

EFFICACY OF CAREGIVER TRAINING TO ESTABLISH JOINT ATTENTION OF  
CHILDREN WITH AUTISM

By

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To all the families living with autism, a heartfelt thank you for all their dedication, hard work, passion, and focus in making their children's lives better

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## LIST OF ABBREVIATIONS

ABA	Applied Behavior Analysis
ADI-R	Autism Diagnostic Interview
ADOS-G	Autism Diagnostic Observation Schedule-Generic
AS	Asperger's syndrome
ASD	Autism Spectrum Disorder
CRC	Complete Reading Cycle
DTT	Discrete Trial Training
IJA	Initiation of Joint Attention
JA	Joint Attention
MITS	Meaningful Interactions Through Storybooks
NELP	National Early Literacy Panel
PDD-NOS	Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS)
PDD	Pervasive Development Disorder
PI	Pervasive Interest
PRT	Pivotal Response Training
RJA	Response to Joint Attention
SES	Socioeconomic Status

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The purpose of this study was to examine the effectiveness of a caregiver implemented intervention of children with autism during storybook reading. Caregivers were taught four interactive reading strategies in an attempt to increase children's joint attention skills. A multiple probe, multiple baseline across participants was used to examine the effectiveness of the Meaningful Interactions Through Storybooks (MITS) intervention. Results of the study displayed that caregivers were able to effectively implement the MITS intervention. In addition, caregivers were able to maintain and generalize the MITS intervention after the training was completed. In addition, increases in the children's joint attention skills and expressive language were observed. As a result, these findings support that the MITS intervention was able to produce changes in caregivers' storybook reading strategies.

## CHAPTER 1 INTRODUCTORY REMARKS

Bruner's (1978) research has demonstrated that young children comprehend the world around them through joint interactions. Described as two persons sharing attention on the same external object through the use of gaze or gestures, joint attention (JA) is considered a fundamental milestone in part because it contributes to a child's learning of a variety of object labels, thus enabling a child to make sense of language around them (Jones & Carr, 2004; Murray et al., 2008; Vismara & Lyons, 2007). For children with autism, the lack of joint attention results in the difficulty of the acquisition of language and social skills (Schertz & Odom, 2007; Vismara & Lyons, 2007). Through the use of joint attention interventions positive results have been shown for children with autism in the areas of responding to joint attention bids and initiation joint attention with others (e.g., Ingersoll & Schreibman, 2006; Isaken & Per Holth, 2009; Jones & Feely, 2007; Martin & Harris, 2006; Taylor & Hoch, 2008; Whalen & Schreibman, 2003).

One daily routine, not yet examined as an early intervention to increase joint attention, is called shared storybook reading. Shared storybook reading is a natural activity in which a parent and child partake in communicating, shared joint attention, and it advocates the growth of language and social participation, two core deficits for children with Autism Spectrum Disorder (ASD). The aim of this study is to examine the effectiveness of a caregiver-implemented intervention. Through shared storybook reading, this intervention is designed to increase joint-attention in young children who are on the autism spectrum.

Chapter 1 defines ASD, describes joint attention and language problems ASD children display, and depicts the importance of early intervention to better develop these

skills. Chapter 2 examines the early interventions that assist young children with ASD in developing joint attention and the benefits of shared storybook reading interventions are analyzed. Chapter 3 discusses the methodology, intervention, data collection, treatment integrity, and social validity in further detail. Next, Chapter 4 displays the results of the study. Chapter 5 discusses the results, implications for future research, and limitations of the study.

## **Background for the Study**

### **Autism Defined**

In 1956, Kanner and Eisenberg provided the first diagnostic criteria for autism. The criteria had two factors: “a profound lack of affective contact” and “repetitive, ritualistic behavior, which must be of the elaborate kind” (p. 58). Today, many of the behaviors that were observed by Kanner and Eisenberg are still seen in the current diagnostic criteria in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association [APA], 2004).

Classified as a Pervasive Development Disorder (PDD), individuals with autism are commonly characterized as having delays or abnormal developments in social and communicative development. In addition, these individuals often show restricted and stereotyped patterns of behavior and/or interest (APA, 2004). Experts frequently refer to autism as a spectrum disorder due to the range of symptoms and skills individuals display. For the purpose of this proposal, ASD will include the conditions of autism, Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), and Asperger’s syndrome (AS).

Language delays and impairment are the hallmark features of individuals with ASD. These deficits include difficulty using spoken language, making gestures, an

inability to imitate, and/or sustain appropriate conversation are among the most common reasons for initial referrals of young children suspected of having autism (Thurm, Lord, & Lee, 2006). Although there is heightened awareness, an increase in early identification, and expanding research on ASD, the majority of children are not diagnosed until after they reach the age of 4 (Centers for Disease Control and Prevention [CDC], 2012). This is problematic, as research indicates that early intervention leads to significant developmental gains for children with ASD (Ingersoll & Gergans, 2006; Jones & Carr, 2004; Mundy & Crowson, 1997).

The number of children diagnosed with autism has increased greatly during the last decade. According to the Centers for Disease Control and Prevention (CDC, 2012) approximately 1 in 88 children has an autism spectrum disorder marking a 23% increase in the past two years. Although there have been numerous theories that attempt to explain the increase in the number of children identified as having symptoms of autism, there is still no known cause. What researchers do know is that the number of cases of autism continues to increase, but it is unclear if this rise is due to “the disorder itself, better diagnostic tests, more inclusive classification guidelines, misdiagnosis, or some combination of these”: no matter the cause autism now affects a substantial number of people in this country (Steuernagel, 2005, p. 138). With the multifaceted nature of ASD, combined with the current lack of genetic or/and biologic markers for early and consistent identification, the study of factors leading to a diagnosis of ASD has become a challenging task (Tomanik, Pearson, Loveland, Lane, & Shaw, 2007).

Professionals use a variety of screening tools, observations, and evaluations to diagnose this disorder. A diagnosis of autism according to *International Classifications*

of *Diseases-Tenth Revised* (ICD-10) and the *DSM-IV-TR* (American Psychiatric Association, 2004) involves a multidisciplinary evaluation method that includes a detailed developmental history, description of current behaviors, assessment of cognitive and language abilities, and observations of functioning in a variety of settings. Once the information is gathered there is a consensus on the data collected (e.g., standardized diagnostic instruments in combination with clinical judgment, and at least two or more professionals within the ASD field). Today, the *Autism Diagnostic Interview* (ADI-R) and the *Autism Diagnostic Observation Schedule-Generic* (ADOS-G) are two of the most common standardized diagnostic tools (Le Couteur, Haden, Hammal, & McConachie, 2008).

### **The Importance of Joint Attention**

In recent years, there has been a wave of early interventions that focus on joint attention behaviors (Nozomi, Tsuchiya, Yamamoto, & Nakamura, 2008). Although there are numerous definitions of JA, the commonly accepted critical components of joint attention are described as two persons sharing attention on the same external object through the use of gaze, head turn, or making gestures. Joint attention is considered a fundamental milestone, in part because it contributes to a child's learning of a variety of object labels, thus enabling a child to make sense of language around them (Jones & Carr, 2004; Murray et al., 2008; Vismara & Lyons, 2007). Children with ASD have notable difficulties with JA, which exacerbate language delays. Bruner's (1978) research has demonstrated that young children use JA to help them comprehend the world around them. From gaining knowledge of novel words to understanding the events happening in the child's environment, JA plays a pivotal role in language

acquisition. It is widely noted that a deficit in joint attention is one of the earliest and most common signs of autism (Dube et al., 2004).

### **The development of joint attention**

Joint attention (JA) typically begins to occur between the ages of 9 to 15 months. Although numerous definitions of JA are found throughout the literature, the term is commonly classified into two forms: response to joint attention and initiation of joint attention (Bakeman & Adamson, 1984; Dube, MacDonald, Mansfield, Holcomb, & Ahearn, 2004; Jones, Carr, & Feeley, 2006). Response to JA is the earliest form of joint attention and occurs when a child's gaze shifts between an object, or event, and a communicative partner in their environment (Dube et al., 2004). As the child develops, this response becomes more sophisticated; the child's focus shifts from an object to the caregiver and then back to the object. Eventually children pair the gaze alternation with gestures and with age, incorporate speech (Jones et al., 2006). Initiation of JA takes place when the child seeks out another's attention and typically occurs around 12 months of age (Bruinsma, Koegel, & Koegel, 2004). This form of JA uses conventional gestures (e.g., pointing, showing) to direct another person's attention. As with response to JA, initiation of JA becomes more complex with growth, pairing gestures with alternative gazes and eventually language (Jones et al., 2006).

### **Joint attention and development of language skills**

The main function of JA is social, as children utilize JA to interact with another person about an object or event in their environment (Jones & Feeley, 2007; Mundy & Crowson, 1997). For example, when a young child sees a dog they might point or look at the adult as if to say, "Look with me at that dog." Following the child's bid for attention, an adult typically comments on the object of JA with a comment, such as,

“That is a big black dog.” Through the processing of labeling and expanding on objects and events, children start to associate objects with the spoken word. Joint attention enables a child to map the adult’s vocal labels to the correct object of interest (Mundy, Sullivan, & Mastergeorge, 2009).

The relationship between JA and language development has been long acknowledged (Farrant, Murray, & Fletcher, 2011; Tomasello & Todd, 1983). For example, Tomasello and Todd’s (1983) seminal study examined the effects that JA had on language development during mother-child play. The typically developing children were between the ages of 12 to 18 months and were observed during natural play interaction with their mothers. Tomasello and Todd reported that the amount of time the dyads spent in joint focus of an object or event positively correlated with the child’s overall vocabulary. The study was replicated comparing singletons to twins (Tomasello, Mannle, & Kruger, 1986) and results were similar, showing positive correlation between the amount of time a child was engaged in joint attention at 15 months to vocabulary size at 20 months.

More recently, Farrant et al. (2011) examined the relationship between socio-emotional engagement, imitation, and development of conversation skills in children’s language development. Ninety-five caregiver/child dyads participated, and the results of the discriminant functions analysis suggest that socio-emotional engagement fosters communication skills. Farrant et al. accomplished this through creating a model that they tested with a group of typically developing children and then with children who had a specific language impairment. The children with language deficits had significantly lower socio-emotional engagement due to lower child imitation, joint attention, and

conversation skills. They reported that the skill of JA is naturally found throughout socio-emotional engagement; consequently these interactions facilitate the growth of JA and warrant further research.

Children with a deficit in JA will have difficulties with shared experiences. The lack of shared interactions makes it significantly difficult to acquire language, as the development of JA skills are critical for these developmental milestones (Woods & Wetherby, 2003). Early identification of children with ASD with a deficit in JA is essential. Once a child is identified with ASD, the focus can be on providing effective communication interventions that will benefit their future social and academic functioning.

### **Joint Attention Impairment in Autism**

Children with ASD have significantly more difficulty following head turns, eye gaze, and pointing than their typically-developing peers (Ingersoll & Gergans, 2006; Jones & Carr, 2004; Jones & Feeley, 2007; Murray et al., 2008; Vismara & Lyons, 2007). Mundy's (1990) longitudinal study of joint attention and language development of autistic children lends credence to the idea that important indicators of language occur prior to verbalizations. For example, children's preverbal ability to coordinate their attention between an object and a person ultimately allows them to understand the expressions and gestures being used by others (Mundy).

Loveland and Landry's (1986) research addresses the development of language and JA skills in autistic children as compared to their development in children with developmental language delays. They concluded that specific language deficits that characterize autism are developmentally related to the failure of JA mechanisms in infancy and early childhood. Due to the impairment of JA that children with ASD

display, the syntax and semantics of language that are usually acquired during this pertinent stage of development are repressed. Therefore, the strategies and techniques that are acquired to use the pragmatics of language effectively need to be explicitly taught.

Murray et al. (2008) examined the relationship between JA and language in 20 children with ASD. Using the receptive language subtest of the *Mullen Scales of Early Learning* (MSEL) and *Mean Length of Utterance* (MLU) and *Type Token Ratio* for expressive language, Murray et al. found that the child's ability to respond to JA bids correlated with receptive language scores as well as the length of a child's utterance. The more responsive a child was to a person's bid for JA the higher their receptive language scores were and longer response utterances were given. The implications of this study suggest that JA interventions could influence a child's language development as the interactions between child and adult yield positive gains.

Typically developing children acquire language through everyday experiences because they are immersed in interactions that increase their language opportunities (Miller, 2010). Joint attention plays a critical role in these language enriched interactions: following others' eye gaze, using gestures to receive and capture attention, and simultaneously acquiring language from those around them. Increasing JA ability in children with ASD, both enhances their interaction with others and expands their language skills. Research suggests that JA is a necessary precursor for language acquisition and that in order for children with ASD to increase their language skills JA needs to be explicitly taught (Jones et al., 2006; Mundy & Crowson, 1997; Rudd, Cain,

2008). Although there is an abundance of research on the importance of JA, there is a limited agreement on how best to teach this skill to young children with ASD.

### **The Importance of Early Intervention**

Receiving early interventions in a timely manner can be a critical factor in long-term outcomes for children with ASD (Jones & Carr, 2004). Early identification of ASD can be difficult due to the requirement of observable behavioral attributes. Steele (2004) reports on the “importance of the years between birth and five for learning” (p.76) and the importance that early intervention can play in creating a foundation for later learning. Due to language delays and impairments, children with ASD often experience social deficits. Young children with ASD have particular difficulties in understanding spoken words; especially abstract words, due to the elusive nature of these words (Rocha, Schreibman, & Stahmer, 2007). The social manifestations can cause isolation, difficulty in making eye contact, and an inability to develop appropriate peer relationships.

Due to the heightened awareness of this disorder, there has been an increase in the amount of research focusing on the cause, preventions, and treatments of ASD, particularly in the area of early intervention. The National Research Council (2001) indicates the positive impact that early intervention has had with individuals on the spectrum. There are many studies that examine early intervention programs that use specific interventions to support children with ASD in acquiring and developing language and communication skills (e.g., Vismara & Lyons, 2007; Whalon, 2004). For example, Delprato (2001) reviewed 10 controlled studies in which early interventions targeted a form of language performance (e.g., receptive language, yes/no responses, descriptive responses) to young children with ASD. Positive gains were found in all

studies examined, though it should be noted that those studies using naturalized interventions were more effective in language gains than those using discrete trial training (DTT). In addition, Wood and Wetherby (2003) reviewed evidenced-based interventions for children with autism. They, too, reported that children with ASD who receive early intervention are more likely to be successful later on in life, as children who participate “beginning by 3 years of age have significantly better outcomes than those beginning after 5 years of age do” (p. 186). More recently, Rickards, Walstab, Wright-Rossi, Simpson, and Reddihough (2008) study assessed 54 children with ASD after 12 months of early intervention. Cognitive development was sustained in children who received the extra home-based intervention improvement as compared to the control group.

Children with ASD experience an increase in successful response to intervention as demonstrated by research. The promotion of positive interactions is vital as researchers are seeing positive long-term outcomes (Delprato, 2001; Schretz & Odom, 2007; Wood & Wetherby, 2003). Early intervention is an integral part of school-readiness for children with ASD. The type of intervention, however, is a matter of some debate due to the array of interventions available.

### **Effective early interventions for the autism population**

Typical children naturally learn from the environment around them; unfortunately, for the majority of children with ASD, this is not always the case. Researchers have conducted numerous studies to identify the most effective ways to teach new skills to children with autism and discrete trial and naturalistic intervention model techniques have been particularly effective strategies used in early intervention. Both DTT and naturalistic intervention models are based on the principles of Applied Behavior Analysis

(ABA) (Smith, 2001). DTTs are behaviorally based interventions with highly structured methods and are the primary approach to teach children novel skills. The main components of DTTs include instruction, prompting, response, consequence, and inter-trial intervals (Whalen & Schreibmam, 2003). Naturalistic intervention models, although structured, follow a more naturalistic behavioral plan. Naturalistic intervention components are responding to multiple cues and stimuli, improving child motivation, increasing self-management capacity, and increasing self-initiations. This method is based on a play format allowing the interventionist to be flexible and adapt to the individuals needs (Isaksen & PerHolth, 2009; Vismara & Lyons, 2007).

Although teaching new skills through DTT and naturalistic intervention models to the ASD population have been successful, there are a few studies that examine the effects of teaching JA using DTT and naturalistic intervention model strategies.

