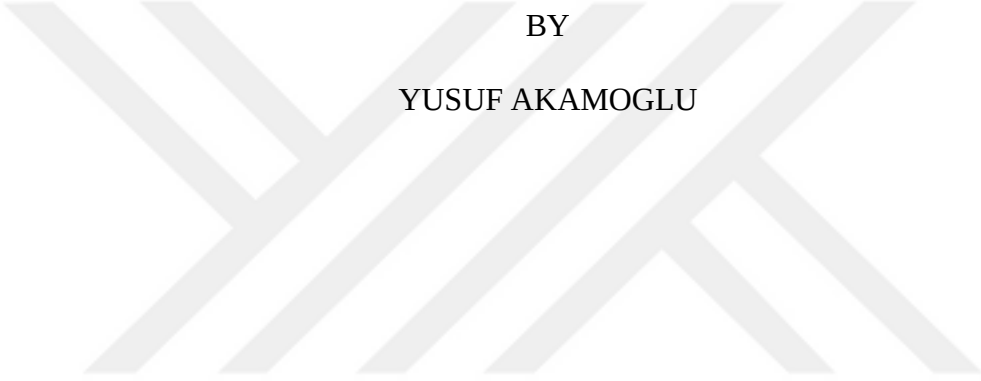


STORYBOOK READING WITH YOUNG CHILDREN WITH AUTISM:
A PARENT-IMPLEMENTED COMMUNICATION INTERVENTION



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DISSERTATION

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ABSTRACT

Children with autism spectrum disorder (ASD) may experience delays in their ability to speak and communicate with their parents, peers, and others. These children often benefit from evidence-based, parent-implemented communication interventions. One parent was trained and coached to use evidenced-based naturalistic communication teaching strategies (i.e., modeling, mand-model, and time delay) and storybook reading techniques while reading books with her child with ASD. Using a multiple-baseline design across naturalistic teaching strategies, the following three study components were examined, (a) the parent's use of book reading techniques, (b) the parent's rate and fidelity (quality) in using of the three naturalistic teaching strategies, and (c) perceptions of the parent and other adults (college students and practitioners) about the social validity of the goals, procedures, and outcomes of the intervention. The entire intervention period lasted 10 weeks. After training and coaching, the parent used the modeling, mand-model, and time delay strategies with higher rates and higher fidelity. The child initiated more communicative acts upon the parent's use of time delay and increased her number of single-word responses. The parent believed that the intervention strategies supported her and led to improvements in her child's communication skills. Adult raters evaluated intervention video clips significantly higher than baseline video clips on aspects of parent-child social engagement, child language, and the parent's ability to facilitate the child's communication.

Keywords: parent-implemented intervention, training and coaching, social-communication skills, naturalistic, storybook reading, intervention

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*This dissertation is dedicated to Bedi Akamoglu whose memory will always inspire me.
Ruhun şad olsun... Seni özliyoruz...*

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CHAPTER 1

INTRODUCTION

Development of language and communication is a complex process that begins very early in life. In general, children who develop typically (without delays and/or disabilities) acquire language and develop communication skills seamlessly over time, whereas many children with developmental delays or disabilities go through a similar process at a slower pace. Throughout this paper, the term *developmental disability/delay* (DD) is used to refer to children who have language delays, global developmental delays, and are at risk for developmental delays and/or developmental disabilities (e.g., autism spectrum disorder [ASD], Down syndrome [DS]) that impact overall language development and communication skills (Centers for Disease Control and Prevention, 2015).

Children with DD typically experience delays and deficits in their language development and communication skills that benefit from evidence-based interventions (Akamoglu, Meadan, & Burke, 2016). According to a systematic review conducted by the United States (U.S) Preventive Services Task Force (2006), speech and language delays are the most prevalent disabilities that affect about 1 in 12 children who are between 2-5 years of age.

Children with DD who develop speech (i.e., spoken language) also can have difficulty in their ability to communicate. A child's difficulty in communicating effectively has an impact on his or her social-communication skills which are associated with social interaction and expression problems, and learning and behavior problems in everyday contexts, including the home (Warren, 2000). Therefore, social-communication skills are essential during early language development because they provide children with opportunities to socially interact with peers and adults in meaningful and functional daily contexts (Kashinath, Woods, & Goldstein,

2006). Children begin to engage in social communication through pre-language communicative interactions involving nonverbal initiations and responses such as eye gaze and joint attention (e.g., a child notices an adult looking at a book and looks *with the adult* at the book), gestures (e.g., pointing, reaching), and facial expressions (e.g., smiling, frowning) (Yoder & Warren, 2002).

Social-communication skills, including making eye contact, imitating, being responsive, initiating and maintaining communication, and eventually, engaging in conversations (Beckman & Leiber, 1994; Kaczmarek, 2002), are often considered some of the most important accomplishments of communication development during the early years (Carpenter, Nagell, & Tomasello, 1998). Teaching communication skills at early ages can lead to positive outcomes in social interaction skills for children with DD (Akamoglu et al., 2016; Koegel, 2000). Children with DD who receive early intervention that incorporates supportive teaching strategies within natural environments (e.g., homes, preschool) are likely to make substantial gains that impact functional development throughout the lifespan (Wetherby, Watt, Morgan, & Shumway, 2007).

Researchers have found that providing early communication and language interventions to children with DD can be effective, particularly when the interventions occur early in life, have a strong empirical base (Wong et al., 2014), and take place in natural and inclusive settings (Hemmeter & Kaiser, 1994; Odom & Wolery, 2003). One way to utilize these interventions is to teach parents to implement the teaching strategies (i.e., parent-implemented interventions) (Meadan et al., 2016). One intervention program, PiCS (*Parent-Implemented Communication Strategies*; Meadan, Stoner, Angell, & Daczewitz, 2014) has been found to be an effective coaching program to teach parents to use specific naturalistic communication teaching strategies (NT strategies) such as environmental arrangement, modeling, mand-model, and time delay.

These NT strategies have been used by many other researchers in the literature and they are referred to as PiCS strategies in this study. The PiCS strategies differ than other NT packages in the way they are presented and taught to parents. Parents learn the use of these strategies via modules (e.g., modeling or time delay module) and are coached to use them with high fidelity (quality). The PiCS program was found to be promising when it was implemented face-to-face, in person (Meadan et al., 2014a) and via telepractice (*Internet-based Parent-Implemented Communication Strategies*; i-PiCS; Chung, Snodgrass, Meadan, Akamoglu, & Halle, 2016; Meadan et al., 2016). The systematic use of coaching strategies along with individualized support for parents and targeted communication goals for children with DD make this program particularly applicable during typical daily routines.

One routine, shared storybook reading, is a naturalistic routine and social activity in which parents can promote cognitive, social engagement, and language and communication skills that match their children's growing abilities (Fleury & Schwartz, 2016; Whalon, Martinez, Shannon, Butcher, & Hanline, 2015; Zimmer, 2015). Shared storybook reading is a broad term used to describe the act of adults reading aloud to children, while encouraging interaction by asking questions or engaging in a discussion about the book (Ezell & Justice, 2005; Zimmer, 2015). Examples of shared storybook reading methods include dialogic reading (Whitehurst et al., 1994; Whitehurst & Lonigan, 1998) and interactive shared book reading (Justice & Ezell, 2002) (refer to Chapter 2 for a description of these methods). Shared storybook reading is designed to engage the child through interaction with the adult around the shared book, thus improving the language skills of children (Whitehurst et al., 1988; Ziolkowski & Goldstein, 2008). Some parents expose their children to shared storybook reading in the first few months of life and in most middle-class homes parents begin reading to their children by the time they are

six months old (Catts, Fey, Tomblin, & Zhang, 2002). However, delays and challenges in language, social communication, and interaction may interfere with a child's ability to engage in and benefit from shared storybook reading. Some of these challenges include making a comment, responding, requesting, joint attention, and reciprocal interactions, which are important for children to fully participate in and learn from shared storybook reading (Ezell & Justice, 2005). To overcome these challenges, interventions that center around shared storybook reading have been designed. These interventions have been found to positively affect the participation of children with DD in shared storybook reading and their communication and language skills (Fleury & Schwartz, 2016; Towson, Gallagher, & Bingham, 2016; What Works Clearinghouse [WWC], 2015). For example, during a shared storybook reading activity, toddlers can learn to turn the pages in a book or identify new vocabulary words, whereas preschoolers might learn to make inferences (e.g., "How do you think this boy feels?") or predictions (e.g., "Where do you think he will go next?"). In addition, an adult can intentionally support a child's abilities by building upon skills the child already has achieved as well as encouraging the child to learn new skills (e.g., labeling objects, commenting on the story). In other words, shared storybook reading is an interactive context which adults can employ to further develop children's social-communication skills.

Because shared storybook reading can be a daily routine, parents may be able to use book reading as a regular opportunity to embed naturalistic communication teaching strategies (NT strategies). For example, allowing children to choose books gives parents an opportunity to teach new skills (pointing, labeling, etc.). Also, choice making increases the chances that the parent will capture the child's attention and motivate him or her to produce a target behavior. Once a child shows an interest in a book or illustration on a page, the parent could follow the

child's lead by responding to any verbal (e.g., child says "train") or nonverbal initiations (e.g., pointing) made by the child. The parent also could give the child feedback and expand on his or her utterances (e.g., "Yes, it is a big train"). For many children, simply engaging in responsive interactions within a book activity may result in the successful demonstration of target verbal or nonverbal behavior (Fleury & Schwartz, 2016).

However, for many children with DD, it is necessary to use strategies that provide additional supports to facilitate the use of verbal and nonverbal communication during shared storybook reading. If the child fails to initiate comments or other verbal and nonverbal behaviors during book reading, alternative or additional strategies (e.g., NT strategies), based on applied behavior analysis techniques, can be used to prompt and reinforce target behaviors. Also, while reading books with children with DD, it may be necessary to use additional book reading techniques to promote children's engagement and participation. These techniques can help refocus children's attention on the book, provide feedback about their comments, and give them opportunities to connect the stories to their own lives (CONNECT, 2011; Ezell & Justice, 2005; Whitehurst et al., 1994).

To date, shared storybook reading has received little attention as a potential parent-implemented social-communication intervention context. Shared storybook reading is a promising context for teaching parents how to implement specific NT strategies to increase the language and social communication of young children with DD. Therefore, the purpose of the present study was to examine the effect of parent training and coaching on a parent's use of reading techniques and three PiCS strategies (modeling, mand-model, and time delay) during storybook reading. In the next chapter, the conceptual and theoretical framework along with the rationale and purpose of the current study are described.

CHAPTER 2

LITERATURE REVIEW

This chapter includes a synthesis of the currently available evidence on the effectiveness of home-based, parent-implemented language and communication interventions for young children with DD. The chapter is organized into six major sections: (a) naturalistic communication teaching (NT) strategies, (b) parent-implemented naturalistic communication interventions, (c) descriptions of the targeted NT (PiCS) strategies, (d) shared storybook reading interventions, (e) social validity, and (f) theoretical and conceptual framework.

Naturalistic Communication Teaching Strategies

Evidence-based communication strategies are practices that have the potential to improve the social communication skills of children with DD. One of the identified evidence-based communication strategies is naturalistic teaching (Wong et al., 2014). A primary goal of naturalistic teaching with children who have communication difficulties is to increase their use of functional communication in natural contexts (Kaiser & Grim, 2006). For children with DD, increasing their functional communication should occur within the context of everyday situations and settings, particularly within “interactive, meaningful exchanges with others” to facilitate the development of useful social-communication skills (Schreibman et al., 2015).

NT strategies are based on the use of naturally occurring learning opportunities that promote a child’s language and/or communication skills based on his or her interest and focus of attention. Moore, Barton, and Chironis (2014) described the common features of NT strategies as “using direct and natural reinforcement, focusing on functional skills, using a variety of materials, and following the child’s interest and lead” (p. 3). The NT strategies are used to: (a) provide the child with verbal and nonverbal language input, (b) enhance the child’s motivation to

communicate, (c) increase the child's engagement in play-based and/or activity-based interactions, and (d) provide the child with opportunities to respond to situations that the adults create (Pretti-Frontczak & Bricker, 2004; Wetherby & Woods, 2006).

A variety of intervention approaches have been developed to teach parents NT strategies. Some examples of these include enhanced milieu teaching (EMT; Kaiser, Hester, Alpert, & Whiteman, 1994), Early Start Denver Model (ESDM; Rogers & Dawson, 2010), incidental teaching (McGee, Morrier & Daly, 1999), language and play everyday (LAPE; Moore et al., 2014), PiCS (Meadan et al., 2014a), i-PiCS (Meadan et al., 2016), pivotal response teaching (PRT; Koegel & Koegel, 2006), and reciprocal imitation training (RIT; Ingersoll, 2010), among others. These models or approaches have some procedural differences but are based on “well-established principles of applied behavior analysis” (Schreibman et al., 2015, p. 2417). To address the similarities of these approaches and the common goals they have for children and families, researchers proposed creating a blended classification (definition) for these approaches and called it *naturalistic developmental behavioral interventions* (NDBIs) (Schreibman et al., 2015). In their seminal article, Schreibman and her colleagues outlined the foundations of NT interventions. Common features of NDBIs include the three-part contingency; manualized practice, fidelity criteria, individualized intervention (treatment) goals, ongoing progress monitoring, child-initiated teaching opportunities, considerations of the environmental arrangement, natural reinforcement, prompting and prompt fading techniques, balanced turns within objects and social routines, modeling, adult imitations of child behavior, and broadening the attentional focus of the child (Schreibman et al., 2015).

The effectiveness of NT strategies (NDBIs is a broader term but “NT” is used throughout the manuscript to maintain consistency) has been documented in the literature for children with

DD including children with language delays, ASD, and DS for increasing a variety of language and social-communicative skills. These skills include speech production (McDuffie et al., 2013; Roberts & Kaiser, 2012), responses to parents' questions and mands (requests) (Meadan et al., 2014a; Mobayed, Collins, Strangis, Schuster, & Hemmeter, 2000; Roberts et al., 2014), spontaneous use of targeted words (Kaiser, Hancock, & Nietfeld, 2000), intentional communication (McCathren, 2010), single and multi-word utterances (Brown & Woods, 2015; Kashinath, Woods, & Goldstein, 2006; Roberts, Kaiser, Wolfe, Bryant, & Spidalieri, 2014; Woods, Kashinath, & Goldstein, 2004), vocalizations (Gillett & LeBlanc, 2007), and mean length of utterance (MLU) (Kaiser et. al., 2000; Peterson, Carta, & Greenwood, 2005). A growing body of literature suggests that parents can be taught to use NT strategies to improve the social-communicative skills of their children. In the next section, the literature around parent-implemented language and communication interventions is described and synthesized.

Parent-Implemented Naturalistic Communication Interventions

One mechanism for supporting parents while targeting specific developmental domains or skills such as language and communication for the child, is to provide a parent education program that helps parents implement specific strategies with their children throughout their daily routines. Some parent education programs, referred to as parent-implemented intervention programs, focus on teaching the parent to be the primary implementer of the intervention. These intervention programs provide parents with opportunities to collaborate with professionals and actively participate in the design and implementation of their child's intervention that include parents' identified concerns, priorities, and resources.

In parent-implemented interventions, parents learn to use specific strategies from a therapist or researcher and they are taught to integrate evidence-based strategies into their daily

routines to promote and maximize the progress of their young child with DD and increase parents' feelings of competence and empowerment (Stahmer et al., 2016). In 2014, Wong and her colleagues in the Autism Evidence-based Practice Review Group at the Frank Porter Graham Child Development Institute completed a systematic review of the literature and concluded that parent-implemented interventions are an evidence-based practice for children birth-11 years of age with autism. They defined parent-implemented interventions as structured programs in which "parents learn to deliver interventions in their home and/or community, which included clinic settings, laboratory settings, research rooms within large universities, and preschool specifically for children with autism" (p. 20).

Kaiser (1993) discussed three reasons why parent implemented interventions are important. First, parents usually have a central and consistent role in the child's everyday environments and activities. Second, everyday parent-child interactions are considered critical for facilitating a child's language and communication skill development. Third, parent-implemented NT strategies promote the generalization of newly learned language and communication skills.

The efficacy of parent-implemented communication interventions is well-documented in the literature. For example, parent-implemented interventions were found to be effective at increasing parents' use of specific strategies, such as modeling (Brown & Woods, 2015; Gillett & LeBlanc, 2007; Meadan et al., 2014a), mand-model (Meadan et al., 2014a; Mobayed et al., 2000), environmental arrangement (Kaiser & Roberts, 2013; Kashinath et al., 2006; McCathren, 2010; Woods et al., 2004), and time delay (Meadan et al., 2014a; Peterson et al., 2005; Woods et al., 2004).

In addition, seven reviews highlighting the effectiveness of parent-implemented language and communication interventions were conducted in recent years (Akamoglu & Meadan, under review; Lang, Machalicek, Rispoli, & Regester, 2009; Matson, Mahan, & Matson, 2009; Meadan, Ostrosky, Zaghawan, & Yu, 2009; Patterson, Smith, & Miranda, 2012; Rakap & Rakap, 2014; Roberts & Kaiser, 2011). For example, Roberts and Kaiser (2011) conducted a meta-analysis of parent-implemented language interventions for children between 18 and 60 months of age. They systematically reviewed 18 studies that investigated 10 different approaches such as the Hanen parent program, parent-based intervention, social pragmatic joint attention, Heidelberg parent-based language intervention, focused stimulation, parent sensitivity and responsiveness, enhanced milieu teaching, and parent video home training. Positive parent and child outcomes were reported in the results of the meta-analysis (effect size range -0.15 to .82). However, Roberts and Kaiser noted that relatively few intervention activities were conducted within family homes (i.e., natural environments).

Akamoglu and Meadan (under review) reviewed 20 parent-implemented communication intervention studies between 2000 and 2015 that used either single-case or group design research methodologies. Across the 20 studies, researchers employed eight different intervention approaches to teach parents specific NT strategies. These approaches included EMT, milieu teaching, prelinguistic milieu teaching, blended communication and behavior support intervention, natural language paradigm, PiCS, and LAPE. Akamoglu and Meadan reported that in the majority of studies, the researchers taught parents to use responsive interaction (e.g., turn-taking, verbal responsiveness, expansion), modeling, and environmental arrangement while the use of time delay and mand-model were employed in fewer studies. Finally, Akamoglu and Meadan reported that the reviewed studies showed that parents could successfully implement NT

strategies across settings and routines.

Similarly, Meadan et al. (2009) reviewed 12 studies of parent-implemented language interventions for children with autism. These studies were investigating 10 different intervention packages (e.g., enhanced milieu teaching, pivotal response training, incidental teaching, etc.). Results of the review revealed that parents were capable of implementing the specific strategies within their homes and their children had improved communication skills.

Rakap and Rakap (2014) evaluated 15 single-case experimental design intervention studies in which the parent was the main implementer of the naturalistic language intervention. They reported that parents were taught to use a variety of NT strategies through six naturalistic language intervention approaches including milieu teaching, pivotal response training, enhanced milieu teaching, blended communication and behavior support intervention, functional communication training, and a naturalistic language paradigm. The authors reported that parents were able to implement the specific strategies within their homes and other settings (e.g., clinic), and their children demonstrated improved developmental outcomes.

Results of these systematic reviews also revealed that parents could implement NT strategies with high rates of fidelity after receiving training and/or coaching (Matson, Mahan, & Matson, 2009; Patterson, Smith, & Miranda, 2012). In another systematic review of parent training interventions that targeted the communication skills of children 10 years of age and younger with ASD, Lang, Machalicek, Rispoli, and Regester (2009) reported that parents were able to implement communication interventions more accurately (with higher fidelity) following training. Lang and his colleagues also reported that parents continued to implement the interventions correctly during maintenance in six of the seven studies.

Results in several research studies also showed that when provided with structured training and systematic coaching, parents use NT strategies with higher frequency and fidelity (Brown & Woods, 2015; McDuffie et al., 2013; Meadan et al., 2016; Roberts et al., 2014; Woods et al., 2004). Training alone might not be sufficient to increase parents' implementation fidelity. Regarding training and coaching, Meadan et al. (2014a) wrote,

Following training, a few parents increased their average use of the target strategies; however, we noticed a much larger increase during coaching sessions and it seems that training alone was not enough to effect a large visible change in the parents' behavior (p. 19).

Such findings show that when parents receive systematic guidance, feedback, and support with opportunities to practice targeted skills with their children, they are more likely to implement the strategies with higher rates and fidelity and to foster their children's language development.

Description of the Targeted NT (PiCS) Strategies

In Chapter 1, three frequently used NT strategies (modeling, mand-model, and time delay) were described along with the PiCS program in which these three strategies have been taught to parents. These three NT strategies were selected because the parent-implemented intervention literature, and in particular PiCS studies, show that parents could learn to use and implement them with high fidelity across daily routines and that they are evidence-based strategies that are related to improvements in children's communication skills (Chung et al., 2016; Meadan et al., 2014a; Meadan et al., 2016; Meadan et al., 2009; Roberts & Kaiser, 2011). These three strategies are described next.

The first strategy that was taught was Modeling, which is used to demonstrate or model specific words, signs, or gestures to show the child a target language and/or communication behavior (Alpert & Kaiser, 1992; Meadan et al., 2014a). For example, on the playground, a child

may tap the adult's arm and look at a toy truck. The adult gains the child's attention and provides a verbal model that matches the child's communication skill level, such as "truck." If the child says "truck," the adult provides praise, repeats the child's word (e.g., "yes, you want the truck"), and gives the child the toy truck. If the child does not respond by saying "truck", the adult provides a corrective model by repeating, "truck." If the child still does not respond within a specific time frame (e.g., two to three seconds) or after a few models, as predetermined by the researcher, parent, and/or teacher, the adult provides a model and gives the object (e.g., truck) to the child. The purpose of modeling is to provide the child the necessary prompts and instructions in natural situations to assist in communication skill development while still keeping the adult-child interaction positive (Gillet & LeBlanc, 2007; Kaiser, 1993; Moore et al., 2014).

The second strategy taught was Mand-Model, which involves giving a direct instruction (commonly referred to as a mand in the literature) within a naturally occurring activity and context (Alpert & Kaiser, 1992; Meadan et al., 2014a; Mobayed et al., 2000). The mand is a vocal request for a response, a question, or a choice that is maintained by a reinforcer (e.g., obtaining a preferred item such as a toy car). The mand-model is used by first gaining the child's attention and then providing a prompt for a target communicative behavior. After the prompt, a model is provided if the mand is not enough to assist the child in demonstrating the target behavior. For instance, if the child reaches for apple juice that is on the counter, the adult obtains the child's attention and provides a prompt by saying, "Tell me what you want" (mand), provides a choice "Do you want apple juice or milk?" or asks a question "What do you want?"

If the child asks for juice using words, signs, or gestures, the adult provides the juice paired with positive praise (e.g., "Good job asking for apple juice"). If the child attempts to grab the juice again without using the communication behavior, the adult repeats the process. The

purpose of the mand-model strategy is to develop independent skills by providing the child with a prompt and an example of the correct communicative response (Gillet & LeBlanc, 2007; Hancock & Kaiser, 2002; Meadan et al., 2014a; Mobayed et al., 2000).

