USING EMPRICAL BENCHMARKS TO ASSESS THE EFFECTS OF A PARENT-IMPLEMENTED LANGUAGE INTERVENTION FOR CHILDREN WITH LANGUAGE IMPAIRMENTS

By

Megan York Roberts

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Approved:

Professor Ann Kaiser

Professor Stephen Camarata

Professor Donald Compton

Professor Mark Wolery

To the KidTalk families and children

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CHAPTER 1

INTRODUCTION

Young children who have expressive and receptive language impairments during their toddler years are at increased risk for persistent language impairment and later academic failure (Snowling, 2005). Developing effective early language intervention for this population is essential. Few studies have investigated the effects of early language intervention for this population (Law, Garrett, & Nye, 2004). Because both remediation of current language impairments and prevention of later impairments and related problems are important, analyzing the impact of intervention on both developmental outcomes and growth trajectories during and after intervention has merit. In the current study, a randomized group experiment was combined with a benchmarking analysis including typical children in order to assess the impact of a naturalistic intervention involving parents on children's language outcomes and to determine if the growth occurring during intervention was similar to the amount of growth on developmental measures in typical children during the same time period.

Prevalence of Language Impairments

Most young children learn language during everyday interactions and experiences with their parents and caregivers without intervention or specialized parent training. Those children who experience early language impairments comprise a heterogeneous population with varying degrees of receptive, expressive or mixed expressive-receptive impairments. Estimates of the prevalence of co-occurring receptive and expressive language impairments range from 3% to

13% based on the age of the population and criteria used in making the estimate (Law, Boyle, Harris, Harkness, & Nye, 2000; Tomblin, Records, Buckwalter, Zhang, Smith, & O'Brien, 1997). Although it is estimated that the majority of children with slow expressive language development will recover, more than 75% of young children with both expressive and receptive language impairments evidence persistent impairments (Law et al., 2000). Weismer (2007) reported approximately 7.5% of all 5-year-olds have language impairments that began during the preschool years. Consistent with Weismer's estimate, Tomblin et al. (1997) reported that 7% of 5-year-olds present with specific language impairment (SLI).

Despite the risk for persistent language impairments, a "wait and see" approach is often recommended to parents of children with language impairments (Paul, 2007). Recently, Buschmann et al. (2008) disagreed with this commonly recommended practice and suggested that intervention is needed for children as young as 24 months with expressive language impairments. The results of their study indicate that children with language impairments benefited from a low-intensity, parent-implemented intervention (Buschmann et al., 2008). At three years, 25% of children in the treatment group exhibited language impairments as compared to 66% of children in the control group. Despite the evidence of positive effects of early intervention, under the current Part C regulations of the Individual with Disabilities Improvement Act (IDEA, 2004) many children with language impairments do not receive early intervention. Children whose developmental delay is restricted to one domain (e.g., language) and who are between 25% and 50% delayed in that domain are not eligible to receive services in 50% of states, although they are at increased risk for persistent language impairments (Shackelford, 2006).

Developing effective interventions for young children with language impairments is particularly important because these children are at increased risk for later academic and reading problems (Snowling, 2005). When children have difficulty learning vocabulary and constructing meaning from syntactic structures, they are likely to have both persistent language deficits and reading problems (Beitchman, Wilson, Brownlie, Walters, & Lance, 1996). Among children with language impairments in kindergarten, approximately 50% had a reading disability in second and fourth grades (Catts, Fey, Tomblin, & Zhang, 2002). Children with persistent language difficulties at age 5½ have been reported to exhibit poor reading comprehension at age 8½ and pervasive problems with word-level and reading comprehension at age 15 (Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998).

Previous Research on Children with Language Impairments

There is relatively little intervention research on children with expressive and receptive language impairments (Law et al., 2004; Yoder & McDuffie, 2002). The majority of research on children with language impairments has included children older than 36 months. Furthermore, research with children between 24 and 36 months of age has focused primarily on expressive language outcomes (Gibbard, 1994; Gibbard, Coglan, & McDonald, 2004; Girolametto, Pearce, & Weitzman, 1996; Pearce, Girolametto, & Weitzman, 1996; Robertson & Weismer, 1999; Weismer, Murray-Branch, & Miller, 1993). Only one published study has examined receptive language outcomes following intervention for children with expressive and receptive language impairments (Glogowska, Roulstone, Enderby, & Peters, 2000). In the largest randomized control trial of children with language impairments, 159 children were randomly assigned to a "wait and see approach" or to receive speech and language therapy in one of 16 community-

based clinics. Children in the treatment group received one-on-one speech and language therapy. The actual therapy delivered to children varied substantially within the treatment group. Number of hours of therapy ranged from 1 to 15 hours. Frequency of therapy ranged from once a week to once every two months. The duration of therapy ranged from 1 month to 12 months. The specific therapy strategies used in intervention were not well specified. The large range in intensity, frequency, duration and type of therapy in the treatment group may explain why differences in outcome measures of expressive language skills were not statistically significant between groups. Despite variability in the treatment protocols, auditory comprehension outcomes were significantly higher in the treatment group, as compared to the control group (d = 0.30). These findings suggest that early intervention may impact auditory comprehension abilities which are a key factor in long term language development (Paul, 2007).

Additional research has focused on the effects of early intervention for children with expressive language impairments only and typical cognitive abilities. Intervention for this population has been implemented by clinicians (Roberston & Weismer, 1999; Weismer et al., 1993) and by parents (Gibbard, 1994; Gibbard, et al., 2004; Girolametto, et al., 1996; Pearce et al., 1996). In a single-subject alternating treatments design, Weismer et al. (1993) compared two intervention strategies, modeling alone and modeling plus prompting for children with expressive language impairments in an alternating-treatment, single-subject design. Both the modeling only and modeling plus prompting strategies implemented by the clinician resulted in increases in expressive vocabulary in 2 of the 3 children. Roberston and Weismer (1999) compared expressive language outcomes of children with expressive language impairments in a study with random assignment of participants to a treatment group (n= 11) or control group (n = 10). Treatment consisted of 12 weeks of small-group direct instruction (150 minutes per week)

during which the clinician employed several modeling strategies including parallel talk (i.e., description of the child's actions), expansions (i.e., repetition of the child's utterance with additional semantic or syntactic information), and recasts (i.e., repetition of the child utterance and including modification of the child's previous utterance to change modality or voice). Gains in mean length of utterance (MLU), total number of different words (NDW), and total number of words (TNW) were significantly greater for the treatment group.

Parent-Child Interaction as a Context for Intervention

Associations between aspects of parent-child interaction and child language development indicate that including parents in early intervention may be important. Several aspects of parent-child interactions are associated with child language development: (a) amount of parent-child interaction, (b) responsiveness to child communication, (c) amount and quality of linguistic input, and (d) use of language learning support strategies. The relationship between parent-child interaction style and child language development is present in both typically developing children and children with language impairments.

Amount of parent-child interaction. Differences in the amount of parent-child interaction are associated with differences in language development from a very young age. For example, Tomasello and Todd (1986) found that typically developing children whose mothers engaged in greater amounts of joint interaction had larger productive vocabularies between 12 and 18 months of age than children whose mothers engaged in less joint interaction. In a study of 60 infants between 8 and 10 months of age, Alston and St. James-Roberts (2005) found that mothers of infants showing early signs of communication difficulties spent half as much time interacting with their infants as compared to mothers of typically developing infants. Differences

in parent-child interaction between parents of young children with typical language and parents of children with language impairments are also apparent. Hammer, Tomblin, Zhang, and Weiss (2001) reported that parents of children with typical language engaged in more conversational activities with their children than parents of children with specific language impairments (SLI).

Responsiveness. Generally, responsiveness refers to parents' verbal and nonverbal responses to child communication attempts, play actions and social eye contact, however, definitions of responsiveness vary by study and age of child. Tamis-LeMonda, Bornstein and Baumwell (2001) examined the relationship between maternal responsiveness and the occurrence of expressive language milestones in typically developing children. Maternal responsiveness to child vocalizations at 13 months predicted the timing of several expressive language milestones (e.g., 50 words, combinatorial speech, first use of language to talk about the past). The association between parent responsiveness and child language growth also exists for children with language impairments. Girolametto, Weitzman, Wiigs and Pearce (1999) reported a significant relationship between maternal contingent responsiveness (e.g., imitation or expansion of the child's communication) and child language development (e.g., number of words, word combinations) in 12 children with expressive language impairments observed before and after intervention. Yoder, McCathren, Warren and Watson (2001) in a descriptive study of 58 children between 17 and 33 months of age with developmental disabilities, found that maternal responsiveness to child intentional communication acts at the beginning of the study was positively related to expressive and receptive language 12 months later. Wulbert, Inglis, Kriegsmann and Mills (1975) compared maternal responsiveness between mothers of children with and without language impairments and found that mothers of children with language impairments were less responsive than mothers of children with typical language.

Language input. The relationship between amount of language exposure during parent child interactions and vocabulary growth has been studied extensively. In a study of 22 children between 14 and 26 months of age, Huttenlocher, Haight, Bryk, Seltzer and Lyons (1991) found a significant positive relationship between the amount of maternal linguistic input (i.e., number of different words) and their child's vocabulary growth. Hart and Risley (1995) observed the relationship between the amount of parent talk and the children's vocabulary size across families from different demographic backgrounds. Rowe (2008) found a similar relation between the amount of child-directed speech and typical children's receptive vocabulary as measured by the Peabody Picture Vocabulary Test at 30 and 42 months.

The content and quality of language input, as well as the quantity of input, affect child language development. The diversity of words that parents use is associated with the size of children's expressive vocabulary. Hoff and Naigles (2002), in a study of 63 typically developing 2-year-old children, found lexical quality (i.e., number of different words, mean length of utterance) and syntactic complexity of maternal speech predicted children's productive vocabulary (i.e., total number of words in a 90 utterance sample). Weizman and Snow (2001), in a study of 316 children, found that both the number of sophisticated words and the density of sophisticated words in parents' talk to children predicted children's receptive vocabulary in kindergarten and 2nd grade. Furthermore, parental linguistic input may vary depending on the child's language ability. Harris, Jones, Brookes, and Grant (1986) found that mothers of typically developing children labeled objects in their child's focus of attention more frequently than did mothers of children with slower language development.

Language support strategies. Parents naturally use a number of language support strategies (e.g., specifying relations between actions, objects and actions; expanding and

recasting child utterances to add words and syntactic structures) that play an important role in child language development. Smith, Landry and Swank (2000) reported that language support strategies occurred in 18% of parent-child interactions and frequency of parental use of strategies predicted verbal skills of their children in a sample of 312, 3-year-olds.

Parents of children with language impairments may not use language support strategies in the same manner or at the same rate as parents of children with typical language. In a study 18 children between 2 and 6 years of age, Conti-Ramsden, Hutcheson and Grove (1995) found that parents of children with SLI used fewer simple recasts (i.e., the parent repeats the child's previous sentence and adds words) than parents of children with typically developing language. Vigil, Hodges, and Klee (2005) also found that parents of children with typical language used more expansions than parents of children with language impairments.

While these studies support the premise that differences in parent interaction, amount of talk, linguistic input and use of language support strategies are associated with children's language development, it is important to consider the transactional nature of interactions and the bi-directional influences of children on parents and parents on children. Children with language impairments may differ from typical children in rate of communication, development of joint attention (Mundy, Kasari, Sigman, & Ruskin, 1995), clarity of communicative intention, intelligibility (Rice, Sell, & Hadley, 1991), and responsiveness to language (Wetherby, Prizant, & Hutchinson, 1998). Teaching parents to modify their interaction styles and linguistic input may be an important element of early language intervention for young children with language impairments.

The Need for Parent-Implemented Interventions

Given the critical role that parents play in their children's language development and the observed differences in parent interaction strategies with children who have language impairments, teaching parents to support language development is an important component of effective remediation of young children's communication deficits. The need for interventions that include typical communication partners and that are delivered in children's natural environments is widely recognized. The Individual with Disabilities Improvement Act (IDEA, 2004) highlights the importance of parent-child interactions in the home environment by mandating that interventions for young children with disabilities be implemented within typical and authentic learning experiences.

Triadic intervention. Training parents to implement specific language intervention strategies to improve language development in their children is a triadic intervention model. That is, a skilled trainer teaches parents to use specific language intervention strategies with their children. The success of this approach depends on parents learning and using the strategies with sufficient frequency and accuracy to influence their children's development. The content of these language support strategies vary. Generally, the strategies have been derived from (a) descriptions of the normative parent-child interactions discussed previously (e.g., Girolametto et al., 1999; Tamis-LeMonda et al., 2001, Tomasello & Todd, 1986; Vigil et al., 2005; Weizman & Snow, 2001), (b) behavioral learning principles (Schreibman & Koegel, 2005) or (c) a hybrid of these (Kaiser, 1993; Dawson et al., 2010).

Studying triadic interventions requires a three-level method for monitoring and measuring parent training, parent implementation of intervention strategies and child language outcomes. Methodologically strong studies measure the procedures for teaching parents specific

strategies, parents' implementation of these strategies and the effects of the intervention on child language development. Parent generalization of language teaching strategies to home interactions and maintenance of these strategies for periods sufficient to impact children's development require measurement across settings and time. Thus, quantifying the dosage of intervention received by the children is a considerable challenge. Few studies measure all aspects of the triadic intervention. However, over the last three decades, there has been a sufficient body of research to build a case for the efficacy of parent-implemented interventions.

Effects of parent-implemented interventions. Beginning in the 1970's, studies demonstrated that parents could be taught specific strategies to support their children's language learning (Cheseldine & McConkey, 1979, Fey, Clive, Long, & Hughes, 1993; Girolametto, 1988; Tannock, Girolametto, & Siegel, 1992; Weistuch & Lewis, 1985). Although there was early evidence to suggest that parent behavior could be altered to create a more supportive interactional context for children (Cheseldine & McConkey, 1979; Mahoney & Powell, 1986; Price, 1984), only more recent studies have included evidence that changes in children's communication are associated with specific changes in parent behavior (Alpert & Kaiser, 1992; Delaney & Kaiser, 2001; Fey et al., 1993; Hancock, Kaiser & Delaney, 2002; Kaiser, Hancock & Hester, 1998).

A recent meta-analysis of parent-implemented interventions found that parent-implemented language interventions have positive effects on child language (Roberts & Kaiser, 2011). This meta-analysis included 18 group design studies of parent-implemented interventions for children with primary and secondary language impairments. The most common intervention was the Hanen Parent Program, a 12-week group-parent training program in which parents are taught to respond to and expand child communication, follow the child's lead in play and use

specific language models. Effect sizes across parent-implemented interventions, when compared to a non-treatment or business-as-usual comparison group, were positive, significant and ranged from g = .35, p = .02, 95% CI [.05, .65] for receptive language to g = .82, p = .00, 95% CI [.37, 1.38] for expressive morpho-syntax. There were several intervention strategies that were common across studies: (a) responding to child communication, (b) increasing quality of linguistic input, (c) adjusting the balance of adult-child communication and (d) expanding or recasting child communication. These strategies mirror those characteristics observed in natural parent-child interactions that are predictive of child language development.

The meta-analysis highlighted the limitations of studies of parent-implemented interventions. First, the majority of studies failed to measure treatment fidelity or to describe the parent training procedures. Without specific description of how the parent-training was actually implemented, it is difficult to determine what specific parent training strategies resulted in changes in parent behaviors. Second, the majority of studies did not measure parent use of intervention strategies or examine the relationship between parent strategy use and child language growth, making it impossible to determine which specific language strategies were effective at improving language skills. Third, while studies included children with autism, Down syndrome, developmental delays and expressive language impairments, only one study included children with receptive and expressive language impairments and typical cognitive development (Law, Kot, & Barnett, 1999). Fourth, few studies followed children over time (exceptions were Buschmann et al., 2008; Law et al., 1999, Baxendale 2003; van Balkam et al. 2009). When parents are trained to use specific language intervention strategies, generally it is expected that intervention effects will maintain over time. Additional research examining parents' use of

intervention strategies and growth of child language skills over time is necessary to determine the long-term effects of parent-implemented language interventions.

Parent-implemented Enhanced Milieu Teaching. Enhanced Milieu Teaching (EMT) is an early language intervention that has been primarily studied using single subject methodology. EMT is a conversation-based model of early language intervention that uses child interests and initiations as opportunities to model and prompt language use in everyday contexts. Experimental applications of EMT typically have included four sequential steps: (a) arranging the environment to increase the likelihood that the child will initiate to the adult; (b) modeling and expanding specific language targets appropriate to the child's language level; (c) responding to the child's initiations with prompts for elaborated language consistent with the child's language targets; and (d) functionally reinforcing the child's communicative attempts by providing access to requested objects. The use of parent-implemented EMT has been widely researched with preschool-age children with varying levels of language and cognitive abilities. Alpert and Kaiser (1992) examined the effects of individual parent training on parental use of EMT strategies in the clinic and two settings in which training did not occur. A multiple-baseline design across six mothers of preschoolers with language impairments illustrated successful implementation of EMT strategies by parents and, subsequently, growth in child's sentence length (MLUw). In addition, the total number of words and number of different words nearly doubled from baseline to the end of intervention.

Consistent results were found by Hemmeter and Kaiser (1994) in a multiple-baseline single-subject design of four parents of children with developmental delays. All parents learned EMT strategies in the clinic and generalized the use of these strategies to the home. Increases in spontaneous communication and target use by the child illustrate the positive effects of parent-

implemented EMT strategies on language development. Kaiser, Hemmeter, Ostrosky, and Fischer (1996) found similar results in a multiple baseline of 12 mother-child dyads. Participants were children with developmental disabilities between 2 and 5 years of age. All parents learned to use the language strategies in the clinic, generalized their use to other activities within the home, and maintained these strategies six months after the end of training. In addition to child language gains observed in intervention, these gains maintained over time. Parents reported high satisfaction with the effect of intervention on the communication skills of their children as well as with the training process.

Similar results have also been found with preschoolers at high risk (Hancock et al., 2002), children with concomitant language impairments and behavior problems (Delaney & Kaiser, 2001), and children with autism (Kaiser, Hancock, & Nietfeld, 2000). Although no published study of parent-implemented EMT has included exclusively children with language impairments, the results of many studies indicate that parent-implemented EMT facilitates language growth for young children with varying degrees of language and cognitive ability, as well for children with developmental disabilities. In addition, unlike the majority of intervention studies of children with language impairments, all parent-implemented EMT studies have included participants with receptive and expressive impairments and cognitive delays, suggesting its potential effectiveness for children with receptive and expressive impairments without cognitive delays. Furthermore, EMT includes all of the language support strategies (e.g., expansions, modeling language, and parallel talk) included in the aforementioned clinician-implemented intervention studies of children with expressive language impairments. EMT also includes embedded prompting (e.g., use of Milieu Teaching prompting sequences), which has

not been used widely with children who have receptive and productive language impairments and typical cognition.