### **Caregivers' involvement**

Children are receiving an ASD diagnosis at a younger age than ever before and consequently these children are spending more and more time with their caregivers in their home environment (Jones & Feeley, 2007). Therefore, it is becoming necessary for effective interventions to be conducted in the home environment. Naturalistic early interventions allow caregivers and interventionists to develop a collaborative vision on how they would like to see a child's skill develop. The combination of a strong partnership and a naturalistic early intervention allow the family to feel comfortable in implementing the intervention throughout their daily life (Pierce, Munier, & Myers, 2009). The importance of including caregivers in the intervention process is well documented (Bagnato, 2007; Cosden, Koegel, Koegel, Greenwell, & Klein, 2006; Crowe, Norris, & Hoffman, 2000; Fletcher, Perez, Hooper, & Claussen, 2005; Schertz & Odom, 2007).

The research indicates that interventions that involve caregivers have greater maintenance and generalization of their newly found skills.

It is important for children with ASD to have multiple experiences that involve skills from their intervention because these experiences lead to adaptability and generalization of functional skills taught, especially when they are continuously practiced in their own home environment (Landa, Holman, Garrett-Mayer (2007). The faster children can obtain these skills and use them effectively, the earlier these skills can be duplicated and lead to generalization. Adult-child shared reading is a natural context with a predictable routine that involves the parents in their home setting. This consistency and predictability allows the children to feel secure in their environment (Ingersoll & Gergans, 2005; Jones & Feeley, 2007). Interventionists are increasingly using storybook reading to facilitate the communication and linguistic development of children who exhibit language impairment (Bellon, Ogletree, and Harn, 2000; Koppenhaver et al., 2001; Vogler-Elias, 2009), yet few studies to date utilize this intervention with preschool-age students with ASD, warranting further research.

### **Interest boosting shared storybooks**

As stated earlier, one characteristic a child with ASD typically displays is a restricted interest in a particular topic or object. There are abundant storybooks available having to do with a wide range of topics and interest. Therefore, family members could build a connection to a child with ASD precisely through finding storybooks pertaining to their child's restricted interest. Merging the evidence-based practice of caregiver shared storybook reading with the restricted interest of a child with ASD, could potentially motivate the child to engage in joint attention, and as a result, increase their language acquisition skills.

## **Statement of Problem**

Adult-child shared reading is viewed as a natural context with a predictable routine. Interventionists increasingly use early interventions (i.e., joint attention and shared story book reading) to facilitate the communication and linguistic development of children who exhibit JA deficits and/or language impairment (Bellon, Ogletree, and Harn, 2000; Koppenhaver et al., 2001; Vogler-Elias, 2009). A number of the interventions that will be discussed focus on teaching adults techniques aimed at increasing active child participation during these interventions (i.e., joint attention and shared storybook reading). Throughout the study, adults were successful at learning a variety of strategies to support children's social and language engagement. As a result of adults increased their use of specific strategies (i.e., joint attention bids or reading strategies), progress was observed in children's number of linguistic and social turns, expressive vocabularies, and language complexity. The use of shared storybook reading strategies begins with the fundamental skill of JA. Although these shared storybook reading studies touch on JA, there are no studies to date that use shared storybook reading solely to establish JA in preschool age children.

## **Purpose of Study**

The study utilized four reading strategies that were modeled from the four steps of the Complete Reading Cycle (CRC) used in Crowe, Norris, and Hoffman's 2003 study. The intervention, called Meaningful Interactions through Storybooks (MITS), facilitated the four reading strategies through an interactive reading experience for four caregiver/child dyads. The purpose of this study was to determine the effects of training caregivers of children with autism on the MITS intervention during storybook reading on establish joint attention.

The following research questions were addressed in the present study:

1. Will training caregivers to use Meaningful Interaction through Storybooks (MITS) intervention increase their use of the four reading strategies?
2. Does caregiver utilization of the four reading strategies during storybook reading facilitate joint attention skills in their child?
3. Does the MITS intervention result in an increase in verbal expressive language in children?

## CHAPTER 2 LITERATURE REVIEW

### **Introduction**

The purpose of this study was to determine the effects of training caregivers of children with autism on the MITS intervention during storybook reading in order to establish JA. This chapter presents a review of the literature related to (a) the effectiveness of JA interventions using discrete trial teaching and naturalistic instructional approaches to increase JA in children with autism, and (b) the effectiveness of shared storybook interventions on at-risk, language and developmentally delayed, and ASD populations. The information from these two literature bases will be synthesized, and implications on these interventions with children with autism will be examined. This section concludes with a rationale for the strategies selected in this study.

This chapter is divided into two major sections. The first section reviews the literature of DTT and naturalistic early intervention studies that focus on increasing JA skills for young children with ASD. The second section reviews the literature on how shared storybook reading improves joint interactions and early literacy skills among preschool students with language and developmental delays and children with autism.

### **Review of Joint Attention Literature**

**Methods for Joint Attention Literature Review.** In collecting the data for this literature review I selected all of the databases that the University of Florida provides using a combination of the keywords: *joint attention, joint engagement, language, preschool, autism, social skills, communication development disabilities, early intervention, intervention, caregiver, parent training, child development, pivotal response*

*training, discrete trial training.* The criteria for inclusion in this review were the following: (a) the research design was experimental or quasi-experimental design; (b) intervention utilized DTT or naturalistic training components; (c) the outcome measure was JA; (d) the participants were of preschool aged children (12-72 months); and (e) each participant had a diagnosis of autism spectrum disorder. In addition, articles were eliminated because they focused on a specific curriculum, rather than a face-to-face intervention with a focus on JA. Nine articles were retained and an ancestral search was conducted to find the remaining 4 articles used for this paper. Due to the small amount of articles, a Google Scholar search was also conducted using the same keywords, though no articles that fix the criteria were found.

### **Joint Attention Literature Review**

Thirteen studies met the criteria for inclusion in this review. Four studies included DTT interventions, four studies were naturalistic early interventions, and five studies had components of both DTT and naturalistic early strategies. Eight studies used a single subject design, three studies used group experimental designs, and two studies used mixed methods. After reviewing the articles, the research fell into the following categories: 1) Interventionist led interventions and 2) Interventions with a caregiver component. Appendix A (Table A-1) provides a listing and summary of all JA articles used in the literature review.

Joint attention is known as a prominent attribute of autism and therefore is a pivotal skill that needs to be incorporated in early interventions (Jones & Carr, 2004). In the following section, I will present a review of the evidence-based research on interventions that increase JA since 2003, discuss the implications of this research, as well as an overall summary of the JA literature.

## **Joint Attention Interventions Using Discrete Trail Training**

Discrete trial training is well known for effectively teaching novel skills to children with ASD. Smith (2001) believes this success of is due to DTT's precise format, one-on-one instruction, and quick trials that allow many learning opportunities for the child. The following four studies are JA interventions that use clinically trained people to conduct DTT methods to increase joint attention in young child with ASD. Appendix A (Table A-1) provides a listing and summary of the articles (4 multiple baseline articles).

### **Interventionist led**

Despite being criticized for its regimented approach, DTT interventions can be a powerful tool when working with children on the spectrum. This is illustrated in Martin and Harris (2006) multiple baseline with reversal design across three children with ASD. The authors evaluate the effectiveness of a program that taught children to respond to joint attention bids. Each child was of preschool age, had a diagnosis of ASD based upon DSM-IV criteria, and failed to display normal levels of JA as assessed by *Autism Diagnostic Interview- Revised (ADOS)*. Two clinically trained people and the primary author conducted each session in the children's preschool. The intervention taught the children how to respond to the experimenter's JA initiation. The children's JA skills were observed during baseline to make sure they did not display any significant levels of response to JA skills. After baseline was established each child participated in response to JA training sessions. Over sequential phrases, lasting approximately 10-20 minutes, children were taught to following the clinician's gaze and head turn. Highly motivated objects were placed 3-5 feet from both the child and the trainer, then the experimenter turned their head toward the object and said, "Look!" Staying true to DTT intervention methods, immediately following the clinician's bids for JA children were

physically prompted to help guide them to a correct response, and then were reinforced for their correct responses. Throughout the sessions, prompts were faded out so that each child was able to correctly respond on their own. Once participant responded to the bids for JA with at least 85% accuracy for two consecutive trials, a time delay was introduced and increased throughout the trials. Data were collected on each child's response to JA and probes were conducted post-intervention to see if their JA skills were maintained.

Martin and Harris (2006) study supports previous early intervention studies on the positive effects of DTT interventions as the authors report that each child successfully responded to JA bids and these skills were maintained after the study ended and without the contingency of reinforcements. This suggests that children with ASD can be taught to attend to the social cues of the interventionist. Being able to follow social cues is an important foundational skill for these children to learn, as it will help in understanding social relationships and interactions later on in life. In addition, although the children's initiation of JA skills was not directly targeted probes were conducted to determine if any of the participants elicited bids for JA. The children displayed isolated incidents of initiation of JA, suggesting that initiation of JA skills is distinctive of response to JA skills and additional research is needed in this area. Researchers should be aware that the sample size limits the generalizability of these findings, though all 3 participants were in the same preschool classroom, which warrants that changes in response to JA were probably caused by the intervention and not outside classroom factors.

In 2008, Taylor and Hoch conducted a similar multiple baseline design that assessed the effects of using prompts and social reinforcement on the response to JA and initiation of JA skills of three children with autism. Like the previous study (Martin and Harris, 2006), Taylor and Hoch (2008) baseline data confirmed that the children would intermittently respond to bids of JA. The interventionist placed novel and unusual toys (e.g., toy horse with wig) throughout a room in the child's preschool. To initiate JA, the experimenter would point to an object and say, "wow!" comment on the item, guide the child to look back to the clinician, then naturally reinforce the child (e.g., tickling or smiling). Common in DTT interventions, if the child did not respond correctly within the allotted time least-to-most prompting (e.g., gestural prompt to physically prompts) towards the object of interest and/or clinician was used.

All participants' response to JA improved upon intervention, supporting previous research of the positive impact DTT methods has on children with autism. Taylor and Hoch (2008) added to previous research, that through the use of social reinforcement response to JA skills could be taught. It should be noted that because physical prompts were used during training, it is possible that the children were negatively reinforced through avoidance of prompts, rather than being reinforced through social attention. Similar to previous findings (Martin & Harris, 2006), although the children's response to JA increased their initiation of JA did not naturally occur. Children only initiated JA when a checklist was used and preferred items were given as a consequence for correct responses. This leads credence that response to JA skills does not lead to the more complex initiation of JA skills and may require more direct intervention. It is

important to note that the authors conducted only one probe that used a novel toy in a novel setting to check for generalization and maintenance of response to JA skills.

Another clinician led intervention conducted by Klein, MacDonald, Vaillancourt, Ahearn, and Dube (2009); studied the effects of JA training on three young boys with ASD. The training took place in a clinical setting lasting approximately 4-7 minutes over 32 sessions. Trials one and two taught the children to follow the experimenter's gaze to the target object, eventually pairing the experimenter's gaze shift with the word "look". Children received access to preferred toys when correct responses were given. As seen in the previous DTT studies, least-to-most prompts were used to attain a child's correct response (e.g., modeling to manually guiding child's head). Once each child had mastered the gaze shift + look trials, delayed cue training was introduced. Following the same procedures, once a child's gaze shift towards a preferred mechanical toy, the toy was activated (e.g., toy bounced or lit up). Throughout this phase a time delay was used to activate the toy, eventually having the child wait 5 seconds for the toy of interest to turn on. The child then moved on to contingent activation training where following the experimenter's gaze within 5 seconds allowed the toy to be activated. The toy remained on for 5 seconds and the experimenter commented on the toy. Once the criterion was met, intermittent sessions were held to strengthen the child's gaze. During these sessions the mechanical toy was randomly activated only six of the nine trial times, though the experimenter made a comment about the toy to the child for every correct response to establish responses as a conditioned reinforcer.

The results of Klein et al. (2009) revealed favorable effects of the JA training, as there was an increase in gaze-shift in children with ASD. Through ABA techniques and DTT the child's gaze-shift became associated with the activation of a reinforcing mechanical toy (which in ABA terms is called a discriminative control) consequently causing an increase in gaze-shift behavior. Maintenance of gaze-shift in participants was fairly high as seen in the success of the intermittent sessions. Despite the study's positive effects researchers should be cautious of results. Although gaze-shift constitutes JA skills, this research is limited, as the authors did not generalize the child's gaze-shift to novel toys and settings. In addition, such ABA techniques are complicated and need to be supervised by ABA clinicians, making it difficult for researchers and parents to use these interventions in the everyday world.

### **Interventions with a caregiver component**

Although teaching this population JA through DTT has been successful, only a few DTT studies incorporating parents in the JA intervention process have been conducted. The importance of including parents in the intervention process is well documented (Bagnato, 2007; Cosden, Koegel, Koegel, Greenwell, & Klein, 2006; Crowe, Norris, & Hoffman, 2000; Fletcher, Perez, Hooper, & Claussen, 2005; Schertz & Odom, 2007) indicating that greater maintenance and generalization of previously acquired skills are applied in new environments (Ingersoll & Gergans, 2005; Jones & Feeley, 2007).

Isaksen and Per Holth (2009) conducted a multi-baseline design across four young children with ASD to increase their response to JA and initiation of JA skill using ABA techniques. The authors recognize the importance of parent involvement and interviewed each participant's parent to identify objects of interest that would be used

throughout the intervention. In addition, each parent took part in the training and was taught how to implement the components of the intervention in their home environment. The study took place in the children's school setting and a therapist employed by the school conducted the training. To assess response to JA and initiation of JA pre- and post- intervention the authors used a simplified version of the *Early Social Communication Scale* (ESCS-m). All of the children showed some response to JA skills, though compared to typically developing children their age those skills were significantly impaired. The intervention consisted of three phases: tasks that required children to respond to JA, establish adult social responses as conditioned reinforcer, and targeting and reinforcing children's response to JA and initiation of JA behaviors through turn-taking activities. During phase one, the child was taught to shift gaze between the trainer and the toy. If the child did not respond correctly, least-to-most prompts were used and faded on over later trials. When the child responded correctly to response to JA, they were allowed to choose a toy to play with. Once five correct consecutive responses were given, the child moved on to the next phase. Phase two was designed using ABA techniques to create adult social responses (e.g., smiling and nodding) as conditioned reinforcers to the child's response to JA. Following the child's response to JA, if the trainer would smile and nod the child would get access to toy, if the trainer did not smile or nod; access to the toy would be blocked. Once the child linked the social response with access to toy, each task became more involved (e.g., head turns and commands) paired with social reinforcement before access to toy began available. Turn taking tasks (e.g., puzzles and block building) took place in phase three. A correct response to JA was marked when the child took a block or puzzle and started

to play. If the child did not show initiation to JA, the therapist took the materials away and reintroduced them after 10 seconds. If the child continued to display incorrect responses, least-to-most prompts were used.

All children showed gains in response to and initiation of JA skills from their baseline data, though greater achievement was seen in response to JA skills. This is in conjunction with previous studies as initiation of JA is a more complex skill to teach and maintained. Unlike previous studies (e.g., Whalen & Schreibman, 2003; Taylor & Hoch, 2008) Isaksen and Per Holth (2009) report that both response to JA and initiation of JA skills were generally maintained at the 1 month follow up. One explanation could be the parent component, as children could have received more JA practice in a variety of settings. Secondly, to promote initiation of JA skills the use of normal social behaviors as a discriminative stimulus may have helped in greater maintenance of that skill.

### **Interpretations of DTT research findings.**

Based on the research reviewed, it appears that JA interventions that exercise DTT in their treatments demonstrate promising results (Isaksen & Per Holth, 2009; Klein et al., 2009; Martin & Harris, 2006; Taylor & Hoch, 2008). Benefits of utilizing DTT strategies in JA interventions were seen in each study. For example, in each of the DTT studies the trials built upon the child's skill set and the sessions moved at the child's pace (e.g., some children took more trials than others to move onto the next session). DTT trials are useful because they provide children with a predictable controlled environment, while receiving intense amounts of treatment. Although this type of environment may be comforting, the tight control does not allow for incidental teaching, so it becomes difficult for new skills to generalize (Smith, 2001). This need for future research to focus in on the generalization of JA skills emerged across the DTT

studies. Subsequently future studies may want to conduct JA intervention more natural settings and use novel stimuli (Isaksen & Per Holth, 2009; Taylor and Hoch, 2008).

Additionally, because DTT interventions are rigid in method, parents often reported less satisfaction with DTT forms of treatment (Schreibman et al., 1991). The potential of using parents in DTT interventions is promising, as seen in Isaksen and Per Holth (2009) study. One reason the parent component may be scarce in these DTT studies is due to the complex nature of DTT strategies. These DTT techniques are based on behavioral learning theories and introduce unfamiliar terms, creating a comprehensive and complicated intervention in which intense training is needed. Therefore many researchers have utilized naturalistic intervention models as they continue to use ABA techniques in more natural settings including families.