Time delay was the third strategy taught. It involves waiting approximately 3 to 7 seconds (depending on the child's developmental level) for the child to initiate communication (Halle, Baer, & Spradlin, 1981; Kaiser, 1993; Meadan et al., 2014a). The purpose of time delay is to decrease the child's dependence on adult prompting, instructions, and models; thus, promoting independent and spontaneous (i.e., unprompted) communication (Halle et al., 1981; Hancock & Kaiser, 2002; Meadan et al., 2014a). Time delay is typically combined with other strategies such as a mand-model. If the child does not respond to the initial time delay, the adult provides a mand-model. For example, if a child wants his coat, but needs help getting it from the rack, then while looking at the child expectantly, the adult could wait 3 to 7 seconds for the child to request help. If the child makes a request by using a communicative behavior such as a word, sign, or gesture, the adult responds to the request by giving the child the coat. If the child does not independently request help during the delay, the adult provides a mand-model.

Summary

In the literature, NT strategies vary from environmental arrangement and time delay to responsive interaction strategies such as expansion and turn taking. The benefits of parents' use of NT strategies are evident. For example, various strategies such as time delay and mand-model have been shown to produce positive results such as increasing the response variation and initiation skills of children (Meadan et al., 2014a). One way to empower parents to provide individualized strategies to their children across environments is to teach parents to be the primary implementer of the intervention. Parent-implemented interventions have resulted in

improved outcomes for both parents and their children with DD. Findings also show that parents can be effective interventionists, especially when provided with structured trainings and systematic coaching.

In general, published studies of parent-implemented interventions for children with DD focus on increasing communication in a variety of naturalistic contexts. However, to date, shared storybook reading has been overlooked as a potential intervention context and routine for parent implemented communication interventions. As a naturalistic routine and social activity, shared storybook reading could be a promising context for increasing language and social engagement in young children with DD.

Shared Storybook Reading

As indicated in the previous sections, parents can maximize the communicative opportunities for their children in naturalistic contexts. The social-communicative interactions between the parents and their children may be an asset in this process and could be further enhanced throughout different daily routines such as shared storybook reading.

Shared storybook reading encompasses various read-aloud methods and book-related activities that support children's language and literacy development (Crain-Thoreson & Dale, 1992; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999). During shared storybook reading, the adult promotes the child's active participation in reading interactions. Shared storybook reading also is used as an umbrella term and includes different methods such as dialogic reading and interactive reading. For example, dialogic reading (DR) utilizes open-ended questions to expand on children's comments and ideas. Dialogic reading incorporates five types of prompts implemented by adults while reading, to encourage and promote children's participation in book reading (Whitehurst et al., 1994). These prompts are called CROWD

(acronym), which represents the prompt types of Completion, Recall, Open-ended questions, Wh-questions, and Distancing. Given that shared storybook reading could be an activity that supports language, social engagement, and also literacy development. A review of the language intervention literature in which shared storybook reading studied as a context was conducted.

This comprehensive literature review served to identify peer-reviewed articles relevant to shared storybook reading interventions as they relate to language development and communication skills. The inclusion criteria were: (a) the study addressed shared storybook reading (including particular methods such as *dialogic reading* or *interactive reading*) as it addressed language development and/or communication skills, (b) included young children (2-5 years old) with delays or disabilities, (c) the study included adults as implementers (e.g., parents, teachers, researchers, etc.), and (d) the article was published between 1995 and 2016. Articles that used any adults as implementers (e.g., parents, teachers, researchers, etc.) was included, because there are limited number of parent-implemented shared storybook reading studies that include children with disabilities.

Articles were identified in two phases. First, an online literature search was conducted through the University of Illinois Library using the following databases: ERIC, EBSCO, PROQUEST, and Google Scholar. A combination of keywords that included *shared storybook reading*, *dialogic reading*, *interactive reading*, *read-aloud*, *parent-implemented*, *language development*, *early literacy*, *caregivers*, and *teachers*, were used. Second, additional articles were identified by conducting ancestry search using the reference lists of all articles found online.

This resulted in 10 articles that met the inclusion criteria (Bellon, Ogletree, & Harn, 2000; Crain-Thorenson & Dale, 1999; Crowe, Norris, & Hoffman, 2000; Dale, Crain-Thorenson,

Notari-Syverson, & Cole, 1996; Fleury et al., 2014; Fleury & Schwartz, 2016; Hockenberger, Goldstein, & Haas, 1999; Rahn, Coogle, & Storie, 2016; Towson, Gallagher, & Bingham, 2016; Whalon, et al., 2015). These 10 articles are described and synthesized in the following four section: (a) general information about the identified articles, (b) strategies and skills targeted, (c) implementers and settings, and (d) adult and child outcomes. These sections provide a general overview of shared storybook reading interventions and capture important details and components about the identified studies.

General information about identified articles. Among the identified studies, six studies employed single-case experimental designs (Bellon et al., 2000; Crowe et al., 2000; Fleury et al., 2014; Fleury & Schwartz, 2016; Rahn et al., 2016; Whalon et al., 2015) and four studies employed group designs (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Hockenberger et al., 1999; Towson et al., 2016). Of the single-case design studies, one employed an ABA design (Bellon et al., 2000), one employed an ABAB alternating treatment design to examine the effect of DR and activity-based intervention (ABI) on children's expressive use of target vocabulary (Rahn et al., 2016), and the remaining articles employed a multiple baseline design across participants.

Three studies evaluated DR for children with mild to moderate language delay (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Rahn et al., 2016). One study included children with "developmental delays" (Hockenberger et al., 2000) and one study evaluated children with "language impairments" (Crowe et al., 2000). Another study included children in self-contained and inclusive preschool classrooms with a wide range of mild to moderate developmental delays and disabilities, including ASD and speech and language disorders. The remaining four studies included children with ASD (Bellon et al., 2000; Fleury et al., 2014; Fleury & Schwartz, 2016;

Whalon et al., 2015).

Strategies and skills targeted. Researchers have been able to improve children's participation and engagement in book reading by making simple adaptations to books, including adding the use of "special prompts" (choices, yes/no questions, modeling, mand-model) (Fluery & Schwartz, 2016), pause time (Crain-Thorenson & Dale, 1999; Dale, et al., 1996; Fleury et al., 2014; Towson et al., 2016), and a prompting hierarchy and visual supports (Whalon et al., 2015). Identified studies aimed to improve oral language skills, including receptive and expressive vocabulary (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Fluery & Schwartz, 2016; Rahn et al., 2016), verbal engagement and initiation (Crain-Thorenson & Dale, 1999), verbal participation (correct responding, commenting), time engaged in reading (Fleury et al., 2014; Hockenberger et al., 1999), verbal turn taking and grammatical complexity (Crowe et al., 2000), spontaneous utterances during reading (Bellon, Ogletree, & Harn, 2000; Whalon et al., 2015), and concepts about print (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Fleury et al., 2014; Hargrave & Senechal, 2000; Towson et al., 2016).

Three studies specifically examined the use of adapted shared reading interventions for young children with ASD (Bellon et al., 2000; Fleury et al., 2014; Whalon et al., 2015). Fleury et al. (2014) included three preschoolers with ASD who communicated verbally using 2-3 phrases. Baseline book reading sessions involved a member of the research team reading the text as written. Despite being "on-task" (e.g., sitting upright, looking at the book and/or adult reader), all children demonstrated low rates of verbal participation during baseline. When the adult employed dialogic reading (DR) techniques while reading, an immediate increase in rates of verbal participation was observed for all three children. In addition to improved rates of verbal participation, children also engaged with the books for longer durations during dialogic

reading sessions than during baseline book reading sessions. A study conducted by Whalon et al. (2015) reported similar findings, thereby providing additional support for the use of a modified dialogic reading approach with this population. Whalon and colleagues adapted dialogic reading by embedding systematic instructional procedures and supports, specifically a prompting hierarchy and visual supports, which are techniques known to facilitate the learning of children with ASD.

Bellon et al. (2000) included a 3-year-old with autism described as “high functioning” who primarily spoke using immediate and delayed echolalia. Bellon et al. (2000) paired wh-questions with scaffolding procedures (i.e., binary choice, cloze sentence, expansion). In several studies, participating children with ASD improved their verbal participation and engagement (Fleury et al., 2014; Whalon et al., 2016), and spontaneous utterances (Bellon et al., 2000). Together, these findings demonstrate that children with DD (and particularly ASD) can benefit from shared reading interventions that target language comprehension, communication, and participation.

Four studies incorporated “pause time” into shared storybook reading and dialogic reading (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Fleury et al., 2014; Towson et al., 2016). When implementing dialogic reading at home, some researchers instructed parents to “slow down and give your child time to respond” (Crain-Thorenson & Dale, 1999, p. 32) or required a five second interval prior to another adult utterance (Fleury et al., 2014; Towson et al., 2016). In two studies, utterances by the adult within two seconds of the prior utterance were coded as “insufficient time to respond,” suggesting the need for children with disabilities to have more time to process language presented to them (Crain-Thorenson & Dale, 1999; Dale et al., 1996). When specifically instructed to increase the time between a prompt and another

utterance, adults made significant changes in their use of pause time (Crain-Thorenson & Dale, 1999). The researchers reported that the pause time strategy facilitated children's linguistic performance and verbal engagement (Crain-Thorenson & Dale, 1999; Dale et al., 1996).

One research team taught mothers of preschoolers with language impairments to use reading techniques to promote the verbal participation of their children during shared storybook reading (Crowe et al., 2000). Mothers were taught the following strategies: attentional vocatives (e.g., attention getters, such as "look"), queries (i.e., requests for information, such as "What's he doing?"), responses, and feedback. As a result of the intervention, increases were observed in mothers' use of the strategies, the balance of mother-child turns (i.e., a decrease in mother turns and an increase in child turns), and the balance of mother-child grammatical complexity (i.e., a decrease in mothers' mean length of utterance and an increase in children's mean length of utterance).

Implementers and setting. In four studies, researchers taught parents to implement the interventions (Crain-Thorenson & Dale, 1999; Crowe et al., 2000; Dale et al., 1996; Hockenberry et al., 1999). In one study, paraeducators in an inclusive preschool implemented an adapted dialogic reading intervention with children with ASD (Fleury et al., 2014) while in the remaining articles researchers implemented the interventions with participants.

Shared storybook reading has been evaluated for use between parents and children with disabilities in home settings as well as in preschool classrooms with one study comparing home versus school implementation (Crain-Thorenson & Dale, 1999). While Fleury and colleagues' (2014) study was implemented in preschools, the intervention took place in a small intervention room adjacent to the children's classroom. Within the interventions in preschool settings, dialogic reading was implemented in small groups of eight or less (Towson et al., 2016) or

individually with either a teacher or researcher (Crain-Thorenson & Dale, 1999; Fleury et al., 2014; Rahn et al., 2016; Whalon et al., 2015). One study used a speech clinic as an intervention setting (Bellon et al., 2000).

Adult and child outcomes. Within the limited research base (10 studies), shared storybook has been found to effectively produce changes in adult behavior, particularly in using specific prompts such as asking wh- and open-ended questions (Crain-Thorenson & Dale, 1999; Crowe et al., 2000; Dale et al., 1996; Fleury et al., 2014; Hockenberg et al., 1999), and higher rates of use of reading techniques (e.g., CROWD) (Crowe et al., 2000) and pause time (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Fleury et al., 2014; Towson et al., 2016). Changes in children's language and behaviors have been described as higher levels of verbal engagement during book reading and more interest in books (Bellon et al., 2000; Crowe et al., 2000, Whalon et al., 2015), increased receptive and expressive vocabulary (Fleury & Schwartz, 2016; Rahn et al., 2016), and an overall increase in oral language skills (Crain-Thorenson & Dale, 1999; Dale et al., 1996; Fleury et al., 2013; Towson et al., 2016). To capture these changes in participants' skills, researchers used standardized assessments, researcher developed tools (e.g., vocabulary assessments), coding of child language and mean length of utterance, and observations.

Summary. Shared storybook reading involves more than just the parent or adult reading to a child. In addition to reading the story, the parent/adult should make comments about the illustrations and events in the story, model new vocabulary, gestures, and/or signs and invite the child to do the same by asking questions and giving the child time to initiate. The literature shows that there are specific techniques to help parents engage in these skills. For example, DR techniques were developed as a set of prompts (i.e., completion, recall, open-ended questions, wh-questions, and distancing questions) to be implemented with a specific prompting hierarchy

(i.e., prompt, evaluated, expand, repeat). Although these prompts complement naturalistic teaching strategies, they are not derived from naturalistic teaching principles (Colmar, 2014). Therefore, teaching parents to incorporate NT strategies within shared storybook reading warrants examination in a research context.

Participation in adult-child shared storybook reading, for most children, is naturally reinforced by social interaction with the adult. Many children are willing to participate in shared storybook reading activities because it gives them the opportunity to spend time with a parent/adult. When children participate in shared storybook reading, ideally, they will initiate comments of their own and the parent/adult can follow the child's lead by expanding on their statements. However, children with DD may lack many of the communication skills necessary to engage in such social interactions, such as initiating, commenting, and using language to describe events. Furthermore, shared storybook reading requires that children sustain social interaction regarding a particular topic (the book), which can be challenging for many children with DD (Kluth & Chandler-Olcott, 2008).

In addition, children who do not naturally find social interactions enjoyable (e.g., children with ASD) may lack the desire to engage in prolonged social interactions that are necessary for quality parent-child book reading. Due to a lack of naturally reinforcing properties in shared storybook reading, children's behavior may make it difficult for parents and other adults to read to them. Research indicates that a large percentage of children with disabilities do not show an early or continued interest in book reading. Some scholars estimate that as many as 40% of children with disabilities may actively resist storybook reading interactions (Kaderavek & Sulzby, 1998) and these behaviors may interfere with adult attempts to engage them in book reading activities. Parents may be reluctant to read to children if their children have difficulty

attending, or engage in challenging behavior during book reading. Given the difficulties that children with DD might have in participating and engaging in book reading, and the potential of this context to promote children's development, teaching parents to use specific and adapted reading techniques to engage their children is another reason to examine a parent-implemented communication intervention in a shared storybook reading context.

Social Validity of Parent-Implemented Interventions

Teaching parents to implement specific NT strategies has produced positive outcomes for young children and their parents as communication partners (Kaiser & Roberts, 2011). It is important for researchers to examine not only the effectiveness of the parent-implemented interventions but also the social validity of the goals, procedures, and outcomes for parents because if parents do not consider interventions to be feasible, acceptable, or relevant to their family, they may be less likely to use them over time (Wolf, 1978). A limited number of published studies have examined parents' perceptions about the effectiveness and feasibility of the communication teaching strategies they use with their children. However, a growing number of research teams have examined social validity because it is one of the quality indicators of the single-case research as outlined by Horner et al. (2005).

In general, social validity refers to how acceptable, relevant, and significant a particular intervention is for the child, his family, and society (Kazdin, 2011; Wolf, 1978). A particular emphasis is placed on the relevance and meaningfulness of the interventions. Social validity data can reveal the perceived effects and feasibility of an intervention or a particular strategy, and provide useful information to determine implementation and effectiveness barriers (Strain, Barton, & Dunlap, 2012; Turan & Meadan, 2011).

Among various methods, subjective evaluation and social (normative) comparison are the two most commonly used methods to gather social validity data. When using social comparison approach, the participant's progress is compared with normative data by using standardized assessment measures (Kazdin, 1977). For example, a child's pre-intervention language development can be compared with post-intervention using the Preschool Language Scale-Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011).

Subjective evaluation focuses on gathering information regarding people's perceptions of some dimensions of the goal, procedures, and/or outcomes of an intervention (Kazdin, 2011). The purpose is to examine how people view some dimensions of the experimental situations. The researchers must first choose the group of people from whom they are going to obtain information. This group can be participants or the participants' teachers or parents. However, the selected group also can be people who are naïve to the study such community members (e.g., teachers, therapists, college students) (Storey & Horner, 1991).

Questionnaires, rating scales, and surveys are the most common ways to gather social validity data through subjective evaluation. Studies that use questionnaires often include Likert scales to measure parent perceptions or satisfaction with the intervention (Brown & Woods, 2015; Kaiser et al., 2000; Kashinath et al., 2006; Meadan et al., 2014a; Mobayed et al., 2000; Moore et al., 2013; Peterson et al., 2005). For instance, Gillet and LeBlanc (2007) asked three parents to rate how often they would continue using the strategies and whether they found the interventions *helpful*. Two parents rated "often" indicating they would continue using the interventions. One parent found the interventions to be "very helpful" while one parent stated they were "somewhat helpful."

Another way to gather social validity data in parent-implemented interventions is to interview parents. The interviews can be structured or semi-structured (Meadan et al., 2014a) and typically include open-ended questions that require parents to discuss the effectiveness of the study (Kashinath et al., 2006; Mobayed et al., 2000). For example, parents in Kashinath et al. reported that the intervention resulted in positive communication outcomes for their children and gave examples such as, “He is pointing more to things,” and “He is more aware of his surroundings.”

There is limited information about parents’ and society’s perspectives on the effectiveness of communicative teaching strategies for young children with DDs (Meadan et al., 2014a). Measuring social validity can be a guiding tool to understand both parents’ and society’s perceptions on the goals, procedures, and outcomes of interventions (Akamoglu et al., 2016). One social validity consideration is that intervention agents and society members (practitioners, students, teachers) report the goals, procedures, and outcomes as acceptable, feasible, and effective (Horner et al., 2005). Therefore, it is important to not only understand how parents perceive goals, procedures, and outcomes but also whether individuals who are naïve to the study also observe positive changes in parent and child behaviors.

Theoretical and Conceptual Framework

The current study was based on three theoretical frameworks. In this section, the transactional model, behavioral approach, and social learning theory are described as they formed the basis of this study.

Transactional model. The transactional model of development (Sameroff & Chandler, 1975) posits that development occurs through reciprocal interactions between parents and children. Typically, parent-child dyads jointly create effective language learning contexts, in

which children learn language successfully. For children with DD, language acquisition can be more complex because they are potentially more dependent on the quality and quantity of the language input they receive. The transactional model is related to the current study because it supports the use of parent-implemented language and communication interventions that target change in parent language input to facilitate change in children's language and communication.

Behavioral approach. The behavioral theory of learning serves as the foundation for several language intervention techniques (Schreibman et al., 2015). In the behavioral theory, learning is based on stimuli that evoke a response from the child. Occurrence of a behavioral response depends on the consequence that occurs afterwards (Alberto & Troutman, 2012).

Naturalistic teaching strategies that were targeted (modeling, mand-model, and time delay) in this study are based on behavioral principles. For example, while using a mand-model strategy, the parent asks a question or gives a specific direction (mand) to the child (see Akamoglu et al., 2016; Drasgow, Halle, & Ostrosky, 1998; Mobayed et al., 2000). Upon the child's correct response, the parent expands on the child's response. This response serves as a natural consequence. For example, within a parent-child shared storybook reading, the natural consequence may be turning the page to see what happens next in the story.

In the current study, the parent and child interacted around shared storybook reading. In this type of interaction, simply opening a book or showing the child an interesting illustration may serve as a discriminative stimulus, which can evoke a response from a child such as making a comment or posing a question about what he or she sees. If the child does not engage in the desired verbal or nonverbal behavior during the book reading, a parent can use an NT strategy to elicit that behavior.

In addition, during shared storybook reading, parents might prompt children's verbal or

nonverbal behavior by asking a choice question or open-ended question, or modeling an appropriate response. Once the child appropriately responds to the parent prompt, he or she receives positive feedback from the parent. If receiving this positive feedback (e.g., acknowledgement of the response, smile, affection) is a positive reinforce for the child, it will increase the likelihood that the child will continue to make similar comments about other pages or during future book reading.

Social learning theory. According to social learning theory, learning occurs through personal interactions. Shared book reading offers both social and contextual support for the development of language. Through repeated readings and the use of familiar routines, adults use books to support children's learning of new concepts and their verbal participation (Vygotsky, 1978).

A parent's use of NT strategies such as asking open-ended questions, giving the child enough time to respond, modeling language, or praising what the child has said constitute social interactions during shared storybook reading. For instance, after a child verbalizes or points to "phone" in the picture, the parent's next reading technique can be acknowledging the expressed word (e.g., "Yes, that is a phone") and following with a question (e.g., "What will he do with the phone?"). Thus, with parent support, the child is able engage in a social-communication with the parent.

Summary. The theories described above reflect three important features about the current study. These features are: (a) reciprocal parent and child interactions are critical and, therefore, the parent's verbal and nonverbal language input is important in promoting the child's social-communication and interaction skills, (b) NT strategies are based on behavioral principles and these principles could help to shape both parent and child communicative behaviors, and (c)

the quality of parent-child interactions could be enhanced by supporting parents' use of NT strategies in specific routines where one-on-one interactions occur such as shared storybook reading routine.

The Purpose of the Study

Given the theoretical and conceptual framework and the fact that NT strategies have not been incorporated in parent-implemented shared storybook reading interventions for children with DD, the purpose of the current study was to examine the effects of a specific parent-implemented communication intervention (PiCS) during a shared book-reading context (PiCSS: Parent-implemented communication strategies-storybook). Specifically, the following research questions were investigated:

1. Is there a relation between training and coaching a parent to use shared storybook reading techniques and a parent's fidelity of technique use?
2. Is there a functional relation between training and coaching a parent to use specific PiCS strategies (modeling, mand-model, time delay) during shared storybook reading and the parent's rate and fidelity (quality) of strategy use?
3. Is there a relation between the parent's use of PiCS strategies (modeling, mand-model, time delay) and the child's communication behaviors during shared storybook reading?
4. What are the perspectives of the participating parent and other consumers/adults (college students and practitioners) about the social validity of the goals, procedures, and outcomes of the intervention?

CHAPTER 3

METHOD

Participants

One parent and her child with ASD who met the inclusion criteria for this study were recruited as participants. The Institutional Review Board of the University of Illinois approved this study (see Appendix A).

Inclusion criteria and recruitment. The inclusion criteria for participation were: (a) child's chronological age must be between 3 and 5 years; (b) child must have an identified language delay in the IEP and/or a diagnosis of ASD or a DD; (c) child must have an expressive vocabulary of at least 25 words based on parent report (MacArthur-Bates Communicative Developmental Inventory; MCDI; Fenson et al., 2002); (d) parent reports that the child has an interest in storybooks; (e) the parent must have an interest in the study; (f) the parent reports that she is available to participate in all intervention sessions; and (g) English must be the family's first language.

To identify and recruit possible participants, a flyer describing the study was distributed to local parent and child disability organizations. Three different contacts expressed interest in participating and one family met the criteria and participated in the study.

Parent. The parent participant, Sarah (pseudonym), was the mother of the child participant. She was a White, 37-year-old stay-at-home mother with a PhD in higher education. Sarah was married and had twins. Her other child was a boy who received private speech therapy. Her husband John had a law degree. Sarah indicated that their annual household income was between \$65,000 and \$85,000. In appreciation for their participation in the study,

the family was given a total of \$200.00 (\$50.00 at the beginning and \$150.00 at the end of the study) and several storybooks.

Child. The child who participated, Emily, was 3 years and 3 months old at the beginning of the study. Emily was eligible for special education services under the educational category of developmental disabilities, having been diagnosed with ASD when she was 2 years and 6 months old. She was receiving public school services in a local early childhood program. During the course of the study, Emily received speech and occupational therapy at her preschool and private music therapy. She also attended a private occupational therapy playgroup.

Standardized Assessments

To characterize Emily's language and overall development, formal communication evaluations were conducted at the beginning and at the end of the study. These assessments were used to describe Emily's language skills at these two time points, and were completed before the study began to ensure that Emily qualified for participation in the study.