The Importance of Using Empirical Benchmarks

Despite the potential for early intervention to improve language skills for children with language impairments, the current practice for this population is a "wait and see" approach because it is assumed that many children will recover from their language impairments without intervention (Law et al. 2000). Given that no treatment is the recommended standard of care for young children with receptive and expressive language impairments, it is especially important to be able to quantify intervention effects beyond the treatment versus control group comparison (Hill, Bloom, Black, & Lipsey, 2008). Comparing language growth of children with typical language skills to children who do and do not receive intervention allows for a more meaningful examination of treatment effects. Developing normative benchmarks by including a sample of two-year olds with typical language development serves two important functions for quantifying intervention effects for children with language impairments. For the treatment group, normative benchmarks extend the research question beyond, "Does early intervention work?" to "How well does early intervention work?" By examining normative growth over time, researchers can determine if early intervention is able to "close the gap" in language development such that children with language impairments are able to "catch-up" to their peers with typical language development. Having a non-treatment control group and a typically developing group of children provides an opportunity to index the rate of development in children with receptive and expressive language in comparison to their peers with typical language development.

Normative benchmarks also allow for the examination of parent use of language support strategies that are associated with variations in children's language development. The inclusion of a typical sample of children and their parents allows for the comparison of language interactions of parents of children with typical language to those of parents of children with language impairments. In addition, it is possible to compare interactions of parents trained in the EMT intervention to the interactions of parents of children with typical language to determine if training in EMT results in parent interactions that are typically associated with positive developmental outcomes in typical children. By comparing strategy use between these two groups, optimal levels of these strategies may be determined.

Purpose of the Present Study

While existing studies of EMT implemented by parents indicates that this intervention has positive effects on children's language use and development, EMT has not been studied with children with expressive and receptive language impairments who have typical cognitive development. The majority of intervention research with children who have expressive language impairments has included group training of parents with minimal individual feedback (Girolametto et al. 1996), or has been delivered by a clinician (Weismer et al., 1993). In contrast, research with young children with cognitive and language impairments has been more intensive and individualized (Kaiser et al., 1996). As a result, the exact form of parent-implemented intervention that would best serve this understudied population of children with expressive and receptive language impairments is currently unknown.

In a randomized control trial (RCT), the effectiveness of parent implemented EMT on the expressive and receptive language abilities of 120 children with receptive and expressive

language impairments is being examined. The current study occurred concurrently with the larger RCT and used a subset of the data collected from that study. In addition, the current study included a group of typically developing children who were not included in the RCT. The purpose of the current study was to extend the analysis of the effects of parent-implemented EMT beyond the treatment- versus control-group comparison in order to examine the effects of the treatment on children and their parents in relation to a typically developing group of children. A group comparison experimental design was used to address the following research questions:

1. Do children with language impairments in the treatment group (LI-treatment) have better language skills than children with language impairments in the control group (LI-control) at the end of the intervention? This is the primary research question of the larger study and addressed with the smaller sample of children in the current study.
2. Do children with language impairments (LI) in treatment group catch up to children with typical language (TL) by the end of intervention?
3. Do children with language impairments in the control group fall further behind children with typical language by the end of intervention?
4. What child characteristics (i.e., non-verbal IQ, risk factors, receptive language, and articulation errors) predict language growth for children with and without language impairments?
5. How do parental language support strategies compare between the parents of LI children who received intervention and parents of TL children after intervention?
6. Which parental language support strategies predict child language skills in children with and without language impairments at the end of intervention?

Methods

Design

A small randomized group design study, conducted as part of a larger efficacy study, was used to evaluate the effects of parent-implemented EMT for children with receptive and expressive language impairments. Children with LI were randomly assigned to the LI-treatment or the LI-control group (i.e., business-as-usual). A second aspect of the study compared the language development of treatment and control children with language impairments to a group of children with typically language development (TD) and examined parent language support strategies in the three groups of children (LI-treatment, LI-control, TD).

Participants

A total of 62 children and their parents participated. Families were recruited through local agencies and schools serving preschool children with disabilities and through advertisements placed in local newspapers. Continuous recruitment of children with and without language impairments began in October 2009 through Tennessee Early Intervention Services (TEIS), local pediatricians' offices, the Bill Wilkerson Speech and Hearing Center at Vanderbilt University and advertisement in the community. Recruitment was a continuous process that occurred until January 2011. Criteria for inclusion for children with language impairments were: (a) between 24 and 42 months of age at screening, (b) cognitive composite standard score of 80 or above on the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III; Bayley, 2006); (c) receptive communication scaled score of 8 or less on the Bayley-III; (d) expressive communication scaled score of 7 or less on the Bayley-III; and (e) a total language standard

score of 79 or less on the Bayley-III. These criteria were selected to identify children who had expressive and receptive language impairments and who are presumed to be at greater risk for persistent language impairments. The 10th percentile cutoff on standardized language measures is a commonly used standard for identifying language delay (Paul, 2007). Furthermore, the inclusion criteria restricted the sample to children with receptive and expressive language impairments without concomitant disorders, thereby increasing the homogeneity of the sample. Children with typical development were evaluated to determine if they met the following inclusion criteria: (a) cognitive composite standard score of 90 or above as measured by the Bayley-III; (b) receptive communication scaled score of 9 or greater as measured by the Bayley-III; (c) expressive communication scaled score of 9 or greater as measured by the Bayley-III; and (d) a total language standard score of 95 or more on the Bayley-III. In addition, children were excluded from the study if they: (a) had a primary diagnosis of any specific disability other than language impairment (e.g., autism, Down syndrome, developmental disabilities); (b) had sound field hearing thresholds over 30dB, as measured by an audiologist; (c) demonstrated symptoms of a motor speech disorder based on the Kaufman Speech Praxis Test for Children (KSPT; Kaufman, 1995); (e) spoke a language other than English at home, as measured by parent report; and (f) demonstrated signs of autism spectrum disorder (e.g., a score of 2.0 or greater), as measured by the Screening Tool for Autism in Two-Year Olds (STAT; Stone, Coonrod, & Ousley, 2000).

After the initial screening, eligible children with language impairments were randomly assigned to the treatment or control group. The majority of children were male, Caucasian and from middle class families. Child and parent demographic characteristics for families enrolled in

each experimental condition are shown in Table 1 and 2. Children and parents in the three groups did not differ significantly on any of these demographic characteristics.

Table 1
Child Characteristics at the Start of the Study

Characteristic	Definition	EMT (n=16)	Control (n=18)	Typical (n=28)
Age	Age in months	31.00 (4.52)	30.83 (4.94)	29.86 (4.17)
Gender	Male	14 (87%)	13 (72%)	26 (93%)
Race	African American	3 (19%)	3 (27%)	2 (7%)
	Caucasian	12 (75%)	14 (83%)	23 (82%)
	Asian	0 (0%)	0 (0%)	1 (4%)
	Other	1 (6%)	0 (0%)	2 (7%)
Speech-Language Therapy	Number of children who received additional speech language therapy	1 (7%)	0 (0%)	0 (0%)
Cognitive Skills	Bayley cognitive composite	87.81 (5.47)	87.78 (6.47)	103.21 (7.48)
Language Skills	Bayley expressive subscale	4.81 (1.08)	5.11 (1.41)	13.14 (3.95)
	Bayley receptive subscale	5.44 (1.55)	5.94 (1.35)	12.04 (1.86)
	Bayley language composite	71.56 (6.47)	74.05 (6.45)	114.07 (12.58)
	Mean Length of Utterance (MLUw)*	1.16 (.20)	1.18 (.19)	2.35 (.85)
	Number of different words (NDW)*	16.98 (10.62)	11.94 (9.73)	66.50 (32.05)
	Total number of words (TNW)*	36.60 (44.37)	28.31 (43.25)	165.81(119.86)

*Based on a 20-minute language sample with a staff member in the clinic.

Table 2
Parent Characteristics at the Start of the Study

Characteristic	Definition	EMT (n=16)	Control (n=18)	Typical (n=28)
Mother Age	Age in years	32.69 (6.00)	32.71 (7.26)	35.00 (4.49)
Child Lives With	Mother and father	14 (87%)	14 (78%)	26 (93%)
	Mother only	2 (13%)	2 (11%)	2 (7%)
	Father only	0 (0%)	1 (6%)	0 (0%)
	Did not respond	0 (0%)	1 (6%)	0 (0%)
Mother Employment	Not working	5 (31%)	11 (61%)	10 (36%)
	Full time	7 (44%)	2 (11%)	12 (43%)
	Part time	4 (25%)	4 (22%)	6 (21%)
	Did not respond	0 (0%)	1 (6%)	0 (0%)
Income	Yearly income	68,347 (28,626)	36,650 (30,849)	71,125 (23,300)
Mother Education	High School	0 (0%)	1 (6%)	2 (7%)
	Some College	2 (13%)	6 (33%)	6 (21%)
	Bachelor's Degree	6 (38%)	7 (39%)	6 (21%)
	Graduate Degree	7 (44%)	3 (17%)	14 (50%)
	Did not respond	1 (6%)	1 (6%)	0 (0%)
Parent Participant	Mother	13 (81%)	15 (83%)	27 (96%)
	Father	3 (19%)	3 (17%)	1 (4%)

Measures

Several methods of assessment were used to evaluate treatment outcomes. Parents completed demographic information forms describing themselves and their children (Appendix A and B). A list of child measures and corresponding testing periods are included in Table 3. Children were assessed at the start of the study (T0), one month later (T1), two months later (T2) and three months later, at the end of intervention for the LI-treatment group (T3).

Table 3
Child Measures

Construct	Assessment	Time point
Cognitive	Bayley III: Cognitive Composite Score	Screening
Overall Language Ability	Bayley III: Language Composite Score	Screening
	Preschool Language Scale-4 Total Score	T0, T3
Expressive Language	Bayley III: Expressive Communication Subscale	Screening
	Language Sample: number of different words (NDW); mean length of utterance (MLU)	T0, T3
	Parent-child interaction: number of different words (NDW); mean length of utterance (MLU)	T0, T1, T2, T3
	Preschool Language Scale-4 Expressive Communication Subscale	T0, T3
Receptive Language	Bayley III: Receptive Communication Subscale	Screening
	Preschool Language Scale-4: Auditory Comprehension Subscale	T0, T3

Screening. The Bayley-III was chosen as a screening measure because it includes both cognitive and language subscales, from which two important inclusion criteria were determined. In addition the Bayley-III does not depend exclusively on parent report and has more test items for this age range (24 to 36 months) than many standardized language assessments. Reliability is estimated to be .88 and criterion validity ranges from .73 to .79.

Child outcomes measures. Children's language development was assessed at four time points: at the start of the study (T0), one month later (T1), two months later (T2), and three months later (T3). Both observational and norm-referenced measures were used. Observational measures included a parent-child interaction and a language sample in the clinic. In the parent-child interaction, the parent and the child played with a standard set of toys for 10 minutes. Parents were shown the toys and were asked to "play as you normally would until the timer beeps." Language samples were collected using a standard set of materials. The examiner followed a standardized protocol for presenting materials and eliciting language (Appendix C). Each 20-minute language sample included five segments: (a) adult-child conversation using a wordless picture book, *Good Dog Carl* (Day, 1997), and (b) free play with four sets of toys (e.g., play-doh, babies, cars, barn). Procedural fidelity for the language sample protocol was completed for 20% of language samples and evenly distributed between groups and over time. Average fidelity for language samples was .96 with a range of .89 to 1.0.

Both the language samples and the parent-child interactions were video recorded and transcribed using Systematic Analyses of Language Transcripts (SALT, Miller & Chapman, 2008). Analyses of linguistic measures were completed using the automated analysis program of SALT. The primary outcome variable obtained from the language samples was number of different word roots (NDW) and the secondary outcome variables were mean length of utterance (MLU) and total number of words (TNW). NDW, MLU and TNW are standard measures generated by SALT.

In addition to observational data, the Preschool Language Scale-Fourth Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002) was used to measure children's expressive and receptive language abilities at T0 and T3. The PLS-4 was chosen for its wide age range (birth to age 6) and

comprehensive measurement of language. On the expressive communication subscale of the PLS-4, children perform a variety of expressive language tasks, such as answering open-ended questions (e.g., "Where do you sleep?"), answering questions about pictures (e.g., "What are these?"), producing spontaneous sentences, describing actions and objects (e.g., "The bear wants something to drink. He must be very …"), and completing analogies (e.g., "I sit on a chair, I sleep in a…"). On the auditory comprehension subscale of the PLS-4, children perform a variety of receptive language tasks, such as pointing to body parts, following directions (e.g., "put the block in the box"), and understanding verbs in context (e.g., "The bear is thirsty. Give him something to drink"). Tasks for both subscales increase in difficulty and tasks are administered until the child responds incorrectly to five consecutive items. Test-retest stability of the PLS-4 ranged from .82 to .85 for the standardization sample. Construct validity is reported to be high, with sensitivity of .77 and specificity of .84.

The administration of the PLS-4 was supervised by an ASHA certified Speech-Language Pathologist. All assessments were administered in the clinic by an experienced master's level special educator or speech-language pathologist. All testing sessions were video recorded and procedural fidelity for test administration was measured for 20% of videos to assess and insure accuracy of test administration. Procedural fidelity exceeded .95 for all direct assessments.

Parent outcome measures. Parents' use of language strategies were measured by transcribing and coding parent-child interaction sessions during clinic observations at T0, T1, T2 and T3. Sessions were coded for the adult strategies listed and defined in Table 4 (i.e., matched turns, responsiveness, targets, expansions, time delay strategies, and prompting). Prior to coding, all observers achieved 85% point-by-point agreement on utterance codes on three consecutive videos. Interobserver agreement (IOA) was calculated for 20% of sessions. The point-by-point

formula was used for each parent behaviors. To calculate agreement for the scoring of coded utterances, each utterance code was compared between observers. If both observers recorded the same two-letter code, an agreement was recorded. If the utterance code was not identical for the two observers, a disagreement was recorded. The total number of agreements was divided by the total number of disagreements and agreements and the quotient was be multiplied by 100. Reliability exceeded 80% for each parent behavior and is summarized in Table 4.

Table 4
Definitions of and Interobserver Agreement for Parents' Use EMT Strategies

EMT strategy	Measure	IOA
Matched turns	Percentage of adult turns that are in response to a child's previous utterance.	.84 (.12)
Parent responsiveness to child verbal turns	Percentage of child verbalizations that are followed by a contingent, related response.	.97 (.09)
Parent talk at the child's level	Percentage of parent utterances that are at the child's target level.	.93 (.09)
Expansion of child's utterances	Percentage of child utterances that the parent expands.	.92 (.11)
Time delay strategies	Percentage of episodes that include correctly executed steps of the non-verbal prompting hierarchy.	1.00 (0.00)
Prompting strategies	Percentage of episodes that include correctly executed steps of the verbal prompting hierarchy.	.87 (.19)

Experimental Procedures

Language impaired control group and typical language group. Participants in the LI-control group did not receive EMT parent training. Information regarding the type and amount of community language intervention their child received was collected at T0 and T3 (Appendix B). Because current practice for this population is a "wait and see" approach, the majority of children with language impairments (92%) did not receive language intervention. No children in the typical language group received community language intervention.

Language impaired treatment group. Participants in the EMT experimental group received individual parent training. An experienced master's level special educator or speech-language pathologist provided the parent training. Parents were taught to use EMT strategies at home and in the clinic during 28 individual training sessions (i.e., 4 workshops and 24 practice sessions). Parents were taught EMT strategies in four phases: (a) setting the foundation for communication, (b) modeling and expanding communication, (c) time delay strategies, and (d) prompting strategies. Each phase included a specific set of EMT strategies taught to parents. A summary of skills taught to parents is provided in Table 5. A new set of skills was introduced when the parent reached criterion level listed in Table 6. The criterion levels are based on previous levels of EMT implementation that most parents achieve within the time frame specified for training.

Table 5
Description and Sequence of EMT Strategies Taught to Parents

Phase	Specific strategies	Outcome measures	Practice sessions
A Context For Communication	• Responding to communication • Taking turns • Waiting • Mirroring and mapping	• Percentage of adult turns that are in response to a child's previous utterance. • Percentage of child verbalizations that are followed by a contingent, related response	1-5
Modeling and Expanding Communication	• Modeling specific child language targets • Expanding verbal and non-verbal communication	• Percentage of parent utterances that are at the child's target level • Percentage of child utterances that the parent expands.	6-12
Time Delay Strategies	• Assistance • Choices • Waiting with routine • Waiting with cue • Inadequate portions	• Percentage of episodes that include correctly executed steps of the non-verbal prompting hierarchy.	13-15
Prompting Strategies	• Open questions • Choice questions • "Say" prompt	• Percentage of episodes that include correctly executed steps of the verbal prompting hierarchy.	16-21
All of EMT	• All of the above strategies		22-24

Table 6.
Fidelity of Parent Training in Home and Clinic Sessions

Parent Training Strategy	***Home***	***Clinic***
Teaching the strategy	.87 (.18)	.90 (.15)
Modeling with child	.95 (.18)	.95 (.12)
Coaching the parent	.96 (.05)	.99 (.04)
Providing feedback	.84 (.37)	.91 (.17)
Overall	.94 (.07)	.94 (.07)

At the beginning of each phase, the topic for the phase was introduced through an hour-long workshop in which the therapist: (a) defined the strategy, (b) provided a rationale for each component of the strategy, (c) described how to do the strategy, (d) showed video examples of the strategy, and (e) answered parent questions about the strategy. Each of the four workshops included standardized information, so that each parent received the same information in the same format. Handouts for the four workshops are included in Appendix D. Following each workshop, parents practiced the specific set of strategies during sessions that occurred twice weekly (one clinic and one home session) and lasted one hour. Each of the clinic sessions contained four, 15-minute segments that occurred in the following order: (a) the therapist reviewed the EMT strategies taught in the workshop (teach), (b) the therapist modeled the EMT strategy with the

child (model), (c) the parent practiced the strategy with her child with coaching from the therapist (coach), and (d) the therapist provided feedback to the parent, summarized the session, and answered the parent's questions (feedback). This teach-model-coach-feedback method of parent training was used during all sessions.

Therapists followed a specific protocol for teaching parents during all four segments of the hour session. During the initial review segment, the therapist reviewed the target EMT strategies previously discussed in the workshop. Then, she explained these strategies in relation to the selected toys, discussed different ways to play with these toys and checked for understanding by asking if the parent had any questions. During the therapist modeling segment, the therapist used all EMT strategies but verbally highlighted the target strategies at least six times during the segment. During the parent-child practice segment, the therapist provided the parent with constructive feedback or specific praise at least once per minute for 15 minutes. After the session, the therapist asked the parent how he or she felt about the session, summarized how the parent used the target strategies and related parent use of strategies to child communication during the session.

