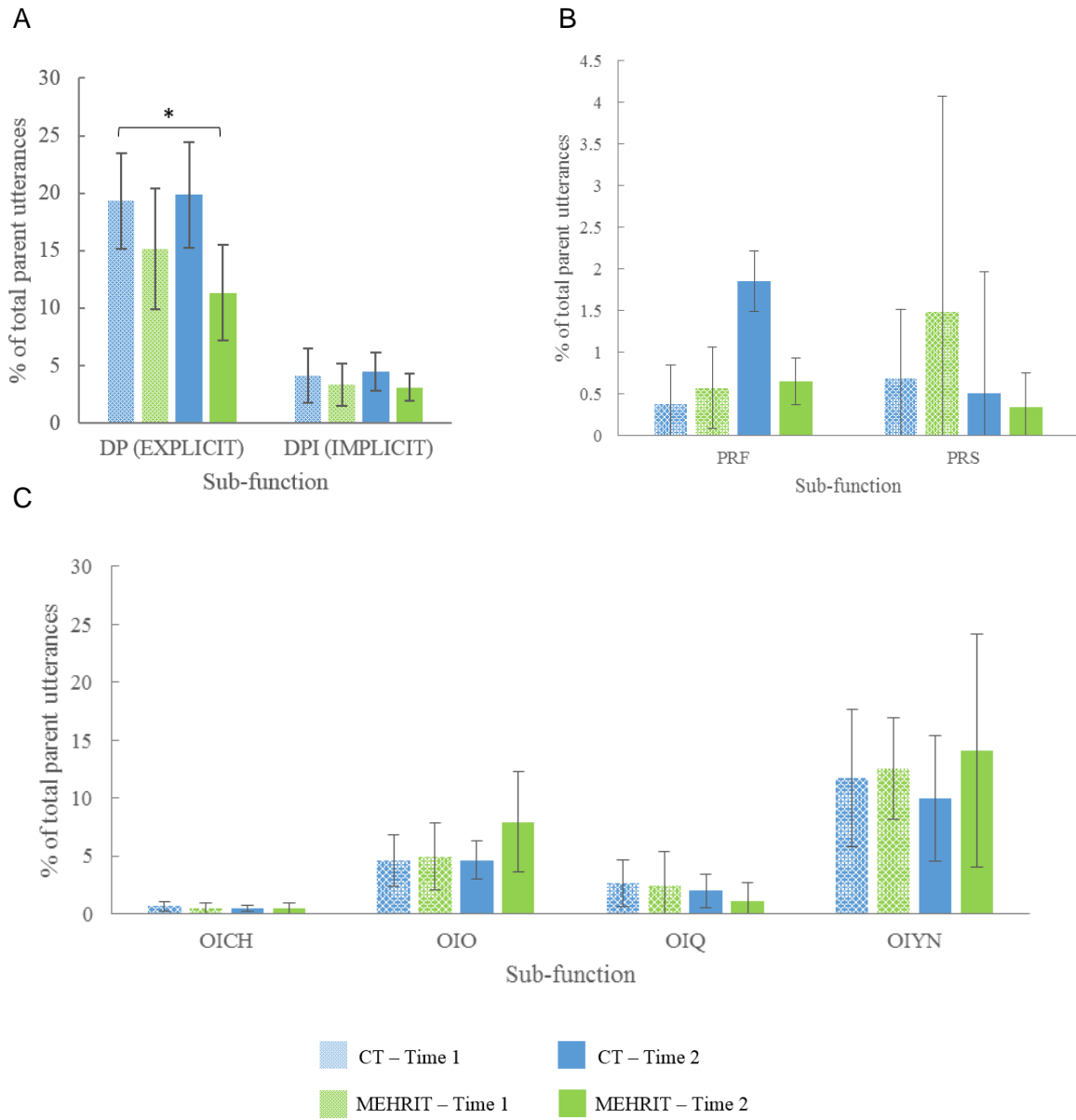


Figure 3. Sub-functions and the mean percentage of total parent utterances for CT and MEHRIT groups at Time 1 (pre-treatment) and Time 2 (post-treatment). Sub-functions of directives (A), prompts (B), and questions (C) are presented. DP = explicit directives, DPI = implicit directives, PRS = “Say ___” prompts, PRF = “Fill-in-the-blank” prompts, OIYN = Yes/No questions, OIO = open-ended questions, OIQ = metalinguistic questions, OICH = choice questions.