The following measures were administered: The MCDI (Fenson et. al., 2002); Preschool Language Scale-Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011); Ages and Stages Questionnaire: Social Emotional-2 (ASQ: SE-2; Squires et al., 2004); Mullen Scales of Early Learning (MSEL; Mullen, 1995); and Get Ready to Read! - Revised (GRTR-R; Whitehurst & Lonigan, 2010). The parent completed the MCDI and ASQ: SE-2 and the researcher administered the MSEL and GRTR-R. A local speech and language pathologist was hired to administer the PLS-5 and report the results. The post-intervention assessments were conducted 6 months after the initial assessment dates. In addition, the family completed a demographic survey (see Appendix B) and returned it to the researcher. See Table 1 for a summary of Emily's performance on these measures.

Table 1

Child Assessment Data

Measure	Pre-Study	Post-Study
MCDI		
Words Understood	268 (of 396)	361
Words Produced	7 (of 396)	83
PLS-5		
AC	53	72
EC	56	68
TLS	51 (1 st percentile)	68 (2 nd percentile)
ASQ-SE-2 (36 months)	130	130
MSEL		
NVDQ	59.82	70.69
VDQ	53.84	68.10
GRTR-R	6	8

Note. MCDI = MacArthur-Bates Communication Development Inventory; Words Produced = Number of reported expressive words. PLS-5 =Preschool Language Scale, 5th Ed; AC=Auditory Comprehension; EC=Expressive Communication, TLS= Total Language Score. ASQ-SE-2: Ages and Stages Questionnaire: Social Emotional 2nd Ed. MSEL=Mullen Scales of Early Learning; NVDQ = Nonverbal Developmental Quotient, VDQ = Verbal Developmental Quotient.

MacArthur-Bates Communication Development Inventories. MCDI (Fenson et. al., 2002) is a standardized, parent-completed assessment that screens children’s emerging language and communication skills. Forms are available for assessing the child’s: (a) use of words and gestures, (b) use of words and sentences, or (c) expressive vocabulary and grammar skills (Fenson et al., 2006). The Words and Gestures form was selected, as it was most appropriate for Emily. The MCDI form typically takes 20-40 minutes for parents to complete. Emily’s score in Words Produced was 7 at the beginning of the study and 83 at the end of the study, demonstrating significant improvement in her expressive vocabulary.

Preschool Language Scales, Fifth Edition. PLS-5 (Zimmerman et al., 2011) is a comprehensive developmental language assessment that is reliable for children birth to age 7

years, 11 months who have severe and persistent language deficits. The PLS-5 assesses receptive and expressive communication. It was administered by an SLP at the beginning of the study and six months later, after the study has ended. Emily's total language standard score was 51 (1st percentile) at the beginning of the study and 68 (2nd percentile) at the end of the study.

Ages and Stages Questionnaire: Social Emotional-2. ASQ: SE-2 (Squires et al., 2004) is a parent-completed questionnaire that identifies young children at risk for social or emotional difficulties. It typically takes 15 minutes for parents to complete. Emily's score on the 36-months ASQ: SE-2 was 130 (cutoff score = 105) both before and after the study, which means Emily's scores were well above the cutoff scores on two points and that developmentally, she was not progressing on the same level with children of her age.

Mullen Scales of Early Learning. The MSEL (Mullen, 1995) is a test of cognitive functioning that may be used with children birth to 68 months. The MSEL developmental quotients (DQ) were calculated to describe Emily's nonverbal and verbal abilities. Age equivalent scores were divided by the child's age and multiplied by 100 to obtain the quotients. Gross motor, fine motor and visual reception age equivalents were averaged for nonverbal DQ (NVDQ), and receptive and expressive age equivalents were averaged for verbal DQ (VDQ). Emily's NVDQ score was 59.82 before the study and 70.69 after the study. Her VDQ score was 53.84 before the study and 68.10 after the study. Emily's MSEL Early Learning Composite standard score was 59 (1st percentile) before the study and 68 (2nd percentile) at the end of the study.

Get Ready to Read!-Revised. The GRTR-R (Whitehurst & Lonigan, 2010) is a screening tool used to determine whether children have the early literacy skills they need to become readers. It requires the child to point to one of four pictures in reference to concepts of

print knowledge, book knowledge, phonological awareness, and phonics. There are 25 items in total. The child receives a score of 1 (correct) or 0 (incorrect) for each item. Emily scored 6 items correctly at the beginning and 8 items correctly at end of the study, which meant that her performance levels were below average for the age range of 3 years 6 months and 3 years 11 months. Thus, Emily had a very basic understanding of books and print, and could recognize some letters.

Setting

The study took place in a local community setting based on the family's preference. Baseline, training, post-training, and coaching sessions were conducted in the community setting. Emily had been receiving private occupational therapy at the community center for the past year and therefore she was familiar with the building. As the interventionist, I met with the family two-to-three times a week depending on their schedule. We met at the center on the days when the family had therapy hours scheduled so as to not impact Emily's weekly routine. Generalization and maintenance sessions were conducted at the family's home (the researcher was not present).

Materials

The materials that were used included: (a) a laptop computer for parent training and coaching, (b) an iPhone to record sessions, (c) storybooks for baseline, intervention, maintenance, and generalization sessions, and (d) parent training video clips. For parent training videos, a parent and her son who did not have a disability were recruited. The videos were recorded at the family's home with storybooks that I gave to the family. The mother and the researcher reviewed the techniques and strategies one by one and filmed separate videos for each technique and strategy. The researcher then edited the training videos with assistance from an

undergraduate student. The videos included the PiCSS logo, strategy titles and descriptions, and captions.

Book Selection

Read Together, Talk Together (RTTT; Pearson Early Learning, 2006) is a book set created to assist educators and parents to use dialogic reading techniques as they engage in shared storybook reading. Based on research by Whitehurst and Lonigan (2010), RTTT has two sets of kits, one for toddlers (ages 2-3) and one for preschoolers (ages 4-5). Each kit includes 20 picture books (both fiction and nonfiction) with accompanying teacher and/or parent notes for each book as well as training videos (notes and videos were not used in this study). Books included in the kit for either age group are of a similar length (approximately 32 pages), age-appropriate, contain a similar number of words on each page, and include pictures that illustrate story content and intend to foster dialogue between the parent and child. Fleury and Schwartz (2016) and Towson et al. (2016) used RTTT books and focused on children with disabilities (e.g., ASD and language delays). They found the books to be useful in promoting child responsiveness to adult prompts, in teaching specific vocabulary, and in fostering child participation in book reading.

The toddler (ages 2-3) kit was used in the study. At the start of the study, the 20 books were randomly divided into two groups in which five books served as baseline and maintenance (same five books as in baseline) and 15 books served as intervention books (post-training and coaching phases). See Table 2 for the types of books used in each phase/condition. For generalization sessions, the parent received different books that were checked out from a local library. These books were different than the ones used in the baseline and intervention phases but they were similar to those in the RTTT package. That is, they were age-appropriate,

contained a similar number of words on each page, and included pictures that illustrated story content and were intended to foster dialogue between the parent and child. During the full maintenance sessions, the parent used the same books as in baseline. More information about generalization and maintenance is provided in the following sections.

Table 2

Types of Books and Settings Used in Each Phase/Condition

Phase/Condition	Types of books	Setting	Interventionist is present
Baseline	RTTT 5 Books	Community Center	Yes
Post-training	RTTT 15 Books	Community Center	Yes
Coaching	RTTT 15 Books	Community Center	Yes
Full maintenance	RTTT 5 Books (Same as in baseline)	Family's home	No
Generalization	Books from a local library	Family's home	No

Note. RTTT. Read Together Talk Together (Pearson Early Learning, 2006).

Interventionist

I was the primary investigator for this research study. I was a doctoral candidate during the study period and am an Oregon State licensed Early Intervention/Early Childhood Special Education specialist with three years of teaching experience with children with language delays and ASD.

Experimental Design and Procedure

A coaching intervention was implemented within a single-case; multiple-baseline design across four tiers (a set of book reading techniques and three PiCS strategies, Meadan et al., 2014a) within a parent-child dyad with follow-up was implemented. An average of 2-3 weekly

sessions was conducted during baseline and intervention in a local community setting. Threats to internal validity were addressed by features of the multiple baseline design (e.g., introducing the intervention at four points in time addresses the threats of maturation and history), having sufficient data points in each phase, and completing procedural fidelity checklists both for the interventionist and the parent (Kratochwill et al., 2013; WWC, 2010). To meet the quality indicators and standards of single-case experimental design (Horner et al., 2005), a minimum of five data points in the baseline phase were collected across three PiCS strategies and the book reading techniques. The design allowed four opportunities to demonstrate a basic effect and to infer a functional relation, based on the data, between the intervention and the dependent variables. In addition, many of the quality indicators described by Horner et al. (e.g., collecting a minimum of five data points in baseline, collecting fidelity data, assessing interobserver agreement, evaluating social validity) were included in the design and procedures. Data collection and analysis procedures are described below.

Independent variable (intervention). The focus of this intervention was to teach, using training and coaching, the participating parent (a) a set of book reading techniques (see Appendix C) to engage the child during shared storybook reading (CONNECT, 2011), and (b) three (see Table 3) PiCS strategies (Meadan et al., 2014a). Therefore, parent training and coaching of strategies served as the independent variable of the study.

Parent training. The initial phase of the intervention consisted of two parent-training sessions, each one lasting approximately one hour, without the child present. These were not staggered across baselines; only coaching was introduced in staggered fashion. The first training session focused on shared storybook reading techniques (CONNECT, 2011) and targeted how to present and read books in a shared and interactive context and engage the child during reading

sessions (see Appendix C for a handout of techniques). This training consisted of the following components: (a) six shared book reading techniques were introduced to the parent using a handout about the techniques (see Appendix C); (b) the *before*, *during*, and *after* book reading techniques was explained (e.g., presenting the book, attention getters, feedback, etc.); (c) video examples of parents using the reading techniques were shown to the parent; (d) the parent practiced the *before*, *during*, and *after* book reading techniques with the researcher; (e) suggestions and feedback were provided to the parent; and (f) the researcher reviewed the training and addressed questions and concerns (see Appendix D for Fidelity Checklist for Training Session 1). Post-training data were collected in sessions conducted exactly like those in the baseline phase.

Table 3

Descriptions of Naturalistic Teaching Strategies

Strategy	Definition and purpose	Example
Modeling	Modeling specific words, signs, or gestures to show the child a target language and/or communication behavior, so the child could imitate the word/sign/gesture.	Parent provides a verbal model by saying <i>ball</i> while the child is looking to the picture of ‘ball’ in a book page.
Mand-model	Giving a direct instruction, asking a question, or giving a choice so the child has an opportunity to communicate with the adult. The mand is a vocal request for a response, a question, or a choice that is maintained by a reinforcer (e.g., obtaining a preferred item such as a toy car).	The child points to a banana picture in the book. The parent provides a choice “Is this a banana or apple?” or asks a question “What is this?”
Time delay	Giving a child a reason to communicate and then waiting approximately 3 to 7 seconds (depending on the child’s developmental level) for the child to initiate communication within a familiar routine.	While reading the storybook <i>Edwin Speaks Up</i> by April Stevens, the parent says “Edwin dropped one large box of ____ (sugar) on to the belt” by leaving the sentence incomplete and looks at her child expectantly to complete the sentence by saying “sugar.”

Note. Adapted with permission from Parents’ use of naturalistic communication teaching strategies by Akamoglu, Y., Meadan, H., and Burke, M. (2016). *DADD Online Journal: Research to Practice*.

The second parent training session occurred on a different day and focused on PiCS strategies and included the following components: (a) information about social communication behaviors and young children with language delays was delivered; (b) the PiCS strategies were introduced to the parent using handouts about the strategies; (c) video examples of parents using each PiCS strategy were shown to the parent; (d) the parent practiced all three PiCS strategies with the researcher; (e) suggestions and feedback were provided to the parent; and (f) the researcher reviewed the training and addressed questions and concerns (see Appendix E for Fidelity Checklist for Training Session 2).

Parent coaching. The PiCS coaching model relies on Rush and Shelden's (2011) definition of coaching. Rush and Shelden (2011) defined this coaching model as:

an adult learning strategy in which the coach promotes the learner's (coachee's) ability to reflect on his or her actions as a means to determine the effectiveness of an action or practice and develop a plan for refinement and use of the action in immediate and future situations (p. 8).

Rush and Shelden's coaching model has certain characteristics that distinguish coaching from other types of coaching models and/or trainings. These are: (a) joint planning: agreement on the actions or opportunities to practice between coaching sessions; (b) observation: one person observes the other's actions to develop new skills, ideas, or strategies; (c) action: coachee practices the target skill or engages in an activity; (d) reflection: the coach and/or the coachee analyze their actions and determine how those actions need to be implemented and, perhaps, modified; and (e) feedback: information provided by the coach to expand the coachee's current level of understanding and practice. In addition to Rush and Shelden's key characteristics of coaching, the PiCS coaching model incorporates the coaching strategies described by Friedman, Woods, and Salisbury (2012): (a) foster conversation and information sharing, (b) observe, (c) demonstrate the intervention, (d) teach the parents directly (e) give feedback after the parent

practices, (f) develop joint interaction, (g) provide guided practice with feedback, (h) use problem solving, and (i) be child focused.

Given that this study extends the PiCS program into a storybook reading context, the PiCS coaching model was adapted for this study. Thus, in the subsequent coaching sessions, adapted PiCS parent-coaching model, which relies on planning, observing, and providing feedback, was used (Meadan et al., 2014a). The parent coaching protocol included the following components: (a) parent and the researcher reviewed the targeted PiCS strategy or book reading techniques before the reading session; (b) feedback on the previous session (starting with the second session) was provided by showing the video clip and explaining what the mother did well and what needed improvement; (c) the parent and child engaged in shared storybook reading; (d) the researcher observed the parent and child while they were engaged in storybook reading (no prompts or coaching were provided); (e) the parent reflected on her own performance; (f) suggestions and feedback was provided to the parent; and (g) the researcher addressed the parent's concerns or questions and problem-solved if there were any concerns or issues (see Appendix F for Coaching Fidelity Checklist).

For reading techniques, coaching sessions continued until the parent reached a pre-established performance criterion level (i.e., high fidelity [a score of fidelity 4] on reading techniques for two consecutive sessions). For PiCS strategy use, coaching sessions continued until the parent reached a pre-established performance criterion level (i.e., high fidelity [a score of fidelity 4] on 80% of PiCS strategy use for two consecutive sessions) (Meadan et al., 2016). The researcher chose not share the pre-established criterion with the parent so as to not impact the parent's self-motivation for learning and implementing the strategy. The goal of this study was to improve the parent's self-confidence and competence with coaching so that the parent

could implement the strategy with high fidelity. If the parent was aware of the pre-established criterion, she might have had a motivation to meet the study criterion rather than her internal motivation to increase her self-confidence and competence. After the parent met the performance criterion for each target PiCS strategy, coaching on the next strategy began. The order of coaching was: (1) Book reading techniques, (2) Modeling, (3) Mand-Model, and (4) Time Delay.

It is important to note that in addition to the reading techniques that were used during reading sessions, a visual support (visual cue card) was used to facilitate Emily's transition from play to the reading session. This need emerged when the coaching sessions began. That is, before the reading session started, Sarah and I first sat to review the targeted strategy and discuss my feedback, which typically lasted about 5-6 minutes. In the mean time, Emily had to wait for us. To keep her busy, Sarah would give Emily toys that she enjoyed. However, on occasions, Emily would get bored and fussy. Therefore, three visual cue cards were created that illustrated (a) the community center building, (b) "it's reading time", and (c) "it's play time" to facilitate her transition to the building, reading session, and play after the reading session. Sarah started using these cards after the second session of coaching. In this way, we helped Emily understand the new routine and facilitated her transitions between activities.

Fidelity of implementation. Monitoring and measuring how an intervention is being implemented is important for evaluating its outcomes (Wolery, 1994). Ensuring consistent implementation of the intervention (fidelity) is considered one of the quality indicators in single-case research (Horner et al., 2005).

Fidelity was measured for two components on two levels. First, during training I completed two training checklists (Appendices D and E). Second, during coaching, I completed

a coaching checklist (Appendix F) with all procedural steps of the coaching protocol. Procedural fidelity was assessed at 100% across all training sessions.

To assess reliability of the fidelity measure, a second observer, a faculty in the Department of Special Education, reviewed the video recorded training and coaching sessions and rated the presence and absence of steps on the fidelity checklists for 100% of training sessions (i.e., two sessions) and 30% (four sessions) of the 12 coaching sessions across all phases for book reading techniques and each PiCS strategy. Fidelity of implementation for the training sessions was 100% for both levels. Fidelity of implementation across the four coaching sessions was assessed at 89% by the second observer across all coaching phases. Point-by-point agreement was calculated by counting the number of agreements and dividing that by the number of agreements and disagreements and multiplying that by 100. The point-by-point agreement between the two observers was 94.5%.

Baseline. During the baseline sessions, the parent used the five books that were randomly chosen out of the 20 for use in baseline sessions. At the beginning of each session, the parent selected at random three of the five books and allowed the child to select one of those three books to be read during the session. The books that were not selected by the child were presented on a different day. This way, if the child chose to read the same books, they could have been read again. The parent was instructed to “read the book as you normally would.” A total of five baseline sessions were conducted (Kratochwill et al., 2013).

Maintenance. The purpose of the maintenance sessions was to assess whether the parents continue to use the book reading techniques and PiCS strategies, as well as to examine the continuing effects of these strategies on the children’s communicative behaviors after coaching (intervention) is complete. I collected two types of maintenance: (a) maintenance with

other coaching and (b) full maintenance. Maintenance data on modeling and mand-model that were collected while receiving coaching on time delay are labeled as “Maintenance with Other Coaching” and separated (by a dotted line) from maintenance data collected when all coaching had ended (labeled as “Full Maintenance”) (see Figure 1 in the Results section). Full maintenance sessions occurred after Sarah met performance criteria for all strategies and all coaching had ended.

Three full maintenance sessions were conducted four weeks after the last coaching session (4/12). The full maintenance sessions took place at the family’s home without the interventionist present due to family being unable to meet again at the community center. That is, I gave the mother the same five storybooks as in baseline (see Table 2) and she conducted the reading sessions at home at a convenient time for her and her daughter. Using the same protocol, the mother selected and presented three books at random. The mother used her iPhone to record the sessions and uploaded the videos to a UIUC Box folder as she was instructed.

Generalization. Generalization was assessed across books and settings. That is, during all phases when the researcher was not present and no coaching was provided, Sarah engaged in shared storybook reading with Emily and recorded the session and uploaded the videos to a UIUC Box folder. The parent was provided with different books that were checked out from a local library. These books were different than the ones used in the baseline and intervention phases but they were similar to those in the RTTT package. That is, they were age-appropriate, contained a similar number of words on each page, and included pictures that illustrated story content and were intended to foster dialogue between the parent and child. The mother recorded five generalization sessions across all phases. One session was conducted during baseline phase, one session was conducted during coaching for “book reading techniques” phase, two were

during the coaching for “modeling” phase, and one was during the coaching for “time delay” phase.

Data Collection and Analysis

Dependent variables. This intervention addressed four dependent variables (DV) as they related to the first three research questions. The first three DVs were related to the parent’s high fidelity use of shared storybook reading techniques (DV1) and rate (DV2) and fidelity (DV3) of the PiCS strategy use. The fourth DV was the child’s communicative behaviors, which were verbal and nonverbal responses and initiations (see Appendix F for operational definitions of parent and child DVs and the coding protocol).

Observational data collection and coding. All parent-child interactions during reading sessions were videotaped to assess child and parent behaviors using an observational protocol. Video footage (ranged between 3 to 12 min across baseline and intervention sessions) of each recording was coded. To code each reading session, a coding manual (Appendix G) that included operational definitions of the DVs and coding rules was developed.

Parent dependent variables. Three parent DVs were measured and coded for analysis. The first parent DV was the parent’s fidelity (also referred to as “quality” or “correct”) use of book reading techniques. These techniques were categorized as *Before* reading techniques (presenting the book, initial question), *During* book reading techniques (praise/acknowledgement statements and attention getters), and *After* book reading technique (closure question). The parent’s fidelity use of book reading techniques was coded from 1 = *low-fidelity* to 4 = *high-fidelity*. Fidelity levels (e.g., Fidelity 1, 2, 3, 4) are defined and described in Appendix G. See Appendix F for operational definitions of techniques and the coding protocol, and Appendix H for the coding form.

The second parent DV was the parent's rate of PiCS strategy use (modeling, mand-model, and time delay). The rate of the parent's PiCS strategy use (frequency of each strategy per minute) was calculated by dividing the number of occurrences of each strategy by the number of minutes (e.g., 5 or 7 min) for each session. The third parent DV was the parent's fidelity implementation of each PiCS strategy. Fidelity of implementation was coded from 1 = *low-fidelity* to 4 = *high-fidelity*.

In addition to the parent's fidelity and rate use, a performance score demonstrating the combined effect of high fidelity and average rate of strategy use (generalization probe rates were not included) was calculated. To create a performance score, I calculated Sarah's average percentage of high fidelity use for each phase respectively (i.e., Baseline, post-training, coaching, maintenance (maintenance with other coaching + full maintenance)). Next, I calculated the average rate of strategy use for each phase respectively. Finally, I multiplied the average percentage of high-fidelity strategy use by the average rate of strategy use for each phase (see Figure 2 in Chapter 5).

High-fidelity reading technique use. Each observation was coded to calculate fidelity reading technique use to assess the parent's mastery of technique use. The parent received one fidelity score (e.g., Fidelity 3 or 4) at the end of each session. To receive a fidelity score of 4 (Fidelity 4) in reading technique at the end of the reading session, the parent had to use all three technique groups (*Before, During, After*) along with using the *During* techniques at least three times throughout the session.

Rate of PiCS strategy use. Each observation was coded to calculate the rate of targeted PiCS strategies. The rate was defined as the occurrence rate of the behavior per reading session. Rate of the parent's PiCS strategy use (frequency of each strategy per minute) was calculated by

dividing the number of occurrences of the targeted PiCS strategy by the number of session minutes.

Percent of high-fidelity PiCS strategy use. Each observation was coded to calculate the percent of high-fidelity PiCS strategy use to assess the parents' mastery of each strategy (Meadan et al., 2016). For example, to receive a score of 4 (high fidelity) in modeling, the parent had to complete four steps: (1) establish joint attention by focusing attention on the child's specific interest and/or story or picture in the book, (2) present a verbal, vocal or a gestural model that was related to book and/or the child's interest, (3) wait 2-3 seconds for the child to respond, and (4) respond to the child's behavior by providing verbal feedback, repeating the model. To calculate the percentage of high fidelity of targeted PiCS strategy use in each session, the frequency of Fidelity 4 strategy implementation was summed and divided by the total number of targeted PiCS strategies (e.g., modeling or time delay) and multiplied by 100 (see Table 4 for a summary of DVs and their measures).

Child dependent variable. The child DV is the child's verbal and nonverbal communicative behaviors (verbal and nonverbal responding and initiating). Both responses and initiations were coded as single-word, vocal, and gesture topographies. The communication topographies were operationally defined (see Appendix G).

Responses. A response was defined as responding to the parent's communication act by imitating the parent's model and/or responding to the parent's mand. Responses were coded when the child responded to the parent's use of a strategy within a 3-s interval and the response was related to the book. Responses could be verbal or gestural (i.e., child points in response to the question [e.g., "Who is following Rosie?" The child responds by pointing to the fox.]). Throughout the intervention, the first communication target (responses, specifically single-word

responses) was emphasized more as it was the goal indicated by both parents before and after baseline and as the child's communication performance progressed.

Child responses were coded per occurrence. If any of the topographies occurred within 3 seconds of the parent's use of a PiCS strategy it constituted a response. To calculate the percentage of the child's response rate, first the child's responses (all topographies) were summed, then the parent's fidelity 3 and 4 scores in modeling and mand-model were summed. Finally, the sum of responses was divided by the sum of the fidelity 3 and 4 occurrences and multiplied by 100.