Home sessions followed the same parent training protocol with three additional components. The modeling segment by the therapist occurred only in the play routine at home. Parents also practiced the target strategies while reading a book, eating a snack and doing a common household routine of their choice. These routines lasted between 3 and 5 minutes each. During these routines the therapist provided constructive feedback or specific praise at least once per minute.

Treatment Fidelity

Because of the triadic nature of this intervention, fidelity of implementation occurred at three levels: (a) the delivery of parent training sessions by the therapist, (b) therapists' use of intervention strategies during her interactions with the child, and (c) the parents' use of the intervention strategies. First, every workshop and practice session was video recorded. Therapists used clinic and home fidelity-of-implementation assessments to guide their implementation of parent training. In addition, trained observers completed fidelity assessments (Appendix E) for 20% of training sessions to determine a percentage of parent training components implemented. IOA for parent training fidelity assessments were completed for 20% of observed sessions. IOA on fidelity exceeded 85% for all sessions. A summary of the fidelity of parent training is presented in Table 6. The average level of fidelity was 94% for all parent training components across home and clinic sessions.

Second, therapist use of EMT strategies during 20% of intervention sessions with the child was coded for the presence of EMT strategies. Use of EMT strategies by the therapist exceeded the criterion levels for all strategies (Table 7). Third, parent use of EMT strategies were coded for the clinic session prior to the next workshop (i.e., sessions 4, 11, 14, 19, 23) to ensure that parents met the criterion levels prior to introducing the next skill. Average parent use of each strategy is summarized in Table 7. Parents exceeded criterion levels of the target skills prior to learning a new skill and all parents attended all 24 intervention sessions. In addition, the use of EMT strategies during parent-child interactions was measured across all time points (T0, T1, T2 and T3) and for all three experimental conditions, as mentioned previously. Interobserver

agreement was determined by having a second observer code 20% of the sessions as described above and summarized in Table 4.

Table 7.

Fidelity of Therapist and Parent Use of EMT Strategies

EMT Strategy	***Criteria***	***Therapist***	***Parent***
Matched turns	>.80	.89 (.07)	.81 (.08)
Responsiveness to child verbal turns	>.80	.87 (.15)	.83 (.08)
Talk at the child's level	>.50	.73 (.12)	.53 (.11)
Expansion of child's utterances	>.40	.68 (.16)	.62 (.11)
Time delay strategies	>.80	.86 (.27)	.74 (.18)
Prompting strategies	>.80	.94 (.20)	.73 (.31)

Data Analysis

First, demographic, observational and standardized measures were summarized. Means and standard deviations for each group were examined to assess differences between groups at the beginning of the study. Next, data related to each research question were analyzed using multi-level modeling. Several models were tested to determine the best fit. First, an unconditional means model was tested to examine mean differences in each outcome variables across children without regard to time. This model evaluated the amount of variability within and between children. The interclass correlation was .81 for NDW, indicating that 81% of the total variability in NDW was due to individual differences. Second, an unconditional or baseline growth model was tested to examine individual variability in growth rates. Significant intercept and linear slope parameters indicated that growth was not constant over time. Furthermore, random error terms associated with the intercept and linear growth were significant ($p<.01$), suggesting that the variability in these parameters might be explained by between-child variables. A comparison of the within-child variability for the unconditional mean model and the unconditional growth model indicated that the residual variance declined by .58 (e.g., 58% of the within-child variability in NDW was associated with a linear rate of change). Next, two higher-order polynomial models (e.g., quadratic, cubic) were tested to examine whether the rate of growth accelerated or decelerated over time. Results indicated that only the linear growth parameter was significant ($p<.01$) and that residual variance did not change with the addition of a quadratic growth term. Furthermore, the -2 log-likelihood statistics were equal between the linear and quadratic models (302.43), but smaller than the unconditional mean model (395.77). Based on these results, a linear model was used with specific outcome measures as the dependent variables, Child age in months was used as a covariate and experimental condition as the

independent variable. Time was nested within child. Time was centered at the last intervention point, such that the intercept value was equal to outcomes at the end of the study (T3). All statistical analyses were conducted using SPSS version 17.

Results

Pre-Test Comparisons Among Groups

Groups were equivalent on all child characteristics presented in Table 1. As indicated by chi-square analyses, groups were equivalent on race χ^2 (6, N = 62) = 3.88, p = .69, gender χ^2 (2, N = 62) = 3.83, p = .15 and the number of children who received additional speech-language therapy, χ^2 (2, N = 62) = 2.92, p = .23. Groups were also comparable on age, F (2, 59) = 0.43, p = .65. As expected, LI children scored significantly lower than TL children on all language measures at pretest. However, TL children had significantly higher cognitive scores than children with LI, F (1, 59) = 82.04, p = .00. This difference may be due to the fact that the Bayley-III is not a non-verbal test of cognitive abilities. There were no differences between the LI-treatment and LI-control groups on cognitive skills, F (1, 30) =...09, p = .77, expressive language, F (1, 30) = 1.76, p = .26, receptive language, F (1, 30) = .52, p = .46, or total language, F (1, 30) = 1.31, p = .26. There were no differences in MLUm, F (1, 30) = .22, p = .64, NDW, F (1, 30) = 1.39, p = .25 or TNW, F (1, 30) = .13, p = .72

Groups were also equivalent on the majority of parent characteristics listed in Table 1. As indicated by chi-square analyses, groups were equivalent on employment, χ^2 (4, N = 61) = 6.32, p = .18, parent with whom the child lives, χ^2 (4, N = 61) = 3.11, p = .54, and parent age, F (2, 57) = .855, p = .43. However groups were not comparable on income, F (2, 57) = 6.89, p = .00 or

education, χ^2 (4, N = 61) = 25.82, p = .00. Parents of TL children and parents in the LI-treatment group had significantly higher average income than parents in the LI-control group. Parents of TL children had more education than both the parents of children in the LI-treatment and LI-control group. There were no differences between parents in the LI-treatment and LI-control group in years of education. There were also no differences between the parents of the LI-treatment and LI-control groups in their use of responsive feedback, F(1,30) = .03, p = .86; matched turns, F(1,30) = .01, p = .91; use of language targets, F(1,30) = .98, p = .33; expansions, F(1,30) = .26, p = .62; and prompting F(1,30) = 1.57, p = .24. However, there were differences between the parents of LI children and the parents of TL children in the levels of responsiveness, F (1, 60) = 43.86, p = .00; matched turns, F (1, 60) = 23.68, p = .00 and use of language targets, F (1, 60) = 13.11, p = .00. These results support previous research showing differences between parents of TL and LI children and indicate that parents of TL children use more language targets and have higher levels of responsiveness and matched turns than parents of LI children.

Comparison of Language Outcomes

To test differences in child language outcomes after intervention and growth in language during intervention, experimental condition was included as a subject-level predictor and age was included as a subject-level covariate. Time was nested within subjects. The intercept was equal to the language outcome value at the end of intervention. An interaction between time and experimental condition was also included to determine the effects of experimental condition on growth in language for observational language measures (NDW, TNW, MLUm). Means and standard deviations for all language measure are in Table 8. Effect sizes and significance levels are in Table 9. Changes in language measures over time are shown in Figures 1, 2 and 3.

Table 8.

Means and Standard Deviations for Child Language Measures

	EMT				***Control***				***Typical***			
Measure	T0	T1	T2	T3	T0	T1	T2	T3	T0	T1	T2	T3
PLS-Total	69.88 (9.90)	n/a	n/a	79.31 (15.87)	71.29 (10.40)	n/a	n/a	71.00 (11.21)	113.96 (13.85)	n/a	n/a	117.41 (12.49)
PLS-AC	69.31 (12.31)	n/a	n/a	79.56 (18.07)	72.00 (13.05)	n/a	n/a	71.90 (14.65)	111.86 (9.63)	n/a	n/a	115.11 (10.74)
PLS-EC	76.06 (7.74)	n/a	n/a	82.06 (12.14)	75.82 (6.63)	n/a	n/a	75.30 (7.20)	113.04 (16.35)	n/a	n/a	116.44 (12.59)
MCDI	93.06 (101.66)	n/a	n/a	275.56 (171.7)	104.31 (83.36)	n/a	n/a	234.40 (107.79)	478.61 (204.77)	n/a	n/a	605.00 (194.03)
MLUm	1.16 (.20)	1.34 (.26)	1.50 (.42)	1.74 (.45)	1.18 (.19)	1.31 (.23)	1.33 (.33)	1.49 (.42)	2.35 (.85)	2.60 (.85)	2.80 (.74)	2.95 (.62)
NDW	16.98 (10.62)	29.62 (19.08)	41.48 (22.92)	48.87 (21.37)	11.59 (9.91)	21.20 (16.95)	27.08 (21.99)	33.99 (27.20)	66.50 (32.05)	80.59 (40.08)	95.24 (36.27)	105.63 (36.83)
TNW	36.60 (44.37)	60.97 (47.16)	92.18 (66.36)	127.11 (73.24)	28.31 (43.25)	43.49 (43.71)	61.06 (59.72)	73.75 (68.20)	165.81 (119.86)	209.07 (148.05)	245.24 (147.10)	295.54 (165.44)

Table 9.
Regression Coefficient, Standard Errors, Significance Values and Effect Sizes for Child Outcome Measures.

		EMT-Control				***EMT-Typical***				***Control-Typical***			
Measure		β	SE	p	d	β	SE	p	d	β	SE	p	d
PLS-Total	T3	9.02	3.84	.03	.60	-34.75	5.16	.00	-2.76	-43.76	5.52	.00	-3.85
PLS-AC	T3	8.00	4.79	.11	.46	-32.70	4.91	.00	-2.57	-40.66	5.05	.00	-3.54
PLS-EC	T3	7.41	3.43	.04	.67	-31.17	4.88	.00	-2.77	-38.88	5.42	.00	-3.72
MCDI	T3	86.90	47.14	.08	.29	-341.24	57.57	.00	-1.77	-390.87	64.50	.00	-2.19
MLUm	T3	.25	.15	.13	.57	-1.28	.18	.00	-2.14	-1.51	.17	.00	-2.61
	Growth	.10	.05	.07	n/a	-.02	.06	.72	n/a	-.11	.06	.07	n/a
NDW	T3	15.86	9.75	.06	.62	-59.47	10.29	.00	-1.76	-74.85	10.54	.00	-2.12
	Growth	3.37	2.14	.11	n/a	-3.61	2.47	.15	n/a	-6.81	2.58	.01	n/a
TNW	T3	50.44	6.05	.03	.75	-174.92	10.39	.00	-1.20	-225.31	41.57	.00	-1.58
	Growth	15.03	.78	.02	n/a	-14.97	10.39	.16	n/a	-29.82	10.17	.01	n/a

Figure 1
Number of Different Words Over Time

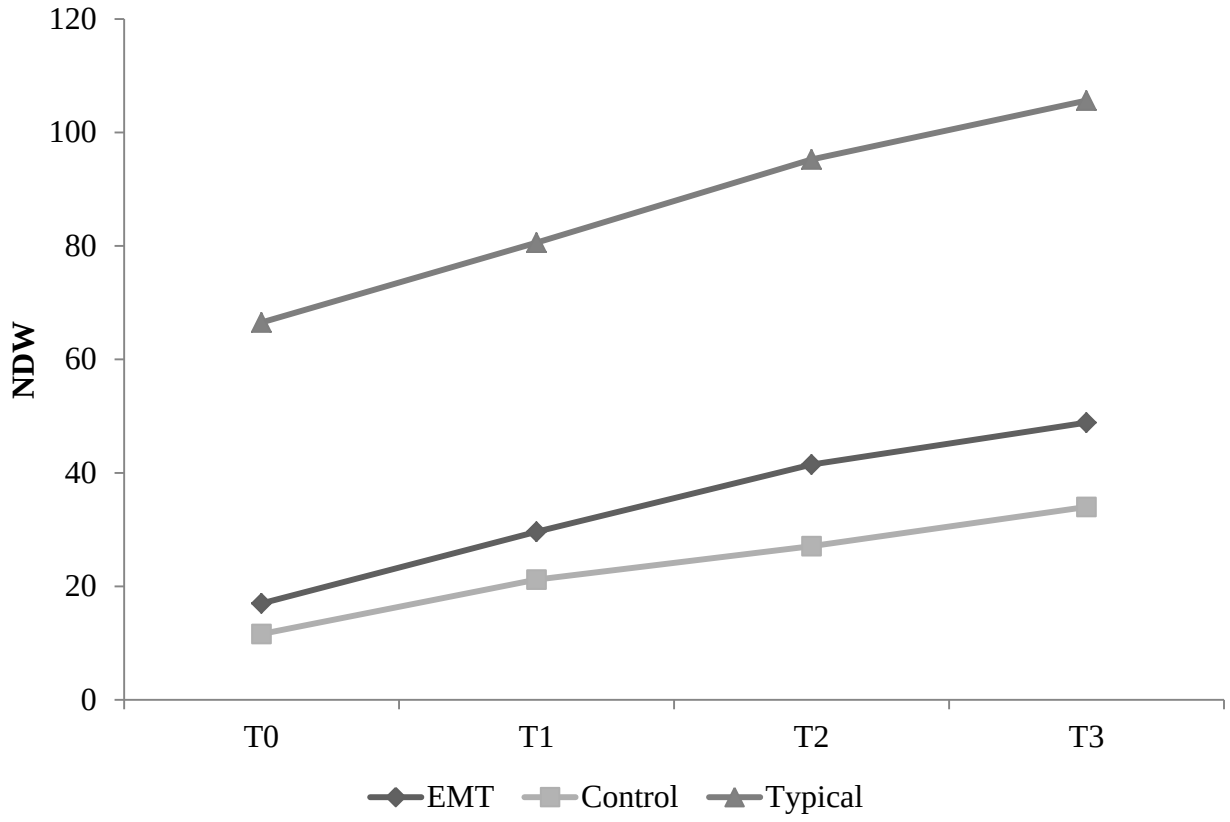


Figure 2
Total Number of Words Over Time

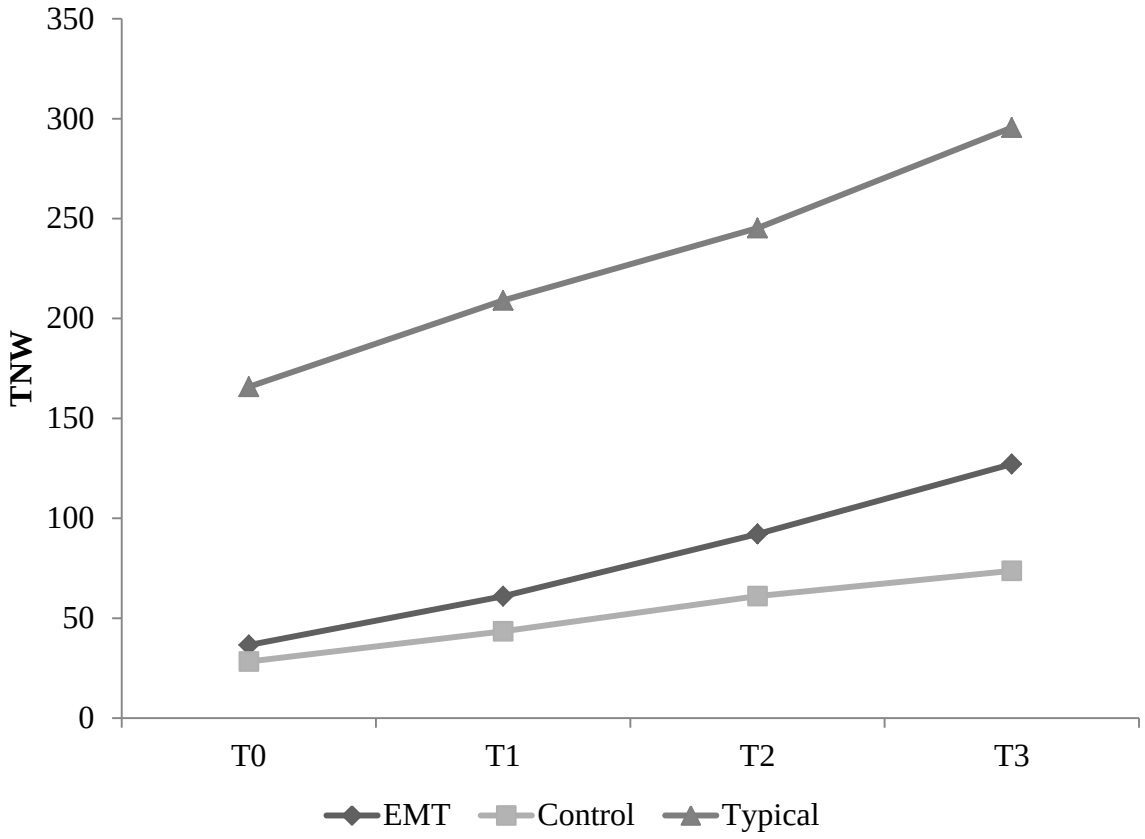
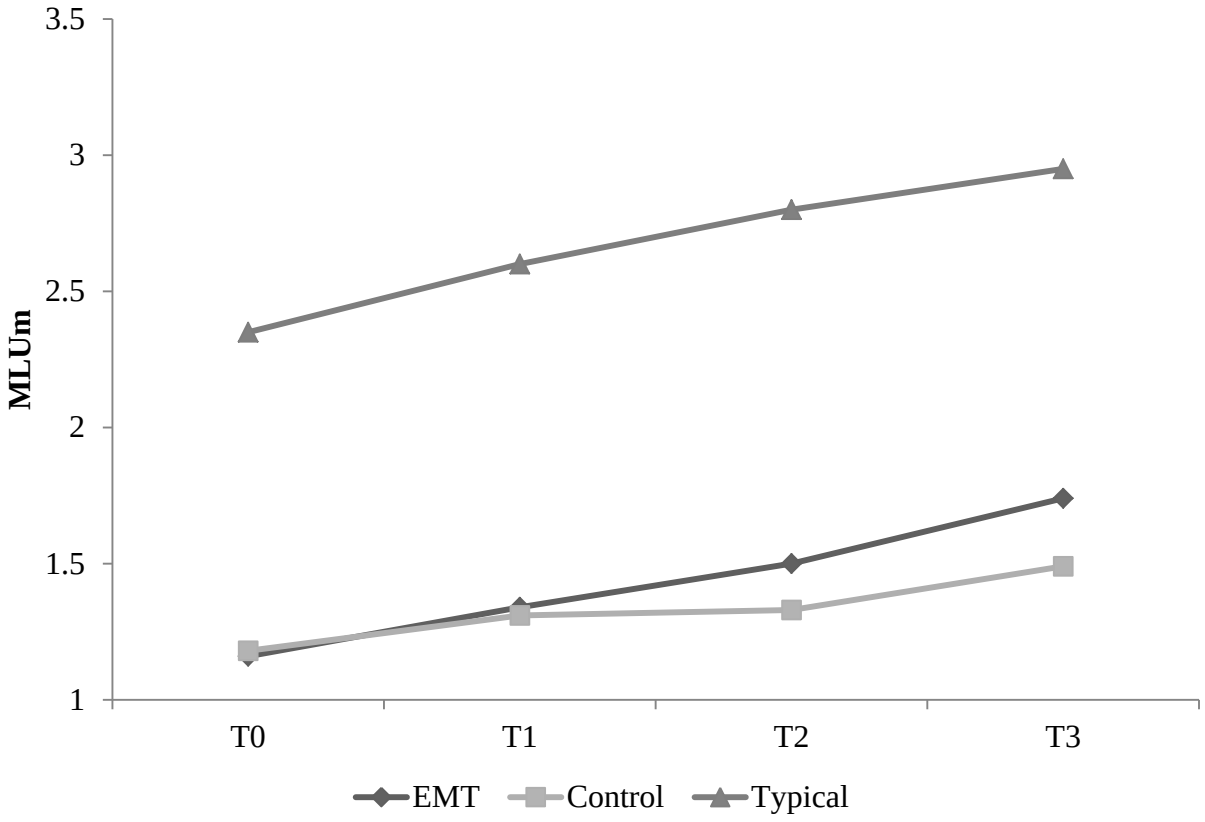