### **Joint Attention Interventions Using Naturalistic Intervention Methods**

A naturalistic intervention method uses objects of the child's interest and common turn-taking play activities to increase a child's motivation to acquire new skills (Ingersoll and Schreibman, 2006; Koegel & Koegel, 2006). Koegel and Koegel (2006) state the primary goals of naturalistic intervention methods "are to move individuals with autism towards a typical developmental trajectory by targeting a broad number of behaviors and providing children with autism the opportunity to lead meaningful live in natural, inclusive settings" (p.4). The following four studies use naturalistic intervention approach in their studies to increase JA in preschool aged children with ASD. Appendix A (Table A-2) provides a listing and summary of the articles (2 multiple baseline articles, 2 mixed methods articles, and 1 experimental article).

## **Clinician led**

Children with ASD demonstrate deficits in the ability to imitate others. This can be problematic for the acquisition of future social-communicative behaviors (Ingersoll & Schreibman, 2006). In addition, there have been a few studies that show a link between imitation and JA in autism (e.g., Carpenter, Pennington, & Rogers, 2002). Pursuing these findings further, Ingersoll and Schreibman (2006) used naturalistic intervention strategies to teach children with ASD to imitate an action with an object thus increasing their JA skills. Using a multiple-baseline design, across five young children with ASD, the authors evaluated the intervention's effect on language, pretend play, and JA skills. Each child was reported as having deficits in all areas of language, play, and JA using the *ADOS-G* assessment. The intervention sessions took place in a clinical setting and were conducted by the first author and undergraduate research assistants. Baseline consisted of free play in which the therapist would only interact with child if he/she initiated the interaction. As exhibited in previous studies, all of the children showed small amounts of imitation, language, pretend play, and JA skills. This is typical in children with ASD as it is a spectrum disorder where individuals appear to have a variety of skill levels. The intervention was comprised of five phases: no actions modeled by therapist, familiar actions with a toy that the child was engaged in, familiar and novel actions with the same toy that the child was playing with, familiar and novel actions with the same and a different toy. Phases were built off of each other and lasted approximately 2 weeks. Naturalistic intervention techniques were used throughout sessions as the therapist followed the child's lead and would talk continuously about the actions they were doing. If the child copied the therapist action

reinforcement was provided through a verbal praise. When the child did not imitate after three models, the therapist used least-to-most prompts and then praised the child.

Data were collected using visual analysis as well as the *Motor Imitation Scale*, the *Joint Attention Assessment*, and the *Structured Laboratory Observation* were used to assess imitation, JA, and generalization respectively. The rate in which children imitated significantly increased once the intervention took place and remained high post-treatment indicating positive effects for the imitation intervention. Looking specifically at the dependent measure of JA, all of the children showed increases in coordinated joint attention (or gaze-shift). As the intervention increased in complexity it was noted that the children continued to engage in higher rates of JA, though only three of the children's JA skills remained as high post-treatment. Ingersoll and Schreibman (2006) acknowledge the two participants whose JA skills returned to baseline rate support previous research in which the removal of contingent imitation results in return to baseline rates of eye gaze. These discrepancies in the maintenance of gaze-shift seems to be contingent upon receiving a reinforcer, as previous research (Klein et al.; 2009) showed maintenance in gaze-shift in children with ASD when paired with a reinforcement, therefore supporting the need for future research. Although Ingersoll and Schreibman (2006) claim that this study uses a more naturalistic behavioral approach, it lacks some major naturalistic components. For example, the intervention itself took place in a clinical setting. Following this further, Koegel & Koegel (2006) stress the importance of using caregivers as "primary intervention agents to ensure that the delivery of the model is both coordinated and comprehensive" (p. 4). For these

examples future research may want to look at the intervention being conducted by caregivers in a more naturalistic setting, thus creating a more effective JA intervention.

### **Interventions with a caregiver component**

The skill of joint attention is considered a fundamental milestone for children to acquire language. This vital skill builds upon a parent-child relationship as children follow their caregiver's eye gaze to make word-object associations (McDuffie, Yoder, & Stone, 2006) yet there are few JA studies that utilize caregivers in their interventions. Those that have a parent component report greater generalization and maintenance (Ingersoll & Gergans, 2005; Jones & Feeley, 2007; Klein et al., 2009; Schertz & Odom, 2007).

Schertz and Odom (2007) used a mixed methods design to determine the effects of an intervention that utilized the parent-child relationship to increase JA in three children with ASD. The mixed method design was chosen so analysis could be done on both the intervention effects and a deeper understanding of how the parents felt about the overall process. The intervention effects were measured using a multiple baseline across 3 children with ASD and took place at the dyads homes supporting a more naturalistic approach. Schertz and Odom based their intervention on an open-ended model, allowing the caregiver-child interaction to be the indirect method of teaching the JA skills. This developmental approach permits natural reinforcements to occur spontaneously throughout the intervention, rather than using a specific reinforcement schedule, as seen in DTT interventions. The model was designed to teach parents how to conduct activities that allowed their children to focus on their face, provided opportunities for turn-taking, response to and initiation of JA in four phases. Focusing on face and turn-taking activities were chosen as they are hypothesized to be

behavioral precursors of JA, which would allow the child an easier transition into the response to JA and initiation of JA activities. Throughout the intervention, parents were interviewed and wrote weekly notes in which they describe their interactions with their child and how they felt their child performed.

Schertz and Odom (2007) reported two of the three children demonstrated gains in JA skills throughout the four intervention phases (focusing on face, turn-taking, response to JA, and initiation of JA). Participant A showed gains only in focusing on face and turn-taking, showing promise for future JA skills. Caregivers continued to use activities in different settings (e.g., backyard, restaurants) and reported that children continued to elicit same behaviors, showing that the children were able to generalize their JA skills. In addition, a 5-week post-intervention maintenance measure was conducted and all children showed higher performance than in their intervention phase. The family centered approach allows caregivers to play an active role in their child's intervention program. Caregivers were able to take the skills they were working on and continue to create opportunities throughout the day. The qualitative data collected by Schertz and Odom acknowledges that caregivers felt their role as interventionist gave them more confidence to be more active in future interventions.

Despite the positive outcomes of using caregivers in a naturalistic intervention there were a number of limitations. For example, although Schertz and Odom (2007) describe that caregiver's instinctively knew how to scaffold activities so that the child was actively engaged there was no emphasis on how JA is a fundamental milestone in development. Caregivers did not understand the importance of JA in language and social developments and would benefit from having direct instruction in this area. In

addition, the intervention did not train parents on specific techniques and although the researchers assumed a coaching role throughout the phases, greater gains might have been seen in if a more structured activity selection was given to parents to help more children through each phases of the intervention (e.g. Participant A).

A typical characteristic of individuals with autism is a restricted interest on a particular topic or object (APA, 2000). Numerous studies use naturalistic intervention methods to teach JA (Kasari et al., 2010; Schertz and Odom, 2007; Whalen & Schreibman, 2003) though few motivate children through the use of their restrictive interests. Vismara and Lyons (2007) expand Schertz and Odom's (2007) mixed method design and examined the effects of using the restricted interests of three young children with ASD as a stimulus to increase their JA skills in a single-subject reversal design with a qualitative measure for interaction. The authors did not directly target JA, as they wanted to see if using objects of preferred interest would motivate children to engage with their caregiver therefore naturally increasing JA. During baseline, parents were asked to play with their child like they normally would using perseverative interest toys (PI) and toys with no interest to the child (NP). Once baseline was established, the first author provided caregivers with overview training on naturalistic intervention techniques. During the intervention no direct teachings of JA skills occur. Instead, the first author would model the use of the naturalistic techniques (e.g., following child's lead, providing natural reinforcers) on PI and NP stimuli with the caregiver's child; gradually allowing each caregiver to become the main interventionist. This type of naturalistic training allowed the principal investigator to coach the caregivers throughout the session.

Throughout the study data were collected on response to JA, initiation of JA, and qualitative measure of child-caregiver interactions.

Vismara and Lyons (2007) show positive results for the PI condition as all children began to initiate joint attention towards the PI stimulus without direct instruction. During the alternating treatment phase when both PI and NP were used all children continued to show initiation of JA even when the NP stimulus was present, though lower levels were exhibited. This gives creditability to Vismara and Lyons hypothesis that children will generalize joint attention initiations to other objects that are not of restrictive interest to them. Examining the quality of interactions Vismara and Lyons observed that using items of interest as motivation helps create more natural social interactions. Furthermore, it appears that using objects of interest combined with naturalistic intervention techniques helped to create opportunities for meaningful child-caregiver interaction that were mutually reinforcing, consequently increasing joint attention skills. This is an important discovery as previous studies (e.g., Martin & Harris, 2006; Taylor & Hoch, 2008) had a difficult time teaching initiation of JA skills.

In a second study Kasari et al. (2010) randomly assigned thirty-eight child-parent dyads to an experimental group or a wait list group to determine the effects of a caregiver mediated joint engagement intervention. The child-caregiver dyad met with a trained interventionist three times a week for a total of 8 weeks. A module was presented weekly to each caregiver explaining how to teach children with autism JA skills. In each session, a trained interventionist modeled skills and the caregiver was given opportunities to practice those skills with their child. Furthermore, the

interventionist was able to coach the caregiver throughout the sessions, providing corrective feedback as well as praise.

An ANCOVA was used to compare the immediate treatment (IT) and waitlist control (WL) groups. Children in the IT group showed significantly more joint engagement and a decrease in object-focus play compared to the WL group. In addition, children placed in the IT group showed greater gain in response to JA, though there was no difference in initiation of JA or an increase of symbolic play between groups. These findings are similar to Schertz and Odom (2007), asserting that initiation of JA skills is difficult to teach to children on the spectrum and likely need longer and denser interventions (Kasari et al., 2010).

Kasari et al. (2010) go on to note that when caregiver's used a high degree of fidelity in implementation, their child moved more fluently from object-focus engagement to more joint engagement between objects and people than those caregiver's who did not. Due to high fidelity, those children were given more opportunities to participate in joint engagement, consequently increasing their response to JA. A regression analysis was also conducted and findings show that after controlling for pretreatment scores the quality of caregiver involvement was predictive of child's joint engagement scores. The authors also conducted a follow-up visit a year later and children's gains were maintained or improved in the areas joint engagement, response to JA, and types of play for the IT groups. Although these gains were sustained, the authors do not know what specific components of the interventions contribute to this claim.

### **Interpretation of naturalistic intervention research findings**

As indicated previously, the primary goal of using naturalistic intervention strategies are to allow children with ASD the opportunity to learn new skills that are

contextually relevant, which may let them to be actively engaged in everyday living (Koegel & Koegel, 2006). Interventions involving naturalistic intervention methods create a more natural environment, making it easier to integrate the interventions components into a family's everyday routine. For example, natural turn-taking activities, which occurred across all the above naturalistic method studies, can be replicated virtually anywhere. In addition, there is little need for tangible reinforcers as natural reinforcers occur during the turn-taking activities (Schreibman et al., 1991).

The naturalistic intervention approach emphasizes the importance of parents as the primary agent (Koegel & Koegel, 2006). We see, with the exception of one study (Ingersoll & Schreibman, 2006), that the family involved was used as an integral part of the above JA interventions involving naturalistic strategies. Across those studies (Kasari et al., 2010; Schertz & Odom, 2007; Vismara & Lyons, 2007) positive JA gains were attained by all participants. In addition, numerous caregiver factors that affect treatment outcomes were evident (Kasari et al., 2010). Although an aim of caregiver-mediated interventions is to train the caregivers so the child has ample opportunities to practice target skills throughout the day, if the intervention does not match the caregivers' beliefs, or caregivers find it too difficult to execute, or the intervention lacks guidelines the probability of high fidelity implementation is low. Moreover, if caregivers do not buy in to the intervention, they still may not provide ample opportunities for a child to practice skills, thus reducing the effects of the JA intervention.

Although Kasari et al. (2010) and Schertz and Odom (2007) specifically targeted initiation of JA skills both report that these JA skills did not improve even if the child made significant gains in response to JA skills. Based on the research reviewed it

seems that initiation of JA skills may be difficult for young children with ASD to learn, even though in one study (Vismara and Lyons, 2007) minimal increases in initiation of JA were reported. Research suggests that JA is linked to motivation and therefore fits within the framework of naturalistic intervention methods (Kasari et al. 2010; Koegel & Koegel, 2006). Thus, by targeting motivation within JA interventions there may be greater gains in behaviors associated with JA in children with ASD. One could infer that initiation of JA skills are increased due to the motivational factor that using highly preferred objects provides, though additional research is needed.

Overall the JA interventions that use naturalistic intervention strategies show promising effects in increasing JA skills in preschool children with autism. With this in mind, it is important that researchers teach the intervention sessions in such a way that caregivers are knowledgeable and confident in their execution of the naturalistic intervention strategies, as the number of the trials (i.e. opportunities) depends on the engagement between caregiver and child.

### **Interventions Using Both DTT and Naturalistic Intervention Methods**

The following five studies use a combination of DTT and naturalistic intervention strategies in their interventions to increase JA in preschool aged children with ASD. Appendix A (Table A-3) provides a listing and summary of the articles (3 multiple baseline articles and 2 experimental article).

#### **Clinician led**

Whalen and Schreibman (2003) conducted a multiple baseline across participants intervention to assess five preschool aged children with ASD on the effectiveness of JA intervention using both DTT and naturalistic intervention strategies. In addition, the authors had six typically developing participants in the intervention so

they were able to identify what typical preschool social behavior looks like. After baseline was established each child participated in joint attention training consisting of two phases: response to joint attention bids and making joint attention initiations towards an adult. In phase one the experimenter used DTT (e.g., inter-trial intervals, prompting) and naturalistic intervention components (e.g., following child's interest, receiving access to object of child's interest as a response-reinforcer) to teach the children how to respond appropriately to JA bids. Phase two provided opportunities for the children to engage in coordinated gaze shifting (i.e., child looks at object of interest and then at experimenter, as to "share" the experience) and protodeclarative pointing (i.e., pointing to a picture on the wall with the purpose of sharing the experience with the experimenter). Following DTT and naturalistic protocol children with ASD were given an allotted amount to respond before least-to-most prompts were used to elicit correct response. This allotted time was based on the average time provided by the typically developing participants.

To measure JA throughout the study the children with ASD were given the following assessments: *Unstructured Joint Attention Assessment*, *Structured Laboratory Observation* (SLO), and *Structured Joint Attention Assessment* (adapted from ESCS). Typically developing children were not assessed, as they all showed response to JA and initiation of JA prior to study and were used to compare typically JA. Whalen and Schreibman (2003) report that the response to joint attention training was effective, as all children successfully completed all trials. In addition, all children with ASD showed positive change in response to JA and in following the experimenter's gaze. Teaching initiation of JA was only effective for four of the five children as one participant was

unable to coordinate their gaze shift, therefore unable to continue. Although teaching initiation of JA was effective, only one child with ASD showed significant gains in initiation of JA, while the remaining 3 participants had only slight increases in initiation of JA skills. For participants with ASD that completed the entire intervention, generalization of JA skills was assessed 3 months after the initial intervention. The four participants maintained responding to JA bids at high levels, while the three participants continued to show minimal initiation of JA skills.

As with the other reported studies Whalen and Schreibman (2003) found it is easier to teach children with autism response to JA than initiation of JA skills, nominal gains were demonstrated by a few students. Low mental or low language age might have played a role for the child that was unable to complete the training. Typically children do not master initiation of JA until about 14 months of age and assessments showed this child's language age to be 8 months. Although after treatment the other participants showed some initiation of JA skills, their coordinated gaze decreased while pointing continued to be seen. This could be due to the lack of caregiver training since pointing is more likely to be reinforced than the more complex skill of coordinated gaze.

Kasari, Freeman, & Paparella (2006) examined the efficacy of a clinician led JA intervention on children with autism joint attention skills. Using an experimental design, Kasari et al. randomly placed 65 autistic children into treatment conditions of joint attention, symbolic play, or control group. Kasari et al. evaluated JA skills pre- and post- intervention by the following assessments: *Early Social-Communication Scales*, *Structured Play Assessment*, and a 15-minute videotaped of each caregiver-child. All interventions took place in a clinical setting and a trained graduate assistant conducted

the JA intervention for approximately 30 minutes a day, for an average of 5-6 weeks. Each session began with numerous trials in which the experimenter would use DTT strategies (e.g., verbal prompts, modeling, positive reinforcement) to teach each participant a targeted JA skill. Following the DTT, the experimenter and child would move to the floor to practice the target JA skill using naturalistic strategies (e.g., naturally occurring opportunities, following child's led). Once the targeted JA skill was mastered (i.e., at least 3 times at both tables and floor) the child was then introduced to the next JA skill.