Initiations. An initiation was defined as initiating a communicative act 3 s or more after the last communication exchange. Verbal initiations were coded when the child made a comment or asked a question related to the book that was not contingent on a parent utterance. A nonverbal initiation was coded when the child made a nonverbal act to show or share (e.g., point to the book) information about the book. If the nonverbal initiation was paired with a comment (e.g., taps the book and says, "Cookie"), it was counted as both a nonverbal and verbal initiation.

Initiations were coded per occurrence and were tallied to determine the number of times the child initiated communication. The number of times the child initiated communication was a combination of spontaneous initiations and initiations following the mother's use of time delay.

Interobserver agreement. I was the primary coder when calculating interobserver agreement (IOA). A second trained graduate student in the special education department, who was naive to the study purpose and design, was recruited and trained to code for reliability purposes. After reviewing and discussing the definitions, we watched one video together. While watching the video, I narrated the codes I assigned.

Table 4

Dependent Variables and Measures

Dependent variable	How it was measured?
Parent's fidelity book reading technique use	<i>One score for fidelity technique use (e.g., Fidelity 4) at the end of each reviewed (video clip) reading session</i>
Parent's rate of PiCS strategy use	<i>Number of occurrences/ Number of minutes</i>
Parent's fidelity of PiCS strategy use	<i>Σ Fidelity 4 / The total number of targeted PiCS strategy events x 100</i>
Child's communication behaviors	<i>Responses: Σ responses / Σ Fidelity 3 + 4 of M & MM Initiations: Tally count.</i>

Note. DV: Dependent variable. M: Modeling. MM: Mand-model.

After discussing any questions, we viewed a second video and independently coded parent and child behaviors. The secondary coder's data were compared to mine and we discussed the disagreements. Training in the observational codes and definitions continued until we achieved a minimum of 80% agreement for each coded category. These categories included (a) timestamp at which an event (parent strategy use or child initiation) occurred, (b) type of PiCS strategy (modeling, mand-model, and time delay) (c) fidelity level of the PiCS strategy (e.g., Fidelity 4), (d) child's communicative behavior, and (e) type of reading technique. The sessions that were used for training were omitted from the IOA scoring. After achieving 80% agreement, the secondary coder was assigned randomly selected sessions from each phase and condition (e.g., baseline, post-training, coaching, full maintenance) to code.

Agreement was defined as both observers identifying the timestamp with a 3 s sliding scale of the occurrence of a DV and coding each of the DV categories in the same way (see Appendix H for coding form). Fidelity scores of PiCS strategies were assessed for agreement

based on whether the two coders agreed that the participant received the same fidelity score (e.g., 3 or 4) or not (i.e., disagreements between any scores were counted as disagreements). I coded all sessions and the secondary observer independently coded a minimum of 33% of the sessions (see Table 5), selected at random, in each phase and condition of the study. IOA was calculated for each coded category as point-by-point agreement by counting the number of agreements, dividing that by the number of disagreements and multiplying that by 100. These scores are presented in Table 5.

Table 5

Interobserver Agreement (IOA) by Phase

Phase/Condition	Average IOA of coded categories (range)				
(n, % of sessions coded)	Timestamp	PiCS strategy	Fidelity score	Child's behaviors	Reading technique
Baseline (3, 60%)	77 (74-80)	90 (81-95)	81 (60-91)	92 (75-100)	98 (94-100)
Post-training (2, 67%)	93 (83-96)	100 (100-100)	83 (75-94)	86 (79-96)	88 (79-100)
Coaching: RT (1, 50%)	94 -	100 -	100 -	100 -	100 -
Coaching: M (2, 33%)	84.5 (80-89)	97 (97-97)	94.5 (93-96)	100 (100-100)	85.5 (73-98)
Coaching: MM (1, 50%)	89 -	100 -	93 -	100 -	100 -
Coaching: TD (1, 50%)	88 -	100 -	88 -	88 -	88 -
Generalization (2, 40%)	86.5 (77-96)	97 (96-98)	98.5 (97-100)	94 (92-96)	94.5 (92-97)
Full Maintenance (1, 33%)	95 -	100 -	100 -	100 -	100- -

Note. IOA. Interobserver agreement. RT: Reading technique. M: Modeling. MM: Mand-model. TD: Time delay.

Data Analysis

Data were collected and analyzed using traditional techniques of single-case research, including visual/graphical analysis of behavior change (e.g., level, trend, and variability) and the calculation of non-overlapping data points.

Visual inspection included an assessment of stability during baseline and potential changes in the level and trend of behavior in intervention (post-training and coaching phases). Behavior levels and trends from baseline to intervention were examined to determine the amount of change across intervention phases.

Social Validity

In applied research, it is important to determine whether the focus of the study and the behavioral changes that take place during intervention align with the values of the family and society (Wolf, 1978). Social validity was assessed through parent interviews and surveys, and consumer survey ratings (graduate and undergraduate students and practitioners). Social validity data analysis procedures appear in the “Analysis of Social Validity Data” section.

Parent interviews and surveys. The participating parent’s and family member’s (father) satisfaction and perceptions about the overall goals, procedures, and outcomes of the PiCSS study as well as changes in their views of shared storybook reading before and after the intervention were examined. Two parent measures were used. The first measure was pre and post semi-structured parent interview that was conducted before and after the PiCSS study to assess the social validity of the project (see Appendix I for pre-and-post-interview questions). The second measure was a parent survey that was given to the participating parent to complete before and after the study (see Appendix J for pre-and-post parent surveys). The parent survey examined the participating parent’s (mother) perceptions of storybook reading and social communication skills and strategies.

I conducted the pre-study interviews and delivered the pre-and-post surveys and another graduate student in special education who was blind to the study conducted the post-study interviews to minimize parent response bias. The pre-study interviews were audio recorded and

the post-study interviews were video-recorded and transcribed. Both interviews were conducted at a time most convenient to the family.

Consumer ratings. Storey and Horner (1991) recommend consulting with experts to determine whether study target goals, procedures, and outcomes are meaningful for the child and his or her family. These experts could be individuals from the child's family and/or community or professionals with expertise in the child's disability. Therefore, adult raters were recruited to determine if external observers could observe changes in parent and child behaviors from baseline to intervention. Adult raters consisted of graduate and undergraduate students in special education and speech and hearing departments, and practitioners (early intervention [EI] service providers and speech and language pathologists [SLP]) who worked in local programs or organizations.

Survey. A survey that was hosted by a University of Illinois at Urbana-Champaign (UIUC) licensed Survey Gizmo was created. The survey included six 1-minute long video recordings from Sarah and Emily's reading sessions. Three videos from baseline and three videos from the last few coaching sessions (modeling, mand-model, and time delay) were randomly selected and used as part of the survey. Adults rated the parent-child interactions using a 10-statement, five-point Likert-style rating scale (1 = strongly disagree to 5 = strongly agree) (see Appendix K). The adult raters rated the same 10 statements separately for each video clip.

Video clip selection. Across all phases of the study, I videotaped 20 parent-child reading sessions. Of these 20, five were from baseline, and 15 were from intervention sessions. I randomly selected three baseline sessions and three coaching sessions (modeling, mand-model, and time delay) for the social validity survey video pool. From these six sessions, I edited 16, 1-minute long video clips: (a) eight video clips from baseline and (b) eight video clips from

coaching for the modeling, mand-model, and time delay phases. A research team consisting of the interventionist, one faculty member, and a secondary coder (a doctoral student) who helped with coding the family's videos, independently reviewed the 16, 1-min long randomly selected video clips and completed a short video clip eligibility form. The form included the following questions: (a) does the session represent the corresponding phase (e.g., baseline, modeling, mand-model, time delay)? Why or why not? and (b) should we include the video clip in the survey? Why or why not? Each question was asked once for each of the video clips randomly chosen for that phase.

After the research team members reviewed the video clips independently and identified those with the clearest representations of each phase, the interventionist sent the commonly selected clips to the team members again to verify that each clip represented the respective phases. Using this process and after the research team reached consensus, three video clip segments were identified and selected from baseline and three from coaching phases (modeling, mand-model, and time delay).

Recruitment. Students were recruited by sending emails to the student listserve of the special education department and contacting the speech and hearing science department at UIUC to distribute the recruitment message along with a URL link to the survey. Then, practitioners were recruited by contacting the local speech and hearing clinics and early intervention centers. As an incentive, 20 \$10 gift cards were distributed to the participants who participated in a drawing.

Analysis of Social Validity Data

Parent interviews. Parent interviews were transcribed and analyzed to generate summaries. I sent the transcript summaries to the parent to confirm the accuracy of the

summaries and to gain support for my conclusions (Brantlinger, Jimenez, Klinger, Pugach, & Richardson, 2005). The summaries also were sent to the faculty member who served as the advisor of the researcher for confirmation. Next, the faculty member and I met to reach consensus on the summaries.

Consumer social validity ratings. A quantitative approach to data analysis was employed to analyze the consumer (adult) ratings. SPSS was utilized to help in the storage, organization, and analysis of the data. Data analyses consisted of descriptive statistics and paired-samples t tests.

After the consumer rating data were entered into SPSS, I examined the distribution of the scales to determine whether they were normally distributed. An examination of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption to determine whether to proceed with parametric or non-parametric statistics (Gravetter & Wallnau, 2013). Parametric tests were utilized after assuming distribution was normal. Normality was tested using SPSS statistic software and utilizing two main methods: graphic (skewness and kurtosis) and numeric.

Internal consistency of the rating scale for each video clip was assessed using Cronbach's alpha, a commonly used measure of the internal consistency reliability of psychometric instruments. For interpretation, a Cronbach's alpha level of above .70 (i.e., .70-1.00) is adequate, between .66-.69 should be interpreted with caution, and below .65 is generally not acceptable. The results revealed that the internal consistency of the six video clips ratings (10 same rating statements for each video) ranged from .887-.909.

In sum, I employed two methods, single-case research design and social validity measures to examine the effectiveness of the intervention. This allowed me to value the context

and experience of those living in real-world conditions (i.e., parent and child) and on the efficacy of the supports provided to them when analyzing and interpreting data collected.



CHAPTER 4

RESULTS

The primary purpose of this study was to examine if there was a relation between parent training and coaching and the parent's fidelity use of reading techniques and rate and fidelity (quality) of PiCS strategy use (modeling, mand-model, and time delay). Individual results for Sarah, the mother, and her child Emily are presented including parent dependent variables (fidelity of techniques used and rate and fidelity of strategy use) and child's dependent variables (responses and initiations). The findings for each question are presented separately in the following sections.

Overview

To answer the four research questions, a single-case multiple baseline across strategies design was employed and data were collected on the social validity of the intervention which included interviews, surveys, and raters' reviews. Data from the single-case study are presented in Figure 1. The top tier of the figure presents the parent's use of Fidelity 4 (i.e., the highest fidelity) reading techniques (the mother received only one score at the end of each session). The next three tiers of the figure present the parent's rate and Fidelity 4 (i.e., the highest fidelity) data in the multiple-baseline design across the three PiCS strategies (modeling, mand-model, and time delay). In these three tiers, the line graph represents the percent of Fidelity 4 strategy use in each session. The shaded bars represent the average rate that the parent used the strategy, at any fidelity level in each phase. The sessions marked with an open symbol are generalization probes during which parent-child interaction was videotaped with no coaching or feedback provided. The generalization probe session (2/14) during baseline took place at home with storybooks that were different than the five books chosen for the baseline phase (see methods chapter for

details). I checked out three generalization storybooks from a local library and gave them to the mother to be read at home at a time convenient for the family.

Post-training data on all three PiCS strategies and reading techniques were collected after the mother received two separate trainings one on reading techniques and one on PiCS strategies. Coaching was not provided during post-training data collection. Maintenance data on modeling and mand-model that were collected while receiving coaching on time delay are labeled as “Maintenance with Other Coaching” and separated (by a dotted line) from maintenance data collected when all coaching had ended (labeled as “Full Maintenance”). The fifth tier in the figure presents the child’s communication data gathered during the same-videotaped parent-child interaction sessions. In this tier of the graph the line graph shows the percentage of child responses, and the shaded bars reflect the number of times the child initiated communication.

Session Description

Sarah and Emily participated in five baseline sessions, followed by two training sessions (training for reading techniques and training for PiCS strategies) and a total of 15 post-training and coaching sessions (number of coaching sessions vary by each PiCS strategy), and three follow-up (Full Maintenance) probes. Five generalization probes also were collected. Generalization data results are discussed in a separate section.

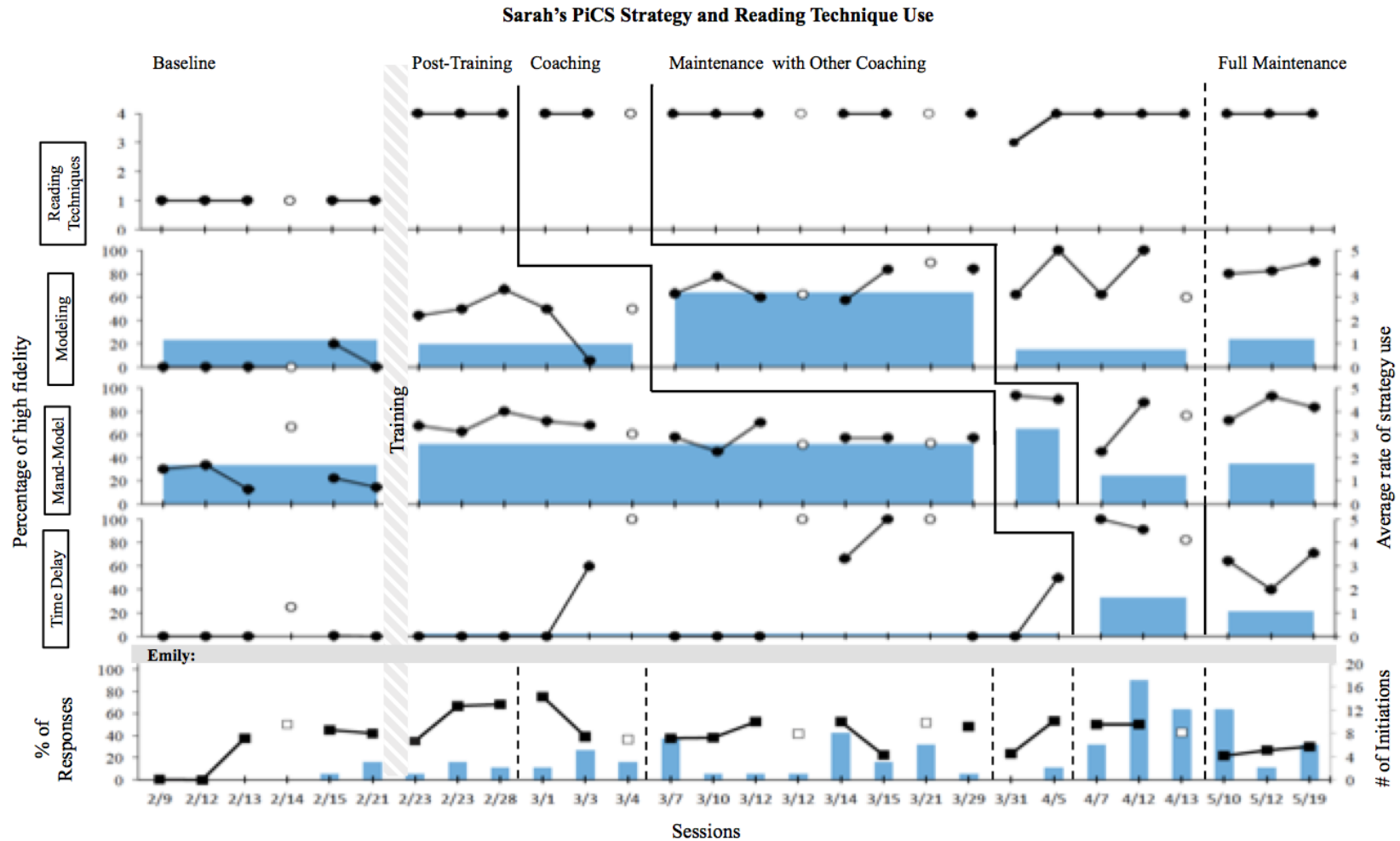


Figure 1. Sarah and Emily's performance.

Note. In Tier 1, the line graph represents Sarah's Fidelity score (e.g., Fidelity 4) in reading technique. In Tiers 2-4, line graphs represent Sarah's percent high-fidelity (Fidelity 4) strategy use; open symbols represent probes for generalization (i.e., no training or coaching provided); shaded bars reflect the average rate at which Sarah used the strategy during each phase; data points in maintenance with other coaching are sessions when coaching is done on another strategy in Tiers 2 and 3 and points in full maintenance are sessions after Sarah met performance criteria for all strategies and all coaching had ended. Bottom tier represents child's communication behavior; line graph shows the percentage of child responses, and shaded bars reflect the number of times the child initiated.

Shared Storybook Reading Techniques and Fidelity of Technique Use

Sarah was taught the following storybook reading techniques: *Before* reading techniques (presenting the book, initial question), *During* book reading techniques (praise/acknowledgement statements and attention getters), and *After* book reading technique (closure question). To receive a fidelity score of 4 in reading technique at the end of the reading session, Sarah had to use all three technique groups (*Before*, *During*, *After*) along with using the *During* techniques at least three times throughout the session (see Appendix F for coding protocol).

In baseline, Sarah used reading techniques with very poor fidelity. In all five-baseline sessions, she received a fidelity score of 1, which means she used only one group of reading techniques. In all five-baseline sessions, she mostly used attention getters, a *During* reading technique. For example, she would say, “look at the tree” while reading the book titled, *The Snowy Day* or “Look Emily” while pointing to character, Curduroy in the *Curduroy* book.

Sarah’s use of Fidelity 4 reading techniques increased in level immediately following training and remained stable throughout the post-training and coaching phases. Although Sarah reached the performance criteria (Fidelity 4 for two consecutive sessions) in three of the post-training sessions, I coached her on the reading techniques for two consecutive sessions (3/1, 3/3) to refine her skills. By doing so, I was able to obtain her reflections and thoughts about the use of those techniques through reflective coaching at the end of each reading session and maintain her use of high-fidelity reading techniques use along with my feedback and suggestions. My feedback included: (a) when and how to deliver feedback/acknowledgement statements when Emily responded and (b) when and how to use attention getters more effectively when Emily was distracted (e.g., using a dramatic or enthusiastic voice, pointing while referring to a picture).

During maintenance for other coaching sessions, Sarah continued to use the reading

techniques with the highest fidelity, except for one session (3/31). For that session, Sarah received a fidelity score of 3 because she did not ask a closure question. During that particular session, Emily was tired when they were done reading the book and attempted to leave her mother's lap before Sarah could ask the closure question and thus Sarah and I decided to end the session without asking a closure question.

PiCS Strategies and Rate and Fidelity of Strategy Use

Modeling (Tier 2). Sarah's data on the three PiCS strategies are presented in Figure 1. Of the 15 total post-training and coaching data points, five of them were collected during the post-training phase, six were collected during the coaching phase, and four were conducted during maintenance with other coaching phase. Also, three full maintenance and four generalization data points were collected.

During baseline, Sarah used modeling with very poor fidelity. She demonstrated a very low and stable level of modeling strategy use. Her percentage of high-fidelity implementation of modeling was zero except for the 2/15 session in which she had a very low percentage (20%). Sarah also used the modeling strategy with very low average rate. Her average rate of modeling use across the five baseline sessions was 1.16 (out of 5.00) (shaded bars) with a range of 0.75-1.33 per minute (generalization probe sessions were not included in the rate calculation for any of the phases).

Sarah's use of high-fidelity modeling increased immediately following the training. Sarah's fidelity of implementation data were variable until coaching was introduced. The average rate at which Sarah used modeling somewhat decreased between baseline and post-training phases. Her average rate of modeling use across five the post-training sessions was 0.96 with a range of 0.40-1.64 per minute in comparison to 1.16 (average rate) in baseline.

When coaching was introduced for modeling, Sarah's rate and level of high-fidelity strategy use increased substantially. Sarah's high-fidelity use of modeling followed an upward trend after the fourth coaching session (3/14) and steadily increased until she reached the performance criteria (i.e., two consecutive sessions of 80% high fidelity use). There was only one overlapping data point between the post-training and coaching phases. During coaching, Sarah's average rate of modeling use across six coaching sessions was 3.2 with a range of 2.0-4.13 per minute in comparison to an average of 0.96 per minute in post-training (see Table 6 below for mean rate of strategy use for each phase across PiCS strategies).

During maintenance with other coaching and full maintenance, Sarah continued to use modeling at a lower rate but with high fidelity with some variability and no changes in trend and level. In comparison to baseline, Sarah's high-fidelity modeling use followed an upward trend with a high level during the full maintenance phase and there were no overlapping data points between full maintenance and baseline, meaning the intervention was very effective.

Table 6

Sarah's Mean Rate and Fidelity Strategy Use for Each Phase Across PiCS Strategies.

Strategy	Phase/ Condition	Mean rate (Range)	Mean fidelity 4 (%) (Range)
Modeling	Baseline	1.16 (0.75-1.33)	4 (0-20)
	Post-training	0.96 (0.40-1.64)	43.5 (5.5-67)
	Coaching	3.20 (2.0-4.13)	71 (57.5-84)
	Maintenance with other coaching	0.73 (0.33-1.13)	81 (62.5-100)
	Full maintenance	1.19 (0.63-1.70)	84 (80-90)
Mand-model	Baseline	1.65 (1.00-2.50)	22.5 (12.5-33)
	Post-training	2.60 (0.88-4.27)	63 (45-80)
	Coaching	3.25 (2.63-3.88)	92 (90.5-93.5)
	Maintenance with other coaching	1.21 (0.85-1.89)	66.5 (45.5-87.5)
	Full maintenance	1.71 (1.40-2.25)	83 (72-93)
Time Delay	Baseline	0.00 (0.00-0.00)	0.00 (0.00-0.00)
	Post-training	0.11 (0.00-0.45)	21 (0.00-100)
	Coaching	1.66 (0.77-2.56)	95.5 (91-100)
	Maintenance with other coaching	N/A	N/A
	Full maintenance	1.04 (0.50-1.75)	58 (40-71.5)

Note. There is no data for Maintenance with Other Coaching in time delay because the intervention ends with time delay phase.

Mand-model (Tier 3). For the mand-model strategy, of the 15 total intervention data points, 11 of them were collected during post-training phase, two were collected during coaching phase, and two were collected during the maintenance with other coaching phase. Also, three full maintenance and four generalization data points were collected.

During baseline, Sarah used mand-model often with relatively stable, low percentages of high fidelity. Her average rate of mand-model use across five baseline sessions was 1.65 per minute with a range of 1.00-2.50. Sarah's use of high-fidelity mand-model increased in level immediately following the training. Sarah reached 80% high-fidelity (2/28) in one session but did not reach the performance criteria (two consecutive sessions of 80% high-fidelity) for mand-model after participating in training. Sarah was relatively stable in the fidelity of her implementation of mand-model during post-training phase. After receiving training, Sarah's rate increased for mand-model. Her average rate of mand-model use across 11 post-training sessions was 2.6 per minute with a range of 0.88-4.27 per minute compared to 1.65 in the baseline.

Upon receiving coaching for mand-model, Sarah's high-fidelity use increased immediately to a very high and stable level of fidelity; she reached the performance criteria in two consecutive sessions. Sarah slightly increased her rate of mand-model use upon receiving coaching. During coaching, Sarah's average rate of mand-model use across two coaching sessions was 3.25 with a range of 2.63-3.88 per minute compared to 2.6 in post-training.