Figure 3
Mean Length of Utterance in Morphemes (MLUm) Over Time



Language outcomes for treatment and control groups. Children in the LI-treatment group showed better language outcomes and more growth over time on all measures, however, the two groups did not differ significantly on some measures. Effect sizes ranged from d = .29 for MCDI to d = .75 for TNW. Differences in NDW between the LI-treatment and the LI-control groups at the end of intervention (T3), β = 15.86, p =.06, 95% CI [-.80, 32.53] in the growth of NDW over time, β =3.37, p =.11, 95% CI [-.84, 7.58], approached significance. On average, children who received EMT used 16 more different words after intervention and gained 3 more different words per time period than children in the control group. Differences in TNW between

the LI-treatment and the LI-control groups were also statistically significant at the end of intervention (T3), β = 50.44, p =.03, 95% CI [4.11, 96.78]. There was also a statistically significant difference in the growth of TNW over time, β = 15.03, p =.02, 95% CI [2.60, 27.46]. Children in the LI-treatment group used 50 more total words after intervention and gained 15 more total words per time period than children in the LI-control group. Differences in MLUm between the LI-treatment and the LI-control groups were not significance for the end of intervention (T3), β =.25, p =.13, 95% CI [.57, -.07] or for growth over time, β =.10, p =.07, CI [-.01 .20]. Children in the treatment group used .25 more words in each sentence at the end of intervention and gained .10 words per sentence per time period than children in the control group.

There was a statistically significant difference in PLS-4 total standard scores between LI-treatment and control groups, β =9.02, p =.03, CI [1.08, 16.97] and in PLS-4 expressive communication scores, β = 7.41, p =.04, CI [.30, 14.51]. Differences in PLS-4 auditory comprehension scores approached significance, β =8.00, p =.11, CI [-1.90, 17.90]. Differences in parent report of total number of words on the MCDI, approached significance, β =86.90 p =.08, CI [-10.87, 184.67]. These results indicate that children in the LI-treatment group had higher overall language skills and higher global expressive language skills than the LI-control group at the end of intervention.

Language comparison between LI-treatment and typical groups. Children in the LI-treatment group had significantly fewer NDW than TL children at the end of intervention, β = -59.47, p =.00, 95% CI [-80.21, -38.74]. However children in the LI-treatment group did not grow at a significantly slower rate, β = -3.61, p =.15, 95% CI [-8.53, 1.32]. TL children gained 3 more different words per time period than children in the LI-treatment group, but this difference was

not statistically significant. Children with LI also had fewer TNW at the end of intervention, β = -174.92, p =.00, 95% CI [-258.97, -90.88] but the rate of growth in TNW was not statistically significantly different between groups, β = -14.97, p =.16, 95% CI [-35.95, 6.00]. This same pattern was observed for MLUm, for which children in the LI-treatment group had lower MLUm at the end of intervention than TL children, β = -1.28, p =.00, 95% CI [-1.63, -.93]. However children's MLUm in the LI-treatment group did not grow at a statistically significantly slower rate, β = -.02, p =.72, 95% CI [-.14, .10].

There were statistically significant differences between LI-treatment and the TL group in PLS total standard scores at T3, β =-34.75, p =.00, CI [-45.35, -24.35], in PLS expressive communication scores, β = -31.17, p =.00, CI [-41.01, -21.33] and in PLS auditory comprehension scores, β =-32.69, p =.00, CI [-42.59, -22.79]. Statistically significant differences in parent report of total number of words on the MCDI, were also observed, β = -341.24, p =.00, CI [-457.59, -224.89].

Language comparison between LI-control and typical groups. In general, a similar pattern of results were found when comparing language outcomes for children in the LI-control group to the children in the typical group at the end of intervention. However, children in the LI-control group grew at statistically significantly slower rates than children in the TL group. Children in the LI-control group had statistically significantly fewer NDW than TL children at the end of intervention, β = -74.75, p =.00, 95% CI [-96.05, -53.64]. Unlike the children in the LI-treatment group, children in the LI-control group experienced significantly slower growth in NDW than NL children β = -6.81, p =.01, 95% CI [-11.97,-1.65]. The same pattern was observed for TNW for which children in the LI-control group had significantly fewer TNW than TL children, β = -225.31, p =.00, 95% CI [-309.12, -141.51]. Children in the LI-control group also

experienced slower growth in TNW than TL children, β = -29.82, p =.01, 95% CI [-50.35, -9.29]. Children in the LI-control group also had significantly shorter MLUm than TL children at the end of intervention, β = -1.51, p =.00, 95% CI [-1.86, -1.16]. Differences in growth of MLUm approached significance, β = -.11, p =.07, 95% CI [-.23, -.02].

There were statistically significant differences between LI-control and the TL group in PLS total standard scores, β =-43.76, p =.00, CI [-54.95, -35.56], in PLS expressive communication scores, β = -38.89, p =.00, CI [-49.86, -27.91] and in PLS auditory comprehension scores, β =-40.66, p =.00, CI [-50.89, -30.43]. Statistically significant differences in parent report of total number of words on the MCDI, were also observed, β = -390.87, p =.00, CI [-521.95, -259.79].

Child Characteristics that Predict Language Growth

To test which child characteristics predicted language growth, risk at birth (e.g., whether the child was admitted to the NICU), cognitive skills (Bayley-III cognitive composite), and receptive language skills (Bayley-III receptive composite) were included as subject-level predictors. In addition, an interaction between time and each of these predictors was included to examine the effects of child characteristics on language growth. Neither risk at birth nor cognitive skills predicted growth in NDW, TNW or MLUm. Neither variable predicted NDW, TNW or MLUm at T3. Receptive language at T0 predicted growth in NDW, β = .20, p =.00, CI [.06, .34] and TNW, β = .82, p =.00, CI [.29, 1.35], but did not predict growth in MLUm, β = .00, p =.82, CI [-.00, .00]. Receptive language also predicted, NDW, β = 1.43, p =.01, CI [.84, 2.03], TNW, β = 4.35, p =.00, CI [2.20, 6.52], and MLU, β = .02, p =.00, CI [.02, .04], at T3.

Regression coefficients, standard errors and significance levels for these results are summarized in Table 10.

Table 10.
Regression Coefficients, Standard Errors, Significance Values for Child Characteristics Predicting Language Outcomes.

	β	SE	p
NDW – T3			
Receptive Language	1.43	.30	.00
Cognitive Skills	-.08	.68	.91
Birth Risk	2.43	9.07	.79
NDW – Growth			
Receptive Language	.20	.07	.01
Cognitive Skills	-.23	.16	.15
Birth Risk	2.43	9.07	.79
TNW – T3			
Receptive Language	4.36	1.08	.00
Cognitive Skills	.30	2.67	.90
Birth Risk (0 = no risk)	36.02	32.92	.23
TNW – Growth			
Receptive Language	.82	.26	.00
Cognitive Skills	-.76	2.47	.90
Birth Risk (0 = no risk)	12.47	8.02	.13
MLUm – T3			
Receptive Language	.03	.01	.00
Cognitive Skills	.00	.01	.79
Birth Risk (0 = no risk)	-.05	.16	.74
MLUm – Growth			
Receptive Language	.00	.00	.82
Cognitive Skills	.00	.00	.44
Birth Risk (0 = no risk)	.02	.05	.69

Comparison of Parent Use of EMT Strategies

To test differences between groups with regard to parent use of the six EMT strategies, experimental condition was included as a subject-level predictor. Initial strategy use at T0 was included as a covariate. Separate analyses were conducted for matched turns, responsive feedback, use of language targets, expansions, time delays, and prompting. Means and standard deviations for all language measures are presented in Table 11. Effect sizes and significance levels are listed in Table 12.

Table 11.
Means and Standard Deviations for Parent Outcome Measures

	EMT		***Control***		***Typical***	
Measure	T0	T3	T0	T3	T0	T3
Matched turns	.48 (.12)	.69 (.17)	.48 (.11)	.23 (.11)	.67 (.11)	.26 (.09)
Parent responsiveness to child verbal turns	.15 (.07)	.73 (.08)	.15 (.09)	.52 (.14)	.26 (.09)	.58 (.10)
Parent talk at the child's level	.06 (.05)	.42 (.17)	.04 (.04)	.06 (.03)	.09 (.03)	.09 (.04)
Expansion of child's utterances	.10 (.25)	.44 (.20)	.12 (.15)	.10 (.08)	.07 (.05)	.06 (.04)
Time delay strategies	0 (.00)	.65 (.17)	0 (.00)	0 (.00)	0 (.00)	0 (.00)
Prompting strategies	.15 (.23)	.47 (.36)	.03 (.08)	0 (.00)	.01 (.04)	.06 (.13)

Table 12.
Regression Coefficients, Standard Errors, Significance Values and Effect Sizes for Parent Outcome Measures.

	EMT-Control				***EMT-Typical***				***Control-Typical***			
Measure	β	SE	p	d	β	SE	p	d	β	SE	p	d
Matched turns	.46	.03	.00	3.19	.48	.02	.00	3.45	-.03	.02	.09	-.31
Parent responsiveness to child verbal turns	.21	.02	.00	1.85	.20	.02	.00	1.61	-.02	.02	.34	-.52
Parent talk at the child's level	.36	.02	.00	2.90	.35	.02	.05	3.10	-.03	.00	.00	-.81
Expansion of child's utterances	.36	.03	.00	2.20	.37	.02	.00	3.07	.03	.01	.00	.70
Time delay strategies	.65	.00	.00	5.32	.65	.00	.00	6.04	.00	.00	1.0	.00
Prompting strategies	.19	.06	.00	1.81	.03	.05	.56	1.72	-.06	.05	.24	-.57

EMT strategy use comparison between treatment and control groups. Following intervention, parents in the LI-treatment group had significantly higher percentages of matched turns, β = .46, p =.00, CI [.41, .51]; responsive feedback, β = .21, p =.00, CI [.17, .25]; use of language targets, β = .36, p =.00, CI [.32, .41]; expansions, β = .36, p =.00, CI [.31, .41]; and prompting, β = .19, p =.00, CI [.07, .30], after controlling for initial levels of these parent behaviors. These results indicate that parents in the LI-treatment group had significantly higher rates of all EMT strategies than parents in the LI-control group, following intervention.

EMT strategy comparison between treatment and typical groups. Parents in the LI-treatment group also had significantly higher rates of EMT strategies when compared to parents of TL children. Parents in the LI-treatment group had significantly higher percentages of matched turns, β = .48, p =.00, CI [.44, .52]; responsive feedback, β = .20, p =.00, CI [.17, .24]; use of language targets, β = .35, p =.00, CI [.32, .38]; expansions, β = .37, p =.00, CI [.33, .40], after controlling for initial levels of these parent behaviors. There were no differences in prompting, β = .03, p =.56, CI [-.07, .13.88], between the two groups for parents. These results indicate that, following intervention, parents in the LI-treatment group also had significantly higher rates of using all EMT strategies except for prompting than parents of TL children.

EMT strategy comparison between control and typical groups. There were no differences between parents in the LI-control group and parents of TL children for matched turns, β = -.03, p =.36, CI [-.09, .03] and responsive feedback, β = -.02, p =.65, CI [-.11, .07]. Parents of TL children used of more language targets, β = .03, p =.03, CI [.00, .06] than parents in the LI-control group. However, parents of children with TL used fewer expansions, β = -.06, p =.01, CI [-.10, -.01] than parents in the LI-control group. There were no differences in prompting, β = .06, p =.72, CI [-.28, .40], between groups. These results indicate that parents'

use of most EMT strategies did not differ for parents of LI-control children and parents of TL children.

Parent Use of EMT Strategies that Predict Language

To test whether parent use of EMT strategies predict child NDW, TNW, and MLUm at T3, parent use of matched turns, responsive feedback, use of language targets and expansions were included as subject-level predictors. In addition, interactions between language impairment status (language impairment =0) and each of these strategies were included to test the differential impact of these strategies for children with and without language impairments. Regression coefficients, standard errors and significance levels for these results are summarized in Table 13.

Only parent matched turns predicted NDW, β = 201.64, p =.01, CI [57.51, 345.76], and TNW, β = 749.64, p =.03, CI [88.92, 1410.37], at T3. There was no interaction between language impairment status and the relationship between strategy use and child language outcomes. These results indicate that matched turns may be an important language support strategy for children with and without language impairments.

Table 13.
Regression Coefficients, Standard Errors, and Significance Values for EMT Strategies Predicting Language Outcomes.

	β	SE	p
NDW			
Matched Turns	201.64	71.60	.00
Matched Turns*Language Group	-86.50	79.51	.28
Responsive Feedback	43.35	61.13	.48
Responsive Feedback*Language Group	-35.84	82.61	.67
Targets	153.38	153.14	.32
Targets*Language Group	-247.61	158.18	.12
Expansions	-213.04	154.28	.17
Expansions*Language Group	201.04	159.07	.21
TNW			
Matched Turns	749.64	328.25	0.03
Matched Turns*Language Group	-490.84	364.51	0.18
Responsive Feedback	170.04	280.22	0.55
Responsive Feedback*Language Group	-84.01	378.73	0.83
Targets	382.60	702.06	0.59
Targets*Language Group	-587.75	725.17	0.42
Expansions	-711.02	707.29	0.32
Expansions*Language Group	663.03	729.21	0.37
MLUm			
Matched Turns	-0.10	1.50	0.95
Matched Turns*Language Group	1.74	1.67	0.30
Responsive Feedback	0.64	1.28	0.62
Responsive Feedback*Language Group	-0.48	1.73	0.78
Targets	-1.60	3.21	0.62
Targets*Language Group	0.08	3.32	0.98
Expansions	-3.06	3.23	0.35
Expansions*Language Group	2.84	3.33	0.40

Discussion

Study Outcomes

The purpose of this study was to evaluate the effects of a parent-implemented intervention, EMT, on the language skills of children with expressive and receptive language impairments and to compare language growth in the treatment and control groups to the language growth of a sample of typically developing children during intervention period. Because the sample size was small and represented a sub-sample of a larger study, these results should be considered preliminary. Nevertheless, statistically significant differences in standardized language measures (i.e., PLS-4) and in observational measures (i.e., NDW, TNW) at the end of intervention suggest that EMT is a promising intervention for children with receptive and expressive language impairments. Children in the treatment group used 16 more different words and 50 more total words than children in the control group at the end of intervention. They gained 3 more different words and 15 more total words per measurement period (approximately 6 weeks) than children in the control group. In addition to gains in expressive vocabulary children in the treatment group also had significantly higher global expressive language scores than children in the control group. Children in the treatment group scored 7 standard score points higher on the expressive communication subtest and 9 points higher on the overall language subscale on the PLS-4 than children in the control group. Children in the treatment group also scored 8 points higher on the auditory comprehension subtest, but this difference only approached significance (p = .08). These results are similar to studies of children with expressive impairments, which found statistically significant positive results for expressive language measures such as expressive vocabulary (Roberts & Kaiser, 2011).

These results differ from the results of the only other study of a parent-implemented intervention for children with expressive and receptive language impairments (Law, et al. 1999), which did not find statistically significant differences in language outcomes between the treatment and control groups. Law et al. (1999) used a modified version of the Hanen Parent Program, which included 25 hours of training in a group format with minimal individualized intervention (e.g., specific language targets were not chosen for children and only two of the ten sessions were individual home sessions). In the current study, parents were taught individually using a teach-model-coach-feedback cycle with practice in the clinic and at home and the intervention included selection of specific language targets for each child. The total hours of intervention were similar in the current study and the Law et al. (1999) study. The total number of intervention hours was 28 for the current study and 25 hours for the Law et al. (1999) study, suggesting that the dosage of parent training was not the source of the difference in results.

Law et al. (1999) reported low levels of parent intervention fidelity (e.g., parent attendance to group training sessions and parent use of intervention strategies) ,while the current study reported high levels of fidelity of parent training and parental use of intervention strategies. On average, parents in the intervention group exceeded criterion levels for use of all EMT strategies, indicating a high rate of strategy use by parents in the intervention group. Because the Hanen and EMT interventions and the methods of training parents differ in several ways, it is not possible to determine which specific components of the EMT intervention (e.g., levels of parental strategy use, individualized training, parent training procedures, selection of individualized child language targets, inclusion of time delay and prompting procedures) contributed to the differential results.

Although parents in the current study successfully learned all six EMT strategies to criterion levels, matched turns was the only EMT strategy that significantly predicted child language performance at T3. The findings from the current study suggest that matching the number of adult to child turns may be an important component of early language intervention for children with language impairments. Reducing the amount of adult turns and thus balancing adult-child turns may provide children with more opportunities to attempt communication. When adults reduce their verbal turns and focus on responding to child communication, it is more likely that children receive immediate, contingent feedback that facilitates language learning.

In addition to the analysis of the main effects between treatment and control groups, the current study also examined the effects of the intervention in comparison to a sample of typically developing children. While children in both LI groups continued to have significantly lower language skills than TL children at the end of intervention, children in the LI- treatment group did not differ significantly from the TL children in terms of growth in NDW and TNW during the intervention period. TL children said less than one more different word (.5) and only 2 more total words per week over time than children in the LI-treatment group. Children in the LI-treatment group grew at similar rates to TL children during intervention. In contrast, LI-control children's NDW and TNW increased at a significantly slower rate than TL children. TL children said one more different word and five more total words per week over time than children in the LI-control group.