Kasari et al. (2006) reported children who partook in the JA intervention displayed significant gains in responding to JA bids. After the intervention, these children initiated more bids for JA during the mother-child interaction sessions than children in the symbolic play and control groups. This illustrates that the children were able to generalize their JA skills, as the mothers were not the treatment provider. Although the sample size adds to the power to this study, some limitations are the lack of follow-up of the children's JA skills and the absence of procedural fidelity measures.

### **Interventions with a caregiver component**

In 2007, Jones and Feeley conducted a multiple-baseline design study to assess caregiver effectiveness in using DTT and naturalistic intervention techniques to increase response to JA and initiation of JA skills in three preschoolers with autism. The intervention took place in the caregiver's home. Before the intervention began the first author and a graduate assistant presented information to each caregiver on the importance of JA, defined response to JA and initiation of JA skills, and explained the intervention procedures. To ensure that each caregiver understood the procedures, the first author modeled the intervention with both parent and child present. The caregiver

was then able to practice the intervention components with the first author acting as the child. As the caregiver started the intervention with their child, Jones or the graduate assistant continuously gave feedback and answered any additional questions the caregiver had. Staying true to DTT and naturalistic methods, the caregiver provided the child with numerous opportunities in quick succession. Once the child mastered response to JA skills, they were then taught initiation of JA skills. Similar to other studies (Klein et al., 2009) Jones and Feeley (2007) used mechanical toys that could be activated by remote as a discriminative stimulus to alternate a child's gaze. As in previous studies, least-to-most prompts, high rates of reinforcement, and objects of interest were used to elicit correct JA responses from the child. Jones and Feeley (2007) used both idiosyncratic (e.g., brief tickle or loud "Wow!") and natural consequences (e.g., parent commenting on object of interest) as reinforcers. Chosen by the caregivers, the idiosyncratic behaviors were child preferred. Jones and Feeley believed that pairing idiosyncratic reinforcements with natural consequences would create a stronger reinforcement as the natural consequence of JA is social, a behavior which alone does not seem to be as reinforcing to children with ASD. In addition, if it was noticed that the child did not seem interest in the reinforcement, an edible reinforcement was provide and eventually thinned out.

Jones and Feeley (2007) results affirm that caregivers are able to effectively implement response to JA and initiation of JA intervention to their children. By the same token each child successfully illustrated both response to JA and initiation of JA skills respectively. Generalization of response to JA and initiation of JA skills were examined through baseline probes (none demonstrated either JA skill) and 1 month after the

intervention was completed. During the follow-up generalization probes, with no prompting, all three participants demonstrated JA skills with the five generalization toys. However it should be noted that all caregivers who participated in this study have been involved in other interventions with their child. Their previous experiences with the DTT and naturalistic strategies prior to this study may have influenced the results of this study. Additionally, one participant's data showed variability in initiation of JA skills of gaze alternating and pointing. However, after the researchers taught gaze alternating and pointing did the child master the initiation of JA suggestion benefits of directly teaching these skills.

Rocha, Schreibman, and Stahmer (2007) took a previous therapist-implemented intervention (Whalen & Schreibman, 2003) and examined the effects of using caregivers to implement the intervention on teaching response to JA to preschool children with autism using a single subject across dyads design. The study took place in a clinical setting and only after baseline was established caregivers were told they were going to be trained strategies that would help increase JA skills. At the beginning of each training session, caregivers received direct instruction on the specific DTT and the naturalistic strategies they were to use. In addition, they were taught the importance of JA skills, the benefits of parent involvement, and activities that would provide their child with numerous opportunities to practice JA skills. To ensure that the caregivers understood the procedures, the trainers would ask caregivers to provide them with examples of how they would use certain activities to create JA opportunities. Caregivers were able to ask questions throughout the training and once they showed proficient knowledge of the procedures the trainers would model JA techniques with the

child. Next, caregivers were asked to implement the JA procedures (initiating JA, prompting, and reinforcement of JA skills). Throughout the sessions the trainer coached and gave feedback. Additional instructions were faded and eventually the trainer left the room and would only give feedback through a one-way mirror if procedures were implemented incorrectly. Besides implementing the intervention in the clinical setting, caregivers were asked to execute the training components at home as well as other settings to ensure generalization of JA skills.

Rocha et al. (2007) determined that all parents were able to implement the JA intervention with fidelity. Generalization probes support the notion that caregiver's have the ability to provide opportunities for response to JA in a variety of settings, as baseline showed minimal JA bids from parents and subsequent growth in JA opportunities as the study continued. However, one caregiver did not implement the JA training at home though she was able to do so in the clinical setting. Perhaps this caregiver was dependent on the trainer or did not buy into the intervention. Either way, further research is needed in this area as this may have influenced why the child conveyed minimal JA behavior at the 3 month follow-up. During the intervention as the parent's bids for JA increased, a gain in each child's response to JA skills was also displayed. Although Rocha et al did not directly targeted initiation of JA skills they highlight that children were displaying some initiation of JA skills. Though nominal, children would alternate their gaze between the object of interest and caregiver, establishing coordinated JA. In light of these findings one would be cautious in how to interpret these results due to the small sample size and the type of design limits the author's

ability to break down the effects of the time used to train and the effects of specific phases.

Few studies have been conducted examining the effects of JA interventions when implemented in a preschool setting. Kaale, Smith, and Sponheim (2012) implemented an experimental design study in which 61 preschool age children with ASD were randomly assigned to either an 8-week JA intervention or a control group. The purpose of this study was to see if a preschool-mediated intervention would increase JA skills. Using a modified version of the JA intervention designed by Kasari et al. (2006), the current study focused on increasing children's initiation of JA skills of show, point, and give. As in the previous study, interventionists were used to teach and coach each teacher on how to correctly implement the JA intervention. Based on DTT and naturalistic strategies, 34 preschool teachers delivered one-on-one intervention, twice a day, for 8 consecutive school weeks. The children with ASD in the intervention group continued to receive the preschool curriculum in addition to the intervention while the children in the control group only received their current preschool curriculum.

Analyses of the data indicated that the children in the JA group as they were five times more likely to display initiation of JA skills during the 10 minutes of play, than the children in the control group. Subsequently, children in the JA group were able to generalize these skills during mother-child play. On average children in the JA group were jointly engaged with their mother 12.2% longer than a child from the control group. Although, it should be noted that no significant difference was reported for children in the JA group being able to display initiation of JA skills. This is not uncommon, as previous studies (e.g., Kasari et al., 2010; Schertz & Odom, 2007) attest to the difficulty

of children with ASD being able to generalize JA skills to others beyond the intervention provider. With this in mind, future research should examine what the effects of longer interventions would have on children with ASD and JA skills conducted by providers with expertise in behavioral skills. This study affirms power through its large sample size, randomization, and generalization. Kaale et al. study is an asset to the growing literature of JA interventions, as there are very few studies out on preschool-mediated component.

### **Interpretation of DTT and naturalistic intervention research findings**

The research reviewed demonstrates that JA interventions successfully merged DTT and naturalistic intervention components to successfully teach children with autism JA skills. The use of sessions in which JA skills are broken down into small components (e.g., DTT) using natural reinforcers in a naturalized setting show that these ABA strategies can be married into a productive intervention.

Complementary to the findings in the previous section, the studies that used parents as the intervention provider demonstrated that if given the effective methodology, parents can successfully implement DTT and naturalistic intervention methods in familiar settings. The effectiveness of parent implementation suggests that JA intervention can become an integral part of parent training programs (Jones and Feeley, 2007; Rocha et al., 2007). The lack of caregiver training in the Whalen and Schreibman (2003) study may explain the decrease in response to JA and initiation of JA skills in follow-up observations. In addition using parents allows for generalization of newly found skills and is an important measure when evaluating parent-implemented interventions and should continue to be done in future JA intervention (Kasari et al., 2006; Rocha et al. 2007).

The use of a highly preferred object is another theme that is seen throughout these studies (Jones & Feeley, 2007; Rocha et al., 2007; Whalen & Schreibman). Although the children working on initiation of JA skills used the highly preferred toys most often, it brings to question if the newly learned JA skills will generalize to novel objects and needs further research. Taken as a whole, these studies suggest that DTT and naturalistic intervention methods both bring important components to early intervention for children with autism and one method does not take precedence over the other.

### **Review of Shared Storybook Reading Literature**

Joint attention is situated early on in the caregiver-child relationship (Bakeman & Adamson, 1984). Typically these interactions happen during familiar routines and daily interactions. Shared storybook reading is a natural activity in which a caregiver and child partake in joint interactions that utilize JA skills (Fletcher, Perez, Hooper, and Claussen, 2005). In addition, shared storybook reading is an evidence-based literacy intervention that has demonstrated effectiveness in increasing emergent literacy skills for the majority of children (Beauchat et al., 2009; Fielding-Barnsley & Pudie, 2003; Justice & Ezell, 2002; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009; Lane & Wright, 2007). This interactive intervention advocates the growth of language and social participation, two core deficits for children with ASD. This technique not only increases a variety of developmental skills for many children, but also allows parents to tailor the intervention to suit their child's specific interests.

The following section explains the following: a) the importance of shared storybook reading, (b) briefly defines the early emergent literacy skills impacted by storybook reading, (c) highlights the influence that shared storybook reading can have

on the at-risk population, and (d) evaluates how shared storybook reading improves developmental and early literacy skills among preschool students with disabilities, particularly children with autism.

### **Importance of Shared Storybook Reading**

Beauchat et al. (2009) broadly defines shared storybook reading as “all instances when an adult reads to a child or children, pausing to engage in discussion about the text” (p.127). The National Early Literacy Panel (NELP) examined the impact of interventions that focused on shared readings and found shared book reading “with young children has a significant, substantial, and positive impact both on young children’s oral language skills and on young children’s print knowledge” (NELP, 2008, p.155). Shared storybook reading also contributes to children’s later success in learning to read and write. Through shared storybook reading, children are exposed to skills vital for social, language, and cognitive development (e.g., JA, phonemic awareness, written language, and complex communication designs) (Bus, van IJzendoorn, & Pellegrini, 1995; Justice & Ezell, 2002; Lane & Wright; 2007). Children who partake in shared storybook reading are provided with opportunities to share a common experience with another individual, develop new concepts, increase vocabulary, develop listening comprehension skills, and engage in conversations about text through questions and answer sessions (Hay & Fielding-Barnsley, 2007).

The significant role that shared storybook reading plays in a young child’s early developmental stage is well documented (Goin, Nordquist, & Twardosz, 2004; Hay & Fielding-Barnsley, 2007; Koppenhaver & Erickson, 2003; Lane & Wright, 2007; Lanter & Watson, 2008; Morgan & Meier, 2008). Research on shared storybook reading indicates the frequency with which a child is read to along with the caliber of adult-child

interaction increases the amount of language and literacy learning that transpires during this context (Crowe, Norris, & Hoffman, 2004; Teale & Sulzby, 1986). These findings lend significant credence to the importance of the shared storybook reading experience and helps young children acquire the emergent literacy skills essential for later academic success (Bus et al., 1995). For the purpose of this literature review, these emergent literacy skills have been categorized into five subskills: book knowledge, print awareness, phonemic awareness, alphabet knowledge, and oral language.

**Literacy subskills.** Book knowledge is an understanding of how books work: how to hold a book correctly, turn pages, and read text from left to right (Beauchat et al., 2009). Although seemingly insignificant, research indicates that this experience begins to create an interest in books for preschool aged children, consequently contributing to the child's later reading success (Beauchat et al., 2009; Hay & Fields-Barnsley, 2007; Justice & Ezell, 2002; Morgan & Meier, 2008). Through joint storybook reading, children also begin to acquire print awareness skills (Justice & Kaderavek, 2002). Print awareness is the ability to understand that print, rather than pictures that carry meaning to tell a story (Johnston et al., 2008). According to a recent meta-analysis (Mol et al., 2009), providing young children an opportunity to retell or act out a story they have heard, results in an improvement in their oral language and print-related skills. In addition, Justice et al. (2009) correlates the print knowledge skills young children acquire in preschools and kindergarten during shared reading with their "later achievements in word recognition and spellings" (p. 68).

Another emergent literacy skill that students gain through shared storybook reading is phonological awareness. This construct is often referred to as one's ability to

acknowledge structures of sounds (e.g. syllables, rhyme, initial sounds and phonemes) that arise in spoken language (Beauchat et al., 2009; Hay & Fields-Barnsley, 2007). Torgeson and Burgess (1998) found that the two most powerful predictors for reading success are letter name knowledge and phonemic knowledge. Yet another predictor of reading development is alphabet knowledge (Beauchat et al., 2009). Justice and Ezell (2002) refer to alphabet knowledge as a “child’s understanding of alphabetic units (graphemes), including details and distinctive features of letters as well as the names of the individual letters” (p. 18). Morgan and Meier (2008) reported that children who exhibit a well-developed oral vocabulary have the necessary skills to become competent readers. Their findings show that “good oral language skills are a prerequisite for becoming a proficient reader because they are necessary for a child to comprehend text” (p.11).

### **Shared Storybook Reading and At-Risk Population**

There is a strong correlation between a child’s socioeconomic status (SES) and reading performance at the beginning of first grade (Masseti, 2009). Children in poverty are at higher risk of literacy delays than children who come from affluent families. This achievement gap happens long before these children enter formal schooling. According to Hart and Risley (1995) report that low-income children begin school with exposure to 15,000 less vocabulary words than children from higher SES environments. Numerous studies highlight the difference in early literacy skills achievement between young children from low-income households and those from affluent households (Chaney, 1994; Hay and Fielding-Barnsley, 2007; Justice & Ezell, 2002; Justice et al., 2009; Whitehurst et al., 1994). These deficiencies are due in part to

low SES families providing little or no literacy opportunities for their children (Goin et al., 2004).

Research findings have chronicled that low SES children lack the exposure to language and vocabulary during shared storybook reading. Therefore, when these children enter school they demonstrate deficits in the literacy skills that are necessary for them to become proficient readers (Justice & Ezell, 2002; Lonigan & Whitehurst, 1998; Massetti, 2009). Whitehurst et al. (1994) reported that low SES children entering first grade have an average of 25 hours of one-on-one picture book reading, whereas children from middle class homes enter with 1,000 to 1,700 hours. Whitehurst et al. go on to describe the less-than-favorable preschool environments in which low SES children are enrolled. Justice and Ezell (2002) had similar findings, stating that preschools and daycare facilities located in poverty-stricken areas had little to no literacy-rich areas for young children to explore throughout the day. It is noteworthy that there is no consensus on the relationship between low SES and emergent literacy skills. In the Hay and Fielding-Barnsley (2007) literature review, SES alone was a weak predictor of reading achievement; instead, it was the lack of social and literacy activities that influenced young children's literacy development.

The shared storybook reading literature stresses the important role that parental expectations play in young children's acquisition of literacy skills (Justice & Ezell, 2002; Whitehurst et al., 1994; Fielding-Barnsley & Purdie, 2003). Parental beliefs regarding participation in home literacy are important factors in the child's emergent literacy skills, such as print awareness and oral language development (Justice et al., 2009). Whitehurst (1994) found that low SES mothers engaged in fewer instructive behaviors

during joint reading, as compared to higher SES mothers. Justice et al. (2009) explain that this might be “because of the inherent and systematic stresses associated with socioeconomic challenges” (p. 68).

Numerous studies have been conducted to see what types of interventions and evidence-based strategies work best in shared storybook reading to increase low SES student’s emergent literacy skills. One method that enhances literacy skills is dialogic reading (Whitehurst et al., 1994; Justice & Kaderavek, 2002; Justice & Ezell, 2002). This promising method allows the child to become an active participant in the storybook reading process. The parent becomes an active listener by “asking questions, adding information, and prompting the child to increase sophistication of his or her descriptions of the material in the picture books” (Whitehurst et al., p. 680). Justice and Ezell (2002) used dialogic storybook reading to increase print awareness in a study of at-risk children. Justice et al. (2009) later conducted a similar study in which teachers of low SES students used dialogic reading with a print focus. Results showed that preschool students made greater gains in print knowledge, alphabet knowledge, and name writing when read to using dialogic reading versus traditional reading. Whitehurst et al. (1994) lead a similar study but also taught low SES parents how to use dialogic reading in the home environment. Researchers also provided the school and the parents with books to allow the children to have a print-rich environment in both settings. Numerous standardized language assessments were given to the children before and after the implementation of the intervention. The intervention was statistically significant and the children showed gains in expressive abilities and vocabulary development.