* Indicates a function with significant Group \times Time interaction ($p < .05$).

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Results of the overall multivariate ANOVA reached significance, Pillai's Trace = .912, $F = 6.072$, $p = .012$, $\eta^2_p = .912$, indicating that the interaction of Group and Time was associated with a change in the twelve major functions as a whole. The effect size for this analysis was high, as 91% of the variance in parent language functions was accounted for by the treatment group and time of evaluation (pre or post-treatment). There was no significance for Group or Time as separate independent variables. As shown in Table 2, post-hoc analyses for individual functions indicated significant Group \times Time interactions in comments, directives, and responses. If, however, alpha is adjusted using Holm's (1979) sequential Bonferroni adjustment, only directives reaches significance.

In addition to the Group \times Time effect on comments, $F(1, 18) = 5.757$, $p < .05$, $\eta^2_p = .242$, the MEHRIT group also significantly increased their proportion of comments used from Time 1 to Time 2, $t(9) = 2.989$, $p < .05$, shown below in Figure 4.

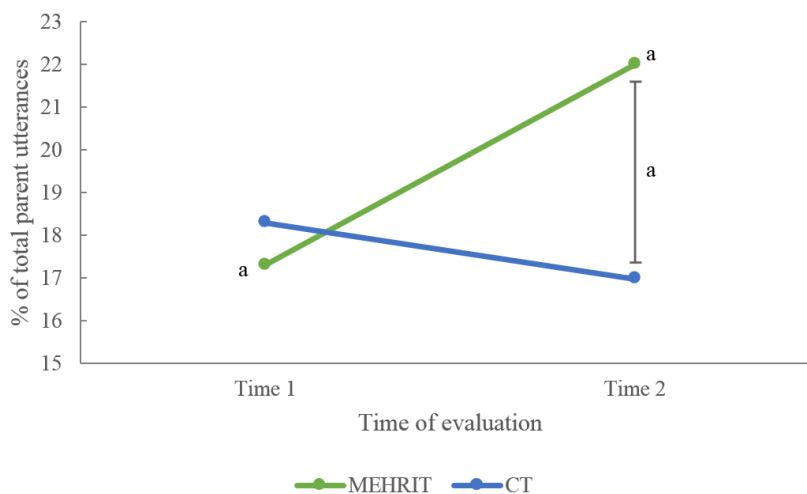


Figure 4. Proportion of total parent utterances that were comments showed an overall significant Group \times Time interaction. A significant within group effect for MEHRIT parents and a significant between group effect at Time 2 was also observed.

^a Indicates significance at $p < .05$.

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Table 2. Descriptive statistics and summary of univariate ANOVA analyses for major functions.

Major function	Group	Mean (SD)		F	η^2_p
		% of total parent utterances			
		Time 1	Time 2		
Clarifications	MEHRIT	4.11 (3.45)	5.01 (2.28)	.220	.012
	CT	3.54 (2.46)	3.89 (2.67)	$p = .645$	
	Total	3.82 (2.93)	4.45 (2.484)		
Comments	MEHRIT	17.31 (4.72)	21.99 (5.15)	5.757	.242
	CT	18.29 (5.75)	16.98 (4.48)	$p = .027^*$	
	Total	17.80 (5.14)	19.49 (5.36)		
Directives	MEHRIT	20.17 (6.90)	14.65 (4.95)	19.938	.526
	CT	21.97 (5.14)	24.09 (5.89)	$p < .001^\dagger$	
	Total	21.07 (5.99)	19.37 (7.17)		
Labels	MEHRIT	2.08 (1.65)	2.13 (2.27)	.160	.009
	CT	2.87 (1.57)	3.33 (2.96)	$p = .694$	
	Total	2.47 (1.62)	2.73 (2.64)		
Questions	MEHRIT	21.48 (5.59)	20.09 (6.29)	.244	.013
	CT	18.91 (8.60)	19.06 (7.70)	$p = .627$	
	Total	20.19 (7.18)	19.58 (6.86)		
Prompts	MEHRIT	2.01 (2.61)	.806 (1.01)	3.267	.154
	CT	1.12 (.871)	1.72 (1.75)	$p = .087$	
	Total	1.57 (1.95)	1.27 (1.47)		
Repetitions	MEHRIT	11.00 (6.43)	10.41 (6.67)	.110	.006
	CT	11.52 (7.43)	10.38 (6.37)	$p = .744$	
	Total	11.26 (6.77)	10.40 (6.35)		
Responses	MEHRIT	8.12 (5.99)	10.75 (6.53)	5.622	.238
	CT	10.86 (6.79)	9.17 (4.02)	$p = .029^*$	
	Total	9.49 (6.39)	9.96 (5.34)		
Rejects/Protests	MEHRIT	1.75 (1.13)	2.06 (1.72)	.025	.001
	CT	2.58 (1.22)	2.78 (1.45)	$p = .876$	
	Total	2.16 (1.22)	2.42 (1.60)		
Social Conventions	MEHRIT	3.22 (1.69)	2.55 (1.40)	3.327	.156
	CT	1.83 (1.02)	2.89 (1.73)	$p = .085$	
	Total	2.53 (1.54)	2.72 (1.54)		
Shares	MEHRIT	2.26 (1.61)	2.31 (.991)	.108	.006
	CT	2.45 (1.35)	2.31 (1.38)	$p = .746$	
	Total	2.36 (1.45)	2.31 (1.17)		
Spontaneous social expressions	MEHRIT	5.75 (2.40)	7.12 (3.53)	1.701	.086
	CT	4.06 (2.18)	4.08 (2.25)	$p = .209$	
	Total	4.90 (2.50)	5.60 (3.28)		
Total parent utterances	MEHRIT	521.40 (101.70)	475.3 (85.07)	8.897	.331
	CT	598.10 (89.38)	598.5 (109.21)	$p = .008^*$	
	Total	559.75 (101.69)	536.9 (114.33)		