During the maintenance phases, Sarah implemented the strategies at lower rates than during coaching but maintained relatively levels of high fidelity. During maintenance with other coaching, Sarah first showed a downward trend in her high fidelity implementation, but that was followed with an upward trend and level in the consecutive sessions. In comparison to baseline, Sarah's high-fidelity mand-model use followed an upward trend with a high level and slight

variability during the full maintenance phase. There were no overlapping data points between full maintenance and baseline, meaning the intervention was very effective.

Time delay (Tier 4). For the 15 time delay intervention data points, 13 were collected during the post-training phase and two were collected during the coaching phase. Also, three full maintenance and four generalization data points were collected.

In baseline, Sarah did not use the time delay strategy with one exception (2/14-generalization probe session). Her average rate of time delay use across five baseline sessions was 0.00 with a range of 0.00-0.00. After training, changes in Sarah's implementation of time delay varied substantially until coaching was introduced. Her use of high-fidelity time delay showed some increase in level with extreme variability. For the first five sessions after training, there were no changes in trend, level, or variability. Sarah reached 66.67% fidelity and 100% high fidelity on two data sessions (3/14 and 3/15) with very low rates (0.38 and 0.22 respectively). However, she did not reach the performance criteria (two consecutive sessions of 80% and above with high-fidelity in the presence of proximal coaching) for time delay after participating in training. Sarah's average rate of time delay use across 13 post-training sessions was 0.11 with a range of 0.00-0.45 per minute compared to 0.00 in the baseline.

Coinciding with coaching, Sarah's rate and level of high-fidelity strategy use immediately increased for time delay. She used time delay with high fidelity at relatively stable and high percentages and reached performance criteria in two consecutive sessions. Her average rate of time delay use across two coaching sessions was 1.66 with a range of 0.77-2.56 per minute compared to 0.11 in post-training.

During full maintenance, Sarah applied time delay at lower rates than during coaching but higher rates than during baseline and post-training, and she maintained low levels of fidelity

implementation than during coaching. In comparison to baseline, Sarah's high-fidelity time delay use was higher both in level and variability during the full maintenance phase and there were no overlapping data points between full maintenance and baseline, meaning the intervention was effective.

In sum, during baseline, Sarah used modeling rarely, mand-model relatively often, and time delay never. After receiving training, her rate decreased slightly for modeling, increased for mand-model, and remained low for time delay. After receiving training on all three strategies, changes in Sarah's implementation varied until coaching was introduced. A substantial increase in the rate at which she implemented modeling and time delay coincided with coaching. Sarah's rate of using the mand-model strategy increased notably from post-training to coaching and her level of high-fidelity strategy use was notably higher and more stable during the coaching phase. Increases in rate of strategy use for all three strategies were accompanied by a substantial increase in the percentage of high-fidelity use of modeling and mand-model, and increased consistency in the high-fidelity use of time delay.

By using vertical analysis, I concluded that, for all three-strategy tiers, coaching coincided with an increase in the average percentage of high-fidelity use of modeling, mand-model, and time delay. This means, although there were few clear or distinct changes in the percentage of high-fidelity strategy use from one phase to another, Sarah began to engage in consistently high percentages ($\geq 80\%$) of high-fidelity use of PiCS strategies when, and only when, coaching was introduced for each specific strategy.

Generalization. The data for the generalization probe sessions obtained during coaching and maintenance phases for reading techniques showed that Sarah continued to use the reading techniques with the highest fidelity in the absence of proximal coaching or feedback.

For modeling strategy, the data for Sarah's strategy use during the generalization probe sessions were similar to the levels achieved during baseline, post-training, coaching, and maintenance with other coaching. This indicates that Sarah generalized strategy use to storybook reading interactions with Emily in the absence of proximal coaching or feedback and maintained use of modeling strategy after coaching for modeling ended.

Similarly, for mand-model strategy, the data for the generalization probe sessions were similar to the data obtained during post-training and maintenance with other coaching except for baseline where she achieved a higher level. This shows that Sarah generalized strategy use to interactions with Emily in following training and maintained using them after coaching for mand-model ended.

For time delay strategy, Sarah's performance during generalization probe sessions was variable and higher in level to that achieved during post-training. Sarah reached 100% high fidelity on three generalization probe sessions (3/4, 3/12, and 3/21) but used the strategy at very low rates (0.33, 0.16, and 0.5 respectively) during the post-training but did not reach the performance criteria (two consecutive sessions of 80% and above with high-fidelity). The data for the generalization probe session obtained during coaching for time delay demonstrate that Sarah generalized strategy use to storybook reading interactions with Emily in the absence of proximal coaching or feedback.

Performance Score

Although, single-case research data in Figure 1 demonstrate the functional relation between parent training and coaching (IV) and parent's rate and high-fidelity strategy use (DV), a performance score demonstrating the combined effect of high fidelity and average rate of strategy use (generalization probe rates were not included) may provide clarity about the overall

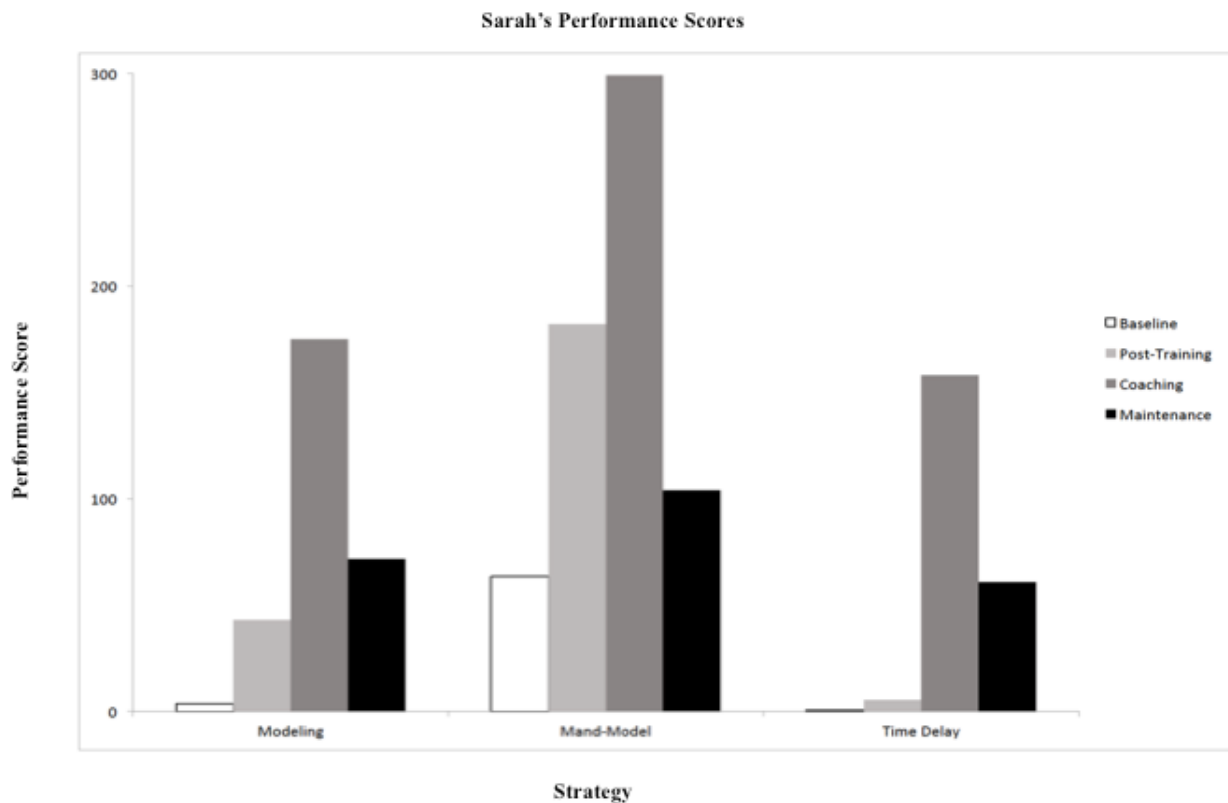


Figure 2. Bar graph of Sarah's performance score for each strategy, calculated by multiplying the average percentage of high-fidelity strategy use by the average rate of strategy use for each phase.

impact (see Sarah's performance scores in Figure 2). Three key patterns emerge from visual inspection of the histogram in Figure 2. First, Sarah's performance scores reflect a clear gain from baseline to post-training for modeling and mand-model. Second, coaching appears to be the intervention component that had the largest impact on the combined measure of fidelity and rate of strategy use (clear for all three strategies). Third, although Sarah's performance scores clearly diminished between the coaching and maintenance phases on all three strategies, her performance in maintenance remained higher than in baseline for all three strategies.

The Parent's Use of PiCS Strategies and the Child's Communication Behaviors

Communication targets for Emily were responses and initiations. Both responses and initiations were coded as single-word, vocal, and gesture topographies. Both communication targets (responses and initiations) were measured throughout the study (see the bottom tier in

Figure 1). The line graph shows the percentage of child responses compared to the parent's use of PiCS strategy use, and the shaded bars reflect the number of times the child initiated communication. The number of times that Emily initiated communication was a combination of spontaneous initiations and initiations following Sarah's use of time delay.

Emily had zero responses during the first two baseline sessions and zero initiations for the first four sessions. Also, visual analysis of the bottom tier in Figure 1 demonstrates that Emily then had a relatively moderate level of responsiveness and low number of initiations during the rest of the baseline phase. Visual analysis also reveals that Emily demonstrated a steady upward trend with a higher level of responsiveness after training (post-training phase) was introduced. After the first session of coaching phase (3/1), Emily's percentage of responsiveness showed a downward trend for two sessions and maintained a steady level with slight variability without an increasing slope or level across coaching phases. There were several overlapping data points between baseline and coaching sessions. However, despite the overlapping data points, Emily's mean level (45.85%) of responses during all four coaching phases was higher than her baseline mean level (24.5%) with several overlapping data points.

Emily did not produce a clear increase in her number of initiations after training was introduced. Her frequency of initiations increased during several coaching sessions (3/3, 3/7, 3/14) with notable variability. The highest and most stable level of initiations appeared to increase, when coaching on time delay was introduced. Finally, during full maintenance, Emily's frequency of initiations diminished somewhat but remained well above baseline levels. During the full maintenance phase, her response to her mother's strategy use declined to baseline levels. Figure 3 represents Emily's response topography given her mother's use of PiCS strategies. For example, across six baseline sessions, Emily used three single-word responses,

three vocal responses, and 17 gestural responses. By coding the topography of Emily's communication targets, it becomes clear that her response topographies changed and that she produced more single-word responses over the course of the coaching phases.

During the baseline phase, Emily frequently responded to Sarah's strategy use by gesturing (see Figure 3); 74% of her responses were coded as gestures, whereas 13% of her responses were coded as single-words. For example, she would respond to Sarah's "is this a car a dog?" question by pointing to the picture instead of verbalizing ("car" or "dog"). Across four coaching phases, her percentage of single-word responses increased to 36.6% with the highest level of 46.4% during coaching phase for mand-model followed by 40% during the coaching phase for time delay and 34% during coaching for modeling. Interestingly, across all phases (from baseline to full maintenance), Emily's percentage of single-word responses was at the highest level of 73.6% during the full maintenance phase (see rationale in the "Discussion" chapter). Given these changes in topography, we can conclude that as Sarah received coaching on the targeted PiCS strategies, Emily's single-word responses gradually increased across the coaching phases and maintained three weeks after the intervention ended. However, we cannot assume a functional relation between Sarah's strategy use and Emily's communication topographies.

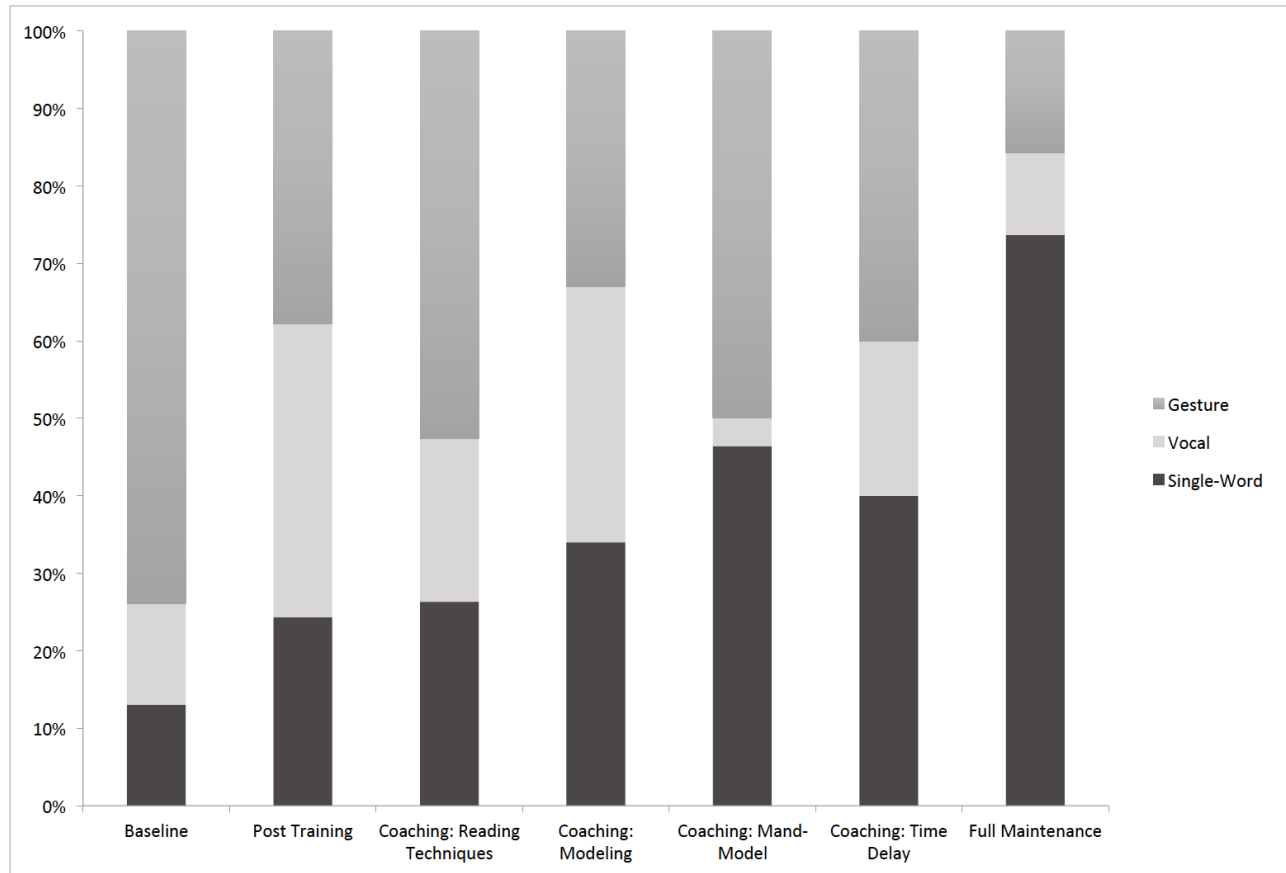


Figure 3. The topography of Emily's responses

Social Validity

Parent social validity measures. Sarah completed pre-and-post study surveys and interviews, and her husband John was interviewed before and after the study. Sarah and John were interviewed on separate days.

Pre-study measures. In her pre-intervention interview when describing her goals for Emily's communication, Sarah said,

I think more, that spontaneous [communication]... well even just being able to ask for the book she wants instead of just pointing. You know, being able to say, "I want this book, I want to read Llama Llama [book]" or whatever.

She hoped that the PICSS program would, "bring out more spontaneous language on her part so that it's not always us having to say... just doing more things on her own and feeling

comfortable with it.” John dreamed of similar goals for Emily’s communication skills, “just expressing her simplest needs, which I think are the building blocks of all those social relationships.”

In a pre-intervention survey, Sarah indicated that, “reading books and watching videos about social interaction... and praising good social behavior...” are effective strategies in enhancing the social communication skill/behavior of young children. She also reported, “in the home, we [both parents] read books and watch videos that demonstrate good social communication.” However, Sarah noted that these strategies were not as effective as she would like for improving Emily’s social communication skills. As a response to an open-ended question in her pre-study survey, Sarah noted,

She [Emily] seems very happy and okay, but maybe, I don’t know, maybe she really does want to engage with people. It is frustrating. But she doesn’t show that, at least. She is very happy to just do her own thing.

In his pre-study interview, Emily’s father, John, explained how she communicates,

She has, since about the age of two, regressed in that she doesn’t speak really much at all, but if she wants something, she’ll use nonverbal cues. She’ll—for example, like a lot of kids her age, she’ll read the same book over and over and over. She will take the book, wrap your hand around it, and kind of force it in your gut. If she wants you to tickle her, she’ll take your hands and place them where she wants to be tickled. But in terms of, like, if she wants milk or she wants—the things that she can’t simply just go and grab, she just won’t communicate that.

Regarding their frequency of reading storybooks, Sarah said,

Every night before bed, and I try to read every day before school when they’re in the car right before we go in, I usually try to read. Each week they pick out a book; they go to their little library at school and they each pick out a book, so I try to...

John also indicated that he reads to Emily frequently,

I’m always home on weekends. So I would say during this period, like where we are now, it’s probably four nights a week [reading time]. And then in the summer and fall, it’s probably closer to six nights a week. It’s kind of my routine.

Sarah indicated that she uses techniques such as,

Asking them [her children] to point to things, find objects in the book, sing songs, have them sit in our lap, and give Emily her favorite blanket and often a chewy to help her focus and engage in storybook reading.

John said that reading with Emily is challenging but he uses some strategies to help Emily calm down,

The goal is to try to get through the book before she tries to wiggle off your lap or slam the book or rip the page of a book... It's more of a commitment for me, like now we're gonna read two more books. Once you turn out the light and you sing, she'll pretty much just relax. So the danger or the temptation is just to say, "Let's just go to that."

Regarding the effectiveness of these techniques, Sarah said, "Pretty good. The kids love books and focus pretty well when we read to them." In addition, in the pre-and-post surveys, Sarah completed a knowledge scale that asked about her knowledge of naturalistic teaching strategies and reading book techniques (see Table 7). Before the intervention, on a scale of 1 to 5 (1=*low*; 5=*high*), Sarah rated her knowledge of and competence in implementing social-communication strategies with a 2 and rated her knowledge of and competence in implementing child engagement strategies in storybook reading with a 3 (see Table 7).

Table 7

Knowledge Scale Results

Question	Pre-intervention rating	Post-intervention rating
Knowledge of social communication teaching strategies.	2	5
Competence in implementing social communication teaching strategies.	2	4
Knowledge of child engagement techniques during storybook reading.	3	5
Competence in implementing child engagement techniques during storybook reading.	3	5

Note. 1 = low, 5 = high

Overall, pre-intervention parent measures showed that storybook reading was important to the family and they used different strategies and techniques to support Emily's communication skills and book engagement but that they were struggling to see positive results.

Post-study measures. Post-study measures included parent surveys and interviews. I assessed the social validity of the intervention by asking the mother to share her perceptions of its goals, procedures, and outcomes using surveys and interviews at the end of the intervention. I also assessed the social validity of the intervention by asking the father to report on his perceptions of its outcomes. The mother perceived the goals, procedures, and outcomes and the father perceived the outcomes of the intervention to be socially valid, but noted room for improvement.

Goals. The goals of the intervention were to (a) improve the mother's fidelity use of the reading techniques; (b) improve the mother's rate and fidelity of use of PiCS strategies; and (c) support the child's communicative competence. The mother and father were asked if the intervention achieved those goals.

Results of the scales in the post-study survey showed that Sarah increased her rating of knowledge of the strategies from 2 and 3 to 4 and 5 and she reported high satisfaction with the goals of the PiCSS program. This indicated that Sarah felt more confident in her ability to support her child's communication skills and engagement during storybook reading at the end of the intervention. Regarding her competence and the ease of implementation of the PiCS strategies, Sarah summarized her perceptions:

It was actually easier than I thought... There were things that I was already doing, but it was a matter of then waiting when I asked questions, or following up and making sure we had joint attention. Those types of things, were things that I wasn't thinking about, I was doing part of it but not all of it.

Sarah rated all items on the post-study survey with a 4 or 5 (1=*low*; 5=*high*) except for one question that she rated with a 3 (“*How useful were the strategies in meeting your child’s communication goals*”) meaning that she perceived the child’s overall goals as not met to the maximum extent possible.

Sarah thought that Emily’s overall language development had not come as close as to what she had envisioned but she indicated that she learned how to generalize the strategies to other behaviors in attempt to have Emily communicate with her,

She’s still not speaking much and so I think overall communication we are still pretty far from where we want to be, but I will say that I have applied some of these techniques to just general behavior, and general throughout the day and it helps. Especially pausing and waiting for her and now I think about it more if she’s clearly wanting something but is not telling me what it is, really kind of making her wait and make her ask for it. I have definitely seen more of that.

John expressed similar opinions, particularly about Emily’s vocabulary, “in terms of Emily becoming more verbal, she’s still pretty much in a non-verbal state. She’ll use words periodically but her vocabulary and things like that, at least to me, haven’t changed since the project began.”

Procedures. Regarding how well the procedures worked for her and whether she enjoyed the procedures or not, Sarah said,

Yeah, I definitely enjoyed it. It just, became part of our schedule. It was a nice thing. And Emma clearly got that too. She would kinda trot in and know that we were going to talk for a little bit, and we were going to read, and then she went and played. And so it was good to see her get that routine.

Sarah noted that some things were initially challenging but with coaching she learned to implement them with more confidence. Sarah said,

Initially, some of them [strategies] were a little challenging cause it just wasn’t natural... but the coaching really helped with just kind of going over it and over it, and having him remind me, “oh here’s how you can do it.” That was helpful.

Regarding the challenging part, Sarah said,

Especially time delay, that was not natural at all, just waiting that long and that much silence but now it is super easy, now that one, actually comes very natural and I can kinda feel when those situations are coming up. And some of the other stuff was pretty obvious, just you know, introducing the book, asking questions, and things like that.

Lastly, regarding future changes in the project, Sarah suggested,

The only thing, looking back I think would have been helpful, would be maybe after each session, after his [interventionist] coaching, if he could provide me a summary of what we talked about during that coaching session, that could have been helpful, just because I got a lot out of the coaching session and then I leave and then chaos erupts and I know that I forget stuff.

She also expressed that some of the reading techniques were not very useful,

There is only two techniques that I still I do them, but I don't like them cause I don't think they're, they haven't been, I haven't seen results from them, it's the introducing the books and asking what it's about and what it was about um, I am not saying that there is anything wrong with them it's just that I don't know, maybe once I have ever gotten a response. So that kinda, and Yusuf would notice that I would get frustrated when I don't get the responses for things. So um, but I still do it and it maybe one day it will come out, but those are the only two that I haven't seen any real results from. Everything else I have definitely seen results.

Outcomes. Sarah indicated that this research study impacted her shared experience with Emily, which may have, in turn, impacted her communication outcomes.

I'd say, a better-shared experience. With her [Emily], it's very clear that she enjoys interaction if you can get it, and if she feels comfortable with it and we haven't quite figured it out because she clearly enjoys having that interaction but it's so hard to get her to do it. So this was nice and that I think it allowed us to have more of those shared experiences that shared joint attention and that she enjoyed it. I think we are getting there to a point where now she associates reading with that being more of a shared thing.