Current research demonstrates the strong relationship between shared storybook reading and the acquisition of literacy skills by low SES students. Throughout the read-aloud experience, caregivers can engage children in meaningful discussions using new vocabulary in the context of the story. Children acquire additional oral language through child-friendly definitions and repeating unfamiliar words (Beauchat et al., 2009; Lane & Wright, 2007).

### **Methods for Shared Storybook Reading Literature Review**

In collecting the data for this literature review I selected all of the databases the University of Florida provides and typed in a combination of the keywords: *literacy, preschool, autism, intellectual disabilities, emergent literacy, disabilities, dialogic reading, home, reading, emergent reading, intervention, shared reading*. To reduce the number of articles retrieved, the publication date was changed to 1990. The criteria for inclusion in this review were the following: (a) the research design was experimental or quasi-experimental design; (b) a face-to-face intervention using shared storybook reading strategies; (c) the participants were of preschool aged children (12-72 months); and (d) each participant had a diagnosis of developmentally delayed, language impairment, or autism spectrum disorder. Of the 157 articles remaining, 153 were eliminated based on reading the titles and abstracts. Four articles were retained and an ancestral search was done and two additional articles were found. Due to the limited amount of articles that used the caregiver to implement shared storybook interventions (six articles), the search was widened to include clinician led interventions and an additional four articles were found (Van Kleeck, Vander Woude, & Hammett, 2006; Lovelace, and Stewart, 2007; Bellon-Hard & Harn, 2008; Bellon, Ogletree, & Harn, 2000).

Ten studies met the criteria for inclusion in this review. Seven studies included developmentally and language delayed children, and three studies had children on the autism spectrum. Six studies used a single subject design and four used an experimental design. Appendix B provides a listing and summary of all the shared storybook reading articles.

### **Shared Reading Interventions with Children with Language and Developmental Delays**

There's an abundance of research that demonstrates typically developing and at-risk children have had an increased in the quantity and quality of joint participation and communication with their caregiver after participating in shared reading interventions, though there are very few studies focusing on children with language impairments, developmentally delays, and other disabilities (e.g., autism) (Bellon-Harn and Harn, 2008; Crowe, Norris, & Hoffman, 2004; Fielding-Barnsley & Purdie, 2003; Hay & Fielding-Barnsely, 2007). Fewer literacy experiences and deficits in expressive language, cognitive, behavioral, and social development are common traits that children with language and developmental delays share with children with ASD. Thus, given the similarity, comparable interventions should be implemented with autistic children (Bellon, Ogletree, and Harn, 2000; Vogler-Elias, 2009; Whalon, Hanline, & Wood, 2007). Therefore, the following seven studies were chosen in particular because they focused on younger aged children with language and/or developmental delays participating in a shared storybook reading intervention. After reviewing the articles, the research fell into the following categories: 1) Interventionist led interventions and 2) Interventions with a caregiver component. Appendix B (Table B-1) provides a listing

and summary of the articles (2 group experimental, 2 quasi-experimental, and 3 multiple baseline designs).

### **Interventionist led**

Caregivers of children with language impairments tend to interact less (e.g. ask less questions, give fewer comments) during shared storybook reading (Bellon, Ogletree, and Harn, 2000; Van Kleeck, Wouder, & Hammett, 2006; Whalon, Hanline, & Wood, 2007). This disconnect in the joint interaction is due to storybook reading being transactional in nature; caregiver and child naturally influence one another (Bakeman & Adamson, 1984). For instance, a child that has difficulty interacting due to their language impairment influences the caregiver as the lack of interaction is not reinforcing for the caregiver to continue the reciprocal interaction needed in shared storybook reading. Therefore, children with language delays may not be exposed to valuable development skills, emergent literacy skills, and more complex language, such as literal and inferential language. Due to the lack of exposure, children with language impairments often have difficulties not only at the literal level, but also with inferential language used (Crowe et al., 2004; Van Kleeck, et al., 2006).

Van Kleeck et al. (2006) study examined the effects of a shared storybook reading intervention on the literal and inferential language skills of 30 preschool students with language impairments. This randomized control group design, pre-tested student's language ability using the *Structured Photographic Expressive Language Test- II* (SPELT-II) and the *Columbia Mental Maturity Scale* (CMMS) for nonverbal cognitive ability. In addition, the PPVT-III was used to assess the children's literal language, while the *Preschool Language Assessment Instrument* (PLAI) assessed both literal and inferential language. The average pretest score for both the PPVT-III

( $M=77.30$ ) and the PLAI ( $M=.84$ ) were considered to be significantly lower than scores from typically developing children.

The children in the treatment group participated in one-on-one 15-minute shared storybook reading sessions, twice a week, for 8 weeks, while the control group received nothing. The intervention consisted of a graduate student asking children a variety of embedded scripted literal and inferential questions (e.g., “What’s that?” or “How to do think \_\_\_\_\_ feels?”) throughout the book. If the child did not respond or responded incorrectly, the graduate student used prompting and/or modeling. All sessions were video and audio recorded and then coded to ensure treatment fidelity. Post-testing was conducted for both control and treatment group. The children’s scores were analyzed using a repeated measures analysis of variance (ANOVA) or analysis of covariance (ANCOVA). Positive effects of the storybook intervention were seen in both the treatment group’s literal and inferential language, even after controlling for pretest abilities. The control group did not show a significant difference in language pre and posttest.

Literal and inferential language can be complicated skills for children with language impairments to acquire; less exposure adds to the problem. Van Kleeck et al. (2006) storybook intervention embeds questions that emphasize children to identify and recall information from the story. These literal questions about the storybook create opportunities for the adult-child dyad to move beyond the text and infer about feelings and events. During the intervention the graduate assistant scaffold questions and modeled more intricate language. These strategies help the child contextualize language, and facilitate their comprehension of text. Although positive gains were seen

in the treatment group, small sample size and immediate assessment of language skills after the intervention warrants future research. In addition, it is not clear if the one-on-one storybook reading or the storybook intervention itself was the cause of positive gains, as the control group did not receive any treatment.

Print awareness is an emergent literacy skill often used during shared storybook reading. A strategy often used to increase print awareness is called print referencing (Justice & Ezell, 2004). Lovelace and Stewart (2007) define print referencing as “adults’ use of verbal and nonverbal cues to direct children’s attention to print concepts” (p.18). This strategy is frequently embedded throughout the storybook session to explicitly identify aspects of print (e.g., “This is the letter *j*”) and has been known to increase children’s print awareness skills, improving their oral language (Justice & Kaderavek, 2004).

Lovelace and Stewart’s (2007) single-subject, multiple probe baseline across participants, assessed the use of non-evocative, explicit print referencing during storybook reading to increase print awareness in children with language impairments. The 5 participants were between the ages of 48-60 months, scored 35% or less on the *Concepts of Print Assessment* (CPA), and received language intervention services. The 13-week intervention was conducted by the first author and took place at an early learning center. During baseline condition, children were probed for their knowledge of print concepts. Their regular language services were continued throughout the course of this study. Once the language service concluded, the first author read a 10 minutes storybook. The storybook portion provided embedded opportunities for the child to work his/her targeted language IEP goals.

The intervention condition was conducted similarly to baseline (i.e., language service, followed by a 10-minute storybook session) with the addition of non-evocative strategies (e.g., commenting, tracking, and pointing to print concepts) during the storybook reading portion. The non-evocative strategies were used to bring print-related concepts to the child's attention. The first author would reference a specific print concept, without requiring the child to comment back (e.g., "I love the picture on the front cover"). Throughout the intervention, the CPA was administered to each participant, using a book that was not previously read.

Data was collected from the CPA probes, calculated (percent correct), and then graphed. Through visual inspection of the data, all children had immediate improvements in their first CPA probe (range= 45%-50%), though there was a greater variability in the final intervention probe (range= 35%-80%). To assess generalization children were asked modified questions based on the CPA (e.g., "draw a circle around a letter) using a new book. The generalization scores were less than the final intervention probes (range= 35%-50%) but higher than baseline (>35%).

Lovelace and Stewart's (2007) study demonstrates that children with language impairments are able to learn print concepts through the use of non-evocative, explicit referencing. Increasing the opportunities to expose children with language impairment to print knowledge in a non-invasive way is valuable as it promotes print awareness without the demands of having the child vocalize answers. Although this study shows promise for children with language impairments, this study had several limitations. Participant's attendance to the sessions were not consistent (i.e., 4 sessions, 3 sessions, and 8 sessions) and it is unknown if this affected the results. Print knowledge

was only assessed by one measure (CPA). In addition, the validity of the CPA needs to be addressed, as it's an informal non-standardized assessment tool. Furthermore, due to the small sample size and the intervention being implemented in one setting, the generalizability of the study is unclear.

Effective with both typically developing and at-risk children, scaffolding is used to increase emergent literacy skills. Bellon-Harn and Harn (2008) define scaffolding as “a systematic application of prompts and models that facilitate language development” (p.112). Bellon-Harn and Harn used scaffolding as an intervention strategy during repeated storybook reading with a 6-year-old girl diagnosed with moderate-to-severe mental retardation. The young girl, Emily, had developmental delays in gross and fine motor, language, social, and self-help skills. When the study began, Emily primarily used one-word utterances to communicate about objects or actions and two-word spontaneous utterances (e.g. “open please”, “get up”) to manage her environment (p.114). The two treatment conditions were scaffolding only and scaffolding in conjunction with an augmentative and alternative communication (AAC) device. Baseline data was not collected; instead a multi-element design was used to compare speech output. The three scaffolding strategies of *wh*-questions, modeling, and expansion were alternatively implemented during the two treatment conditions. Storybooks were selected based on redundant text, interesting pictures, and plots that were meaningful to the child. In both conditions the use of scaffolding increased communicative behavior and phonological complexity while decreasing off-topic utterances. The participant demonstrated an increase in initial and final consonant sound, a literacy skill that was not present before intervention.

The addition of an AAC device in the school context allowed a student who once had a difficult time communicating with her environment, become an active participant (Bellon-Harn & Harn; 2008). The number of child initiated on-topic utterances was greater during the AAC condition, then at any other time. This is an important factor because of the intrinsic difficulty children with language and developmental delays face during literacy activities. Some children may require an AAC device, which they may or may not have access to in the environment in which shared reading takes place, making it difficult for the child to communicate (Koppenhaver et al., 2007). Other children simply do not understand the task or question that is being asked of them and, as a result, cannot be taught in the traditional way (Basil & Reyes, 2003; Goin et al., 2004). Although this study shows promise for children with severe language impairments further research is needed as the sample size was based on one child. Furthermore, it would be would be interesting to see the effects of the child's language if a caregiver component was added.

### **Caregiver component**

Dale and Cole (1996) state, "shared storybook reading facilitates the establishment of JA by parent and child, a context that aids language development" (p. 215). The joint focus on the story allows the caregiver to better understand and respond correctly to a child's utterance. This can be particularly helpful to a caregiver when their child displays language impairments. In 1996, Dale and Cole conducted an experimental design study in which 33 mother-child dyads were randomly assigned to either a dialogic reading intervention or a language-focused comparison group. The purpose of this study was to determine the effects of the caregiver-implemented interventions on children (36-72 months) with language delays. Before the experiment

began, each child was assessed using the *McCarthy Scales of Children's Ability* and *General Cognitive Index* (GCI) for general cognitive measures and the PLAI for the children's language ability. In addition, dyads were videotaped either reading a book or free playing (depending on intervention group) with their child and *Mean Length of Utterance* (MLU) was assessed at this time.

After the pretest observations, caregiver's met in their corresponding groups. The experimental group viewed Whitehurst's Dialogic Reading Training Program (DRTP). This video explained numerous strategies that facilitate language during storybook reading. The comparison group watched a conversational language training program (CLTP) which show caregivers ways to encourage and promote language during free-play (i.e., "describe what child is doing or seeing", "expand child's utterance") (p. 220). The groups met twice (before and in the middle of intervention) and after viewing their assigned video were given opportunities to discuss what they watched, as well select toys or books to use with their child. Caregiver's were asked to implement their assigned intervention for approximately 8 weeks. Post-testing was videotaped at the end of intervention using the same toys or books used during the pretest sessions. Videotapes were used to collect data and then transcribed to assess language. Moreover, two coding system were created and used to analyze interactions between caregiver and child.

An ANCOVA assessed the changes in scores for caregiver and child's behaviors. Caregivers in the DRTP intervention had significant increases in their overall engagement, asking more questions, imitating, and expanding behaviors. Caregivers in the CLTP intervention only had an increase in expansion. Although there was an

increase in MLU for all children pre- to posttest, it is noteworthy that children in the dialogic reading intervention had more significant changes in MLU and in the number of different words they produced.

Dale and Cole (1996) study adds to the growing research that supports shared storybook reading creates opportunities for children to hear and practice more complex language, thus increasing their overall language skills. This study also shows promise of the effects that caregiver's can have on their child's language abilities in a relatively short amount of time. Research shows the impact that caregivers can have on their child's generalization and maintenance of a novel skill, though further evaluation of language skills acquired by children with language delays during storybook reading should be assessed (Kasari et al., 2006; Rocha et al. 2007). Likewise, this study did not monitor the implementation of either language interventions. Additional monitoring and coaching could have strengthened the interventions treatment fidelity, as there is no record of how they were implemented in the caregiver's home.

Fielding-Barnsley and Purdie (2003) intervention supports the positive impact caregiver's can have on shared storybook reading interventions. The authors evaluated the effects of an eight-week dialogic reading home intervention with developmentally delayed children. The 26 children (mean age 70.2 months) in the experimental group were matched with the 26 children (mean age 70.5 months) in the control group. The PPVT-III, *Rhyme Recognition Test*, *Concepts of Print Test (CAPS)*, and the *Recognition of Initial Consonant Sound and Alphabet (RICSA)* were administered to all children two weeks before formal intervention reading instruction. Additional word identification and spelling assessments were given to each child based on an abridged assessment

version used in a similar study (Lieberman, Rubin, Duques & Carlisle, 1985). The intervention took place in each child's homes using books that were selected from *The Reading Together* series. Videos illustrating the use of dialogic reading during shared reading were given to the caregivers to watch. Caregivers were also asked to read to their child at least five times during the intervention. Although there was no statistical difference in alphabet knowledge for either group, the results demonstrated that the intervention group scored significantly higher in picture vocabulary, initial consonant, rhyme, and print concepts than the control group.

Even with all the literacy barriers young developmentally delayed children face, Fielding-Barnley and Purdie (2003) provide evidence that dialogic reading has a positive effect on shared storybook reading and should be encouraged. The use of dialogic reading is beneficial as it provides opportunities for the development of new experiences through joint book interactions, monitoring children's comprehension of the content, introducing new vocabulary, and practicing complex language (Hays and Fielding-Barnsley, 2007). Due to the small sample size, interpretation of results should be carefully examined. Furthermore, the authors did not describe the abridged version of the instruments used to assess the children's word identification and spelling. A discussion of the reliability and validity of these instruments is warranted. In addition, Fielding-Barnsley and Purdie did not observe how the caregiver implemented the intervention. Future research should consider more rigorous treatment fidelity guidelines for a stronger study.

Studies have documented that caregivers of children with language impairment are often motivated to be an active participant in their child's intervention (Howlin, 1984;

Crowe, Norris, & Hoffman, 2003). Crowe et al. (2003) assessed the effects of training six caregivers to use an interactive reading intervention called Complete Reading Cycle (CRC) with preschool students (between 38-41 months) who displayed impairments in language development. The *Slosson Intelligence Test (SIT)*, *Preschool Language Scale-3 (PLS-3)* were used to assess children's intellectual and expressive communication ability. A single-subject multiple baseline across subject design was facilitated to implement the CRC intervention. The caregivers were trained in the CRC four essential components: Attentional Vocative, Query, Response, and Feedback. The primary investigator taught the caregiver the four CRC components as steps. The primary investigator coached the caregivers on how to increase the child's participation throughout the implementation of the intervention. Video recordings were taken from the baseline, training, and maintenance phases. Data from the recordings data were collected, and analyzed.