[†] Indicates a value that is significant when adjusted using Holm's (1979) sequential Bonferroni adjustment for multiple comparisons ($p < .001$).

* Indicates a value that is significant before or without Bonferroni adjustment ($p < .05$).

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Furthermore, at Time 2, MEHRIT parents used a significantly greater proportion of comments compared to CT parents, $t(18) = 2.323$, $p < .05$. There were no between group differences present at Time 1, and the CT group did not change significantly in their use of comments from Time 1 to Time 2.

Figure 5 shows the significant Group \times Time interaction and high effect size observed for total directives, $F(1, 18) = 19.938$, $p < .001$, $\eta^2_p = .526$. At Time 1, the MEHRIT and CT groups were not significantly different. While the CT group did not change in their use of comments from Time 1 to Time 2, MEHRIT parents significantly reduced their use of directives post-treatment, $t(9) = 3.961$, $p < .005$. A significant between group effect was also observed at Time 2, as MEHRIT parents used a lower proportion of directives than CT parents, $t(18) = 3.883$, $p = .001$.

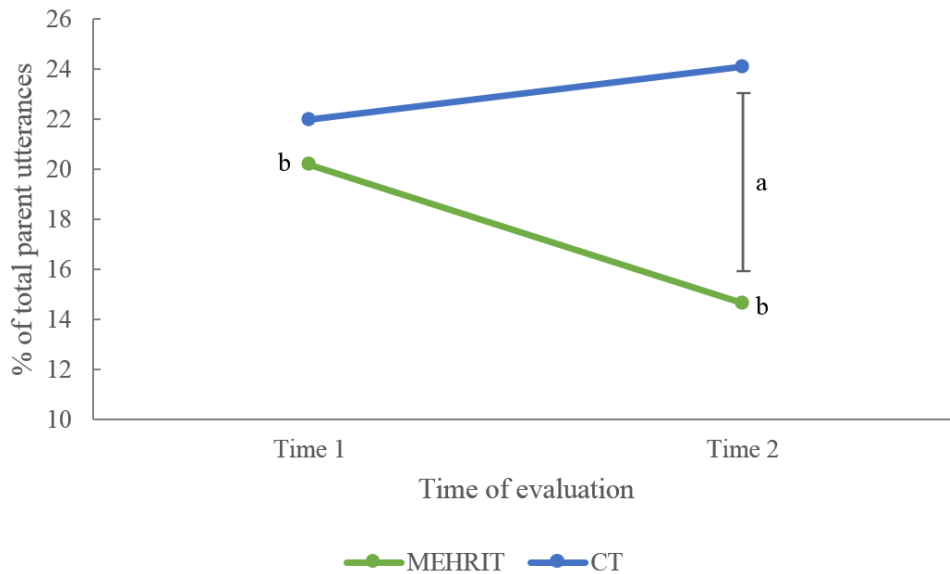


Figure 5. Proportion of total parent utterances that were directives showed an overall significant Group \times Time interaction. A significant within group effect for MEHRIT parents and a significant between group effect at Time 2 was also observed.