In terms of the outcomes of the study, Sarah expressed her perspective as follows,

We were also doing the PLAY Project and we were trying to schedule that as well and it just got to be too much. And I really felt like this [PiCSS program] was more helpful though I actually put that [PLAY Project] on hold till the summer. It [PiCSS program] was really useful and I was seeing more results out of that than other things, and I was getting more things that I can do to help out of it. With the PLAY Project it's just kind of been like hitting my head against a wall... but with this, every session I feel like I have gotten a little something out of it. So I could then apply it.

Sarah found the mand-model strategy to be especially useful in eliciting responses,

... I would say, “what’s this?” or “point to this” or things like that, but now I am getting much more of it because I am waiting. The pointing was always pretty good, but this, now with saying “what is that?” and giving that time, I was not doing that, and that, I get more than I would expect out of her.

She also indicated that she generalized the strategies to other behaviors as an outcome of the project,

I will say that I have applied some of these techniques to just general behavior, and general throughout the day and it helps. Especially pausing and waiting for her [Emily] and now I think about it more if she’s clearly wanting something but is not telling me what it is, really kind of making her wait and make her ask for it. I have definitely seen more of that. So that’s been really good to help me kind of apply it, shift it from not just the books.

In addition, Sarah noted that she liked the study and requested that it be shared with other people in the community,

I thought it was great, and I’ve talked to Yusuf [interventionist] about, he’s going to do a kind of condensed training for my husband and my husband is very interested in that. I have also suggested about setting something up at the local autism group, because I think there is a lot of value in this and it’s something fairly, I mean once you get used to it, it’s simple things you can do. Whereas something like PLAY Project, that’s very intensive and um, this is and this can just be one book, it can be a five-minute thing so it’s not as stressful.

Regarding child outcomes, in her post-study interview Sarah indicated that the PiCS strategies supported her child’s communication skills overall. In a response to whether the PICS strategies supported her child’s communication during storybook reading or not, Sarah said, “Yeah, I think so, definitely.” Sarah found time delay to be the most useful in having Emily initiate communication with her during storybook reading, “especially like with the time delay, having her finish phrases and things like that. That’s something I really never attempted and didn’t necessarily think she would do [initiate] and she did.” Sarah also thinks that Emily communicated more with her during storybook reading since she started using the strategies. She followed up with her time delay example and said,

For the most part it all of her speech it's just one word, but with that, with time delay especially you can get a couple words together and that's really the only time you get that. So that's really big.

John shared similar observations about Emily's social communicative engagement with her family members. He said,

I would say, during the course of the study, it's hard to know if its maturity or because of this [study]. But I would say during the last few weeks, certainly she is very engaged she does a lot more playing this spring. I notice her playing more with her brother and engage with him more. She seems to be paying more attention when you talk. So last night, it's a small thing, but my wife had put her to bed and I was worried, I had had the windows opened earlier in the day, cause it was hot and I got to thinking about it and said I better make sure that the windows are shut and locked, um, even though they are not really close to her crib. Well I went up there and she was still in her bed awake and said "alright Emily [pseudonym] goodnight" and she did say "goodnight" which I don't think she has ever done. So, it was nice. So I see some changes in the last few weeks.

Regarding Emily's language outcomes, John expressed, "in terms of Emily become more verbal, she's still pretty much in a non-verbal state. She'll use words periodically but her vocabulary and things like that, at least to me, haven't changed since the project began."

Sarah thinks that Emily enjoyed storybook reading more since she has learned the reading techniques. She noted,

She [Emily] will maybe take my hand and point at something... but now what I have noticed especially is that she has a definite preference for, like she'll... I used to just grab a book and read, and now it's very clear that she has a preference for what she would like to read. I think it's those books that you can engage with more. It's definitely the ones she picks are the ones that she definitely does engage with more, and have those opportunities.

Regarding Emily's participation and engagement during book reading, Sarah said,

It depends on her mood. She is a very stubborn child, so um, there were definitely times that, and Yusuf was great about saying "you know what it's just not happening today, like she's just not there today" which is good, you don't want to force it. And I think sometimes I did, I would try to like, "no we are going to read this book, and were going to do it" and sometimes it just wasn't the right time. But yeah, definitely, once you can get her connected, and focused she was great. And she definitely has a preference for types of books she likes and I can kind of now gauge what she's going to like and what she won't like as much. Although we had some surprises too, where we would give her

options we thought for sure she would pick one and she would pick something totally different.

Yet, she also stressed the importance of the reading techniques, “The reading technique of “look” [attention getter] makes a big difference. Or you know, “look” and then making a noise or looking and saying something specific, that has helped a lot in bringing her back.”

Emily’s father noted that Emily’s attentiveness was still a problem for him while he would read to her,

We had a good... with her about a week ago where we went through about an alphabet book and each day, each letter rather, had a word that we really wouldn’t use in most language. She stayed with me for about the first third of the alphabet where she would either say what the thing was or um, you know, seem attentive to it. But at least about half of the alphabet, she was back to not really paying attention. So I think, I don’t know if we made it to the end, and so that part of been the problem is, you need to stick with those things to see the progress, but it’s so unresponsive that it’s almost like, fine we will quit reading we’ll just sing a song or just do whatever, which I know ultimately isn’t really helpful, but that is what often happens.

In sum, the parents reported that the intervention was socially valid. The mother reported that she gained practical, evidence-based instructional skills she could use in their home environment to enhance the social-communication skills of her young child with ASD. Both the mother and father thought that Emily did not make a significant progress in her overall language development, however they have seen improvement in her social-communicative interactions such asking for things that she wanted after they gave her more time to communicate. More importantly, the mother reported, “better shared experience” during book reading where both she and Emily enjoyed the interactive part of the intervention.

Consumer social validity ratings. In total, 70 adult raters attempted to complete the survey during a two-week time period, however only 58 (82.8%) of them completed the entire survey. Of the 58 raters, 38 of them were college students and 20 of them were practitioners. Of the 38 students, 31 were graduate students, and seven were undergraduate students. Of the 20

practitioners, 10 were EI or ECSE service providers and 10 were SLPs. Given this recruitment strategy, it is unclear how many adults received the recruitment message about the study. The video clips were randomly selected from the baseline and coaching phases. The adult raters, who were not informed as to the phase from which the clips were obtained, rated the parent-child interaction using a 10-statement, 5-point Likert-style rating scale (1=strongly disagree to 5=strongly agree). I conducted two separate paired-samples *t* tests. First, a paired-samples *t*-test was conducted to compare adults' ratings of baseline and coaching session interactions between Sarah and Emily. To do so, I calculated mean scores of each rater for the baseline and coaching sessions and combined them respectively. This way, I generated a mean score of ratings for the three baseline video clips and three coaching sessions across all participants. This allowed me to compare the results between baseline and coaching sessions. The results revealed that there was a significant difference in the ratings for baseline ($M = 20.88$, $SD = 8.16$) and coaching ($M = 42.80$, $SD = 6.97$) sessions; $t(57) = -15.705$, $p < .01$. Second, another paired-samples *t* test was conducted to examine if there are statistically significant differences at the item level. I calculated mean scores for each item across three baseline and three coaching video clips. To calculate the means, I first summed item scores across three sessions (e.g., item 1 score = item 1 score in Baseline 1 + Baseline 2 + Baseline 3) and then generated a mean depending on missing values. This allowed me to compare item level results between baseline and coaching. The results revealed that the adult ratings for the baseline and coaching phases were significantly different for all 10 statements ($p < .0001$).

I also conducted independent samples *t*-tests to see if there were statistical differences between the student raters and practitioner raters. No significant differences in the ratings for

baseline and coaching between the two groups were found. That is, the student raters and practitioner raters rated the items with similar means (see Table 8).

Table 8

Results of T-test for Ratings by Rater Groups

Group	Baseline	Intervention	<i>t</i>	<i>p</i>
	<i>M (SD)</i>	<i>M (SD)</i>		
Students	22.2 (8.47)	43.01 (7.78)	1.71	.092
Practitioners	18.4 (7.01)	42.40 (5.25)	0.31	.077

p < .05*; *p* < .01** Note. Variables are listed based on mean values. *M*: Mean. *SD*: Standard Deviation.

Summary

In summary, a 10-week parent-implemented communication strategies intervention during shared storybook reading was employed to examine changes in the parent's use of PiCS strategies and reading techniques, and child's communication skill progress. Data were analyzed using traditional techniques of single-case research, including visual/graphical analysis of behavior change (e.g., level and trend). The results revealed that the mother increased her level of high-fidelity PiCS strategies and reading techniques use during coaching phases. She also increased her average rate of her PiCS strategy use when coaching was introduced.

The parent who participated in this study appreciated the one-on-one coaching and reported an increase in her ability to support her child's social-communication skills. Both the mother and father noticed gains in their child's social communication skills. Adult ratings also revealed that the parent-child reading interactions during the coaching sessions were more positive in terms of parent's use of the targeted techniques and strategies and the child's communication and engagement during book reading.

CHAPTER 5

DISCUSSION

Overview

A 10-week parent-implemented communication strategies intervention that included parent training and coaching during storybook reading for a preschooler with ASD was implemented. This study provides support for the effectiveness of delivering systematic parent training and coaching, and extends the evidence for the PiCS (Meadan et al., 2014a) and i-PiCS programs (Chung et al., 2016; Meadan et al., 2016) as effective models of training and coaching to facilitate parent-implemented communication interventions across different family routines such as storybook reading. The data across tiers provide preliminary information on the associative relations between (a) interventionist coaching strategies and parent strategy use, and (b) parent strategy use and child communication. Sarah learned to implement the targeted reading techniques and three PiCS strategies (modeling, mand-model, and time delay) with high fidelity during shared storybook reading with Emily. Emily's topographies of communication became more sophisticated as she started to use more single-word responses. In addition, both parents (Sarah and her husband) and naïve adult raters (college students and practitioners) found the intervention socially valid. These findings are particularly important because the PiCSS project aligns with recommended practices of building parents' capacity to support children's development during natural routines and activities such as storybook reading (ASHA, 2008; DEC, 2014; IDEA, 2004).

This study was carefully planned to ensure that the quality indicators for single case research described by Horner et al. (2005) were addressed. For example, experimental control was enhanced and threats to internal validity were decreased by (a) providing sufficient data

points in most of phases (i.e., at least three sessions in each phase except during coaching for the mand-model and time delay phases), and (c) observing three demonstrations of a basic effect (i.e., across the three teaching strategies) (Horner et al., 2005; Kazdin, 2011; Kratochwill et al., 2010). In addition, fidelity data, were gathered, interobserver agreement were assessed, and social validity was evaluated (Horner et al., 2005).

This chapter is divided into seven parts: (1) shared storybook reading context, (2) PiCS strategies, (3) training and coaching, (4) child outcomes, (5) parent and child coding systems, (6) social validity, (7) limitations and implications.

Storybook Reading Context

Adults naturally read in different ways to children. There are times when adults may have to use special reading techniques or prompts to facilitate a child's engagement and participation (e.g., dialogic reading prompts). Reading techniques not only facilitate child engagement but also help to elicit responses from the child (Fleury et al., 2014). Adults' fidelity of implementation is noted as an issue in some dialogic reading studies (Whitehurst et al., 1994). Implementation with fidelity may require additional supports such as coaching (Kadaverek, Pentimonti, & Justice, 2014). Observations during baseline sessions indicated that Sarah did not attempt to (a) introduce the book, (b) engage Emily in book reading by using attention getters and feedback, or (c) ask closure questions at the end of the book. The storybook reading technique training and coaching was effective in changing Sarah's reading behavior. When Emily did not attend to the storybooks and did not respond to her mother's strategy use, Sarah would use attention getters to gain Emily's attention. By acknowledging Emily's smallest attempts to communicate or using an attention getter with dramatic voice (e.g., "Look at these big pigs!") to gain her attention, Sarah showed Emily that participation (verbal or nonverbal) was

appropriate and expected. Although the effectiveness of specific reading techniques was not analyzed in this study, the mother appeared to use attention getters with higher frequency. This suggests that the attention getter technique in particular might have contributed to Emily's increased engagement. If parents notice that their children respond to specific types of techniques more consistently than other techniques, it is likely that the parents will continue to use the techniques successfully during future book readings. Sarah's responses from the post-study interview support this hypothesis. While noting the effectiveness of attention getters, Sarah said, "She gets distracted very easily but it [attention getter] helped definitely to bring her back."

Both Sarah and John reported challenges in Emily's engagement and participation. A lack of child engagement during book reading is not unique to this study. Previous research has shown that children with disabilities tend to be less engaged in book reading activities (Fleury & Schwartz, 2016; Koppenhaver, Erickson, & Skotko, 2001) and may actively avoid book reading. Typically developing children may spontaneously point to or comment about what they see in book illustrations or readily respond to their parents' questions. However, children with ASD may require support to engage in the same verbal and nonverbal interactions (Fleury & Schwartz, 2016). Attention getters or acknowledgements (feedback) posed by a parent during book reading may set the occasion for the child to verbally or nonverbally participate in the reading activity.

The storybook reading environment also could be a factor in child's lack of engagement. For example, in the current study, the environment was not the ideal place to read a book with a child. One suggestion for improving child engagement in book reading activities is to create an environment that supports engagement in reading activities, including making reading a part of

the child's daily routine. The environment for children with ASD should be carefully arranged so that they are able to focus on the reading task. Parents can create a comfortable learning environment for their children by designing a specific space for reading that is free from visual or auditory distractions. In addition, parents should describe the daily routine to their children using visual cards and schedules to help their children predict the next activities and facilitate their transitions between routines (Dennis, Lynch & Stockall, 2012).

PiCS Strategies

Research on parent-implemented interventions has shown that parents can be taught to implement intervention strategies with fidelity. In this study, the teaching and coaching of the PiCSS program focused on three evidence-based naturalistic communication-teaching strategies. The findings are consistent with other research that supports parent training and coaching as effective methods to increase a parent's fidelity of implementation and enhance children's communication (Kaiser et al., 2000; Meadan et al., 2014a, 2016; Roberts et al., 2014). Sarah learned to implement the targeted naturalistic teaching strategies with fidelity when she was provided with training and coaching. However, her fidelity percentages were variable across all phases for each of the strategies. For example, during the coaching phase for modeling, it took Sarah six sessions to reach the criteria of 80% or above for two consecutive sessions. There are two possible reasons to explain this. First, modeling was the first PiCS strategy that Sarah was supposed to use with high fidelity. Although she increased her rate of strategy use, she struggled to follow the high-fidelity use procedures.

Second, Sarah seemed very motivated to model new vocabulary from the books and, therefore, she started to model as many vocabulary words as she could which impacted her high fidelity use. For instance, she would often forget to allow the wait time (3 seconds). After a few

coaching sessions, Sarah started to focus on wait time and was more responsive to Emily by acknowledging her responses enthusiastically, thus reaching the criteria.

Sarah used the mand-model strategy more frequently than the other strategies during the baseline phase. This is not surprising given that during everyday interactions, people seem to use more mands (i.e., questions, choices, or requests) than the other forms of communication strategies on which we focused in this study (i.e., modeling and time delay) (Meadan et al., 2014a, 2016). Yet, frequency of strategy use without high fidelity is not adequate to elicit responses from children.

During post-training, Sarah used time delay at a very low rate ($n = 2$) but with high fidelity only on one primary data session. However, when taking rate into consideration, this percentage may be considered abnormal and not representative of the parent's overall mastery of the strategy because the goal of the intervention was to maintain Sarah's fidelity use across numerous implementations of the strategy (i.e., at increased rates). Time delay is reported to be the least frequently used strategy in the literature (Akamoglu et al., 2016; Kashinath et al., 2004; Meadan et al., 2014a, 2016). One reason to explain this is that time delay is as an antecedent strategy that gives the child a reason to communicate (Kashinath et al., 2006), and, therefore, requires more intentional planning and wait time on the caregiver end.

Generalization. Although generalization across settings and books was examined, generalization of the PiCS strategies across different family routines (e.g., snack time) was not investigated. In addition, the frequency with which Sarah used the strategies during the day (e.g., other routines) was not evaluated. Given that naturalistic teaching strategies are applicable across daily routines, Sarah was likely to use these strategies during other routines with Emily. When we met to administer the PLS-5, Sarah, the SLP, and I believed that Emily was much more

talkative. Our observation was confirmed by the standardized assessment results that showed significant progress in Emily's expressive language (see Table 1 in Chapter 3 for assessment results). For example, when Emily held onto the doorknob in an attempt to step out of the room, Sarah asked her, "What do you want?" and Emily replied, "Open door." When I asked whether this was something (request) Emily had done before, Sarah said, "No, I started to use the strategies everywhere and now she is learning how to request." This anecdotal evidence showed two things. First, Sarah believed in the strategies that she learned in the study and second she perceived them as effective strategies in teaching Emily communication skills across different routines. However, as indicated earlier, this was anecdotal evidence and generalization across different family routines was not examined. Yet, Sarah's generalization of the strategies across routines might have had an impact on Emily's communication targets that were not detected during storybook reading sessions. For example, during snack time, Sarah might be more likely to elicit numerous responses from Emily due to the child's motivation to request something to eat or drink. Further, for the parent, some of these strategies could be easier to generalize and to elicit more responses from the child across different routines. Research on parent-implemented interventions has demonstrated that parents might struggle in generalizing their skills across daily routines and activities with their children (Woods et al., 2004), so in this regard, it is noteworthy that Sarah reported that she used the strategies within other routines without being asked or prompted. Although Sarah reported generalization across routines, her behaviors across different family routines were not examined. It is important to examine how parents generalize strategies from one specific routine to other routines. This might be helpful in detecting other child outcomes. Future studies should examine generalization across family routines.

Training and Coaching

Training was sufficient to help Sarah reach the performance criteria for reading techniques. It is possible that these techniques were easier to use compared to the naturalistic strategies because they are more straightforward and focus on engaging the child rather than eliciting responses from children. Training helped Sarah to increase her average rate and high-fidelity use of the modeling and mand-model strategies; however, she did not reach mastery performance criteria ($\geq 80\%$) following training. Therefore, it appeared that training alone was not enough to effect a large visible change in Sarah's behaviors. The results presented in Figures 1 and 2 reveal that it was the coaching phases that resulted in Sarah's increased rate and high-fidelity implementation of the three teaching strategies.

Improved parent behaviors might have been due to the collaborative and supportive nature of the coaching sessions (Dunst & Trivette, 2009). Coaching complements training by facilitating the transfer of knowledge acquired during training into implementation (Joyce & Showers, 2002). However, it differs from training parents in both theory and application. Parent training models increase parents' knowledge and help them acquire skills to demonstrate their use of specific strategies based on the interventionist's plans for the session (Roberts & Kaiser, 2012). However, the PiCS coaching model (Meadan et al., 2014a, 2016) that was adapted in this study, enhanced the mother's competence and confidence by collaborating with her to provide opportunities to refine her skills (Dunst & Trivette, 2009).

Training on reading techniques and the PiCS strategies were delivered on two consecutive days, and then post-training data on all techniques and PiCS strategies were collected. Training on the reading techniques appeared to impact the parent's mand-model performance because the reading techniques entail asking initial and closure questions, which

mirror the mand-model strategy. However, the contribution of that training on mand-model performance was not examined independent of the PiCS training. That is, any effect on mand-model observed during the post-training phase might have been the result of the reading techniques training. It was impossible to distinguish the independent effects of these two trainings in the current study. Future research should deliver training in a staggered fashion and examine the independent effects of each training.

Child Outcomes

To assess child behavior, I focused not only on the two communication targets (responses and initiations) but also on detecting meaningful changes in Emily's communication topography. Although child outcomes were not the primary dependent variables of the study, a connection between Sarah's use of the teaching strategies and Emily's communication behaviors was present. However, there were no clear results regarding Emily's communication behavior in the multiple-baseline analysis with the possible exception of initiations in the time delay coaching phase.

When Sarah demonstrated high rates of high fidelity modeling and mand-model strategies, Emily slightly increased her responding in terms of level, with some variability in trend and stability. However, greater increases with upward trends in Emily's responses, particularly when Sarah demonstrated similar trends in her implementation of modeling and mand-model strategies were anticipated. The minimal changes might have been due to two reasons. First, Sarah had indicated that she often became frustrated when she elicited no response from Emily. Thus, she began to use the mand-model strategy with higher frequencies so that she could improve the likelihood of eliciting responses. When she focused on frequency, her fidelity scores started to decrease. For example, she would skip the wait step or would not

repeat her mand or model. Second, Emily selected one book from three choices at the beginning of each session. However, although Sarah and I thought that Emily had book preferences, on a few occasions she selected books that she did not appear to be interested in very much. Thus, her motivation and interest level in certain storybooks could have influenced her responding.

Emily's evidence of higher frequencies of initiations was expected when Sarah implemented the time delay procedure because this strategy provided Emily more time to initiate communication when she was especially motivated to communicate with her mother. Also, it is possible that when Sarah reduced her use of the mand-model and modeling strategies, Emily had more time to spontaneously initiate communication and thus her initiations increased. Similar results were found in other studies (Meadan et al., 2014a, 2016; Whalon et al., 2016).

It is important to note that changes in child communication could have been enhanced by factors outside of the intervention. For example, maturation and experiences beyond the intervention might have had an impact on Emily's language development. Therefore, the results should not be generalized beyond the participating child. It is critical to interpret the results as a preliminary exploration for this specific dyad and their storybook routine.

Parent and Child Coding Systems

The behavioral recordings (i.e., objective measures) used to assess parent and child behaviors were not sufficiently sensitive to detect meaningful changes in Sarah behaviors and Emily's communication skills. For example, the coding system included information about the type of PiCS strategy used but not the type of the mand the parent used (e.g., open-ended questions, choice question, request statement) or modeling (word, gesture, vocal). If a more sensitive coding measure was used, it could have been possible to assess strategy topographies,

which in turn could have revealed more detailed information about the effect of the parents' implementation of these strategies on their child's communication.

On the other hand, child behavior coding systems included behavior topographies but did not include the function of the child's communication (e.g., comment, request, protest). In addition, only independent child responses were coded; child responses with the parent's help (e.g., holding Emily's finger to point) were not coded. For example, on several occasions, Emily used Sarah's hand to point to a picture on a page but these were not coded. Thus, changes in independent responses were not reflected in the data.

Future analysis might include a more sensitive coding system. For example, researchers should develop child behavior coding systems that include the function of children's communication (e.g., comment, request, protest), and parent behavior coding systems that include information about the type of mand the parent used (e.g., open-ended questions, choice question, request statement).

Social Validity

Assessment of social validity provides important information about the acceptability and importance of intervention programs. This information is especially important because socially valid intervention goals, procedures, and outcomes increase the likelihood that parents will continue to use them (Kazdin, 2011; Turan & Meadan, 2011; Wolf, 1978). In this study, the social validity of the intervention was measured in two ways, parent measures and consumer ratings.

Parent measures. Analyses of the social validity surveys and interviews revealed that Sarah was satisfied with the goals, procedures, and outcomes of the project, and (c) positively impacted her shared-reading experience with Emily.

Goals. Although both the mother and father reported that Emily's communicative interactions improved, they thought her overall language had not progressed as they had expected and that she still was far behind in her language and communication goals. This finding was particularly interesting given the fact that Emily's single-case research data also showed that she did not demonstrate significant changes in her communication goals. However, the standardized assessment results revealed that Emily's expressive language and words has improved significantly. This result suggested that perhaps some changes in parent-child interactions were not detected by the study measures. Perhaps subtle changes in social communication were achieved over the course of the intervention, however different measures are needed to identify such changes. Lastly, it is important to note that the child dependent variable was a secondary variable in this study, which means that the independent variables did not have a direct functional relation with the dependent variables.