The similar growth rates between TL children and children in the LI-treatment group suggest that LI children may need higher levels of language support strategies than TL children. Analysis of parents' use of EMT strategies at the start of the study indicated parents of TL children used some EMT strategies (e.g., responsiveness, matched turns, talk at the target level)

more often than parents of children with LI. These differences before intervention are consistent with findings that parents of typically developing children use more language support strategies than parents of children with impaired language (Conti-Ramsden, et al., 1995; Vigil et al. 2005). Following intervention, parents in the LI-treatment group used significantly more EMT strategies than parents in the TL group. The positive changes in language outcomes and the increased rate of growth in NDW and TDW suggest that children with LI do benefit from higher rates of parent support for language learning and possibly may require increased use of these strategies to learn language in the natural environment.

Contributions of the Current Study

The current study confirmed and extended the research on parent-implemented naturalistic language interventions for children with language impairments. In addition to demonstrating that parent-implemented EMT is a promising intervention for this population, the current study provided further evidence of the relationship between receptive language and overall language growth. Previous research has suggested that receptive impairments may be better predictors of long-term language problems than productive impairments. Receptive language at the start of the study predicted growth in language for all three groups of children after controlling for differences in IQ. It is important to note however, that LI children in the EMT group gained 10 points on the auditory comprehension subscale of the PLS-4 during intervention while the LI children in the control group did not change. If receptive skills are an important predictor of persistent language impairments, the differential gain in receptive skills for the intervention group is a promising indicator for the potential of the intervention to improve long-term language outcomes.

The current study was the first study to clearly describe and report fidelity for specific parent training procedures in addition to reporting the effects the training on parent use of specific intervention strategies. Furthermore, the study was the first to examine the direct relationship between parental use of specific intervention strategies and changes in child language. The overall high level of internal validity in this study, including the randomized design, the high levels of parent training treatment fidelity, and reliability of the measures of parent and child behavior increase confidence in the outcomes of the study. This was also the first study of an early intervention for LI children to quantify intervention results in comparison to language growth in a group of typically developing children. This comparison allowed the intervention effects to be evaluated in relation to a clinically relevant metric. Children in the LI-treatment group not only made greater gains than children in the LI-control group, but intervention changed their rate of growth such that the growth of children in the LI-treatment group became more similar to the rate of growth observed in typically developing children. The rate of growth did not change for the children in the LI-control group.

These results have several clinical implications. First, these findings highlight the value of including parents in early language intervention for children with language impairments. These findings also illustrate the relationship between systematic parent training procedures, changes in parent behavior and changes in child language. Using teaching, modeling, coaching and feedback in a systematic training protocol supported parents' acquisition of specific language support strategies and implementation of these strategies at criterion levels. Teaching specific strategies using individualized video examples and specific child language provided the initial foundation by teaching parents why and how to use each strategy. The therapists modeling of specific EMT strategies in interactions with their children gave parents an applied example of

the strategy and provided children with increased dosage of the intervention. Coaching provided immediate and direct feedback to parents regarding their use of a specific strategy. Feedback was constructed to focus on connecting parents' strategy use and their children's language progress. Lastly, training at home during various routines provided additional opportunities for parent and child generalization. Systematic training of parents at home as part of their inclusion in early language intervention may be essential for generalized and maintained use of language support strategies by parents.

In addition to findings from the experimental portion of the study, the study yielded other findings of interest. First, only one of the 34 children with language impairments received speech and language services outside the study. This finding suggests that "wait and see" is still the standard for community care in the community where this study was conducted. While the rationale behind this approach is that the majority of children will catch up over time, the short-term results of this study do not support this reasoning. Children in the LI-control group did not catch up, but fell further behind their typically developing peers during the approximately 4 months in which they were in the study. Although long-term observations are needed, the current findings suggest that early intervention is warranted for children with receptive and expressive language impairments.

Limitations

The long-term outcomes for this population of LI children are unknown and the current findings should be considered in the context of several limitations of the study. First, the typical sample in this study may not represent typically developing children in this age range. The current sample of TL children had language skills that were one standard deviation above the

standardization sample. The TL sample also had parents with higher levels of education and income than the LI sample. Second, the sample size for the LI treatment and control groups was small (e.g., less than 20 children in each group). Small sample sizes yield more variable results than larger samples and the findings should be considered preliminary. Third, only short-term intervention outcomes were examined. Longer term outcome measures (e.g., 12 months following intervention) that are part of the larger study may yield different results. Based on other research, we expect that the effects of the intervention will maintain over time if parents continue to use the EMT strategies. These limitations will be addressed in the larger study, by increasing the sample size, following children for a longer period of time and by recruiting a more representative sample of typical children by systematically including families of lower education and income levels.

Future Research

Although some key research questions will be addressed in the larger study, the current findings suggest a need for research in a number of related areas. First, there is a need to further examine the effects of fidelity and dosage of parent language support strategies on child language outcomes. A proxy for dosage of parent use of strategies may be obtained from analysis of audio recordings from home and examined in relation to child language outcomes at home and in the clinic over time.

Second, the impact of early intervention on later reading and academic outcomes requires a longitudinal follow-up of the sample of LI children into the elementary school years. Receptive language at the start of the study was predictive of language growth for all groups of children. It is important to determine if this relationship maintains as children age and as they transition into

reading. Third, given the promising short-term outcomes of the current study, it would be valuable to directly compare EMT with another frequently used early language intervention, the Hanen Parent Program and to include a systematic analysis of the skills taught and learned by parents in the both programs. Such a study would not only allow for evaluation of which language intervention strategies (e.g., prompting, focused stimulation, mirroring and mapping) are most effective but also which components of parent training (e.g., teach, model, coach, feedback) are most effective for different types of parents.

Conclusion

The results of this study indicate that parent-implemented EMT may be an effective early intervention for children with expressive and receptive language impairments. Parents can be taught to implement specific language support strategies and these strategies are associated with growth in language. LI children who received intervention had significantly greater receptive and expressive language skills than children who did not receive intervention. Including a sample of typically developing children allowed for the comparison of growth between LI children and TL children. Results of this comparison indicated that the language growth was similar between the TL and LI-treatment groups but different between the TL and LI-control groups. These conclusions must be considered in the context of the limitations and the exploratory nature of the current study.

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APPENDIX A

Child and Family Characteristics

Date survey completed (mm/dd/yyyy)**: _____**

Person completing the survey: _____ **Relationship to child: _____**

1. What is child's date of birth? / /

2. What is your child's birth order (Check ONE)

- ❒ First born
- ❒ Second born
- ❒ Third born
- ❒ Fourth born

3. What is child's gender?

- ❑ Male
- ❑ Female

4. Please choose the category that best describes child's ethnicity:

- ❒ American Indian/Alaska Native
- ❒ Asian/Pacific Islander
- ❒ Black, not Hispanic
- ❒ Hispanic
- ❒ White, not Hispanic
- ❒ Other (specify):_____
- ❒ Decline

5. Child lives with:

- ❒ Biological mother and father
- ❒ Biological mother and stepfather
- ❒ Biological mother only
- ❒ Biological father only
- ❒ Biological father and stepmother
- ❒ Foster parents
- ❒ Relatives
- ❒ Other (specify): _____

6. How many siblings or other children who live in the home with the child are under age 3?
_____ # of children under age 3

7. How many siblings or other children who live in the home with the child are 3-5 years of age?
_____ # of children 3-5

8. How many siblings or other children who live in the home are 6-18 years of age?
_____ # of children 6-18

9. How many adults live in the home? _____ # of adults

10. Does anyone in your immediate family (parents, siblings, nieces, nephews) have behavioral, learning, speech or language problems?

_____ *Yes* _____ *No*

If Yes, please describe who and what the problem is.

_____	_____	_____	_____
(relationship)	*(age)*	*(problem)*	*(lives with child?)*
_____	_____	_____	_____
(relationship)	*(age)*	*(problem)*	*(lives with child?)*
_____	_____	_____	_____
(relationship)	*(age)*	*(problem)*	*(lives with child?)*

11. What languages are spoken in child's home? *(Check ALL that apply)*

- ❒ English
- ❒ Spanish
- ❒ Other language (specify _____)
- ❒ Unknown/Decline

12. What is the primary caregiver's date of birth: *mm / dd / yyyy*

13. What is the primary caregiver's gender?

- ❑ Male
- ❑ Female

11. What is the relationship of the primary caregiver to the child? (select one)

- ❒ Birth mother
- ❒ Adoptive mother
- ❒ Foster mother
- ❒ Step-mother
- ❒ Other relative guardian (e.g., aunt)
- ❒ Birth father
- ❒ Adoptive father
- ❒ Foster father
- ❒ Step-father
- ❒ Other non-relative guardian

12. What is the highest grade completed by primary caregiver? **(select one)**

- ❒ 8th grade or below
- ❒ 9th grade
- ❒ 10th grade
- ❒ 11th grade
- ❒ High School
- ❒ GED
- ❒ Some College
- ❒ Trade school
- ❒ 2 yr degree
- ❒ 4 yr degree
- ❒ Some graduate school
- ❒ Graduate degree

13. Is the primary caregiver currently taking classes? **(select one).**

- ❒ No
- ❒ Yes, part-time
- ❒ Yes, full-time

14. Please list average total yearly (or monthly) cash/check household income before taxes including child support.

Yearly: _____ **OR** Monthly: _____

OR

Please mark the line next to the range that is closest to your total average <u>yearly</u> household cash/check income before taxes including child support.

____$0 to $4,999____ $20,000 to $24,999____ $40,000 to $44,999 ____ $60,000 to $64,999

____$5,000 to $9,999 ____ $25,000 to $29,999____ $45,000 to $49,999 ____ $65,000 to $69,999

____$10,000 to $14,999 ____ $30,000 to $34,999 ____ $50,000 to $54,999____ $70,000 to $74,999

____$15,000 to $19,999 ____ $35,000 to $39,999____ $55,000 to $59,000 ____ $75,000 or above

15. Do you or your child receive any additional support (e.g., Tenn Care, Unemployment, Food Stamps?) _____ yes _____ no

16. What is the primary caregiver's employment status?

- ❑ Full-time
- ❑ Part-time
- ❑ Unemployed/Not working
- ❑ Unknown/Decline

Complete only if primary caregiver is NOT the child's mother:

17. What is the child's mother's date of birth: *mm / dd / yyyy*

18. What is the child's mother's employment status?

- ❑ Full-time
- ❑ Part-time
- ❑ Unemployed/Not working
- ❑ Unknown/Decline

19. ***What is the highest grade completed by the mother?*** **(select one).**

- ❒ 8th grade or below
- ❒ 9th grade
- ❒ 10th grade
- ❒ 11th grade
- ❒ High school
- ❒ GED
- ❒ Some college
- ❒ Trade school
- ❒ 2 yr degree
- ❒ 4 yr degree
- ❒ Some graduate school
- ❒ Graduate degree

20. What is the child's father's date of birth: *mm / dd / yyyy*

21. What is the child's father's employment status?

- ❑ Full-time
- ❑ Part-time
- ❑ Unemployed/Not working
- ❑ Unknown/Decline

22. ***What is the highest grade completed by the father?*** **(select one).**

- ❒ 8th grade or below
- ❒ 9th grade
- ❒ 10th grade
- ❒ 11th grade
- ❒ High school
- ❒ GED
- ❒ Some college
- ❒ Trade school
- ❒ 2 yr degree
- ❒ 4 yr degree
- ❒ Some graduate school
- ❒ Graduate degree

23. Were there any complications during the child's delivery (e.g., premature birth, spent time in the Neonatal Intensive Care Unit (NICU)?

_____Yes _____No

If yes, please describe:_____

24. How much did child weigh when he/she was born?

____ ____ AND ____ ____

ENTER POUNDS ENTER OUNCES

OR ____ ____ . ____ ____ OR ____ ____ ____ ____

ENTER KILOGRAMS ENTER GRAMS

25. Has child had any major surgeries or significant hospitalizations since birth?

_____Yes _____No

If yes, please describe:_____

26. During the past three months has your child experienced:

Recurrent ear infections? _____Yes _____No

Placement of ear tubes? _____Yes _____No

If yes, please give a date for ear tubes: _____

27. Does your child take any medication regularly? _____Yes _____No

If yes, please describe:_____

28. Do you have any concerns about how your child talks and makes speech sounds?

_____ Yes _____ No _____ A little

If yes, please check all that apply:

- ❑ My child has difficulty saying words
- ❑ My child has difficulty saying or pronouncing certain sounds (e.g., "at" for "cat" or "do" for "dog")
- ❑ Other (please describe):

_____

29. Did your child babble (e.g., ga-ga-ga, ba-ga-ba)? _____Yes _____No

30. When did you child say his or her first words?

_____ months

_____ my child does not have any words

31. Do you have any concerns about how your child understands what you say?

_____ Yes _____ No _____ A little

32. Do you have any concerns about how your child uses his or her hands and figures to do things?

_____ Yes _____ No _____ A little

33. Do you have any concerns about how your child uses his or her arms and legs?

_____ Yes _____ No _____ A little

34. Did your child achieve motor milestones (e.g., walked later than 15 months) later than expected?

_____ Yes _____ No

If yes, please describe:_____

35. Are you concerned with your child's hearing?

_____Yes _____No

If yes, please describe:_____

36. Do you have any concerns about how your child behaves?

_____ Yes _____ No _____ A little

If yes, please check all that apply:

- ❑ My child is shy or withdrawn
- ❑ My child has tantrums more that I would expect
- ❑ My child has trouble listening or following directions
- ❑ Other (please describe):

_____

37. Do you have any concerns about how your child gets along with others?

_____ No _____ Yes _____ A little

If yes, please describe:

_____

38. Do you have any concerns about how your child is learning to do things for himself/herself?

_____ No _____ Yes _____ A little

If yes, please describe:

_____

39. Do you have any concerns about how your child is learning preschool or school skills?

_____ No _____ Yes _____ A little

If yes, please describe:

_____

Thank you very much for completing this questionnaire!

APPENDIX B

Community Services

Date survey completed (mm/dd/yyyy)**: _____**

Person completing the survey: _____ **Relationship to child:** **_____**

1. ***Please describe the child's regular child care arrangement. (Mark ALL arrangements where child spends 10 or more hours per week)***
   - ❒ **In child's home with relatives**
   - ❒ **In child's home with non-relatives**
   - ❒ **In relative's home**
   - ❒ **Family-based care (regular basis in a private home from someone who is not related to child)**
   - ❒ **Child care/Day care program <u>without</u> special services**
   - ❒ **Nursery school/preschool, prekindergarten at a school or in a center <u>without</u> special services**
   - ❒ **An early intervention or center-based program <u>with</u> special services**
   - ❒ **Head Start (federally-sponsored preschool program primarily for children from low-income families)**
   - ❒ **Other child care arrangement (specify _____)**
   - ❒ **Refused**
   - ❒ **Don't know**

2. ***If child care arrangement includes care outside of child's home, provide the date of first attendance.***

Date of first attendance (mm/yyyy) _____

3. ***Please tell us about the time your child spends in child care. Please include the approximate times you drop-off and pick-up your child from child care each day.***

	Mon	***Tues***	***Wed***	***Thurs***	***Fri***	***Sat***	***Sun***
Drop-off time	___	____	____	____	____	____	____
Pick-up time	___	____	____	____	____	____	____
approx. hours per day	___	____	____	____	____	____	____

4. Is the child participating in other research projects in the community or at a university?

- ❑ Yes
- ❑ No
- ❑ Don't know

If yes, please describe: _____

5. Therapy services received(month/year):

❑ **Physical Therapy** Date Services Started: _____ Date of Last Service: _____

# of sessions per week: ____ ***session length***: ____ ***location***: home, school, clinic ***size***: group or individual

(circle one) (circle one)

❑ **Occupational Therapy** Date Services Started: _____ Date of Last Service: _____

# of sessions per week: ____ ***session length***: ____ ***location***: home, school, clinic ***size***: group or individual

(circle one) (circle one)

❑ **Speech Therapy** Date Services Started: _____ Date of Last Service: _____

# of sessions per week: ____ ***session length***: ____ ***location***: home, school, clinic ***size***: group or individual

(circle one) (circle one)

❑ **ABA Therapy** Date Services Started: _____ Date of Last Service: _____

# of sessions per week: ____ ***session length***: ____ ***location***: home, school, clinic ***size***: group or individual

(circle one) (circle one)

❑ **Special Ed. Teacher** Date Services Started: _____ Date of Last Service: _____

# of sessions per week: ____ ***session length***: ____ ***location***: home, school, clinic ***size***: group or individual

(circle one) (circle one)

6. Which statement best describes your level of participation in **most** of your child's speech/language therapy sessions? Please check only one.

____ I observe the therapist working with my child.

____ I participate in the sessions by working with the therapist and my child.

____ I mainly interact with my child while the therapist provides suggestions or describes language facilitating techniques for me to try.

____ My child's speech-language pathologist does not involve me in therapy sessions.

7. Is there anything else you think it is important to know about your child's therapy services:

_____
_____

_____
_____

_____
_____

Thank you very much for completing this questionnaire!

APPENDIX C

Language Sample Protocol

	All	***Babies***	***Barn***	***Play-doh***	***Cars***	***Book***
The materials are in close proximity to child.						
The tester is at the child's level.						
The tester uses a warm, positive tone of voice.						
The tester presents all 4 toy sets and the wordless picture book during the session: 1. Babies, clothing, food 2. Barn, animals 3. Play doh with tools 4. Cars + blocks 5. Carl goes to daycare wordless picture book.						
The tester introduces each toy set by saying: 1. Babies: here are some babies, what should we do? 2. Barn: here are some animals, what should they do? 3. Play-doh: here's some play-doh, what should we make? 4. Cars + blocks: here are some cars, where should they go? 5. Book: Here's my dog book, tell me what you see.						
The tester points to at least 4 different pictures in the picture book.						
The tester plays with the child with all 4 toy sets.						
The tester models at least 2 novel play actions per toy set.						
The tester uses at least 2 environmental arrangement strategies per toy set:						
The tester does not use new language (e.g., not said by the child) unless the child has not initiated vocalizations or language within a 2 minute interval.						
If the child has not initiated vocalizations or verbal language within a two minute interval, the tester makes a comment about the toy set or the book.						
The tester responds to all child communication with a verbal response.						
The tester sets the timer for 21 minutes and ends after 21 minutes.						
Subtotal	/7	/5	/5	/5	/5	/3
Grand Total	/30					

Appendix D

KIDTalk

A Context for Communication

Play and Engage

Why?

- Children learn best when they are engaged and interacting with a communication partner.
- Children are more likely to be engaged and learn language while doing activities they enjoy.
- When the adult plays with the child at his or her level, the adult optimizes the opportunity for communication to occur.