^a Indicates significance at $p = .001$.

^b Indicates significance at $p < .005$.

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As shown in Table 3, analysis of sub-functions for total directives revealed that explicit directives, $F(1, 18) = 22.466$, $p < .001$, $\eta^2_p = .555$, rather than implicit directives, $F(1, 18) = .142$, $p = .142$, $\eta^2_p = .008$, accounts for the significant interaction effect.

Table 3. *Descriptive statistics and summary of univariate ANOVA analyses for sub-functions.*

Sub-function (Code)	Group	Mean (SD)		F	η^2_p
		% of total parent utterances			
		Time 1	Time 2		
Directives – Explicit (DP)	MEHRIT	16.89 (6.37)	11.47 (4.18)	22.47 ^a	.555
	CT	17.80 (4.80)	19.66 (5.18)	$p < .001^\dagger$	
	Total	17.35 (5.51)	15.57 (6.22)		
Directives – Implicit (DPI)	MEHRIT	3.28 (1.96)	3.18 (1.35)	.142 ^a	.008
	CT	4.17 (2.42)	4.43 (1.81)	$p = .711$	
	Total	3.73 (2.19)	3.81 (1.69)		
Choice questions (OICH)	MEHRIT	.563 (.491)	.582 (.442)		N/A ^b
	CT	.600 (.468)	.483 (.313)		
	Total	.580 (.468)	.533 (.376)		
Open-ended questions (OIO)	MEHRIT	4.88 (3.05)	6.57 (3.88)		N/A ^b
	CT	4.74 (2.29)	5.43 (1.81)		
	Total	4.81 (2.62)	6.00 (3.00)		
Quizzing questions (OIQ)	MEHRIT	2.49 (3.13)	1.38 (1.74)		N/A ^b
	CT	2.66 (2.16)	1.83 (1.62)		
	Total	2.58 (2.62)	1.60 (1.65)		
Yes/No questions (OIYN)	MEHRIT	13.54 (4.61)	11.55 (4.17)		N/A ^b
	CT	10.91 (6.03)	11.32 (7.15)		
	Total	12.23 (5.39)	11.44 (5.70)		
“Fill-in-the-blank” prompts (PRF)	MEHRIT	.477 (.478)	.326 (.280)		N/A ^b
	CT	.474 (.563)	.509 (.387)		
	Total	.476 (.508)	.418 (.342)		
“Say ___” prompts (PRS)	MEHRIT	1.53 (2.71)	.480 (.894)		N/A ^b
	CT	.647 (.889)	1.22 (1.54)		
	Total	1.09 (2.02)	.850 (1.28)		

[†] Indicates a value that is significant when adjusted using Holm’s (1979) sequential Bonferroni adjustment for multiple comparisons ($p < .001$).

^a Follow-up multivariate ANOVA with sub-functions of total directives (DPT) reached significance, Pillai’s Trace = .566, $F = 11.075$, $p < .001$, $\eta^2_p = .566$.

^b Univariate ANOVA for major function did not reach significance (Table 2), so follow-up tests were not performed.

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Although there was no between group effect for responses, MEHRIT parents significantly increased their use of responses from Time 1 to Time 2, $t(9) = 2.514$, $p < .05$. Moreover, there was a significant Group \times Time interaction, $F(1, 18) = 5.622$, $p < .05$, $\eta^2_p = .238$, as shown in Figure 6. The CT group did not change significantly in their use of responses from Time 1 to Time 2.