Through the use of CRC, there was a significant increase in the number of child and parent interactions. Communicative turns between child/parent dyads also had significant increases. The children also showed gains in communication initiations throughout the story session. Moreover, four of the children spoke more words at the follow-up session than during baseline.

Studies have shown that children with language impairments engage differently than their typically developing peers during caregiver-child storybook reading (Ezell & Justice, 1998; Crowe, 2000; Crowe et al., 2003). Crowe et al. study displays how interactive reading strategies can increase joint interactions during storybook reading. Such strategies create opportunities for children with language impairments to engage

in communicative behaviors. Caregiver's using the CRC behaviors encouraged children to initiate communication about the text. These joint interactions help clarify the text for the child. Increasing the child's comprehension allows for further initiating and responding behaviors, supporting the child's overall language development. Additional research is needed in this area as a small sample size was used. Although all children had language impairments, the variability between the children's ability were reflected in the data. The background and experience of each caregiver could have also played a role in the implementation of the intervention. Controlling for such factors, would give the study more power.

Justice, Skibbe, McGinty, Pianta, and Petrill (2011) assessed the practicability, efficacy, and social validity of a print knowledge, caregiver implemented, storybook reading intervention on children with language impairments. This experimental design was composed of 62 caregivers and their children. Caregivers chosen to be in this study, had to be able to read at a fourth grade level, assessed by the *Wide Range Achievement Test* (WRAT). Each child was evaluated by two subtests in the *Test of Language Development* (TOLD) to reaffirm the presence of language impairments. In addition, the children were pre- and post-tested for their print-concept and alphabet knowledge with *Preschool Awareness Literacy Screening for PreK* (PALS) and *Upper-Case Alphabet Recognition* subtest (PWPA) respectively.

The dyads were randomly assigned to one of three groups: print-referencing (treatment group), picture-focused, or sound-focused condition. After initial screenings, caregivers were given written and verbal instructions on how to implement their respective intervention. Caregivers were asked to implement their intervention four

times a week for 12-weeks, introducing a new book each week. The treatment group (print-referencing) integrated nine scripted questions about print concepts, letters, and words; picture-focused condition integrated nine scripted questions focusing on the pictures, plot, characters, and action; and the sound-focused had nine scripted questions about phonological concepts (e.g., rhyme, beginning sounds, and syllable structure). To ensure fidelity of implementation caregivers tape-recorded and kept a written log on each book session. Members of the study would fidelity check review logs and tapes for correct implementation.

Analyses of data for Justice et al. showed significant differences in print-concept knowledge between groups. The treatment group (print-referencing) made significantly more gains in print-concepts than the picture-focus group. However, the print-referencing group did not see significantly greater gain when compared to the sound-focused, though data showed an upward trend towards a significant difference. Surprisingly, alphabet knowledge was considered not statistically significant for any group even though the print-focus group specifically targeted letters. Authors randomly selected caregiver's in the picture-focused group to see if caregivers discuss print and/or letters in a more general manner. Of the 16 picture-focused sessions coded, "71% included no parental print reference, four contained one reference, and one contained six references" (p. 531). This supports previous research in which caregiver's who have children with language impairments need to be explicitly taught to embedded print awareness strategies into shared storybook reading (Justice & Ezell, 2002; Lovelace & Stewart, 2007).

In regards to social validity of this study, caregivers were asked to anonymously complete a questionnaire. Justice et al. highlighted that there were two significant differences between the treatment (print-focused) and comparison groups (picture- and sound-focused), both having to do with caregivers' perception of their child's experience. First, the caregivers in treatment group reported their children had higher satisfaction of the reading sessions than children in the comparison groups. Secondly, children in the print-referencing group enjoyed the books more than the children in the picture and sound focused groups. With respect to the feasibility of the implementation of the intervention, about a quarter of the caregivers (14 dyads) were unable to complete the 12-week intervention. Caregiver's age and educational achievement were associated with attrition. The younger the caregiver and less education they had, the more likely they were to leave the study.

Overall, Justice et al. intervention on caregiver implemented, shared storybook reading for children with language impairments were positive, supporting previous finding with print-referencing interventions. Storybook reading enables children's emergent literacy skills to cultivate through meaningful joint interactions. The rate of attrition, though common among storybook studies (e.g., Whitehurst & Lonigan, 1998), warrants further investigation. Moreover, the participants who finished the intervention were rather homogeneous (e.g. English speaking, older caregivers), future research should include a more diverse sample, as it would strengthen intervention's power.

### **Interpretation of shared reading interventions with children with language and developmental delays**

The research reviewed demonstrated the child's interactions during shared storybook reading were influenced by the adult reading the book (Bruner, 1983; Bus et

al., 1995; Hay & Fielding-Barnsley, 2007; Johnston, et al., 2008). Hays and Fielding-Barnsley (2007) explain that children with language delays are frequently less responsive and tend not to ask questions or initiate conversations about the story. The lack of oral communication between the adult and child lead to fewer opportunities to create interactions for language development, which leads to considerably less letter recognition, introduction of new vocabulary words, phonological awareness, and other literacy development skills (Bellon-Harn & Harn, 2008; Hays and Fielding-Barnsley, 2007; Koppenhaver et al., 2007; Marvin & Wright, 1997; van der Schuit et al., 2009). Shared-storybook reading is transactional in nature, so it is important that the adult uses strategies to facilitate language, particularly when the child displays a language impairment (Bakeman & Adamson, 1984; Dale & Cole, 1996; Crowe et al., 2003; Lovelace & Stewart, 2007; Justice et al., 2011).

Complementary to the findings in JA research, scaffolding is commonly used to expand communication in a meaningful way between adult and child. This is an important strategy as it helps children expand their own vocabulary. Through the use of scaffolding in shared storybook reading, adults can facilitate language and speech patterns that increase, elaborate, and model new and unfamiliar vocabulary words in a context that can help a child expand their own vocabulary (Bellon-Harn and Harn, 2008; Justice & Kaderavek, 2002; Lane & Wright, 2007). An adult's modeling language is an example of a scaffolding strategy that is seen throughout shared storybook reading studies (Dale & Cole, 1999; Fielding Barnsley & Purdie, 2003; Crowe et al., 2003; Lovelace & Stewart, 2007; Justice et al., 2011). Modeling language during shared reading (e.g., commenting on a picture) is another effective scaffolding strategy to elicit

language (Van Kleeck et al., 2006). By the same token, expanding on what the child has said is an additional storybook strategy used throughout the studies to support children with language impairments (Kleeck et al., 2006; Lovelace & Stewart, 2007; Justice et al., 2011). Further research is needed, as it is not known if one scaffolding strategy facilitates more language than another. An area of research that shows promise is the use of adult's using non-evocative explicit referencing during shared storybook reading. Lovelace & Stewart (2007) study illustrates the use of non-evocative techniques can easily be incorporated during shared storybook reading and promote emergent literacy skills without demanding responses for the child. This warrants further research with children who have language impairments, as it seems they can still learn vital literacy skills without responding vocally.

Further research is needed in the area of JA in shared storybook reading interventions, as it is not explicitly targeted in any of the reviewed interventions. Although the studies imply that joint interactions increased, special attention is needed specifically on children's initiation and response to joint attention, as these skills are foundational for the acquisition of language.

Based on the research reviewed, it appears that the use of caregiver's during shared storybook readings generally displayed positive results, complementing findings found in the JA literature review. Crowe et al. (2003) study provides evidence of an interactive reading intervention that was easy to teach caregivers, simple for caregivers to implement in the comfort of their own home, and had positive effect the child/parent interaction allowing an increase in the child's language ability. In addition, numerous other studies (e.g., Dale & Cole, 1996; Fielding-Barnsley & Purdie, 2003; Justice et al.;

2011) support Crowe's findings by stressing the importance of the adult interaction by providing a literacy rich experience. Overall, the caregiver led storybook interventions provided interactive strategies in a naturalistic manner. These interactive strategies, paired with the natural interaction of caregiver and child, have the potential to foster generalization of numerous emergent literacy skills.

### **Shared Reading Interventions with Children with Autism Spectrum Disorder**

Although numerous studies have been conducted with shared storybook intervention on typically developing and at-risk children, there are a limited number of studies on the acquisition of emergent literacy skills using storybooks with young children with ASD. There are only two studies and one dissertation found in which preschool aged children with ASD participated in a shared storybook reading to increase joint interaction and expressive communication (Bellon, Ogletree, and Harn, 2000; Koppenhaver et al., 2001; Vogler-Elias, 2009). Appendix B (Table B-2) provides a list and summary of all the ASD shared storybook reading articles (3 single subject articles). Current research has focused on hyperlexia (i.e., the ability to recognize words with little or no comprehension of the word) and sight word instruction, in lieu of the acquisition of early literacy skills, such as JA (Koppenhaver & Erickson, 2003; Watson, Lanter, McComish, & Poston Roy, 2004). The failure to focus on the attainment of early literacy skills is partly due to the complex nature of autism, which makes it difficult to construct and implement adequate language and communication interventions (Bellon et al., 2000).

### **Interventionist led**

Bellon et al. (2000) combined scaffolding with shared storybook reading on a 3 year-old-boy with high functioning autism. A seven-week intervention using a single-

subject design was implemented. The young boy's speech was often inaudible and extremely difficult to understand. During the baseline sessions, two storybooks were introduced using *wh* questions by a trained graduate assistant. The MLU data collected from baseline determined that the boy's speech was typical of a child between 18 to 20 months (i.e., 1.8 morphemes), though the authors noted no other assessments.

Throughout the treatment sessions five storybooks were introduced using four scaffolding techniques: cloze procedure, binary choice, expansions and constituent questions. The cloze procedure technique is a pause that cues a child that they should provide information about the story. A binary choice is a strategy where the adults "states information, offering the child two alternate utterances" (p. 54). Expansion strategy is used when the adult reading the story wants the child to elaborate on their response. When an adult wants specific information from the child, a constituent question is used. There was a criterion for the storybooks chosen: contain a setting, events in the story had to be sequential, and have a result to the problem. In addition to the storybook, manipulative objects and activity were introduced with the storybook. For instance, in the storybook *Mrs. Wishy Washy*, a farm setting and animals were brought out and the child could recreate the events of the story with scaffolding by the graduate assistant if needed. The objects were to "provide a multi-sensory context to illustrate actions and events occurring in the books" (p. 54).

Each session was recorded, transcribed, and a checklist was used to record when a scaffolding procedure was used. The results demonstrated an increase in storybook related utterances and a decrease in echolalia with the young boy. The use of scaffolding showed positive results and is in conjunction with previous studies that

use scaffolding to increase language in children who show deficits in language. One should be cautious when interpreting the results, as the sample size is one child. In addition, there was very little information given about the participant, no psychometric testing was reported. It is unknown if the increase in the participant's spontaneous language is due to scaffolding, the activities with the manipulatives, or a combination of both, as an alternating treatment design was not used.

### **Interventionist led**

Koppenhaver et al. (2001) conducted a study on the use of storybook reading in conjunction with an augmentative and alternative communication an (AAC) device to increase meaningful interactions between four mothers and daughters (between 39-72 months) diagnosed with Rett Syndrome, a disorder on the autism spectrum. All children displayed significant language impairments, as no intelligible speech was used. *Bayley Scales of Infant Development (BSID-II)* and *Vineland Adaptive Behavior Scale* were used to assess age equivalent, 5-19 months, and 9-17 months respectively. Authors reported that the schools placed all the participants in the range of severe to profound intellectual disability, though no additional information was given.

A multiple baseline design was used to conduct three intervention phrases. Caregivers were given a selection of 30 children's books and asked to choose one familiar and unfamiliar book that they believed their child would be interested in. Each caregiver was asked to read to their child at least two stories a week in their home environment. Baseline data was video recorded to collect the way in which the mothers typically read and interacted with their daughter. The second phase of the intervention was handing splinting. This allowed the authors and parent to examine the effects of the use of hand splinting to prevent the stereotypical hand movements (seen in children

with Rett Syndrome) that would otherwise interfere with learning. AAC devices were implemented in phase three of this study. Each family was given: a set of Picture Communication Symbols (PECS), a single-message Big Mack, and a multi-message Four In-Line Cheap Talk. The AAC devices were set up to allow the children to communicate about the storybooks. During this phase, the authors examined the impact that a variety of assistive technologies had on storybook reading and communication between dyads. In phase four, parents were trained on effective storybook strategies, as well as strategies that would encourage their child to use ACC devices. During this phase caregivers were taught to acknowledge their child's attempt to communicate and give them meaning. For instance, one child yelled and looked at her mom when she turned to a picture of a cicada in the book *The Very Quiet Cricket*. So the mother replied, "Oh, you like that beautiful picture of the cicada, don't you? I wonder if we could find a cicada in the field near our house" (p. 400). The caregivers encouraged their children to use the AAC devices to answer their questions through the use of prompting. The importance of wait time was taught, as well as the use of appropriate questioning to use to maximize the use of the AAC devices.

Limited by their own gestures and vocalization in phases one and two, little to no interaction took place (only one participant pointed to pictures during phase two). However, once the introduction of the AAC device in conjunction with shared reading took place, a significant increase in labels and comments made between caregiver and child occurred. As a result of the caregivers' training, the four girls also had significant gains in accessing AAC devices, response and initiation to JA bids, and labeling and

commenting of items in the storybook. The authors did note that the condition of familiar and unfamiliar books did affect the data and were combined.

Koppenhaver et al. (2001) used storybooks to set up a predictable and familiar condition that encouraged communication between dyads. With the addition of AAC devices it created greater opportunities for joint interactions and exposure to emergent literacy skills through nonconventional ways. Though this study shows much promise, results should be interpreted with caution. The AAC devices used in this study are not a one-fits-all solution and may not work for other children on the autism spectrum. Generalization and long-term effects of the intervention were not assessed and future research to examine such things.

Vogler-Elias dissertation (2009) used “interactive to independent” model based on Kaderavek and Rabidoux (2004) framework of literacy development, which had a pragmatic focus on the social aspects of shared literacy experiences, such as turn-taking, JA, and acceptance of a range of communicative behaviors. A single subject multiple baseline across seven dyads was used to examine whether a parent implemented scaffolding strategies used during shared reading would increase children with ASD expressive language and parent/child engagement. The children were between the ages of 36-60 months and had an expressive vocabulary of 25 words. Parents met three times a week for four weeks, in which the primary investigator conducted direct instruction parent training, modeling, practice with constructive feedback, and independent practice with the child. During the session the parents were taught to increase four of the following strategies: praise/encouragement statements, pauses, attention-getters, achievable models, recasts, cloze statements, *wh* questions,

and vocabulary definitions. The strategy selection was individualized based on parents' baseline levels of performance. The "interactive to independent" intervention had positive effects on parents' use of strategies, children's language, parent-child social engagement, and parent's confidence in facilitating reading sessions with their child. Vogler-Elias (2009) also reports an increase of duration that the dyads spent reading. This is a valuable piece of data, given that children with ASD are reported to have fewer opportunities to participate in early literacy activities.

### **Interpretation of shared reading interventions with children with autism spectrum disorder**

Children with ASD are likely to have impaired JA skills and social interactions, making the acquisition of emergent literacy skills particularly difficult (APA, 2000). Based on the research reviewed, it appears that caregiver and child can establish joint interaction through storybook reading as it creates an environment in which both parties are focused on the same external object (Dale & Cole 1996; Lovelace & Stewart; 2007).

As illustrated by the lack of research, there is a need for further research in the area of shared storybook reading with young children on the spectrum. It was noted that children with disabilities had more sporadic and limited access to literacy rich materials, such as books and pencils, than their non-disabled peers (Bellon-Harn & Harn, 2008; Goin et al., 2004; Koppenhaver et al., 2007; Marvin & Wright, 1997). Inadequate literacy experiences early in the children's lives may factor into academic difficulties later in spelling, reading comprehension, and reading fluency (Goin et al., 2004; Hays and Fielding-Barnsley, 2007). The reasons for the lack of opportunities are varied. Some caregivers may have lower literacy expectations of children, simply due to the presence of a disability (the lack of the transactional communication). Others

caregivers, may lack the motivation or understanding of the importance of emergent literacy activities (Basil & Reyes, 2003; Goin et al., 2004; Koppenhaver et al., 2007; van der Schuit et al., 2009). In addition, the majority of the child's early interventions are speech, physical ability, and self-care focused, placing opportunities for literacy development on the backburner (Basil & Reyes, 2003).