How?

- Be at your child's eye level and do whatever your child is doing.
- Follow your child's lead, avoiding directions and letting your child lead the play.
- Avoid questions and let your child initiate the communication.
- Choose toys that are interesting and engaging and put toys away that aren't being used
- If you don't want your child to do something, give him or her another option.

When?

- Whenever possible; at least once a day for at least 15 minutes of concentrated and individualized adult-child time.

Notice and Respond

Why?

- Noticing and responding to all communication teaches your child that their communication is important to you.
- By acknowledging all communication and communicative attempts you reinforce your child for communicating.
- The more your child communicates the more practice he or she receives and the easier communication becomes.

How?

- Notice and respond every time your child communicates.
- Respond by talking about what your child is doing.
- Language is most meaningful when it's related to what your child is doing OR in response to what your child is communicating.

When?

- As much as possible; in all contexts throughout the day.

Take Turns

Why?

- Taking turns allows your child more opportunities to communicate.
  - More opportunities = more practice = growth in communication skills
- Taking turns teaches your child how to have a conversation.
- Waiting signals to the child that it is his or her turn to communicate.

How?

- Take turns communicating with your child and wait for your child to communicate.
- Play a game of "communication catch."
  - Your child communicates; You respond (and wait)
  - Your child communicates; You respond (and wait)
- Only say something after your child communicates.

When?

- As much as possible; in all contexts throughout the day

Mirroring and Mapping

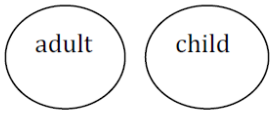
What is Mirroring and Mapping?

- Mirroring: when the adult imitates the child's nonverbal behaviors.
- Mapping: when the adult "maps" language onto these nonverbal behaviors.

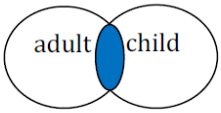
Why Use Mirroring and Mapping?

- Mirroring allows the adult to join the interaction with the child.
- Mirroring allows the adult to be responsive when the child is not communicating.
- Mapping provides the child with a language rich description of the activity.
- Mirroring and mapping allows the adult and child to have balanced turns.
  - Child: {drives car}
  - Adult: {drives car} I drive the blue car.
- When the adult "mirrors" or imitates the child, the child is more likely to orient toward the adult since the adult is doing what is of interest to the child.
- What the adult says is more meaningful to the child since the adult and child are both engaging in the same activity and language is "mapped" right on top of what the child is doing.

Before



After



Following the child's lead
Noticing and responding
Mirroring and mapping

⇩

Meaningful conversation
Opportunities for learning

How and When to Mirror and Map?

- Use mirroring and mapping when the child is <u>not</u> communicating.
- Mapping must come <u>after</u> mirroring.
- <u>First</u> imitate the action and <u>then</u> label the action with words.
  - Child : {feeds baby}
  - Adult: {feeds baby} we feed the baby some milk.
- Mirror the child's actions close to the child's actions to make language more salient.
- Avoid mirroring behaviors that are unacceptable (e.g., throwing toys, hitting).
- Balance mapping and playing (e.g., don't over map).

Using Strategies at Home

- During what activities at home can you "mirror" and "map"?

  _____

- What will you do? What will you say?

  _____

KIDTalk

Modeling Language

Language Goals

- Increase the rate at which your child communicates.
- Increase the diversity of communication.
- Increase the child's independence.
  - Increase spontaneous communication.
  - Decrease the dependence on adult cues.

Why Do We Model Language?

- Children learn language through modeling.
- Contingent modeling that is in response to your child's communication is the most powerful form of modeling.
- Simplifying language to match your child's language targets helps him/her learn language more quickly.
- Modeling makes it easier for your child to imitate and understand language.

How to Model Language?

- We pick targets based on the language your child is already using and what he/she should learn next.
- How does your child communicate now?
  - Gestures, vocalizations
  - Single words
  - 2 words
  - 3 words
  - 4 words

Using Your Child's Targets

- 50% of what you say should be one of your child's targets:

1. _____ 2. _____
3. _____ 4. _____
5. _____

- 50% should be slightly higher than your child's targets.
  - 1-2 words above his/her level
  - All words should be teaching words (nouns, verbs, modifiers)

When to Model Language?

- After your child communicates (expanding)
  - Respond with a language target
- When you are doing the same action or have the same object as your child.
  - Child: {drives car}
  - Adult: {drives car} car
- While taking communication turns.

Expanding Communication

What is an expansion?

- Expansion: adding more words to your child's communication.
- The most powerful expansion includes one of your child's communication targets.

Why expand communication?

- Expansions immediately connect the child's communication to additional new communication.
- The more your child hears and practices language that is more complex, the better his/her language skills become.
- When you give your child a little more language than he/she gives you, he/she hears more about the topic in which he/she is interested.
- Expansions help your child learn new vocabulary and talk in more complex sentences.

How to expand communication?

- Gestures: by imitating the gesture or taking/touching the object while labeling the word, you are increasing the saliency of the word and making it more likely that your child will learn this new word.
  - Point/reach:
    - Child: {points to/reaches for ball}.
    - Adult: {points to/reaches for ball} ball.
  - Show
    - Child: {holds up block}.
    - Adult: {points to block} block.
  - Give
    - Child: {gives adult car to drive}.
    - Adult: {takes the car} car.
- Vocalizations: by replacing the vocalization with the word you want your child to say and by imitating his action or pointing to an object you are increasing the saliency of the word and making it more likely that your child will learn this new word.
  - Child: {says "ah" and is walking the cow}.
  - Adult: {walks the cow} walk.
- Words: by adding words to your child's words you connect a new word to a word your child already knows, which increases the saliency of the new word and makes it more likely that your child will learn this new word.
  - Child: car.
  - Adult: drive car.

Time Delay Strategies

What are Time Delay (TD) Strategies?

- Non-verbal strategies that encourage your child to communicate with you.
  - Inadequate Portions: providing small or inadequate portions of preferred materials.
  - Assistance: creating situations in which the child needs the adult's help.
  - Waiting with Routine: setting up a routine in which the child expects certain actions and then waiting before doing the expected action again.
  - Waiting with Cue: using associated objects (e.g., shoe to foot) and then waiting before completing the expected action.
  - Choice Making: holding up two objects and waiting for the child to communicate about which item he/she wants.

Why Use TD Strategies?

- Provides the child with more opportunities to practice communicating.
  - Increases the child's rate of communication
- Provides the adult with more opportunities to teach new language by
  - Responding
  - Expanding the child's communication

How to Use TD Strategies?

- Set up the opportunity to encourage your child to communicate by using an environmental arrangement strategy.
- Wait until your child communicates (gestures, vocalizes, says a word).
- Expand this communication with a target.

When to Use TD Strategies?

- Use TD Strategies when the child is not communicating frequently (e.g., less than 2 times per minute).
- Some strategies work better than others for different children.
  - Use the ones that work best for the child.
  - Avoid TD strategies that frustrate the child.

Prompting Language

What is a Prompt?

- An adult prompt is a signal to the child to do or say something.
- There are four types of prompts, with different levels of adult support:
  - Time delay (waiting for 5 seconds)
    - An overt nonverbal cue for the child to use language
    - The adult uses an expectant look and waits for the child to verbalize before performing the expected action or giving the child a desired object.
    - This offers the least language support.
  - Open prompt (e.g., "what do you want?" "tell me what you want.")
    - The adult gives an open prompt (i.e., no single correct answer).
    - This offers a little more support by verbally cueing the child to verbalize his or her requests.
  - Choice prompt (e.g., "dog eats or dog drinks?")
    - The adult uses a choice prompt that has no single correct answer
    - This offers even more support by including the answer in the question.
  - SAY prompt: "say _____".
    - The parent tells the child exactly what to say "say _____"
    - This offers the most adult support as it tells the child exactly what to say.

What to Prompt?

- Your child's communication targets:
  - Target 1: noun (e.g., cat)
  - Target 2: verb (e.g., eat)
  - Target 3: protoverb (e.g., in)
  - Target 4: request (e.g., help, again)

Why Prompt Language?

- Gives children an opportunity to practice language targets during a highly motivating context.
- Gives the child functional practice and reinforcement for communication.

Prompting Language

How to Prompt Language?

- Wait for your child to request OR use time delay strategy to elicit a request.
- Choice Prompt: Adult uses TD choice making strategy to set up the request
  - Use the choice TD strategy (hold up 2 items).
  - Wait for the child to respond (if no response, abandon the prompt since the child isn't interested, but don't give either object)
  - If the child does not use a target, say " _____ or _____"
  - If the child still doesn't say the target, give model ("say") up to 2 times if the child doesn't use a target.
- Open Prompt: Child requests or adult uses another TD strategy (other than choice) to set up the request.
  - Wait for the request or use an TD strategy (all but choice) to get a request
  - Say "Tell me what you want?" or "What do you want?"
  - Wait for the child to respond or wait 5 seconds if no response.
  - If the child does not use a target, say "say _____"
  - Give model ("say") up to 2 times if the child doesn't use a target
- Stop prompting after your child says exactly what you wanted him to say.
- Give your child enough time to respond (5 seconds) before giving another prompt.
- Prompting episodes should always result in the child receiving the object or action.
- After your child has said what you wanted OR you have given two model prompts
  - Expand if he has said the target
  - Repeat if he has not said the target

When to prompt language?

- Only when the child is requesting and not using a target.
- Only as one of the many tools (not the only tool) of Enhanced Milieu Teaching.
- No more than three times per minute 15 minute session
  - Too many demands may cause the child to become frustrated.

Appendix E

Phase 1 (Setting the Foundation for Communication) Workshop Fidelity	
Introduction	
Therapist explains purpose of the session (e.g., informal discussion about the first set of intervention techniques), encourages the parent to ask questions at any time.	/1
Therapist gives the parents the handouts for the workshop.	/1
Therapist checks for clarification at least three times during the session. Tally:	/1
What is EMT?	
Therapist explains that EMT is evidence-based and has been research for 20 years.	/1
Therapist explains foundations of EMT (naturalistic, conversation-based, uses child initiations as opportunities to model and prompt language in everyday contexts).	/1
Therapist explains that EMT can be used throughout the day.	/1
EMT strategies	
Therapist explains EMT tools: 1. Setting up an interactive context between the parent and child 2. Noticing and responding to child communication; balancing turns 3. Modeling and expanding play 4. Modeling and expanding communication 5. Time delay strategies 6. Prompting strategies	/6
Therapist explains that throughout this intervention we will teach you a set of intervention strategies during each of these workshops. Then you will practice this strategy for a few weeks in the clinic and at home. We measure how you are using the strategy. Once you have met the goal for the strategy, you will learn the next strategy. We will be focusing on the first 3 strategies today.	/1
Strategy 1: Play and Engage	
Therapist explains the first goal of intervention is to set up an interactive context between the adult and child.	/1
Therapist explains that communication develops on a platform of shared joint attention and engagement (social interactions, play with objects and partner, everyday routines where communication is functional).	/1
Why Play and Engage	
Therapist explains that children learn best when they are engaged and interacting with a communication partner and that play helps engagement and interaction.	/1
Therapist explains that children are more likely to be engaged and learn language while doing activities they enjoy.	/1
Therapist explains that when the adult plays with the child at his or her level, the adult optimized the opportunity for communication to occur.	/1
How to Play and Engage	
Therapist explains Strategy 3: Play and Engage 1. Be at [child's name]'s level. 2. Do whatever [child's name] is doing. 3. Follow [child's name]'s lead.	/8

4. Avoid directions and let [child's name] lead the play. 5. Avoid questions and let [child's name] initiate the communication. 6. Choose toys that are interesting and engaging. 7. Put away toys that aren't being used. 8. Substitute undesired activities with desired activities.	
Therapist relates strategy to parent/child dyad.	/1
How are you and [child's name] engaging?	
Therapist directs parent to use the Workshop 1 worksheet while watching these clips.	/1
Therapist gives the direction to watch the clip and notice how you are playing, if you are following your child's lead and how your child responds to your actions.	/1
Therapist includes a video clip of adult following child's lead and discusses: 1. If parent is following the child's lead. 2. How the child responds to parent actions.	/2
Therapist gives the direction to watch the clip and notice how you and your child are engaging with toys, what you are playing with, how you can tell your child is engaged, how your child is responding.	/1
Therapist includes a video clip of adult and child engaging with toys and discusses: 1. What parent and child are doing/playing with. 2. How one can tell child and parent are engaged. 3. How child is responding.	/3
Therapist gives direction to watch the clip and notice how you and your child are engaging, what you are playing with, how you can tell your child is engaged, how your child is responding.	/1
Therapist includes a video clip of adult and child engaging socially with each other and discusses: 1. What parent and child are doing. 2. How one can tell child and parent are engaged. 3. How child is responding.	/3
Therapist gives the direction to watch these clips and notice how many and what types of toys are available, and how this is impacting the child's engagement.	/1
Therapist includes a video clip of few toys/good control and discusses: 1. How many and what types of toys are available. 2. How this is impacting the child's engagement.	/2
Therapist includes a video clip of lots of toys/poor control and discusses: 1. How many and what types of toys are available. 2. How this is impacting the child's engagement.	/2
Therapist gives the direction to watch the clip and notice if there is an opportunity to substitute an activity for another activity.	/1
Therapist includes a video clip of adult telling the child not to do something and discusses: 1. When/if an activity could be substituted for another. 2. What the activity could have been.	/2
When to Play and Engage	
Therapist explains that the parent should play and engage whenever possible.	/1
Therapist explains that the parent should play at least once a day for 15 minutes of	/1

concentrated and individualized adult-child time.	
Strategy 2: Notice and Respond to all Communication	
Therapist explains that all children are communicating.	/1
Therapist explains how children communicate 1. Prelinguistic 2. Linguistic	/2
Therapist explains that children communicate for many reasons (requesting/commenting continuum) and that we want the child to communicate for many reasons not just requesting	/1
How is [child's name] communicating?	
Therapist includes 3 minute video from language sample that includes multiple examples of communication.	/1
Therapist uses and explains Noticing Communication Worksheet.	/1
Therapist give direction to parent: "What this video and notice when, how, and why your child communicated every time he or she communicates."	/1
Therapist and parent do the first five communications together	/1
After parent is comfortable, therapist tells the parent to let her know when she sees communication. Therapist stops the video every time the parent indicates there was communication or when the child communicates (if missed)	/1
Therapist pauses the video as necessary to ensure parent understanding	/1
Therapist helps parent to determine: 1. How is [child's name] communicating now? 2. Why is [child's name] communicating now?	/2
Notice and Respond to Communication	
Therapist explains: 1. Notice and respond every time [child's name] communicates 2. Respond by talking about what [child's name] is doing. 3. Language is most meaningful when it's related to what [child's name] is doing or in response to what [child's name] is communicating.	/3
Therapist relates strategy to parent/child dyad.	/1
Why Notice and Respond?	
Therapist explains that noticing and responding to all communication teaches your child that their communication is important to you.	/1
Therapist explains that by acknowledging all communication and communicative attempts the parent reinforced the child for communicating.	/1
Therapist explains that the more the child communicates the more practice they receive and the easier communication becomes.	/1
When to Notice and Respond	
Therapist explains to notice and respond a. As much as possible b. In all contexts throughout the day (play, meals, routines)	/2
How are you responding?	
Therapist directs parent to use the Workshop 1 worksheet while watching these clips.	/1
Therapist gives the direction to watch the first two clips and notice:	/2

a. If and how you respond to your child's communication b. How the child reacts	
Therapist includes 2 video clips (1 for good responding, 1 for bad responding) of the adult responding to communication and discusses: a. If and how you respond to your child's communication b. How the child reacts	/4
Therapist gives the direction to watch both clips and notice: a. What you are saying b. If it's related to what you child is doing or saying. c. How the child reacts	/2
Therapist includes 2 video clips (1 for the adult talking about the child's actions, 1 where the adult is not talking about the child's actions) and discusses a. What the parent is saying b. If it is related to what the child is doing or saying c. How the child reacts	/6
Goal 1: Responding to Communication	
Therapist explains that the first goal is to try to respond to all child communication, so that the adult responds to 90% of the child's communication.	/1
Therapist inserts bar graph (using workshop 1graph template) of % responsive from the parent baseline session and moves red line to be at 90% and explains the goal of getting above the red line.	/1
Strategy 3: Take Turns	
Therapist explains Take Turns 1. Take turns communicating with [child's name]. 2. Allow time for [child's name] to communicate. 3. Play a game of "communication catch." 4. Only say something after [child's name communicates].	/4
Therapist relates strategy to parent/child dyad.	/1
Why take turns?	
Therapist explains that it allows your child more opportunities to communicate (more opportunities = more practice = growth in communication skills).	/1
Therapist explains that it teaches your child how to have a conversation.	/1
When to Take Turns	
Therapist explains to notice and respond: (a) As much as possible and (b) In all contexts throughout the day (play, meals, routines)	/2
How's your turn taking?	
Therapist gives the direction to watch each clip and notice how many communication turns you take and how many communicative turns the child takes.	/1
Therapist includes 1 video clip of adult taking communication turns with child and discusses how many turns the parent and the child takes. Therapist makes the connection that the less the parent talks, the more opportunity that the child has to communicate.	/2
Therapist includes 1 video clip of adult taking multiple turns after a child turn and discusses how many turns the parent and the child takes. Therapist makes the connection that the more the parent talks, the fewer opportunities that the child has to	/2

communicate.	
Therapist gives the direction to watch each clip and count how many seconds you gave your child to respond.	/1
Therapist includes 1 video clip of adult waiting for child communication and discusses how many seconds they gave their child to respond. Therapist makes the connection that by waiting, the child has an opportunity to take his/her turn in the conversation.	/2
Therapist includes 1 video clip of adult not waiting for child communication and discusses how many seconds they gave their child to respond. Therapist makes the connection that by not waiting, the child does not have an opportunity to take his communication turn.	/2
Goal 2: Taking Turns	
Therapist explains that the second goal is to match adult and child communication turns (e.g., have balanced or matched turns).	/1
Therapist inserts bar graph (using workshop 1graph template) of matched turns from the parent baseline session and moves red line to be at 75% and explains the goal of getting above the red line (e.g., that 75% of what you say should be "matched" or in response to what your child has communicated).	/1
Strategy 4: Mirror and Map	
Therapist explains mirroring and mapping: a. Mirroring: adult imitates the child's nonverbal behaviors b. Mapping: adult "maps" language onto these actions by describing the action.	/2
Why Use Mirroring and Mapping?	
Therapist explains that: a. Mirroring allows the adult to join in the interaction with the child. b. Mapping provides the child with a language rich description of the activity. c. Mirroring & mapping lets adult have balanced turns when child isn't communicating. d. What the adult says is more meaningful since the adult and child are doing the same action and language is "mapped" right on top of what the child is doing.	/4
How and When to Mirror and Map?	
Therapist explains that: a. Use mirroring and mapping when [child name] is <u>not</u> communicating. b. Mapping must come <u>after</u> mirroring. c. <u>First</u> imitate the action and <u>then</u> label the action with words.	/3
Therapist includes a clip of the therapist during the baseline session mirroring and mapping at least one action. Therapist highlights the action the child did then the action the adult did and what the adult said.	/1
Therapist instructs the parent to watch the next clip and look for the action the child did, the action the adult imitated and what the adult said.	/1
Therapist and parent practice mirroring and mapping at least twice.	/2
How and When to Mirror and Map?	
Therapist explains that: a. Mirror the child's actions close to [child's name] actions to make language	/3

more obvious. b. Avoid mirroring behaviors that are unacceptable (e.g., throwing toys, hitting). c. Balance mapping and playing (e.g., don't over map).	
Let's Review	
Therapist reviews major concepts: 1. Do what [child's name] does, following his lead. 2. Make statements (no questions, no directions). 3. Respond when [child's name] communicates. 4. Talk about what [child's name] is doing. 5. Wait for communication. 6. Only talk after [child's name] talks.	/7
Next Session	
Therapist previews next session with parent: 1. Review the strategy for the session and role play. 2. Pick toys and talk about how you will use target strategy with these toys. 3. Watch child play with child trainer and look for how child trainer responds, plays, engages, and arranges the environment. 4. Practice with child for 15 minutes. 5. Talk about how it went and make a plan for home and next session.	/5
Coaching	
Therapist discusses the importance of coaching (gives immediate feedback but should not interrupt interaction between adult and child).	/1
Therapist discusses and plans coaching style with parent.	/1
Therapist discusses and plans feedback type with parent.	/1
Questions?	
Therapist confirms date and time of next appointment.	/1
Therapist asks parent if they have any questions.	/1
Therapist gives the home visit handout and goes over the handout	/1
Therapist gives and explains the calendar (and example calendar) and explains that EMT should happen every day throughout the day.	/2
Total	/144