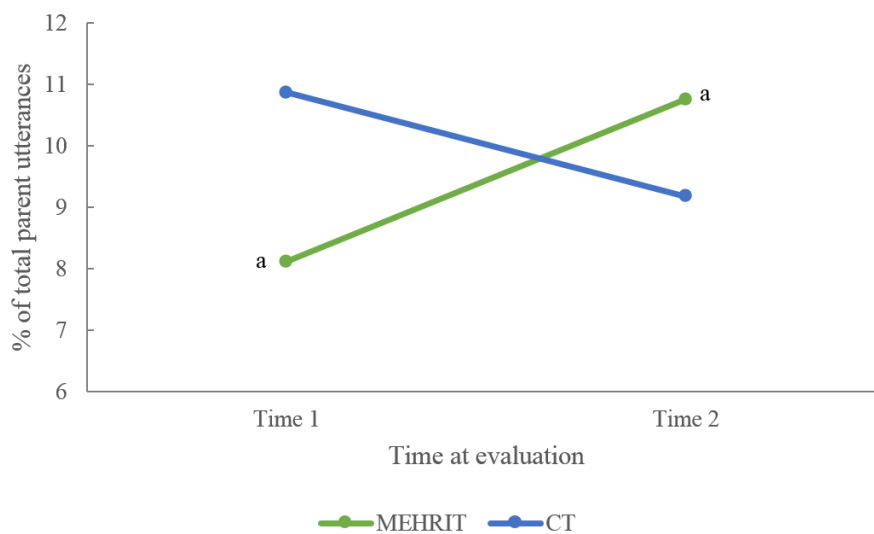


Figure 6. Proportion of total parent utterances that were responses showed an overall significant Group \times Time interaction and a significant within group effect for MEHRIT parents.

^a Indicates significance at $p < .05$.

Finally, we also note that there was a Group main effect on the total number of parent utterances per transcript, $F(1, 18) = 8.897$, $p < .01$, $\eta^2_p = .331$, where MEHRIT parents produced significantly less utterances compared to CT parents (Table 2).

Discussion

Overall, parents in both MEHRIT and CT groups used a diverse set of language functions when interacting with their child (Figures 2 and 3). To our knowledge, this is the first study to analyze the pragmatics of parent language to such a thorough extent. Although MEHRIT parents used functions of communication in similar proportions to CT parents, there are several key differences which should be noted.

To begin with, in support our hypothesis, MEHRIT parents proportionally increased their use of language-promoting functions (comments and responses), while reducing their use of language-restricting functions (directives) (Figure 2, Table 2). The effect on open-ended questions, prompts, and metalinguistic questions was inconclusive, likely because these functions were infrequently used by parents (Figure 2 and 3C).

Increased use of commenting by MEHRIT parents post-treatment is in line with skills taught during training (Figure 4). Parents were encouraged to make comments about the child's focus of attention in order to facilitate joint attention, which is the ability to maintain a shared focus of two individuals on a common object (Bakeman & Adamson, 1984; Scaife & Bruner, 1975). Children with ASD often have difficulty with acquiring this skill, although it is essential for social and language development (Charman, 2003; M. Harris, Jones, Brookes, & Grant, 1986; Mundy & Newell, 2007). Interestingly, a previous paper on behavioral changes for participants in this study reported that children in the MEHRIT group demonstrated greater joint attention abilities than their CT peers post-treatment (Casenhiser et al., 2013a). This occurrence may be associated with MEHRIT parents' increased use of commenting. Although we cannot infer causation with the present data, whether parent's use of comments predicts child's

joint attention skills can be investigated using a regression analysis in a future study. Using comments also provides parents with greater opportunity to model correct language use, in contrast with other functions such as labelling. For example, a comment such as “This is a big blue ball” is a more complex and language-rich statement than simply labelling an object as “Ball.” Children acquire new language skills by learning from more competent speakers (Vygotsky, 1976), and adults often try to tailor their speech to the linguistic abilities of children (Konstantareas, Zajdeman, Homatidis, & McCabe, 1988). Therefore, using comments which model complex language but can still be understood by the child may promote linguistic development in children with ASD.

MEHRIT training was also associated with a decrease in use of directives, which was the only major function to reach significance even after Bonferroni adjustment. This is noteworthy, as several studies have previously highlighted that parents of children with ASD tend to use more commands than parents of typically-developing children (Iacono, Chan, & Waring, 1998; Wulbert, Inglis, Kriegsmann, & Mills, 1975). Our results support this finding, as directives accounted for a higher proportion of parent speech than any other function pre-treatment (Table 2). It is suggested that parental directiveness is used to address attentional difficulties or disruptive behavior on the part of the child, but overuse of imperative statements may reduce child’s spontaneous speech and impede language development (Bell & Harper, 1977; DePaulo & Bonvillian, 1978; McDonald & Pien, 1980; Moellman-Landa & Olswang, 1984; Snow, 1972). As shown in Figure 5, parents in the treatment group decreased their use of directives following MEHRIT training, which is likely attributed to parents being trained to follow their child’s lead. Reduction in utterances with a directive function may be correlated with the child

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language gains reported in Casenhiser et al. (2015) and is a promising candidate for further investigation.