Similar to the research on children with language impairments, positive affects were seen in children with autism when scaffolding strategies were introduced during shared reading (Bellon et al., 2000; Koppenhaver et al., 2001; Vogler-Elias, 2009). Scaffolding allowed the adults to guide the child through joint interaction during storybook reading. For instance, during reading an adult can use gestures or facial expressions to help a young child understand the meaning of a new word. This can be extremely beneficial to children with ASD, as many of them have to be explicitly taught gesture and vocabulary skills. Books with repeated vocabulary and predictable texts are important supports to use for children with language delays, as it will expose young children to quality language experiences (Johnston, et al., 2008). Storybook reading can create an environment that exposes children with ASD to skills in which they have deficits.

Researchers recognize the importance of intensive early intervention for young children across the autism spectrum (Jones & Carr, 2004; Loveland & Landry, 1986; Ortiz, Stowe, & Arnold, 2001). Due to the varying degree of signs and symptom individuals with ASD exhibit, it is important for interventions to be flexible in order to meet the family and child's needs. Parent-implemented interventions are one way to meet these individuals' needs. Positive results have been shown for children with ASD

in the areas of language and communication skills through the use of parent-implemented interventions (e.g., Koppenhaver et al., 2001; Vismara & Lyons, 2007; Schertz & Odom, 2007; Jones & Feeley, 2007; Vogler-Elias, 2009). Considering that shared storybook reading is a natural activity in which a parent and child partake in joint object, it advocates the growth of language and social participation (two core deficits for children with ASD) though more research is needed in this area. As stated previously, further research is needed in the area of JA in shared storybook reading interventions.

To enhance early literacy development in children with language and developmental delays, researchers also suggest picking books that are meaningful, motivating, and engaging (Bellon-Harn and Harn, 2008; Hays and Fielding-Barnsley, 2007). The use of highly preferred object is a theme that is seen throughout JA studies and should also be examined with storybooks and children with autism. Research has implied that it is possible to support participation in literacy activities through adjusting the way caregivers approach shared reading, particularly with children with disabilities. Unfortunately, the lack of empirical research and longitudinal data on specific interventions to help increase literacy skills in children with autism shows the desperate need for future research to be conducted for children with ASD.

### **Statement of Problem**

Adult-child shared reading is viewed as a natural context with a predictable routine. Interventionists are increasingly using storybook reading to facilitate the communication and linguistic development of children who exhibit language impairment. All of the interventions discussed focus on teaching adults techniques aimed at increasing active child participation during storybook reading. Throughout, adults were successful at learning a variety of strategies to support children's language and social

engagement. As a result of adults increasing their use of reading strategies, progress was observed in children's expressive vocabularies, language complexity, number of linguistic and social turns. All of these important components of cognitive learning begin with the fundamental skill of JA. Although these studies touch on JA, there are no studies to date that use shared storybook reading solely to establish JA in preschool age children.

## CHAPTER 3 METHOD

The Meaningful Interactions through Storybooks (MITS) was used to train caregivers of young children with autism to increase their interactions during storybook reading. The MITS strategies: Attention Directing, Query, Model Response, and Feedback are adapted from the Complete Reading Cycle (CRC) developed to use with children with language impairments (Crowe, Norris, & Hoffman, 2003). In their original study, Crowe et al. trained caregivers to use the CRC four essential components: Attentional Vocative, Query, Response, and Feedback. Caregivers were taught the four CRC components as steps and coached on how to increase the child's participation through the CRC components during shared storybook reading. Significant increases in the number of child and parent interactions were observed, and child participants showed gains in communication initiations throughout the storybook sessions.

The MITS strategies were adapted based on a pilot study with 2 caregiver-child dyads. The four MITS strategies are defined as: (a) Attention Directing: noted as any verbal or nonverbal initiation (e.g., point) to establish joint focus (e.g., attention to the book), such as the pictures, events, attributes, or text; (b) Query: any communicative act to volunteer or request information to be shared and to solicit a child's verbal or nonverbal response; (c) Model Response: any semantically contingent response to the Query, if the child did not respond to the Query in verbal or nonverbal way within 5 seconds; and (d) Feedback: any comment serving to acknowledge, extend, restate, or clarify the response of the child or provides an opportunity for the caregiver and the child to discuss material presented in the storybook. Full strategy definitions and examples are also provided in Appendix C (Table C-1). Each caregiver was taught the

4 MITS strategies during individual sessions using direct instruction, modeling, practice, and feedback from the researcher.

The purpose of Chapter 3 is to describe the methods and procedures used to conduct this study. This chapter is organized by the following: (a) the criteria for participation and selection of participants; (b) descriptions of the participants; (c) setting; (d) materials used; (e) research design; (f) measurement procedures; (g) experimental procedures; and (h) data collection and analysis procedures.

### **Criteria for Participation and Selection of Participants**

The purpose of this study was to determine the effects of training caregivers of children with autism to use four interactive reading strategies called MITS. The participants in this single-subject, multiple-probe-across-participants research study were four children with autism and their primary caregivers.

#### **Children**

The children were between the ages of 24 and 39 months and came from English-speaking homes. The children were nominated by the Orlando Center for Autism and Related Disabilities Center (CARD) regarding their initial eligibility. The criterion for participation also included a diagnosis on the autism spectrum and an evaluation of the child's joint attention level as determined by the *Unstructured Joint Attention Assessment* adaptive from Loveland and Landry (1986).

Each child received an independent diagnosis of autism by an outside agency based on the *Diagnostic and Statistical Manual of Mental Disorders- Fourth Addition Text Revision* (DSM-IV-TR; Association American Psychiatric, 2000) or an autism diagnostic instrument (e.g., *ADOS*, *ADI-R*, *CARS-2*, or *SCQ*). During baseline, an

evaluation of the child's joint attention level was completed using the *Unstructured Joint Attention Assessment* (adaptive from Loveland & Landry, 1896).

### **Caregivers**

The primary caregiver of each child participant also participated in this study. Once the caregivers agreed to participate, the primary investigator visited each participant to determine if they met all the criteria to be included in this study. The criterion for participation included: a completed informed caregiver consent form, completion of a Child's Interest Inventory survey (Appendix F), and permission to evaluate the child's joint attention skills using *Unstructured Joint Attention Assessment* (adaptive from Loveland & Landry, 1896).

### **Participants**

After the caregivers completed the informed consent forms to participate in the MITS study with their child, the researcher collected demographic and background information through a questionnaire (Appendix J) for each participant. The participants in the study were four caregivers and their children diagnosed with autism. The following describes each of the caregiver-child dyads based on the information collected from the questionnaire, the *Unstructured Joint Attention Assessment* (Loveland & Landry, 1896), and the 5-minute caregiver-child play session.

#### **Dyad 1: Jon and his caregiver:**

Jon, a Hispanic male, was 35 months old when the study started. He was diagnosed with PDD-NOS at the age of 2. During the study Jon was receiving speech therapy once a week and behavioral therapy two times a week. He was enrolled in a general education preschool classroom. Jon was the younger of two children. His older sister, 10 years old, was also on the autism spectrum.

Jon's mother was a single 31-year-old mother, at the time of the study. She was a student at a local college and the caregiver participating in the MITS intervention. Jon's mother indicated that he enjoyed seeing how things worked and would like to see improvement in his communication skills and interact more with his peers.

On the *Unstructured Joint Attention Assessment* (Loveland and Landry, 1986) Jon responded to nine out of the ten joint attention task. The only task Jon was unable to respond to was the shift gaze using gesture-only task.

During the 5-minute free play between child and caregiver, Jon used a variety of word and word combinations. He would occasionally initiate conversation and frequently responded to his caregiver. Jon averaged 4 single words per minute and 9 multiple word combinations per minute.

Jon's mother indicated on the Child Interest Inventory that he played with cars, fire trucks, and trains most often. Jon enjoyed playing with computers, electronics, and flipping things on and off.

### **Dyad 2: Jess and his caregiver:**

Jess, a 26-month-old Caucasian male when this study started, was diagnosed with autism at 18 months of age. At the time of the study he was the youngest child of two children living in the home with his 4-year-old sister. Jess was receiving speech therapy twice a week, occupational therapy once a week and ABA therapy twice a week for 3 hours per session when the study began. He did not attend preschool.

Jess' mother, and caregiver participating in this study, was a 32 year old stay at home mother. His parents were married and living together. The father graduated from college and was working as a nuclear electrician. She reported that Jess had strength

in matching objects and wanted to see improvement in his verbal communication, as he had severe speech problems.

On the *Unstructured Joint Attention Assessment* (Loveland and Landry, 1986) Jess responded to four out of the ten joint attention task. He was responsive to the pointing and showing for both gesture-only and language-plus-gesture tasks. During the 5-minute free play between child and caregiver, Jess interacted very little with his caregiver. He would occasionally respond to his caregiver using canonical vocalization, though his caregiver seemed to have understood what he was saying. Jess averaged 1 canonical vocalization per minute, though no words or word combinations were coded.

The Child Interest Inventory indicated that Jess played most often with cars, play dough, Mr. Potato Head, and puzzles. In addition, he liked to sort shapes, match objects, and occasionally participated in sensory experiences.

### **Dyad 3: Dave and his caregiver**

Dave, a Caucasian male, was 39 months old when enrolled in this study. Dave was diagnosed with PDD-NOS at the age of 27 months, though mother noted that they anticipated a change to a classic autism diagnosis soon. Dave received speech two times a week, ABA therapy five times a week, and occupational therapy two times a week. He was also enrolled in a varied exceptionalities prekindergarten classroom 3 days a week for 3 hours. Dave has a younger sibling, an 18-month old, sister.

The mother, and caregiver participating in this study, was 35 years old and currently working on her Ph.D. in biology at the local university. His father indicated that he had taken some college courses, but no degree was ever obtained. At the time of the study, he was the manager of the family's retail shipping business. Through the

questionnaire the mother wrote that some strengths Dave were that he was affectionate, skilled in visual puzzles, a rule follower, and task oriented.

Dave responded to four out of the five gesture-only tasks in the *Unstructured Joint Attention Assessment* (Loveland and Landry, 1986). Shift gaze was the gesture only task that he did not respond to. In addition, Dave only responded to two out of the five language-plus-gesture tasks. He was unresponsive in all attempts of shift gaze, tapping object, and moving child's hand.

During the 5-minute free play between child and caregiver, Dave interacted very little with his caregiver. He would occasionally join in when she would say, "three, two, one, blastoff". He had no canonical vocalization or words, and a total of 5 multiple word combinations, averaging 1 multiple word combination per minute.

According to the Child Interest Inventory the objects that Dave most often played with were: rockets, airplanes, trains, helicopters, puzzles, and the family's iPad. He also enjoyed sensory experiences, especially licking and mouthing objects and was extremely visual sensory seeking (e.g., looking at objects very close and from all angles).

#### **Dyad 4: Jay and his caregiver**

Jay, a Hispanic male, was 30 months old when the study started. Jay was diagnosed with autism and expressive language and speech delays when he was 2 and half years old. Jay is echolalic, meaning he repeats words or sounds he has recently heard. Through the questionnaire Jay's mother indicated that Jay received speech therapy, occupational therapy, and ABA therapy once a week, in the home, respectively. Jay did not attend preschool at the time of the study.

Jay's mother, the caregiver who participated in this study, was 35 years old. She has a bachelor's degree but stayed home with Jay at the time of the study. Jay's father has an associates degree and was working as an audio engineer. Jay was an only child, whose parents were married when the study started. When asked what some of Jay's strengths were, she wrote, "exceptional memory, quick learner, eager to learn new things, and great attention to detail".

For the *Unstructured Joint Attention Assessment* (Loveland and Landry, 1986), Jay responded to five out of the five language-plus-gesture task. He only responded to four out of the five gesture-only tasks, not responding to the shift gaze without language.

During the 5-minute free play between child and caregiver, Jay did not use any canonical vocalizations or word combinations. He would occasionally repeat what his caregiver had said, but echolalia was not coded as expressive verbalization. His caregiver would ask questions about the toys (e.g., what's this, what color is this) and he would answer with a word. A total of 8 single words were coded for Jay.

On the Child's Interest Inventory, Jay's mother shared that he was interested in trains, cars, ABC's, numbers, and shapes. She wrote that Jay liked to participate in sensory experiences, such as: touching, lights, and tearing paper.

## **Materials**

### **Assessment Instruments**

During the pre-baseline phase, the investigator assessed the children using *The Unstructured Joint Attention Assessment* (Appendix D). This assessment took approximately 15 minutes for each child. It involved playing with the child, at their home, in a relatively unstructured setting (no tables and chairs, no demands on the

child, and free access to toys). During this time, the investigator used gesture-only (e.g., shifting gaze, pointing, and tapping) and language-plus-gesture probes (shifting gaze plus saying, “Look at the \_\_\_\_”). The assessment was videotaped and scored for joint attention.

In addition, an analysis of each child’s expressive language was collected in a naturalistic context, (i.e., play session with caregiver) (Helimann, Nockerts, & Miller, 2010). This assessment took approximately 5 minutes for each child and took place during free play between child and caregiver. The language sample was videotaped and coded for canonical vocalizations, single words, and word combinations (Appendix C).

### **Caregiver Training Material**

The primary researcher worked one-on-one with the caregiver until the caregiver could implement the MITS intervention. During the training component of the intervention phase, the researcher taught each caregiver how to implement the four reading strategies of MITS through the use of a research-training guide, a caregiver’s handbook explaining the basics of MITS (Appendix E), and handouts giving examples of appropriate prompts. Paper and pencil were utilized to check for comprehension. To analyze the data, the researcher used Quick Time, a computer video software program, to watch the recorded video sessions. Using the MITS Collection Coding Sheet (Appendix C) strategies were coded and then calculated to rate.

### **Books**

Research suggests exposing children to books that they are interested in is a critical factor in their success (Ortiz, Stowe, & Arnold, 2001). In this study, some of the books used were matched to the child’s interest. For example, if the child’s interest

inventory indicated a fascination with trains, the child's book selections would contain some books on trains (e.g., *The Good Night Train* or *Inside Freight Trains*). Additional books not based on the child's interest were also selected. The selection criteria for the books were as follows: (a) had colorful illustrations, (b) were at or below a second grade readability level, (c) were of typical length, (d) were age-appropriate, and (e) some books were based on the particular interests of each child. Information about the child's interest was gathered from the caregiver through the Child's Interest Inventory Survey, given at baseline, and results can be seen in Table 3-1.

### **Setting**

The baseline, intervention, maintenance, and generalization phases were conducted in the home of each dyad. The rooms had adequate lighting and were arranged in such a way that the caregiver and child could sit next to each other, so they were able to see and interact with each other and the book during each session.

### **Study Design**

A multiple probe, multiple baseline across participants design was used in this present study (Horner & Baer, 1978). This type of design was used to determine: (a) if the MITS instruction was functionally related to the caregiver's use of MITS strategies; (b) if the caregivers' use of the MITS strategies resulted in changes in their child's use of joint attention behaviors; and (c) if the caregiver's use of the MITS strategies resulted in changes in their child's use of expressive utterances.

In addition, this type of design was chosen as the intervention was introduced to the participants at different times; allowing the investigator to evaluate threats to internal validity as well as demonstrating experimental control (Gast, 2010). Furthermore, the multiple baselines controlled for developmental maturation and exposure to the

treatment setting. This design was useful in evaluating immediate effects of the intervention. Multiple probe baseline design also allowed for fast and simultaneous collection of data, as it did not require continuous measurement of the strategies and behaviors. In addition, participants were not denied intervention (Horner & Baer, 1978; Gast, 2010).

As required, baselines were staggered across the dyads (Gast, 2010). Multiple probes were used for participants that remained in baseline, while the other participants participated in true baseline prior to MITS instruction. Once Dyad 1 showed a stable baseline, the MITS intervention training began. Dyad 2 remained in baseline until a similar reliable baseline was displayed and an upward trend in Dyad 1 intervention data was established. Once this was evident, Dyad 2 began MITS training. A replication began with Dyad 3, and Dyad 4, after the establishment of an upward trend of the first two dyads.

Multiple probes were conducted during the baseline and maintenance phases, as it was more practical for the caregivers to video record their reading session intermediately rather than for an lengthy period of time (Horner & Baer, 1978). Continuous data were collected during the intervention and generalization phases. Internal validity was strengthened through the staggering of the experimental process (Gast, 2010).

## **Measurement Procedures**

### **Dependent Measures**

During the baseline, intervention, maintenance and generalization phases of this study, data were collected on three dependent measures:

1. The frequency of the 4 MITS reading strategies implemented by the caregiver during storybook reading per minute;
2. frequency of the child's joint attention (initiated and response) per minute; and
3. frequency of the child's expressive utterances produced during the shared storybook reading per minute.