Phase 1 (Setting the Foundation for Communication) **Clinic Fidelity**	
Initial Parent Training Session	
Therapist reviews 4 strategies: 1. Notice and respond 2. Take turns 3. Play and engage 4. Mirror and map (when the child is not communicating)	/4
Therapist & parent model/role play mirroring and mapping with the selected toys.	/1
Therapist & parent discuss at least 3 novel ways to play with the selected toys.	/3
Therapist checks for understanding and invites parent questions before the session.	/1
Therapist Practice Session	
Therapist highlights mirroring and mapping at least 3 times.	/3
Therapist highlights responding, taking turns, and following the child's lead at least 3 times.	/3
Session lasts for 15 minutes.	/1
Parent Practice Session	
Therapist gives parent positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Ending Parent Training Session	
At the end of the session the therapist asks the parent how he/she felt the session went.	/1
Therapist summarizes how the parent responded, took turns, played, and/or mirrored and mapped.	/1
Therapist relates the parent's performance and child's behavior during the practice session at least once.	/1
Total	/35

Phase 1 (Setting the Foundation for Communication) Home Fidelity	
Initial Parent Training Session	
Therapist asks the parent how the intervention has been going at home.	/1
Therapist reviews 4 strategies in the context of the last session: 1. Notice and respond 2. Take turns 3. Play and engage 4. Mirror and map (when the child is not communicating)	/4
Therapist checks for understanding and invites parent questions before the session.	/1
Therapist Practice Session: Play	
Therapist highlights mirroring and mapping at least 3 times.	/3
Therapist highlights responding, taking turns & following the child's lead at least 3 times.	/3
Session lasts for 15 minutes and occurred before the parent play session.	/2
Parent Practice Session: Play	
Therapist gives parent positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Therapist summarizes how the parent, responded, took turns, played and mirrored and/or mapped during play.	/1
Therapist relates the parent behavior to child behavior.	/1
Parent Practice Session: Snack	
Therapist attempts to do snack with the parent and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon snack.	/1
Therapist gives parent positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate.	/1
Therapist summarizes how the parent, responded, took turns, played and mirrored and/or mapped during snack. Score 1 if abandoned when appropriate.	/1
Therapist relates the parent behavior to child behavior. Score 1 if abandoned when appropriate.	/1
Parent Practice Session: Book	
Therapist attempts to do book with the parent and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon the book.	/1
Therapist gives parent positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate.	/1
Therapist summarizes how the parent, responded, took turns, played and/or mirrored and mapped during book. Score 1 if abandoned when appropriate.	/1
Therapist relates the parent behavior to child behavior. Score 1 if abandoned when appropriate.	/1
Ending Parent Training Session	
Therapist solicits questions/comments about playing/engaging, noticing/responding, taking turns, mirroring/mapping.	/1
Total	/51

Phase 2 (Modeling and Expanding Communication) Workshop Fidelity	
Introduction	
Therapist explains purpose of the session (e.g., informal discussion about the second set of intervention techniques), encourages the parent to ask questions at any time.	/1
Therapist gives the parent the handouts for the session.	/1
Therapist checks for clarification at least three times during the session. Tally:	/3
What is EMT?	
Therapist reviews that EMT is a set of tools to help facilitate a child's communication growth: 1. Setting up an interactive context between the parent and child 2. Noticing and responding to child communication; balancing turns 3. Modeling and expanding play 4. Modeling and expanding communication 5. Time delay strategies 6. Prompting strategies	/6
Therapist reviews that the parent has learned the first two strategies (setting up an interactive context, noticing and responding, balancing turns) and highlights the focus of workshop (modeling and expanding play and communication targets).	/1
Review of Goals	
Therapist reviews that throughout this intervention we will teach you a set of intervention strategies during each of these workshops. You have practiced the first two strategies for a few weeks in the clinic and at home. We measured how you used these strategies. Now that you have met the goal for the strategy, you will learn the next strategy. Your first two goals were matched turns and missed communication.	/1
Therapist inserts graph of matched turns for "before intervention" and i4 (short coded) and reviews how the parent has met the goal (e.g., that __ % of your turns were matched to your child).	/1
Therapist inserts graph of responsiveness for "before intervention" and i4 (short coded) and reviews how the parent has met the goal (e.g., that __ % of your child's communication to which you responded).	/1
Therapist discusses changes in child communication as a result of language strategies (e.g., increased engagement, increased communication)	/1
Play Goals	
Therapist explains play goals: 1. Extend the time [child's name] plays with a toy. 2. Expand the different action [child's name] does with the same toy. 3. Expands the types of different toys [child's name] uses.	/3
Therapist relates each goal to providing more opportunities for language learning.	/1
Why do we teach play?	
Therapist explains rationale for teaching play: 1. Linking words with engaging activities maximizes opportunities for teaching language. 2. Choosing toys that keep the child engaged. 3. Expanding play activities allows more language modeling and facilitates	/3

language learning.	
How to model new play actions?	
Therapist explains how to model new play: 1. Continue to follow [child's name]'s lead. 2. Set a new toy in sight or model new action & wait to see if [child] shows interest. 3. Do what [child's name] does and add a different action or object. 4. If [child's name] shows interest, model a new play action with the object. 5. Follow [child's name]'s lead and if [child's name] is not interested, try again later with a different object or action.	/5
Therapist directs parent to use the Workshop 2 worksheet while watch these clips.	/1
Therapist inserts video clip of the adult introducing a new object by setting it in sight, the child showing interest in the new toy, and the adult responding with target language.	/1
Therapist gives the guiding direction to watch the video to see what object the adult introduced, how the adult introduced the object, how the child responds.	/1
After watching the clip, the therapist asks: a. What object did the adult introduce? b. How did the adult introduce the object? c. How does the child respond?	/3
Therapist inserts video clip of the adult imitating the action and then adding an <u>action</u> that the child imitates and the adult maps new language.	/1
Therapist gives the guiding direction to watch the video to see what action the adult introduced, how the adult introduced the action and how the child responds.	/1
After watching the clip, the therapist asks: a. What action did the adult introduce? b. How did the adult introduce the action c. How does the child respond?	/3
Therapist highlights that by adding an action or object that is related to what the child is doing, makes it more likely that the child will imitate the action. When the child imitates the action, the adult is able to teach new language by mirroring and mapping.	/1
Using Routines in Play	
The therapist explains: 1. Routines are a predictable sequence that has a beginning, middle and end. 2. Children learn language during small routines during play because they know what actions (and words) will come next.	/2
Therapist provides at least two examples of play routines.	/2
Therapist illustrates a routine in the context of mirroring and mapping (e.g., doing one action, see if the child imitates, then adding the next action …)	/1
How are you playing?	
Therapist includes 1 video clip of adult modeling new actions while the child is engaged.	/2
Therapist gives the direction: watch the clip and notice how you many different things you did and said and how [child's name] responded.	/1

Therapist discusses with parent for the "modeling new action" clip: 1. How many different actions the adult did 2. How many different things adult said 3. How [child's name] responded	/3
Therapist includes 1 video clip of adult continuing to do same action while child is not engaged or when no new language is being introduced	/1
Therapist gives the direction: watch the clip and notice how you many different things you did and said and how [child's name] responded.	/1
Therapist discusses with parent for the "same action" clip: 1. How many different actions the adult did 2. How many different things adult said 3. How [child's name] responded 4. What could have been done to make the play more interesting	/4
Therapist makes the connection that the more actions you are do and the child imitates, the more language you are able to teach.	/1
When to model new play?	
Therapist explains when to model new play: 1. When the child is doing the same action with the same object 2. When child is doing an undesired action with the toy	/2
Let's Practice	
Therapist has already selected toys from toy room.	/1
Therapist uses play worksheet to help parent brainstorm play routines and how to expand play.	/1
Therapist guides parent to only complete the "play actions" portion of the play worksheet	/1
Language Goals	
Therapist connects play with language: 1. Now that we have a good foundation for language learning we are going to talk about what to say during play to teach [child's name] new language. 2. Before you focused on responding to [child name]'s communication in any way. Now we are going to focus on using specific language targets.	/2
Therapist explains language goals: 5. Increase the rate at which [child's name] communicates. 6. Increase the diversity of communication. 7. Increase [child's name]'s independence by increasing spontaneous communication and decreasing dependence on adult cues.	/3
Why model language?	
Therapist explains rationale for modeling language: 1. Children learn language through modeling. 2. Contingent modeling that is in response to a child's communication is the most powerful form of modeling because it's easier for the child understand and produce language that is related to what he is saying or doing. 3. Simplifying language to match [child's name]'s language targets helps child to learn language more quickly because it's easier to imitate and it's easier to understand.	/3

How to model language?	
Therapist explains that we pick targets based on the language [child's name] is already using and what [child's name] should learn next.	/1
Therapist discusses and circles [child's name]'s most common form of communication.	/1
Therapist explains that we will teach 1 level higher than [child's name]'s most common form.	/1
Types of target 1	
Therapist explains and provides examples of target 1.	/1
Therapist includes a table of target 1.	/1
Therapist says: "These are word that we have heard [child's name] say spontaneously (e.g. without adult support) during all of our observations. We know that [child's name] may have other words that he is not using as often or in this context."	/1
For 2 word targets: make the connection that all of these targets help children learn complete sentences (e.g., "dog eats" and "eat banana" becomes "dog eats banana."	/1
Asks if this feels right (e.g., matches what the parent sees at home).	/1
Types of target 2	
Therapist explains and provides examples of target 2.	/1
Therapist includes a table of target 2.	/1
Discuss the difference between action verbs and other verbs, noting how action verbs are easier to learn because they are more obvious to the child (can be relation to any target that contains action verbs).	/1
Types of target 3	
Therapists explains and provide examples of target 3.	/1
Therapist includes a table of target 3.	/1
Types of target 4 (if less than 4 targets, give all points for both items)	
Therapists explains and provide examples of target 4.	/1
Therapist includes a table of target 4.	/1
Types of target 5 (if less than 4 targets, give all points for both items)	
Therapists explains and provide examples of target 5.	/1
Therapist includes a table of target 5.	/1
[Child's Name]'s Targets	
Therapist explains that 50% of what parent says should be one of [child's name]'s targets:	/1
Therapist explains that 50% of what parent says should be slightly higher than [child's name]'s targets. 1. 1-2 words above his/her level 2. All words should be teaching words (nouns, verbs, modifiers)	/2
Therapist explains that by simplifying language, it is easier for the child to understand and produce. For example, if you are driving a car and you say "drive" it is more likely that your child will learn that drive means that we roll along the table than if you had said "we drive the car fast." The child may not understand which word (we, drive, car or fast) means rolling the car along the road.	/1
How are you modeling [child's name]'s targets?	

Therapist includes graph of percent target talk with a criteria line at 50%. Before is from i4 (short coded)	/1
Therapist explains that the goal for this strategy is 50%.	/1
When to model new language	
Therapist explains when to model new language: 1. After [child's name] communicates (expanding) 2. When you are doing the same action or have the same object as [child's name] 3. While taking communication turns	/3
Therapist includes examples at child's target level.	/1
Let's Practice	
Therapist guides parent to use play worksheet and add targets to clinic toy set. Therapists explains that now we are going to add language targets to the new play actions.	/1
Expanding Communication	
Therapist explains that: 1. An expansion is imitating what your child communicated and then adding more words. 2. The most powerful expansion includes one of your child's communication targets.	/2
Why expand communication?	
Therapist explains: 1. Expansions immediately connect the child's communication to additional new communication. 2. The more your child hears and practices language that is more complex, the better his/her language skills become. 3. Expansions help your child learn new vocabulary and talk in more complex sentences.	/3
How to expand communication?	
Therapist instructs parent to imitate child's communication and add target words.	/1
Therapist relates expansions to both verbal and nonverbal communication.	/1
Therapist explains that expansions immediately connect the child's communication to additional new language.	/1
Expanding Gestures	
Therapist explains how to expand: 1. Point/reach, 2. Show, 3. Give	/3
Therapist uses target level language when modeling expansions.	/1
Therapists explains that by imitating the gesture or taking/touching the object while labeling the word, you are making the word easier to understand and it more likely that [child's name] will learn this new word.	/1
Expanding Vocalizations	
Therapist explains how to expand: 1. Vocalizations referring to a specific word 2. Vocalizations not referring to a specific word	/2
Therapist uses target level language when modeling expansions.	/1

Therapist explains that the goal is to use language that replaces the non-verbal form of communication (What do you want [child's name] to say?).	/1
How are you expanding?	
Therapist includes graph of expansions with a criteria line at 50% (before is from i4, short coded).	/1
Therapist explains that the goal for this strategy is 50%.	/1
Therapist includes video that matches the segment chosen for the expansion worksheet.	/1
Therapist chooses a different segment than for the target worksheet.	/1
Therapist inserts child and adult actions/communication in the first two columns of the target worksheet.	/1
Therapist explains expansion worksheet: 1. Purpose is to review the expansions you used in a recent session. 2. Did you use an expansion? 3. If you didn't, what expansion could you have used?	/3
Therapist does first line of expansion worksheet with parent.	/1
When to expand communication?	
Therapist explains that the parent should expand whenever the child communicates by adding 1 to 2 words.	/1
Let's Practice	
Therapist directs the parent to the workshop 2 handout and gives the direction to look at each line to see what you said. Determine if it's a target and an expansion. If not, what could you have said.	/1
Therapist does first line together with the parent.	/1
Let's Review	
Therapist reviews major concepts: 1. Do what [child's name] does. 2. Model new play actions. 3. Model new target language with these actions (nouns, action verbs, protoverbs, requests OR agent-action, action-object, modifier-noun, noun/verb-locative, 2 word requests). 4. Expand [child's name]'s communication with target words.	/4
Questions?	
Therapist confirms date and time of next appointment.	/1
Therapist asks parent if they have any questions.	/1
Total	/134

Phase 2 (Modeling and Expanding Communication) **Clinic Fidelity**	
Initial Parent Training Session	
Therapist reviews the 3 strategies: 1. Model and expand play. 2. Model all of the child's language targets (list child's targets). 3. Expand all of the child's communication by adding 1-2 words.	/3
Therapist and parent discuss how to play with the toys: 1. At least 2 ways to expand play 2. At least 2 mini routines with the play (e.g., have beginning, middle and end)	/4
Therapist reviews the child's targets (4 or 5 targets) and gives examples of each target. 1. Says <u>each</u> target (4 points) 2. Gives an example of <u>each</u> target (4 points)	/8
Therapist reviews types of expansion: Every time your child communicates we're going to add <u>1-2 words</u>. 1. Vocalization: respond with a target (e.g., what you would want him to say) 2. Gestures: imitate the gesture and then add a target (e.g., what you would want him to say). 3. Words: imitate the word and add a word. Words can come before or after the child's word. (e.g, eat → cow eats OR eat apple).	/3
Therapist practices 1 gesture and 1 word expansion with parent.	/2
Therapist reviews coaching plan with parent (e.g., what and how to coach).	/1
Therapist checks for understanding and invites parent questions before the session.	/1
Therapist Practice Session	
Therapist highlights modeling and expanding play at least 2 times.	/2
Therapist highlights targets at least 2 times.	/2
Therapist highlights expansions at least 2 times.	/2
Session lasts for 15 minutes	/1
Parent Practice Session	
Therapist gives parent positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Ending Parent Training Session	
At the end of the session the therapist asks the parent how he/she felt the session went.	/1
Therapist summarizes how the parent modeled and/or expanded communication and/or play.	/1
Therapist relates the parent's behavior and child's behavior during the practice session at least once.	/1
Total	/48

Phase 2 (Modeling and Expanding Communication) Home Fidelity	
Initial Parent Training Session	
Therapist asks the parent how intervention has been going at home.	/1
Therapist reviews the 3 strategies: 1. Model and expand play. 2. Model all of the child's language targets (list child's targets). 3. Expand all of the child's communication by adding 1-2 words.	/3
Therapist checks for understanding and invites parent questions before the session.	/1
Therapist Practice Session: Play	
Therapist highlights modeling and expanding play at least 2 times.	/2
Therapist highlights modeling targets at least 2 times.	/2
Therapist highlights expanding communication at least 2 times.	/2
Session lasts for 15 minutes and occurred before the parent play session.	/2
Parent Practice Session: Play	
Therapist gives parent positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Therapist summarizes how the parent modeled and/or expanded communication and/or play.	/1
Therapist related the parent behavior to child behavior.	/1
Parent Practice Session: Snack	
Therapist attempts to do snack with the parent and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon snack.	/1
Therapist gives parent positive or training feedback at least once per minute. Score 5 if abandoned when appropriate	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate	/1
Therapist summarizes how the parent modeled and/or expanded communication.	/1
Therapist related the parent behavior to child behavior.	/1
Parent Practice Session: Book	
Therapist attempts to do book with the parent and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon the book.	/1
Therapist gives parent positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate	/1
Therapist summarizes how the parent modeled and/or expanded communication.	/1
Therapist related the parent behavior to child behavior.	/1
Ending Parent Training Session	
Therapist solicits questions/comments about modeling and expanding play and language.	/1
Total	/50