Procedures. One of the most salient findings was that Sarah found time delay to be more challenging than other strategies. Similar perceptions are reported in the literature. In their survey study, Akamoglu, Meadan, and Burke (2016) found that parents reported that they used time delay the least frequently and viewed time delay as the least useful strategy. The authors explained, "When parents elicit limited responses from their children, they might be less likely to use time delay and eventually think that this strategy is not very useful" (p. 20).

Sarah also indicated that mand-model was the most useful strategy to elicit responses from Emily. This finding is related to the transactional model, which asserts that communication is bidirectional, and that parents are more likely to be responsive to their children when they elicit responses from them (Yoder & Warren, 2002).

Outcomes. As far as project outcomes, Sarah indicated that she prioritized this project and put other projects on hold (e.g., PLAY project) because this project gave her more opportunities to apply the strategies she learned. This showed that Sarah believed in the study due the study's immediate applicability in her daily life.

Consumer ratings. Obtaining participants' perceptions about the goals, procedures, and outcomes is one way to measure social validity and creating a survey platform and including external observers is another (Meadan, Stoner, Angell, Daczewitz, Cheema, & Rugutt, 2014b). Consumer ratings were a unique method to assess social validity in the current literature. Information gathered from people who are naïve to the study but have expertise or knowledge about parent-child interactions is necessary to determine whether the magnitude of change in the dependent variable is a socially valid. Gathering additional information such as this supplements the comprehensiveness of social validity evaluation. To design a comprehensive evaluation, Meadan et al. (2014b) suggested that, "...we must broaden our focus beyond outcomes and include the following components: (a) appropriate evaluators, (b) an accurate and adequate sample, and (c) a valid instrument (e.g., survey)" (p. 417). The three aforementioned components were applied to the current study to comprehensively measure social validity. This study adds to the literature on social validity assessment methods.

The consumer rating results showed that the magnitude of parent and child dependent variables were socially valid, meaning that the PiCSS intervention resulted in improved parent-child interaction in reading and social-communication. Previous studies (e.g., Halle, 1982; Hemmeter & Kaiser, 1994; Meadan et al., 2014a, 2016) have shown positive results in children's social-communication skills when these strategies were implemented. Additionally, the results of our study confirm that parents, children's first teachers, can be taught and coached to

implement naturalistic teaching strategies. Other research teams found that parents have the ability to implement intervention strategies in natural environments (e.g., Kashinath et al., 2006; Meadan et al., 2014a).

The adult raters' social validity results indicate that there may be some qualitative differences in social engagement and enjoyment of participation that are not detectable in the parent, child, and parent-child variables. These qualitative differences may have to do with the general comfort level of the parent and child, the effort that appears to be going into the interaction, and moments of humor and back-and-forth social exchanges that were not coded (e.g., smiles, eye-contact between the parent and child) (Crain-Thorenson & Dale, 1999). Future research should focus on developing measures to assess these important changes in parent-child interactions.

In sum, social validity must be assessed regularly and in a variety of ways in research studies. As Turan and Meadan (2011) stated, “demonstrating the social validity of an intervention is an important characteristic of early childhood special education interventions that should not be overlooked” (p. 26); the demonstration of social validity must be the norm in early childhood special education research.

Limitations and Directions for Future Research

There are several limitations to this study. First, the intervention presented in this study was conducted in one state with only one family; therefore generalization of the findings beyond this family is limited. Also, the participating parent was a highly educated and motivated mother. Future research should examine the effectiveness of this intervention with more families who represent a broader diversity such as family education attainment, parent interventionist gender, child's disability, and geographic location.

Second, the type of training and coaching provided to the family required an intensive time commitment both for the researcher and family (e.g., meeting 2-3 times a week for about 30 minutes along with 30 minutes travel time) and resources such as storybooks. These resources might not be available to all researchers and service providers; therefore future research could explore conducting the same study design using telepractice (use of videoconferencing and online resources).

Third, the behavioral recordings (i.e., objective measures) for parent and child were sufficient and sensitive only to a certain extent. Future research should include more sensitive measures to detect subtle changes in parent and child behaviors.

Finally, for future research, it is important to investigate which storybooks elicit more responses and also which reading techniques are more effective in engaging children throughout reading. It would be useful to study which coaching components are effective in producing higher fidelity of parent implementation. Understanding coaching as a process and providing data to support its utility would provide a foundation for making parent-implemented interventions more effective.

Implications for Practice

This study has several implications for practice. First, the results expand on previously published work, supporting the importance and effectiveness of parent-implemented interventions for young children with ASD. Previous studies primarily focused on increasing parents' frequency of use of strategies to facilitate children's communication skills (Kashinath et al., 2006; Moore et al., 2013) whereas this study focused on increasing the parent's high-fidelity technique and strategy use. This is especially important given that higher frequency alone without fidelity is not sufficient to facilitate child communication.

Second, it is important not only to teach parents strategies that can enhance their children's communication development but also to partner with them and coach them until they feel competent with the strategy implementation. Having parents reflect on each interaction session is especially critical in individualizing the interventionist's feedback (Dunst & Trivette, 2009).

Thirds, teaching parents strategies to increase the participation of children with ASD in storybook reading activities is important. Children with ASD often have challenging behavioral needs, which might make participation in shared storybook reading a difficult task. Providing support to parents and teaching techniques to make shared storybook reading a successful communication and early literacy routine supports the participation of children with ASD in society. As a result of the current intervention study, the parent increased their strategy use, and also felt more confident about their ability to engage child in storybook reading. This result can have a meaningful impact on the number of opportunities that children with ASD have to participate in early literacy activities. To successfully engage their children in book reading, parents can: (a) carefully arrange a distraction free environment for their children with ASD, (b) select books that align with their children's interests, and (c) periodically provide feedback for engaging in appropriate behaviors such as sitting, listening, and participating.

Finally and most importantly, researchers and practitioners should build rapport with families to facilitate parent learning and implementation. Building rapport is critical for parents to buy-into an intervention. Establishing trusting partnerships with parents on setting goals and modifying study procedures, and a commitment to leave communication channels open and available to each other are important elements in building rapport. For example, when working with families, practitioners can make an effort to obtain the parents' reflections and listen to their

thoughts, concerns, and questions (Curtiss et al., 2016). Moreover, professionals can communicate with family members not only via email but also through telephone calls and messaging, and respond to their texts and calls in a timely fashion. Finally, approaching families in a genuine and friendly manner, and showing an interest in their goals can help to pave the road towards rapport building.

Conclusion

The findings of this study contribute to the evidence base supporting parent-training and coaching interventions that enhance the communication skills of children. The results suggest that providing systematic training and coaching could be one of the support methods to increase parents' fidelity when using reading techniques and naturalistic teaching strategies. The intervention package that included evidence-based practices demonstrated modest effects on both parent performance and child communication. The results of the study contribute to the parent coaching and shared storybook reading literature for young children with ASD, and may be especially relevant for parents who need supplemental supports for their children.

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APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research

Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820



December 7, 2016

Hedda Meadan-Kaplansky
Special Education
288 Education Bldg
1310 South Sixth Street
Champaign, IL 61820

RE: *Parent Implemented Communication Strategies for Young Children with Language Delays:
Shared Storybook Reading Context*
IRB Protocol Number: 17331

Dear Dr. Meadan-Kaplansky:

This letter authorizes the use of human subjects in your project entitled *Parent Implemented Communication Strategies for Young Children with Language Delays: Shared Storybook Reading Context*. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) approved, by expedited review, the protocol as described in your IRB application. The expiration date for this protocol, IRB number 17331, is 12/06/2017. The risk designation applied to your project is *no more than minimal risk*.

Copies of the attached date-stamped consent form(s) must be used in obtaining informed consent. If there is a need to revise or alter the consent form(s), please submit the revised form(s) for IRB review, approval, and date-stamping prior to use.

Under applicable regulations, no changes to procedures involving human subjects may be made without prior IRB review and approval. The regulations also require that you promptly notify the IRB of any problems involving human subjects, including unanticipated side effects, adverse reactions, and any injuries or complications that arise during the project.

If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at <https://www.oprs.research.illinois.edu>.

Sincerely,

Ron Banks, MS, CIP
Human Subjects Research Coordinator, Office for the Protection of Research Subjects

Attachment(s): 2 Consent Forms, 1 Waiver of Documentation

c: Yusuf Akamoglu

APPENDIX B

FAMILY DEMOGRAPHIC SURVEY

Getting to Know You

Thank you for taking time to complete this survey. We want to get to know a bit about you, your child, and your family before you begin the PiCS-Storybook project. All responses are optional and we think it will take about 15-20 minutes to complete this form. Please enter your responses in the gray boxes. Thank you!

About Your Child

Please tell us about your child who will participate in this study.

Name of child:

Sex: ☐ Female ☐ Male

Date of birth:

Disability/Delay as specified in the
Individualized Education Plan (IEP):

Age of diagnosis:

Who is the primary caregiver of the child during the day?

Please check all support services your child currently receives:

- | | | |
|--|---|--|
| ☐ Speech therapy | ☐ Occupational therapy | ☐ Personal assistance |
| ☐ Developmental therapy | ☐ Physical therapy | ☐ Other (please specify): |

How many hours per week does your child receive services in the **home** environment?

How many hours per week does your child receive services **outside the home**?

The following information will help us to better know your child. You can write as much as you would like.

How does your child usually communicate (e.g., gestures, sounds, words, phrases, a combination)?

How does your child let you know what he/she likes and wants (i.e., requesting)?

How does your child let you know what he/she doesn't like or want (i.e., rejecting)?

How does your child get your attention to something he/she has noticed (i.e., commenting)?

Does your child like to read storybooks with you or with other adults?

Does your child have favorite storybooks? What are they?

What are the challenges you have with your child's communication skills?

What strategies do you use at home to enhance your child's communication skills?

What hopes do you have for your child's communication skills?

About Your Family

Please tell us about your child's parent(s)/guardian(s).

Parent/guardian 1:

Name:

Sex:

Age (check one):

- ☐ Younger than 25
- ☐ 25-35
- ☐ 36-45
- ☐ 46-55
- ☐ Older than 55

Marital status (check one):

- ☐ Single
- ☐ Married
- ☐ Divorced
- ☐ Widowed

Race/ethnicity (check one):

- ☐ American Indian and Alaskan Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Two or more races

Highest educational level or degree (check one):

- ☐ High school or GED
- ☐ Associate's degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree
- ☐ Other

Parent/guardian 2:

Name:

Sex:

Age (check one):

- ☐ Younger than 25
- ☐ 25-35
- ☐ 36-45
- ☐ 46-55
- ☐ Older than 55

Marital status (check one):

- ☐ Single
- ☐ Married
- ☐ Divorced
- ☐ Widowed

Race/ethnicity (check one):

- ☐ American Indian and Alaskan Native
- ☐ Asian
- ☐ Black or African American

Highest educational level or degree (check one):

- ☐ High school or GED
- ☐ Associate's degree

- | | |
|--|--|
| ☐ Hispanic or Latino | ☐ Bachelor's degree |
| ☐ Native Hawaiian or Other Pacific Islander | ☐ Master's degree |
| ☐ White | ☐ Doctorate degree |
| ☐ Two or more races | ☐ Other |

Please use the following categories to provide an approximate estimate of your family's annual income:

- ☐ Less than \$10,000
- ☐ Between \$10,000 and \$25,000
- ☐ Between \$25,000 and \$45,000
- ☐ Between \$45,000 and \$65,000
- ☐ Between \$65,000 and \$85,000
- ☐ Between \$85,000 and \$100,000
- ☐ Greater than \$100,000

Thank you so much for completing this survey!

Adapted from The i-PiCS Program. PI: Dr. Hedda Meadan.
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APPENDIX C

SHARED STORYBOOK READING TECHNIQUES HANDOUT

Before Book Reading

Presenting the Book:

- Say the **title** and **author** of the book to your child before beginning to read.
 - This book's title is *Say What?* and written by *Angela DiTerlizzi*.
- **Ask** your child **at least one question** to build your child's interest in the story.
 - "What do you think this book is about?"
 - "Do you think this book is about animals or the cars?"

During Book Reading

Feedback/Acknowledgement/Encouragement Statements:

- Provide **feedback, acknowledgement, or encouragement statements** to your child.
 - "I like how you are sitting so nicely with mommy!"
 - "Look at how well you turn the page"
 - "I like how you asked me so nicely"
 - "You're right" or "Yess, this is a truck" in the form of feedback.
 - "Yess/Yeahh" with animated voice to acknowledge the child's response.

Attention Getters:

- Use verbal, nonverbal, or a combination to focus your child's attention on the storybook.
 - "Look at that" (pointing to the picture or using a dramatic voice).
 - "Oh, this is so silly" (smiling/laughing while making a comment on picture or story).

After Book Reading

Closure Questions:

- At the end of the book, **ask your child at least one question** to maintain her interest in the story or to relate the story to her life.
 - Which animal makes a funny sound, a Cow or a Sheep? Why?
 - What sound does our dog make?

APPENDIX D

FIDELITY CHECKLIST FOR TRAINING SESSION 1

(Shared Storybook Reading Training)

Family: _____

Session Date: _____

Person Completed: _____

Y: Yes, N = No

Provide general information about the importance of shared storybook reading and using the context of book reading to promote communication and language.	Y ☐ N ☐
Introduce shared book reading techniques that include <i>before</i> , <i>during</i> , and <i>after</i> strategies (e.g., presenting the book, attention getters, feedback, etc.) to the parent and give handouts about the strategies.	Y ☐ N ☐
Explain the <i>before</i> , <i>during</i> , and <i>after</i> book reading techniques (e.g., presenting the book, attention getters, feedback, etc.) that can improve child engagement and participation in storybook reading.	Y ☐ N ☐
Show video examples of parents' use of reading techniques.	Y ☐ N ☐
Have the parent practice the before, during, and after book reading techniques with me (interventionist).	Y ☐ N ☐
Provide suggestions and feedback.	Y ☐ N ☐
Review the training and address questions and concerns.	Y ☐ N ☐
Totals: Yes ____ No ____ Yes/(Yes+No) X 100= ____	

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APPENDIX E

FIDELITY CHECKLIST FOR TRAINING SESSION 2

(PiCS Training)

Family: _____

Session Date: _____

Person Completed: _____

Y: Yes, N = No

Explain to the parent the format of the training and ask the parent to feel free to stop the training at any time to ask questions and share his/her concerns.	Y ☐ N ☐
Give information about social communication behaviors and young children with language delays (i.e., many young children with disabilities have delays and/or impairments in their social and communication behavior. An important component in social and communication intervention for children with disabilities is using their natural environments and routines.)	Y ☐ N ☐
The purpose of our training is to learn how to use naturalistic strategies. We are going to review three naturalistic strategies: (1) modeling, (2) mand-model, and (3) time delay.	Y ☐ N ☐
Review parent handout and flowchart for (1) modeling (2) mand-model, and (3) time delay strategies.	Y ☐ N ☐
Watch video clips that demonstrate the use of the strategies, commenting on the way the parent or caregiver in the clips used the strategy. Ask the parent if they have any questions.	Y ☐ N ☐
Ask parent to explain each PiCS strategy in her/his own words and provides an example.	Y ☐ N ☐
Have the parent practice all three PiCS strategies with me (interventionist) in a shared book reading context.	Y ☐ N ☐
Provide suggestions and feedback.	Y ☐ N ☐
Create an action plan with the parent that describes how the parent will use each PiCS strategy during reading sessions.	Y ☐ N ☐
Review the training and address questions and concerns.	Y ☐ N ☐
Totals: Yes ____ No ____ Yes/(Yes+No) X 100= ____	

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APPENDIX F

COACHING FIDELITY CHECKLIST

Family: _____

Person Completed: _____

Y: Yes, N = No

Review storybook reading strategies and/or the targeted PiCS strategy with the parent.	Y ☐ N ☐
Provide feedback on the previous session by showing the video clip and explaining what she did well and what needs improvement.	Y ☐ N ☐
Parent and child engage in dialogic storybook reading until the end of the book.	Y ☐ N ☐
Observe the parent and child while they are engaged in storybook reading without prompting/coaching.	Y ☐ N ☐
Parent reflects on his or her own performance.	Y ☐ N ☐
Provide the parent with suggestions and feedback.	Y ☐ N ☐
Ask the parent if he or she has any concerns or questions and problem solve if there are any concerns or issues.	Y ☐ N ☐
Totals: Yes ____ No ____ Yes/(Yes+No) X 100= ____	

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APPENDIX G

CODING MANUAL

1. PiCS Strategies Coding Definitions

- a. Code to indicate the type of teaching strategy Modeling, Mand-Model, or Time Delay.
- b. Code, on a new line, one strategy each time the parent uses a naturalistic teaching strategy.
- c. If the parent is responding to a child initiation with a naturalistic teaching strategy, code the initiation on one line, and begin a new line to record the strategy use and the remainder of the interaction.
- d. If the parent uses a naturalistic teaching strategy, and within one second repeats it or uses another (same strategy), code these as one naturalistic teaching strategy use:
 - i. If one of these teaching strategies was a mand-model, code as a mand-model.
 - ii. Time stamp must be coded for the last one.
 - i. Example: Parent: “What is this?” at 00:50. Then at 00:51 Parent repeats: “What is that?” code at 00:51.
 - ii. Parent: “What is this?” at 00:50. Then at 00:51 Parent repeats: “What is that?” at 00:52 “What is that John?” Code the last one at 00:52.
 - iii. Time delay does not fit into this rule. Because the procedure of establishing joint attention and looking expectantly for 5-15 seconds without giving explicit instruction, time delay cannot be used within 1 second of a mand/model.
- e. If the parent uses a naturalistic teaching strategy and uses another naturalistic teaching strategy between 1-2 seconds after the end of the first strategy, code the first use as one strategy with a quality of 1 or 2, and begin a new line to record the second strategy use and the remainder of the interaction.
- f. If the parent repeats a naturalistic teaching strategy because someone (the child or a third party) was talking, do not code the first use and code the repeated use.

2. Correct Use (Fidelity) of Naturalistic Teaching Strategy

- a. Code correct use (fidelity) of naturalistic teaching strategy use as 1, 2, 3, or 4 (as described below)
- b. Code fidelity each time the parent uses a naturalistic teaching strategy.
- c. Correct Use of Naturalistic Teaching Strategy Use (Described below)

Operational Definitions

1. Parent use of Naturalistic Teaching Strategy – Parents use one of three types of naturalistic teaching strategies (i.e., Modeling, Mand-Model, and Time Delay).
 - a. Modeling: Modeling is a teaching strategy in which the parent uses demonstrations to teach the child new words, phrases, signs, or gestures. The first step in modeling is to establish joint attention by focusing attention on the child or the child’s specific interest. Next, the parent presents a model that is related to the child’s interest. If the child

responds correctly to the model by imitating, the parent gives the child immediate positive feedback.

i. Examples:

1. Referring to ball picture in the book, the parent says, “Blue ball!” (Parent expects the child to imitate.)
2. The parent says, “More, please.” (Parent expects the child to imitate.)
3. The parent says, “Look at the *shoes*.” (Parent expects the child to imitate *shoes*.)
4. The parent says, “No.” (Parent expects the child to imitate.)
5. The parent says, “Gorilla.” (Parent expects the child to imitate.)
6. The parent says, “There is the *gorilla*” pointing to the gorilla.
7. While reading the text on the page, the parent says, “the lion” as part of the text but points to the “lion” picture.

ii. Nonexamples:

1. The parent asks, “What do you have?” (Code as a mand-model).
2. The parent asks, “What is this?” (Code as a mand-model).
3. The parent says, “Say ‘gorilla.’” (Code as a mand-model).
4. The parent reads, “They’re going to unlock the lion” from the text but does not point or show the “lion” picture on the page (This is reading the text and therefore, there is no Modeling).

- b. Mand-model: The mand-model strategy is very similar to the modeling strategy. Mand-model differs from modeling by including a verbal prompt in the form of a question (e.g., “What do you want?”), a choice (e.g., “Is this an apple or a banana?”), or a mand (e.g., “Tell me what you want” or “Say ‘more please’”).

The first step in the mand-model strategy is to establish joint attention by focusing attention on the child or the child’s specific interest. Next, the parents say a mand that is related to the child’s interest. If the child responds correctly, the parent gives the child immediate positive feedback.

i. Examples:

1. The parent asks, “Is this an apple or a banana?”
2. The parent asks, “Do you want to turn the page?”
3. The parent says, “Say ‘more please.’”
4. The child points to a picture (child initiates) and the parent asks, “What is this?”
5. When reading a book, the parent points to pictures and asks, “What’s this?” or “How about this?”
6. The parent gives an instruction/mand, “Let’s turn the page” OR “Turn the page” OR “Turn” by holding the page and expects the child to turn the page.

7. Parent says, “Can you tell me what color this is” expecting the child to respond with the name of the color. NOTE: This is a mand because the parent expects the child to respond with an answer (color) other than “YES/NO” so it is NOT a YES/NO question.
- ii. Nonexamples:
 1. The parent says, “Ball.” (Parent expects the child to imitate. Code as modeling).
 2. Parent asks a “Yes/No” question, “Can you say ‘ball’?” or “Is this a gorilla?”
 3. The parent says, “Yes.” (Parent expects child to imitate. Code as modeling).
 4. The parent says, “No.” (Parent expects child to imitate. Code as modeling).
- c. Time Delay: Time delay is a strategy that encourages children to initiate communication within a routine or regular activity where the child understands the expectations based on past patterns. This strategy is especially helpful in encouraging children to ask for help, to ask for food or toys, or to ask for permission. The first step in time delay is to establish joint attention. Once the parent has established joint attention, he or she looks expectantly at the child, and waits 3 to 7 seconds to see if the child will request help or the object she/he wants. If the child requests correctly, the parent gives the child immediate positive feedback.
 - i. Examples:
 1. While reading the storybook *Edwin Speaks Up* by April Stevens, the parent says “Edwin dropped one large box of ____ (sugar) on to the belt” by leaving the sentence incomplete and looks at her child expectantly for 5 s to complete the sentence by saying “*sugar.*”
 2. The parent and child are taking turns turning the pages. The parent holds the page and looks at the child expectantly to turn the page or until the child says, “*My turn!*”
 - ii. Nonexamples:
 1. The child points to a picture in the book. The parent looks expectantly at the child and says, “*Tell me what this is?*” (Code as mand-model).
 2. The parent and the child are looking at a blue ball picture. The child initiates by saying “*ball.*” (Code as initiation, with no teaching strategy use).
2. Correct Use of of Naturalistic Teaching Strategy – The fidelity of the parent’s correct use of a naturalistic teaching strategy depends on several criteria. Joint attention is the process of sharing one’s experience of observing an object or event via nonverbal means, such as following another’s eye gaze or pointing. If the child responds to the parent or the referent object, you can assume joint attention exists, even if the child was not looking at the parent or referent object. General Guidelines:

- Wait time (2-3 s) has to be intentional, meaning the parents intentionally waits for the child to respond. If there is a natural pause while turning the page, do NOT consider as wait time.
 - Even if the parent waits for 2-3 seconds but there is NO Joint Attention then code as Fidelity 1.
 - If the parent uses the all four steps of the Fidelity procedures (Joint attention, presents the naturalistic strategy, waits 2-3 seconds, and provides feedback even IF the child does NOT respond, then score as Fidelity 4.
 - Do NOT code Fidelity 4 if the parent's feedback to the child's responses is in the form of a Yes/No question.
 - If the child responds to the parent's strategy (e.g., Mand-model) within 3-5 s despite parent's follow up Yes/No question, score as Fidelity 4.
- a. When parent uses modeling:
- i. Fidelity 1 – The parent presents a verbal or a gestural model that is related to the child's interest and/or story/picture in the book (no joint attention).
 - ii. Fidelity 2 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal or a gestural model that is related to book.
 - iii. Fidelity 3 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal or a gestural model that is related to book AND waits 2-3 seconds for the child to respond.
 - iv. Fidelity 4 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal or a gestural model that is related to book AND waits 2-3 seconds for the child to respond AND responds to the child's behavior by providing verbal feedback, repeating the model, or using the mand-model strategy.
- b. When parent uses a mand-model:
- i. Fidelity 1 – The parent presents a verbal prompt in the form of a question, a choice, or a mand. (No joint attention).
 - ii. Fidelity 2 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal prompt in the form of a question, a choice, or a mand.
 - iii. Fidelity 3 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal prompt in the form of a question, a choice, or a mand AND waits 2-3 seconds for the child to respond.
 - iv. Fidelity 4 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND presents a verbal prompt in the form of a question, a

choice, or a mand AND waits 2-3 seconds for the child to respond AND responds to the child's behavior by providing verbal feedback, repeating the mand-model or using the modeling strategy.

c. When parent uses time delay:

- i. Fidelity 1 – Parent looks expectantly at the child, but no joint attention.
- ii. Fidelity 2 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND looks expectantly at the child for less than 5 seconds.
- iii. Fidelity 3 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND looks expectantly at the child for 3-7 seconds.
- iv. Fidelity 4 – The parent establishes joint attention by focusing attention on the child's specific interest and/or story/picture in the book AND looks expectantly at the child for 3-7 seconds AND responds to the child's behavior by providing verbal feedback, or using the mand-model or modeling strategy.