Furthermore, MEHRIT parents used a significantly greater proportion of responses post-treatment compared to pre-treatment (Figure 6), which is in accordance with the MEHRIT principle of responding consistently to the child's communicative attempts. The importance of parent responsiveness in supporting children's language development has been established by numerous studies (Cross & Morris, 1980; Kaiser et al., 1996; Tamis-LeMonda, Bornstein, & Baumwell, 2001; Yoder, Warren, McCathern, & Leew, 1998). Increase in MEHRIT parent's use of responses found in this study and the previously reported increase in child's attention to activity, initiation, and involvement (Casenhiser, Shanker, & Stieben, 2013b) are consistent with the bi-directional mechanism of conversation. Responding consistently acknowledges the child's communication efforts, and promotes further attempts at communication (Girolametto, Sussman, & Weitzman, 2007).

A major inference from this study is that parents are able to apply and retain key language facilitation skills after weekly training with a MEHRIT therapist. This finding offers support for the feasibility of parent-implemented therapies as a method of intervention for children with autism spectrum disorder. Support for involving parents in treatment provides a three-fold benefit: maximizing quantity of therapy received by the child in a wide range of communication contexts (Dale, Crain-Thoreson, Notari-Syverson, & Cole, 1996; Kashinath, Woods, & Goldstein, 2006), increasing parents' self-efficacy (Koegel et al., 1997; Tonge et al., 2006), and extending the scarce professional

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resources available to families affected by autism, thus allowing more children to receive treatment (Schreibman, Kaneko, & Koegel, 1991).

Finally, the between group difference in total number of parent utterances underscores the importance of a greater sample size for further analysis. While it is likely attributed to outlier effects, we recognize that an inherent difference is possible despite the randomized group assignment of participants. Therefore, to account for this group effect, the values in this report were reported as percentage of total parent utterances per transcript rather than a raw tally.

A limitation worth mentioning is that the CT group is not a homogenous treatment group, as participants were allowed to seek other forms of therapy within the community. This was to ensure that no children were deprived of necessary intervention, but prevents conclusions from being made about whether MEHRIT treatment is significantly different from any one treatment program in particular. In addition, even though groups were randomized, there was a self-selection bias; parents who participated were willing to spend at least three hours a day interacting with their child, according to the exclusion criteria. This limits the generalizability of our findings for the effects of MEHRIT on parents who are not able to fulfill the time requirement, although this can be addressed in a follow-up study.

In terms of future directions, coding the remaining transcripts and adding to the current data set will yield more robust findings. Details of the how codes were assigned to functions, as well as specific examples can be found in the MEHRI coding manual, which makes it possible for additional researchers to code a transcript using methods consistent with the initial researchers. After coding is complete, child development

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measures (Casenhiser et al., 2015) will be analyzed for concurrent associations with parental speech, followed by regression analysis to identify parent language functions which predict child language gains. By determining if differences in linguistic input to children with ASD influence their acquisition of verbal skills, we can provide guidance for both parents and therapists on more effective communication strategies.

Conversely, it is also necessary to take into account whether differences in child language abilities influence parent language use. For example, attempting to communicate with a non-verbal child is quite different from speaking to a child who can ask and answer questions. Thus, if we stratify the participants based on their baseline language abilities, we may find that the optimal intervention strategy varies at different language levels. This analysis will provide insight into how intervention can be tailored to suit each individual child's needs at different points in his or her development.

Finally, determining if MEHRIT parents will sustain the skills they have acquired over a longer term is a key tenet to the feasibility of parent-implemented therapies, and will require follow-up study. Previous papers have emphasized the importance of continuing professional support for parents in order to fully maintain the efficacy of parent coaching (S. L. Harris, Wolchik, & Weitz, 1981; Kasari et al., 2014). It is also essential to ensure that parents renew and adapt their communication strategies to the child's evolving developmental capacities.

In conclusion, findings of the present study elucidate the characteristics of parental speech to children with ASD from a functional perspective. In addition to providing empirical evidence on parent-specific outcomes of the MEHRIT program, they also offer insight into the feasibility of an intervention model in which a skilled therapist

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coaches parents on strategies to implement on a daily basis with their child. In summary, this investigation brings us one step closer to the development of more effective treatment programs, with the hope that a greater number of children with ASD will find ways to overcome their communication challenges with the support of dedicated parents and therapists.

3728 words

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