Phase 3 (Time Delay Strategies) Workshop Fidelity	
Introduction	
Therapist explains purpose of the session (e.g., informal discussion about the third set of intervention techniques), encourages the caregiver to ask questions at any time.	/1
Therapist gives the parent the handouts for the session.	/1
Therapist checks for clarification at least three times during the session. Tally:	/3
What is EMT?	
Therapist reviews that EMT is a set of tools to help facilitate a child's communication growth: 7. Setting up an interactive context between the parent and child 8. Noticing and responding to child communication; balancing turns 9. Modeling and expanding play 10. Modeling and expanding communication 11. Time delay strategies 12. Prompting strategies	/6
Therapist highlights the focus of workshop (using TD Strategies)	/1
Review of Goals	
Therapist reviews that that throughout this intervention we will teach you a set of intervention strategies during each of these workshops. You have practiced the second two strategies for a few weeks in the clinic and at home. We measured how you used these strategies. Now that you have met the goal for the strategy, you will learn the next strategy. Your second two goals were target talk and expansions.	/1
Therapist inserts graph of targets for i4 and i11 (short coded) and reviews how the parent has met the goal, explaining the variables.	/1
Therapist inserts graph of expansions for i4 and i11 (short coded) and reviews how the parent has met the goal, explaining the variables.	/1
Therapist discusses changes in child communication as a result of language strategies (e.g., increased engagement, increased communication)	/1
What are TD Strategies?	
Therapist explains that TD Strategies are non-verbal tasks that encourage child to communicate	/1
TD Strategy 1: Inadequate Portions	
Therapist defines inadequate portions – providing small or inadequate portions of preferred materials	/1
Therapist includes video clip of inadequate portions	/1
Therapist gives direction: Watch this clip and notice what [therapist name] does to elicit [child name] communication. Notice how [child name] responds to this strategy. What target does the adult use to expand this communication?	/1
Therapist discusses clip with adult and asks: 1. What does [therapist name] do to elicit communication? 2. How does the child respond to this strategy?	/3

3. What target does the adult use to expand the child's communication?	
Therapist discusses 3 examples of inadequate portions.	/3
Therapist and adult practice at least 1 inadequate portions strategy	/1
TD Strategy 2: Assistance	
Therapist defines assistance – creating situations in which the child needs the adult's help	/1
Therapist includes video clip of assistance	/1
Therapist gives direction: Watch this clip and notice what [therapist name] does to elicit [child name] communication. Notice how [child name] responds to this strategy. What target does the adult use to expand this communication?	/1
Therapist discusses clip with adult and asks: 1. What does [therapist name] do to elicit communication? 2. How does the child respond to this strategy? 3. What target does the adult use to expand the child's communication?	/3
Therapist discusses 3 examples of assistance.	/3
Therapist and adult practice at least 1 assistance strategy	/1
TD Strategy 3: Waiting with Routine	
Therapist defines waiting routine – setting up a routine in which the child expects certain actions and then waiting before doing the expected action	/1
Therapist includes video clip of waiting expectantly	/1
Therapist gives direction: Watch this clip and notice what [therapist name] does to elicit [child name] communication. Notice how [child name] responds to this strategy. What target does the adult use to expand this communication?	/1
Therapist discusses clip with adult and asks: 1. What does [therapist name] do to elicit communication? 2. How does the child respond to this strategy? 3. What target does the adult use to expand the child's communication?	/3
Therapist discusses 3 examples of waiting expectantly.	/3
Therapist and adult practice at least 1 waiting expectantly strategy	/1
TD Strategy 4: Waiting with Cue	
Therapist defines waiting with cue – using associated objects (e.g., shoe to foot) and then waiting before completing the expected action.	/1
Therapist includes video clip of waiting expectantly	/1
Therapist gives direction: Watch this clip and notice what [therapist name] does to elicit [child name] communication. Notice how [child name] responds to this strategy. What target does the adult use to expand this communication?	/1
Therapist discusses clip with adult and asks: 1. What does [therapist name] do to elicit communication? 2. How does the child respond to this strategy? 3. What target does the adult use to expand the child's communication?	/3
Therapist discusses 3 examples of waiting expectantly.	/3
Therapist and adult practice at least 1 waiting expectantly strategy	/1
TD Strategy 5: Choice Making	
Therapist defines choice making – the adult holds up two objects and waits for	/1

the child to communicate about which item he/she wants	
Therapist includes video clip of choice making	/1
Therapist gives direction: Watch this clip and notice what [therapist name] does to elicit [child name] communication. Notice how [child name] responds to this strategy. What target does the adult use to expand this communication?	/1
Therapist discusses clip with adult and asks: 1. What does [therapist name] do to elicit communication? 2. How does the child respond to this strategy? 3. What target does the adult use to expand the child's communication?	/3
Therapist discusses 3 examples of choice making.	/3
Therapist and adult practice at least 1 choice making strategy	/1
Why use TD Strategies?	
Therapist explains why to us TD Strategies: 1. Provide your child with more opportunities to practice communicating 2. Provide you with more opportunities to reinforce and teach new language by responding and expanding child communication	/2
How to use TD Strategies?	
Therapist explains how to use TD Strategies: 1. Set up the opportunity to encourage your child to communicate using a time delay strategy. 2. Wait until your child communicates (gestures, vocalizes, says a word). 3. Expand this communication with a target	/3
When to use TD Strategies?	
Therapist explains to use TD Strategies when the child is not communicating frequently (e.g. less than 2 times per minute)	/1
Therapist explains: 1. Some strategies work better than others for different children 2. Use the TD strategies that work best for the child 3. Avoid the TD strategies that frustrate the child	/3
Therapist discusses with the parent 1. Which strategies they think will be the most effective for the child 2. Which strategies they think will be the least effective for the child	/2
Let's Review	
Therapist reviews major concepts: 1. Use TD Strategies to set up an opportunity for child to communicate when he/she is not communicating at a high rate 2. TD Strategies 3. Expand child communication to include a target	/7
Goals	
Therapist reviews the TD goal (80% of the TD strategies used correctly).	/1
Questions?	
Therapist confirms date and time of next appointment.	/1
Therapist asks caregiver if they have any questions.	/1
Total	/88

Phase 3 (Time Delay Strategies) **Clinic Fidelity**	
Initial Caregiver Training Session	
Therapist reviews all 5 time delay strategies: 1. Inadequate portions 2. Assistance 3. Waiting with routine 4. Waiting with cue 5. Choice making	/5
Therapist discusses with the parent about which strategies would be best for the child given the set of toys.	/1
Therapist and parent role play at least 3 TD strategies.	/3
Therapist and parent discuss at least 3 novel ways to play with the toys.	/3
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session	
Therapist highlights TD strategies at least 3 times.	/3
Therapist highlights previous strategies at least 3 times.	/3
Session lasts for 15 minutes	/1
Caregiver Practice Session	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Ending Caregiver Training Session	
At the end of the session the therapist asks the caregiver how he/she felt the session went.	/1
Therapist relates the caregiver's behavior and child's behavior during the practice session at least once.	/1
Therapist summarizes how the caregiver used TD strategies.	/1
Total	/40

Phase 3 (Time Delay Strategies) **Home Fidelity**	
Initial Caregiver Training Session	
Therapist asks the caregiver how intervention has been going at home.	/1
Therapist reviews all 5 time delay strategies: 1. Inadequate portions 2. Assistance 3. Waiting with routine 4. Waiting with cue 5. Choice making	/5
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session: Play	
Therapist highlights TD strategies at least 3 times.	/3
Therapist highlights previous strategies at least 3 times.	/3
Session lasts for 15 minutes and occurred before the caregiver play session.	/2
Caregiver Practice Session: Play	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes	/1
Therapist summarizes how the caregiver used TD strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Snack	
Therapist attempts to do snack with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon snack.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate	/1
Therapist summarizes how the caregiver used TD strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Book	
Therapist attempts to do book with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon book.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate	/1
Therapist summarizes how the caregiver used TD strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Ending Caregiver Training Session	
Therapist solicits questions/comments about TD strategies.	/1
Total	/52

Phase 4 (Prompting Strategies) **Workshop Fidelity**	
Introduction	
Therapist explains purpose of the session (e.g., informal discussion about the fourth set of intervention techniques), encourages the caregiver to ask questions at any time.	/1
Therapist gives the parent the handouts for the session.	/1
Therapist checks for clarification at least three times during the session. Tally:	/3
What is EMT?	
Therapist reviews that EMT is a set of tools 1. Setting up an interactive context between the parent and child 2. Noticing and responding to child communication; balancing turns 3. Modeling and expanding play 4. Modeling and expanding communication 5. Time delay strategies 6. Prompting strategies	/6
Therapist highlights the focus of workshop (prompting language)	/1
Review of Goals	
Therapist reviews that throughout this intervention we will teach you a set of intervention strategies during each of these workshops. You have practiced TD strategies for a few weeks in the clinic and at home. We measured how you used this strategy. Now that you have met the goal for TD, you will learn the next strategy.	/1
Therapist inserts graph of targets for i11 and i14 (short coded) and reviews how the parent has met the goal.	/1
Therapist discusses changes in child communication as a result of language strategies (e.g., increased engagement, increased communication)	/1
What is a prompt?	
Therapist explains that a prompt is a signal to the child to do or say something	/1
Therapist explains that there are 4 types of language prompts	/4
Time Delay	
Therapist defines time delay: an overt non-verbal cue for the child to use language	/1
Therapist explains time delay procedures (e.g. the adult uses an expectant look and waits for the child to verbalize before performing the expected action or giving the child a desired object)	/1
Therapist explains that you may choose to model the target or prompt the target following a time delay.	/1
Therapist explains that time delay offers the least language support	/1
Therapist includes video example of time delay	/1
Therapist discusses clip with adult	/1
Open Question	
Therapist defines open prompt: a question without a single correct answer	/1
Therapist explains that open prompts offer a little more support by verbally cueing the child to verbalize her or her requests	/1
Therapist lists examples of open prompts.	/1
Therapist includes video example of open prompt.	/1

Therapist discusses clip with adult	/1
Choice Question	
Therapist defines choice prompt: a prompt that gives a choice	/1
Therapist explains that choice prompts offer even more support by including the answer in the prompt	/1
Therapist lists examples of choice prompts.	/1
Therapist includes video example of choice prompts.	/1
Therapist discusses clip with adult	/1
SAY Prompt	
Therapist defines SAY prompt: the adult tells the child exactly what to say	/1
Therapist explains that the SAY prompt offers the most adult support because it tells the child exactly what to say	/1
Therapist includes video of SAY prompt	/1
Therapist discusses clip with adult	/1
What to Prompt?	
Therapist explains that the adult should prompt the child's communication targets	/1
Therapist reviews the child's communication targets	/1
Why Prompt Language?	
Therapist explains that prompting gives the child an opportunity to practice communication targets during a highly motivating and salient context	/1
Therapist explains that prompting gives the child functional practice and reinforcement for communication	/1
How to Prompt Language? (1)	
Therapist instructs adult to: 1. Wait for a child request or 2. Use one of the 5 time delay strategies to elicit a request.	/2
How to Prompt Language: Choice Question (1)	
Therapist explains the second prompting sequence option: 1. Use the choice TD strategy (hold up 2 items). 2. Wait for the child to respond (if no response, abandon the prompt since ___ isn't interested, but don't give either choices) 3. If the child does not use a target, say " ____ or _____" 4. If the child still doesn't say the target, give SAY prompt up to 2 times if the child doesn't use a target.	/4
How to Prompt Language: Choice Question (2)	
Therapist reviews flow chart handout with parent.	/1
Therapist inserts clip of choice prompting sequence in which the adult sets up the request using the choice making TD strategy.	/1
Therapist gives the guiding direction to follow along with the flow chart handout and stops the video after every adult and child response so that the adult can follow along.	/1
How to Prompt Language: Open Question (1)	
Therapist explains the first prompting sequence option: 1. Wait for the request or use an TD strategy (all but choice) to get a request 2. Say "Tell me what you want?" or "What do you want?"	/5

3. Wait for [child's name] to respond or wait 5 seconds if no response. 4. If [child's name] does not use a target, say "say ____" 5. Give SAY prompt up to 2 times if [child's name] doesn't use a target	
How to Prompt Language: Open Question (2)	
Therapist reviews flow chart handout with parent.	/1
Therapist inserts clip of open prompting sequence in which the child requests spontaneously.	/1
Therapist gives the guiding direction to follow along with the flow chart handout and stops the video after every adult and child response so that the adult can follow along.	/1
Therapist inserts clip of open prompting sequence in which the adult sets up the request using a TD strategy other than choice.	/1
Therapist gives the guiding direction to follow along with the flow chart handout and stops the video after every adult and child response so that the adult can follow along.	/1
How to Prompt Language	
Therapist explains to: 1. Stop prompting after [child's name] says exactly what you wanted him to say. 2. Give [child's name] enough time to response (5 seconds) before giving another prompt. 3. End each prompting episode by giving [child's name] the requested object or action. 4. After [child's name] has said what you wanted him to say or you have given two SAY prompts • Expand if [child's name] says the target • Repeat if [child's name] does not say the target	/4
When to Prompt Language	
Therapist explains when to use prompting: 1. Only when the child is requesting 2. Only as one of many tools (not the only tool) of EMT 3. Not more than 3 times per 15 minute session (too many demands may cause frustration)	/3
Let's Practice	
Therapist utilizes toys to practice the prompting sequence with the adult at least 4 times (2 times with each sequence type)	/4
Let's Review	
Therapist reviews major concepts: 1. Prompt the child's communication targets when he or she is requesting 2. Use the prompting strategies that best fit the child 3. Use prompting sparingly so the child does not become frustrated	/3
Goals	
Therapist reviews the prompting goal (80%)	/1
Questions?	
Therapist confirms date and time of next appointment.	/1
Therapist asks caregiver if they have any questions.	/1
Total	/81

Phase 4 (Prompting Strategies) **Clinic Fidelity**	
Initial Caregiver Training Session	
Therapist reviews the 2 prompting sequence options briefly 5. Choice prompt 6. Open prompt to request or set up using other TD strategies except for choice.	/2
Therapist reviews when to prompt language 1. Only when the child is requesting 2. Only as one of many tools (not the only tool) 3. No more than 2 or 3 times per session	/3
Therapist and parent discuss at least 3 novel ways to play with the toys.	/3
Therapist & caregiver role play the 2 different prompting sequences	/2
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session	
Therapist highlights prompting at least 3 times.	/3
Therapist highlights previous strategies at least 3 times.	/3
Session lasts for 15 minutes	/1
Caregiver Practice Session	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Ending Caregiver Training Session	
At the end of the session the therapist asks the caregiver how he/she felt the session went.	/1
Therapist summarizes how the caregiver used prompting strategies.	/1
Therapist relates the caregiver's behavior and child's behavior during the practice session at least once.	/1
Total	/37

Phase 4 (Prompting Strategies) **Home Fidelity**	
Initial Caregiver Training Session	
Therapist asks the caregiver how intervention has been going at home.	/1
Therapist reviews the 2 types of prompts briefly 1. Choice prompt 2. Open prompt to request or set up using other TD strategies except for choice.	/2
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session: Play	
Therapist highlights prompting strategies at least 3 times.	/3
Therapist highlights previous strategies at least 3 times.	/3
Session lasts for 15 minutes and occurred before the caregiver play session.	/2
Caregiver Practice Session: Play	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes	/1
Therapist summarizes how the caregiver used prompting strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Snack	
Therapist attempts to do snack with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon snack.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate.	/1
Therapist summarizes how the caregiver used prompting strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Book	
Therapist attempts to do book with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon book.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate	/1
Therapist summarizes how the caregiver used prompting strategies or other strategy if prompting wasn't used.	/1
Therapist related the caregiver behavior to child behavior.	/1
Ending Caregiver Training Session	
Therapist solicits questions/comments about prompting strategies.	/1
Total	/49

Phase 5 (All EMT Strategies) **Clinic Fidelity**	
Initial Caregiver Training Session	
Therapist reviews the 4 components of EMT and the goal of using all of the strategies 1. Play and Engage, noticing and respond, taking turns (including mirroring and mapping) – all the time. 2. Model and expand play and communication – all the time 3. Use TD strategies – when child is not communicating 4. Use prompting strategies – when child is requesting and not using a target.	/4
Therapist and parent discuss at least 3 novel ways to play with the toys.	/3
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session	
Therapist highlights previous strategies at least 6 times.	/6
Session lasts for 15 minutes	/1
Caregiver Practice Session	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes.	/1
Ending Caregiver Training Session	
At the end of the session the therapist asks the caregiver how he/she felt the session went.	/1
Therapist summarizes how the caregiver used EMT strategies.	/1
Therapist relates the caregiver's behavior and child's behavior during the practice session at least once.	/1
Total	/34

Phase 5 (All EMT Strategies) **Home Fidelity**	
Initial Caregiver Training Session	
Therapist asks the caregiver how intervention has been going at home.	/1
Therapist reviews the 4 components of EMT and the goal of using all of the strategies 1. Play and Engage, noticing and respond, taking turns (including mirroring and mapping) – all the time. 2. Model and expand play and communication – all the time 3. Use TD strategies – when child is not communicating 4. Use prompting strategies – when child is requesting and not using a target.	/4
Therapist checks for understanding and invites caregiver questions before the session.	/1
Therapist Practice Session: Play	
Therapist highlights previous strategies at least 6 times.	/6
Session lasts for 15 minutes and occurred before the caregiver play session.	/2
Caregiver Practice Session: Play	
Therapist gives caregiver positive or training feedback at least once per minute.	/15
Session lasts for 15 minutes	/1
Therapist summarizes how the caregiver used EMT strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Snack	
Therapist attempts to do snack with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon snack.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate.	/1
Therapist summarizes how the caregiver used EMT strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Caregiver Practice Session: Book	
Therapist attempts to do book with the caregiver and child. If the child protests for more than 30 – 60 seconds and is visibly distressed, they can abandon book.	/1
Therapist gives caregiver positive or training feedback at least once per minute. Score 5 if abandoned when appropriate.	/5
Session lasts for 5 minutes. Score 1 if abandoned when appropriate.	/1
Therapist summarizes how the caregiver used EMT strategies.	/1
Therapist related the caregiver behavior to child behavior.	/1
Ending Caregiver Training Session	
Therapist solicits questions/comments about prompting strategies.	/1
Total	/51