2. Correct Use (Fidelity) of Shared Storybook Reading Strategy

- d. Code correct use (fidelity) of book reading strategy use as 1, 2, or 3 (as described below)
- e. Code fidelity each time the parent uses a book reading strategy.
- f. Correct Use of Shared Storybook Reading Strategy (Described below)

Operational Definitions

3. Parent use of Shared Storybook Reading Techniques – Parents use one of three types of reading techniques (i.e., Presenting the book, initial question, feedback/acknowledgement/encouragement statements, attention getters, feedback, and closing question). These techniques are categorized as *Before*, *During*, and *After* reading techniques. *Before* reading techniques include *presenting the book* and *initial question*, *During* reading techniques include *feedback/acknowledgement/encouragement statements* and *attention getters* and *After* book reading technique includes *closing question*.

a. Presenting the book: The parent says the title and author of the book.

i. Examples:

1. "This book's title is *Edwin Speaks Up* and is written by April Stevens.

ii. Nonexamples:

1. "This is book is about Edwin (without saying the title). He is a little boy."
2. "This is an old book, written 10 years ago."
3. Do NOT code if the parent ONLY presents the title and does not say the author (or vice versa).

b. Initial Question: Parent asks the child at least one question to build child's interest in the story.

i. Examples:

1. "What do you think this book is about?"

2. “Do you think this book is about Gorilla’s or the little boy Edwin?”
- ii. Nonexamples:
 1. The parent says what the book is about without asking a question, “This book is about Edwin.”
 2. Yes/no question. The parent asks, “Is this book about Edwin?”
- c. Feedback/Acknowledgement/Encouragement Statements: The parent provides feedback, acknowledgement, or encouragement statements to the child.
 - i. Examples:
 1. Parent: “I like how you are sitting so nicely with mommy!”
 2. Parent: “Look at how well you turn the page”
 3. Parent: “I like how you asked me so nicely”
 4. “Yess, this is a truck” or “You’re right” in the form of feedback.
 5. “Yess/Yeahh” with animated voice to acknowledge the child’s response.
 - ii. Nonexamples:
 1. Parent: “Okay”
 2. Parent: “Is it a truck?”
- d. Attention getters: The parent uses verbal, nonverbal, or combined methods to focus the child’s attention on the storybook.
 - i. Examples:
 1. Parent: “Look at that” (parent pointing to the picture or using a dramatic voice)
 2. Parent: “Oh, this is so silly” (smiling/laughing while making a comment on picture or story)
 3. The parent says, “Look at the *shoes*” pointing to “shoes” picture (Code also as Modeling because parent expects the child to imitate *shoes*.)
 - 4.
 - ii. Nonexamples:
 1. Parent: “Okay, let’s keep reading” (without providing any prompts to direct child’s attention while the child is distracted).
 2. Parent: “Let’s look at this picture” (without using any dramatic voice to direct child’s attention).
 3. Parent: “Do you want to look here?” (asking a yes/no question to maintain the child’s attention).
 4. Do NOT code as Attention Getter if the parent is describing something in the book

Example:

 - a. “Oh, he got the elephant out.”
 - b. “Oh, there is the Gorilla (Code as Modeling for *Gorilla*).

- e. Closure question(s): At the end of the book, the parent asks the child at least one question to maintain their interest in the story or to relate the story to their lives.
 - i. Examples:
 - 1. Which do you like better, caterpillars or butterflies?
 - 2. How do you feel when you eat too much food at dinner?
 - ii. Nonexamples:
 - 1. What is this book about?
 - 2. What did you eat at snack? (unrelated to the story or book).
- 4. Correct Use of Shared Storybook Reading Techniques – The fidelity of the parent’s correct use of book reading techniques depends on use of *Before*, *During*, and *After* reading techniques. Therefore, code fidelity after watching the whole video-footage.
 - a. When parent uses Before techniques:
 - i. Fidelity 1 – The parent uses only one group of reading techniques (e.g., only Before OR During strategies throughout the reading session).
 - ii. Fidelity 2 – The parent uses only two groups of strategies (e.g., only After AND Before strategies throughout the reading session).
 - iii. Fidelity 3 – The parent uses all three of the groups (i.e., Before, During, AND After strategies throughout the reading session).
 - iv. Fidelity 4 – The parent uses all three of the groups (i.e., Before, During, AND After strategies by using the each During strategy at least three times throughout the reading session).

Child Communication Definitions

Child’s Communication Behavior – The child’s communication behavior can include responding to the parent’s communication act, initiating a new communication exchange, or not responding to the parent’s communication act (i.e., none).

Child Response: When a child responds, he/she uses a verbal, vocal, or gestural communication behavior to communicate in response to the parent’s use of a teaching strategy. Responses will be classified as verbal single-word, vocal, or gesture.

- a. Verbal single word response: A single word response is a single word voiced by the child that is understood as a single word and not a vocalization to respond to parent’s strategy (e.g., modeling, mand-model) within 3-5 s. Recognizable single word that may not be articulated perfectly but is understandable to the viewer as a conventional word.
 - i. Examples:
 - 1. The parent asks, “Is this a ball or shoe?” and the child says, “ball.”
 - 2. The parent asks, a “wh” question such as, “What is he doing?” and the child says, “splash.”
 - 3. Parent: “What is it?”
 - 4. Child: “Cow”
 - ii. Nonexamples:
 - 1. The parent uses a strategy and the child begins crying.

- (Code the child's communication behavior as none).
2. The parent says, "let's turn the page" and the child says, "No." (This is not a response because the parent's communication was not a teaching strategy).
- b. Verbal multiple-word response: A multiple-word response is voiced by the child and is understood as multiple words to respond to parent's strategy (e.g., modeling, mand-model) within 3-5 s.
Recognizable multiple words that may not be articulated perfectly but are understandable to the viewer as conventional words.
- i. Examples:
 1. The parent asks, "Is this a ball or shoe?" and the child says, "This is a ball."
 2. The parent asks, a "wh" question such as, "What is he doing?" and the child says, "He's splashing"
 3. Parent: "What is it?"
 4. Child: "It is a cow"
 - ii. Nonexamples:
 5. The parent asks, "Is this a ball or shoe?" and the child says, "ball." (Code as single-word response)
 6. The parent uses a strategy and the child begins crying. (Code the child's communication behavior as none).
- c. Vocal response: Vocal responses are non-word or unintelligible verbal utterances voiced by the child to respond to parent's strategy (e.g., modeling, mand-model) within 3-5 s.
Utterances that are coded as vocal responses are those that cannot be understood as single or multiple words. They include speech sounds such as /ba/, /k/, /do/, /gr/, /m/, approximations of words, motor sounds (e.g., "vroommm") and animal sounds (e.g., "moo")
- i. Examples:
 7. The parent asks, "Is this a ball or shoe?" and the child says, "baa."
 8. The parent asks, a "wh" question such as, "What is he doing?" and the child says, "splaa" for "splash."
 - ii. Nonexamples:
 1. The parent uses a strategy and the child begins crying. (Code the child's communication behavior as *none*).
 2. Crying/whining/screaming,
 3. Abnormal vocalizations (like screeching)
 4. Sigh
 5. Lip smacks
 6. Tongue clicks
 7. Grunts
 8. Involuntary noises such as hiccups
- d. Gesture response: Gesture response is defined as pointing toward the picture, text or page in the book or manipulating the parent's hand to respond to a

question or strategy (e.g., modeling) within 3-5 s to communicate with the parent.

i. Examples:

1. The parent asks, “Which one is a ball?” and the child points to “ball.”
2. The parent asks, a “wh” question such as, “Where is snowman?” and the child points to “snowman.”

ii. Nonexamples:

1. The parent asks, “where is snowman?” and the child points to another picture (code as *none*).
2. The parent uses a strategy and the child begins crying. (Code the child’s communication behavior as *none*).
3. The parent says, “let’s turn the page” and the child says, nods his/her head for “No.” (This is not a response because the parent’s communication was not a teaching strategy).

Child Initiation: When a child initiates a communication act, he/she uses a verbal, gestural, or vocal communicative behavior to begin a communication exchange with the parent. To be coded as initiation, the child’s communication act must either be within the use of a Time Delay strategy by the parent or begin 3 seconds or more after the end of the last communicative act. If the child begins/initiates a spontaneous communication with the parent after 3 seconds or more after the end of the last communicative act, then code that line as “initiation” (based on the below classified initiations) without any coding any parent strategy (except for “Feedback/Acknowledgement technique”). All initiations will be defined as single word, vocal, and gesture.

- a. Verbal single word initiation: A single word initiation is a single word voiced by the child that is understood as a single word and not a vocalization to begin communication with the parent. Recognizable single word that may not be articulated perfectly but is understandable to the viewer as a conventional word.

i. Examples:

1. After 5 seconds of no communication exchanges between the parent and the child, the child points to a picture and says “snow.”
2. Within the use of a time delay strategy by the parent, the parent says “Edwin dropped one large box of ____ (sugar) on to the belt” by leaving the sentence incomplete and child says, “sugar.”
 - a. For this item, time delay will be considered only if the book was read to the child before. Therefore, please refer to PiCSS Log notes to check if the child is familiar with this book.
3. While the parent is reading a text on the page and the child looks at the parent and says “Splash” (referring to “splash” in the page/picture) 3 s after the last communicative act.

- ii. Nonexamples:
 - 1. The parent says, "Say cat," and the child responds after 1-2 seconds with "cat". (Code the child's "cat" as a *single word response*).
 - 2. The parent says, "Say cat," and the child responds after 1-2 seconds by pointing to "cat" picture. (Code as a *gesture response*).
- b. Verbal multiple-word response: A multiple-word initiation is voiced by the child and is understood as multiple words to begin communication with the parent.
Recognizable multiple words that may not be articulated perfectly but are understandable to the viewer as conventional words.
 - i. Examples:
 - 9. The parent asks, "Is this a ball or shoe?" and the child says, "This is a ball."
 - 10. The parent asks, a "wh" question such as, "What is he doing?" and the child says, "He's splashing"
 - 11. Parent: "What is it?"
 - 12. Child: "It is a cow"
 - ii. Nonexamples:
 - 13. The parent asks, "Is this a ball or shoe?" and the child says, "ball." (Code as single-word response)
 - 14. The parent uses a strategy and the child begins crying. (Code the child's communication behavior as none).
- c. Vocal initiation: Vocal initiations are non-word or unintelligible verbal utterances voiced by the child to begin communication.
Utterances that are coded as vocalizations are those that cannot be understood as single or multiple words. It includes speech sounds such as /ba/, /k/, /do/, /gr/, /m/, approximations of words, motor sounds (e.g., "vroommm") and animal sounds (e.g., "moo")
 - i. Examples:
 - 1. After 5 seconds of no communication exchanges between the parent and the child, the child says, "lii" for "lion"
 - 2. Within the use of a time delay strategy by the parent, the parent says "Edwin dropped one large box of ___ (sugar) on to the belt" by leaving the sentence incomplete and child says, "su" to complete the sentence.
 - 3. While the parent is reading a text on the page, from the child, the child vocals "moo" 3 s after the last communication act.
 - ii. Nonexamples:
 - 1. The parent says, "Say cat," and the child responds after 1-2 seconds by saying, "caa". (Code the child's response for "cat" as a *vocal response*).
- d. Gesture initiation: Gesture initiation is defined as pointing toward the picture,

text or page in the book or manipulating the parent's hand to begin communication with the parent.

i. Examples:

1. After 5 seconds of no communication exchanges between the parent and the child, the child points to a picture of "lion."
2. Within the use of a time delay strategy by the parent, the parent says "Edwin dropped one large box of ____ (sugar) on to the belt" by leaving the sentence incomplete and child points to "sugar" picture to complete the sentence.
3. While the parent is reading a text on the page, the child points to a picture on the page 3 s after the last communication act.

ii. Nonexamples:

1. The parent says, "Say cat," and the child responds after 1-2 seconds by pointing to "cat". (Code the child's gesture for "cat" as a *gesture response*).

- e. None: When a child's communication behavior is none, the child is not responding to the parent's use of a teaching strategy, although joint attention was established. The child does not verbally or non-verbally respond to the parent strategy within 5 s.

i. Examples:

1. The parent has established joint attention and asks, "What is he doing?" and the child only continues to look at the parent.
2. The parent has established joint attention and says, "Say lion," and the child looks around the room.
3. Off-topic responses/initiations, such as child echoing a word or song from a movie that is unrelated to the book.

ii. Nonexamples:

1. The parent has established joint attention and asks, "is this a car or an animal?" and the child makes an audible utterance with no intelligible words, but the utterance has meaningful intonation. (Code as a vocal response).
2. The parent has established joint attention and says, "Say lion," and the child says, "No." (Code as a single word response).

General Guidelines for Coding Child Communication

- Do not code any vocalization/utterance if you are unsure of whether the child vocalized/spoke or not.
- Code only vocalizations or gestures that the child is directing towards anything related to the book (e.g., pages, pictures, text) or parent.
- Do NOT code “response” if the child responds to parent’s “Yes/No” question.
- Do NOT code as “gesture response” if the child receives physical assistance from the parent to point to pictures (e.g., holding the child’s finger).
- Do NOT code as “gesture initiation” if the child holds the parent’s finger/hand to point to a picture.
- Do NOT code gestures if they are off-topic and not directed towards anything related to the book or parent and you are not sure of the purpose of the behavior.
 - For example, if child is pointing in the air.
 - Parent: points to the cheetah and asks, “What is it?”
Child: “A, B, C, D, E ...” (sings the alphabet song) (incorrect and off-topic)
 - Important!! Parent: points to the cheetah and asks, “What is it?” Child: “lion” (incorrect, but on-topic) (code as *single-word response*).
- If a gesture continues for a long period of time (*for example, the child may point to a picture for 10 seconds or more*) code as two gestures only if the gesture is interrupted by the child moving hand or body and then the gesture is repeated.
 - *For example, the child may be pointing to a picture, may retract her hand and then point to the picture again. This counts as two gestures. If child doesn’t move her hand at all, it counts as 1 gesture.*
- Code as vocalization if child uses transcribable sounds with clear function (response, request, comment) even if there is some emotion (like excitement or happiness). Do not code if child is clearly upset or if the vocalization is just the child’s excited or happy sounds.

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APPENDIX H
CODING FORM

Family: S.B **Session:** Coaching Modeling 5 **Date:** 3/15/17 **Clip Length:** 9:00 **Coder:** YA **Reading Technique Fidelity:** 4

Clip Time	Parent PiCS Strategy	Fidelity	Child's Communication Behavior	Parent Reading Technique	Comment
00:06	xxx	xxx	xxx	Presenting the book	
00:12	Mand-Model	3	None	Initial Question	Mom: "What do you think this book is about?"
00:15	Mand-Model	4	None	Initial Question	Mom: "What do you see?" Mom: "What's this?"
00:18	Mand-Model	3	None	xxx	Mom: "What's this?"
00:22	xxx	xxx	Gesture initiation	xxx	Child points at the picture.
00:42	xxx	xxx	None	Attention Getters	Mom: "Look at the bear"
00:45	Modeling	4	None	xxx	Mom: "You see his shoes" Mom: "Shoes"
03:28	Mand-Model	4	Single Word Response	Feedback/Acknowledgement	Mom: "Where is your chin?" Child: "Chin" Mom: "Chin"
03:39	Mand-Model	4	Gesture Response	Feedback/Acknowledgement	Mom: "Let's turn the page" Child turns Mom: "Good"

APPENDIX I

PARENT INTERVIEW QUESTIONS

Pre-intervention

1. Tell me about your child's communication skills and behavior.
2. Tell me how you and other family members communicate with him/her.
3. Are there challenges regarding your child's communication skills/behavior?
 - a. If yes, can you describe the challenges?
 - b. Have there been challenges for your family regarding your child's communication skills?
 - c. Please describe any challenges for other family members.
 - d. How does your child's communication skills affect him/her?
4. How often do you read storybooks to your child?
 - a. What kind of books, stories and characters does your child usually enjoy?
 - b. Tell me about what happens during a typical reading routine?
 - c. Does your child enjoy reading storybooks with you?
 - d. Does your participate in storybook reading? If yes, how?
 - e. Are there any challenges regarding your child's communication skills and/or participation during reading?
5. What are your hopes and dreams for your child related to communication skills? What do you hope our PiCS-Storybook intervention will do for your child?
6. What goals do you have for your child's communication and language for the next 1-year?
7. What goals do you have for your child related to storybook reading?
8. What do you hope the PiCS-Storybook intervention will do for you and for other members of your family?

Post-intervention

1. How easy/feasible were the PiCS strategies (Modeling, Mand-Model, Time Delay) to incorporate into storybook reading?
2. Did PiCS strategies support your child's language during storybook reading? If so, how?
3. Did PiCS strategies support your child's social communication/engagement during storybook reading? If so, how?
4. How easy/feasible were the book reading techniques to use during storybook reading?
5. Did book-reading techniques support your child's participation and engagement during storybook reading? If so, how?
6. Do you think your child enjoyed reading more during storybook reading?
7. Do you think your child communicated more with you during storybook reading? Why or why not?
8. Did PiCS-Storybook intervention support your child's overall communication goals? How?
9. Please describe what was effective about the PiCS-Storybook intervention (e.g., training, coaching, books).
10. Please describe what was ineffective about the PiCS-Storybook intervention (e.g., training, coaching, books).

11. Please describe your overall perspective on the outcomes of the PiCS-Storybook intervention, for both you and your child.
12. Is there anything you would change about the PiCS-Storybook intervention?



APPENDIX J

PARENT SURVEYS

Pre-intervention

We would like to know what you think about social communication behavior (i.e., the use of communication to carry out interactions in social environments), what strategies you are using to enhance your child's social communication behavior, and storybook reading. Please complete this short questionnaire.

1. To what extent do you think social communication behavior is important for preschool-age children? Please explain.
2. How would you describe a young child with good social communication skill/behavior?
3. What strategies do you think are effective in enhancing the social communication skill/behavior of young children?
4. What strategies do you currently use at home to enhance your child's social communication skill/behavior?
5. How effective are the strategies that you currently use to enhance your child's social communication skill/behavior?
6. To what extent do you think reading storybooks is important for preschool-age children? Please explain.
7. What strategies do you currently use to engage your child during storybook reading?
8. How effective are the strategies that you currently use to engage your child's during storybook reading and support his/her social communication skill/behavior?
9. On a scale of 1 to 5 (1=*low*; 5=*high*) rate your:
 - a. Knowledge of social communication teaching strategies.
1 2 3 4 5
 - b. Competence in implementing social communication teaching strategies.
1 2 3 4 5
 - c. Knowledge of child engagement techniques during storybook reading.
1 2 3 4 5
 - d. Competence in implementing child engagement techniques during storybook reading.
1 2 3 4 5

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Parent Survey (post-intervention)

We would like to know what you think about the PiCS-Storybook project you participated in.

Please complete the following short questionnaire.

On a scale of 1 to 5 (1=*low*; 5=*high*) please rate the following:

1. The information provided to you during naturalistic strategies training.
1 2 3 4 5
2. The guidance provided to you during coaching.
1 2 3 4 5
3. How satisfied you are with the overall project procedures.
1 2 3 4 5
4. How easy it was to incorporate the communication strategies into storybook reading.
1 2 3 4 5
5. How useful the strategies were in meeting your child's communication goals.
1 2 3 4 5
6. How satisfied you are with the overall project outcomes for your child.
1 2 3 4 5
7. How satisfied you are with the overall project outcomes for you.
1 2 3 4 5
8. Your knowledge of naturalistic teaching strategies (i.e., environmental arrangement, modeling, mand-model, and time delay).
1 2 3 4 5
9. Your competence in implementing naturalistic teaching strategies.
1 2 3 4 5
10. Your knowledge of child engagement techniques during storybook reading (i.e., before, during, after reading techniques).
1 2 3 4 5
11. Competence in implementing child engagement techniques during storybook reading.
1 2 3 4 5
12. Your enjoyment in implementing naturalistic teaching strategies.
1 2 3 4 5

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APPENDIX K

ADULT RATING SCALE

Tell us who you are:

Grad Student ☐ Undergrad student

Major/Department: Special Education ☐ Speech and Hearing Science ☐ Other _____

Special Education Teacher ☐ Speech and Language Pathologist ☐ Other

(The following three questions will be asked only to practitioners in the survey.

Students will not see these questions).

1. How long have you been working in your profession?
2. With what age group do you work?
3. With what disability groups do you work?

Please rate the following questions after watching each video clip.

1. The parent is making attempts to encourage social communication/interaction.

**Strongly
Disagree**

☐

**Somewhat
Disagree**

☐

**Neither Agree
Nor Disagree**

☐

Somewhat Agree

☐

**Strongly
Agree**

☐

2. The child responds to the parent's attempts to encourage social communication/interaction.

**Strongly
Disagree**

☐

**Somewhat
Disagree**

☐

**Neither Agree
Nor Disagree**

☐

Somewhat Agree

☐

**Strongly
Agree**

☐

3. The child is initiating social communication/interaction during the storybook reading.

**Strongly
Disagree**

☐

**Somewhat
Disagree**

☐

**Neither Agree
Nor Disagree**

☐

Somewhat Agree

☐

**Strongly
Agree**

☐

4. The parent is responsive to the child's communication attempts.

**Strongly
Disagree**

☐

**Somewhat
Disagree**

☐

**Neither Agree
Nor Disagree**

☐

Somewhat Agree

☐

**Strongly
Agree**

☐

5. The parent is modeling new vocabulary to the child.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐

6. The child is imitating the parent's models.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐

7. The parent is giving instructions, asking questions, and/or giving choices to elicit responses from the child.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐

8. The child is responding to the parent's instructions, questions, and/or choices.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐

9. The parent is giving the child time (3-5 seconds) to respond.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐

10. Overall, the storybook reading activity seems to be mutually enjoyable for both the parent and child.

**Strongly
Disagree**
☐

**Somewhat
Disagree**
☐

**Neither Agree
Nor Disagree**
☐

Somewhat Agree
☐

**Strongly
Agree**
☐