This interactive reading intervention was composed of four strategies produced by the caregiver: Attention Directing, Query, Model Response, and Feedback. The four strategies are based on the work of Crowe, Norris, and Hoffman (2003). The four MITS strategies are defined as: (a) Attention Directing: noted as any verbal or nonverbal initiation (e.g., point) to establish joint focus (e.g., attention to the book), such as the pictures, events, attributes, or text; (b) Query: any communicative act to volunteer or request information to be shared and to solicit a child's verbal or nonverbal response; (c) Model Response: any semantically contingent response to the Query, if the child did not respond to the Query in verbal or nonverbal way within 5 seconds; and (d) Feedback: any comment serving to acknowledge, extend, restate, or clarify the response of the child or provides an opportunity for the caregiver and child to discuss material presented in the storybook. Operational definitions and an example of each MITS strategy are presented in Table 3-2.

For the purposes of this study, joint attention is defined as two persons sharing attention on the same external object through the use of gaze, head turn, gestures, or language. Each child's joint attention behaviors were represented in four subcategories: (a) Vocal Response to joint attention (e.g., the caregiver ask the child, "What is the bear eating" and the child responds, "apple"); (b) Nonverbal Response to joint attention (e.g., the child points to the bear and alternates eye contact to the caregiver); (c) Vocal Initiation of joint attention (e.g., the child says to the caregiver,

“brown bear”.); and (d) Nonverbal Initiation of joint attention (e.g., as the caregiver turns the page, the child sees the bear on the page & alternates eye contact between the bear and the caregiver). These subcategories are based on Vismara and Lyons’ (2007) work on joint attention with children with autism. Table 3-3 lists specific types of joint attention behaviors that were used to code the analysis. Each behavior is operationally defined and further clarified with an example.

Expressive language was represented in three subcategories: Canonical Vocalizations were defined as a rhythmic production of one or more consonant-vowel sounds. A single Word was defined as any single word utterance, and Word Combination was defined as multiple word combinations in a single utterance (e.g., play ball). Table 3-4 lists definitions and examples used to code the analysis.

### **Independent Variable**

The independent variable was the MITS intervention training. The primary investigator conducted the training. The training was broken into three parts and lasted approximately 30 minutes in each session and described in the procedures section below.

## **Experimental Procedures**

### **Pre-baseline Phase**

Prior to the beginning of the study, the researcher conducted an initial visit to the home of each potential participant to discuss the study and ask permission to assess the joint attention level of each child. Once caregiver consent was granted, the child’s joint attention was assessed using the *Unstructured Joint Attention Assessment* (adapted from Loveland & Landry, 1896) and a sample of each child’s language was

also taken through a 5-minute caregiver-child free play session. In addition, the caregivers completed the Child Interest Inventory (Appendix F).

### **Baseline**

During the baseline home visits, the researcher instructed each caregiver to read to their child like they normally would, using books that they already had in their home. The researcher observed and videotaped the reading sessions. Baseline data were gathered for a minimum of four sessions per dyad or until there was a stable trend. The researcher used the MITS Collection Checklist (Appendix C) to analyze videotapes to determine the number of MITS strategies used by the caregivers as well as responses to bids and initiation of joint attention by the child participants.

### **Intervention Phase**

The investigator conducted the trainings. Each training session was broken up into three segments and lasted approximately 30 minutes. The following three segments were used in the training:

#### **MITS Instruction/Review**

At the first training session, the caregiver received a MITS manual (Appendix E). This session began with an introduction of the importance of joint attention, shared storybook reading, and the MITS strategies. As the MITS strategies were explained, the researcher modeled the interactive skills and the caregiver was given opportunities to practice those skills using a storybook that was not used with the child (i.e., *Cat in the Hat*).

Subsequent training sessions with the caregiver continued with a review of the MITS reading strategies. The researcher would ask the caregiver to explain each strategy. If the caregiver were having trouble with a specific strategy, then the

researcher would provide corrective feedback and would ask the caregiver to explain the missed strategy later on in the training session. Once the MITS strategies were reviewed, the caregiver was able to practice the MITS strategies with the researcher using storybooks that were not used in the study (i.e., *If You Give a Mouse a Cookie*, *Goodnight Moon*, *The Very Hungry Caterpillar*). During this time the researcher continued to model, provide corrective feedback, and praise. Once the training session was over, the caregiver would then read a book to their child.

The MITS training sessions continued during the intervention phase until the caregiver was able to produce 7 or more spontaneous MITS strategies per minute consecutively for 3 sessions during reading probes with their child. The researcher selected 7 MITS per minute as the criteria as that was used in Crowe et al. (2003) Complete Reading Cycle study. The researcher reviewed each dyad's reading probe using the MITS Collection Checklist and Coding Sheet (Appendix C) for the frequency count of the MITS behaviors.

### **Dyad Reading Probe**

Following the MITS instructional review session, the caregivers had the opportunity to practice what they had learned. Eight books were given to the caregiver. Four books were based on the child's interest and the researcher selected the other four books. The caregiver was instructed to give their child a choice of which book to read from a selection of three books. Once a book was read, the caregiver was not to read that book again during that phase. Video recording began when the caregiver started the storybook session with the child.

## **Investigator/Caregiver Coaching**

After the reading probe, the investigator and caregiver watched the videotape, reviewed, and discussed the reading session. The coaching style used during the coaching portion of the intervention could be considered practice-based coaching, as the coaching was used to support and improve the caregiver's use of the MITS strategies. As the caregiver and researcher watched the reading session video, the researcher frequently paused the video to address the positive exchanges between the caregiver and the child, the caregiver's responses to the child's interaction, and/or techniques to increase or fix communication between the dyad. Caregivers were allowed to stop the video to ask any questions they may have had, point out any positive exchanges they saw, and/or explain where they could have used additional MITS strategies.

The coaching portion of the training allowed a more relaxed setting between the researcher and the caregiver, rather than a more directive approach. Reviewing the reading probe session videotapes allowed the investigator and the caregiver to discuss where additional MITS strategies could have been used to increase caregiver-child interaction. After participating in the MITS training, the caregiver needed to use a minimum of 7 MITS strategies per minute, consistently for three sessions before the caregiver was able to implement the MITS intervention independently. If the caregiver produced below 7 MITS strategies, additional training was given.

## **Maintenance**

Once the caregiver produced a minimum of 7 MITS strategies per minute consistently for three sessions, the MITS training was completed and the caregiver was asked to use the MITS intervention with their child for a minimum of two times per week

for two weeks. The caregivers chose the best time of day to read aloud, and this time was asked to remain consistent for the duration of the study. Caregivers recorded each session using a Kodak video recorder. The caregiver was allowed to use any of the eight books given to them during intervention, continuing to allow the child to choose from a selection of three books. The investigator collected the recorded reading session videos each time the caregiver completed a read aloud. Follow-up coaching sessions were implemented if the caregiver produced less than 5 MITS strategies during this phase.

### **Generalization**

Generalization of MITS skills was assessed through the use of four novel books, which were given to the caregivers by the researcher. The caregiver was asked to complete at least 3 reading sessions using the unfamiliar books. The caregiver and child were videotaped reading the unfamiliar books and coded for the MITS strategies and child responses.

### **Data Collection**

The investigator and a graduate assistant collected data throughout the baseline, intervention, maintenance, and generalization phases using the MITS Collection Checklist (Appendix C) during the reading probe segment. The following data were collected:

1. Rate of the MITS strategy used by the caregiver;
2. Rate of the child's response to and initiation of joint attention; and
3. Rate of expressive utterances emitted by the child.

## **Analyzing Data**

Visual analysis of level and trend of the data points on each graph was used within phases to determine if changes in the dependent variables occurred due to the independent variable and to determine condition length (Gast, 2010).

Level stability for each caregiver was determined by calculating the median level for the data within the phase and using Gast (2010) recommended “80%-20%” criteria to determine stability. In addition, the data were examined visually to determine the trend of each phase. This was determined by assessing the trend direction using the freehand method through drawing a straight line that intersects the data points. Finally, the percentage of non-overlapping data points were calculated between adjacent conditions (Gast, 2010).

## **Interobserver Agreement**

Gast (2010) defines interobserver agreement (IOA) as the extent to which observers agree on the occurrence of the particular behavior in question. The researcher and a trained graduate assistant scored the videotaped sessions for approximately 33% of the sessions (23 sessions total) to assess interobserver agreement on the MITS strategies, child’s joint attention skills, and child’s expressive language behaviors. The second observer became familiar with the coding definitions of the MITS strategies, child’s joint attention skills, and child’s expressive language, as the graduate assistant and the researcher had practiced coding from sample videos from the previous pilot study (see Appendix C for coding manual). They had to meet a training criterion (i.e., 80% IOA on 4 consecutive pilot study videos) before coding was started on the current study. The researcher and the graduate assistant independently

coded for occurrence and nonoccurrence of each behavior, compared codes, and developed decision rules for each behavior. The decision rules were added to the MITS Collection Checklist and Coding Sheet (Appendix C).

Once the training criterion was met, the interobserver agreement of each behavior (i.e., MITS strategies, child's joint attention skills, and child's expressive language) was determined as the researcher compared the list of strategies and behaviors generated on the coding sheet from both the researcher and the graduate assistant (Appendix C). Occurrence of agreement was calculated using the time-window method; meaning agreement was scored if behavior occurred within 5 seconds of each other (Kern, Starosta, & Adelman, 2006). Then the researcher calculated the number of agreements and disagreements, divided by number of agreements plus disagreements, and multiplied by 100 for each behavior (Gast, 2010).

The coding sheets were created so that the researcher and second observer were able to record each time the behaviors occurred within the reading session (i.e., frequency count). Each box on the coding sheet represented 1 second, each row was 10 seconds long, totaling 1 minute every 6<sup>th</sup> rows. For example, if the observer saw the caregiver use a Query at the 32-second mark, the letter Q (abbreviations are located in Appendix C) would be placed in the fourth row, second box. If the observed dyad didn't need all the time, the boxes were left blank. If additional time was needed, additional coding sheets were used.

Once the data were collected, it was then converted to rate. This conversion allowed the behavior counts to be a constant scale due to the variance in observation

time that was encountered while working with children with ASD. An agreement of 80% or greater was required.

Interobserver agreement was also calculated for the *Unstructured Joint Attention Assessment* (Loveland & Landry, 1986). The graduate assistant watched the joint attention video recordings of the assessment and scored the joint attention tasks. Scoring sheets from both the researcher and graduate assistant were compared, and the number of agreements and disagreements were calculated. The researcher divided the number of agreements by the number of agreements plus disagreements, and multiplied by 100 (Gast, 2010). The percent of agreement was then recorded for the *Unstructured Joint Attention Assessment*.

In addition, interobserver agreement was also calculated for the 5- minute free play video between caregiver and child to code the child's expressive language. The graduate assistant and researcher watched the video recordings separately and scored separately. The number of agreements and disagreements were recorded. The rate was calculated by dividing the number of agreements by the total number of agreements plus disagreements, and multiplied by 100 (Gast, 2010).

### **Treatment Integrity**

The investigator used the MITS Treatment Fidelity Checklist to assess caregiver training (Appendix G). The MITS Treatment Fidelity Checklist outlined components that the investigator must have taught during training to ensure treatment fidelity between caregivers. The investigator self-evaluated her implementation of the training through the use of this checklist. This evaluation was completed to ensure that the caregiver instruction was implemented consistently across caregivers.

## **Social Validity**

To establish the social validity of the MITS intervention, caregivers were asked to complete a questionnaire at the end of the intervention. The purpose of the questionnaire was to gather the caregiver's opinion on nine questions regarding the practicality and usefulness of the MITS intervention and its effects on their child's joint attention skills. Eight questions used a 5-point Likert scale and one question was an open response (Appendix H). It is important to evaluate the social validity, as the information gathered will help to maintain or enhance MITS's viability (Schwartz & Baer, 1991). The social importance and acceptability of the intervention is crucial for effective interventions (Wolf, 1978).

Table 3-1. Books used based on Child Interest Inventory

Participant	Interest	Books based on interest	Books not based on interest
Jay	trains, cars, ABC's, numbers, shapes	<ul style="list-style-type: none"> <li>• Touch and Feel ABCs</li> <li>• The Good Night Train</li> <li>• That's Not My Car</li> <li>• Colors and Shapes</li> <li>• Numbers</li> <li>• Car Galore</li> <li>• Inside Freight Train</li> </ul>	<ul style="list-style-type: none"> <li>• John Deere Touch and Feel Tractor</li> <li>• Dear Zoo</li> <li>• Hooray for Fish</li> <li>• Zoo!</li> <li>• Zoom into Space</li> </ul>
Dave	rockets, airplanes, trains, helicopters, puzzles, iPad	<ul style="list-style-type: none"> <li>• The Good Night Train</li> <li>• On the Launch Pad</li> <li>• Dogs in Space</li> <li>• Zoom into Space</li> <li>• Roaring Rockets</li> <li>• Amazing Airplanes</li> <li>• Inside Freight Train</li> </ul>	<ul style="list-style-type: none"> <li>• Touch and Feel ABCs</li> <li>• John Deere Touch and Feel Tractor</li> <li>• Dear Zoo</li> <li>• Zoo!</li> <li>• Numbers</li> </ul>
Jess	cars, fish, rhyming	<ul style="list-style-type: none"> <li>• Commotion in the Ocean</li> <li>• That's Not My Car</li> <li>• This Little Fish</li> <li>• Hooray for Fish</li> <li>• Tails</li> <li>• Belly Button Book</li> <li>• Numbers</li> </ul>	<ul style="list-style-type: none"> <li>• Touch and Feel ABCs</li> <li>• John Deere Touch and Feel Tractor</li> <li>• Dear Zoo</li> <li>• Zoo!</li> <li>• Colors and Shapes</li> </ul>
Jon	cars, fire trucks, trains, sensory	<ul style="list-style-type: none"> <li>• John Deere Touch and Feel Tractor</li> <li>• Fire Trucks</li> <li>• The Good Night Train</li> <li>• That's Not My Car</li> <li>• Inside Freight Trains</li> <li>• Touch and Feel ABCs</li> <li>• Colors and Shapes</li> </ul>	<ul style="list-style-type: none"> <li>• Dear Zoo</li> <li>• Zoo!</li> <li>• Numbers</li> <li>• Hooray for Fish</li> <li>• This Little Fish</li> </ul>

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\*Complete list of books and authors in Appendix I

Table 3-2. Definition of MITS strategies to be implemented by caregivers

MITS strategy	Definition	Example
Attention Directing	Any verbal or nonverbal initiation (e.g., point) to establish joint focus (e.g., attention to the book), such as the pictures, events, attributes, or text. The caregiver's attention directing can include a word or combination of words (e.g., "look", "see"), which serve to establish the topic or picture for discussion.	Caregiver points to a picture of a dog and says, "Look! A big dog".
Query	Any communicative act to volunteer or request information to be shared and to solicit a child's verbal or nonverbal response. Queries include requests for labels (e.g., "What's that?") or actions (e.g., "What's he doing?", "What's happening here?"). Cloze procedure (e.g., "He's eating ____.") and binary choice (e.g., "Should he walk or run?") also can be used as a query. Queries can be open-ended questions (e.g., "What will happen now?") or introduced with an attention directive plus query combination, (e.g., "Let's see what he did.", "Let's find out what happened next.", "Let's do it again".). Caregivers are taught to wait 5 seconds, to allow the child time to respond.	Caregiver give the child a binary choice, "Is that dog eating a bone or a hamburger?"
Model Response	Any semantically contingent response to the Query, if the child did not respond to the Query in verbal or nonverbal way within 5 seconds. Model Response includes answering the Query requests for labels (e.g., "What's that?" wait 5 seconds, then model "That is a ____."), or actions (e.g., "What's he doing?", "What's happening here?" wait 5 seconds, then model answer). Waiting 5 seconds, then modeling the cloze procedure (e.g., "He's eating ____.") and binary choice (e.g., "Should he walk or run?", "He should ____").	After waiting 5 second for the child to respond, the caregiver them models the appropriate response: "That dog it eating a bone".
Feedback	Any comment serving to acknowledge, extend, restate, or clarify the response of the child. Or provides an opportunity for the caregiver and child to discuss material presented in the storybook. The caregiver can clarify the accuracy of the child's previous utterance or response.	While reading a book about a dog, the child says, "big". The caregiver acknowledges the child by saying, "You're right, that is a big black dog".

**Table 3-3. Definitions of child's joint attention**

Type of joint attention	Definition	Examples
Vocal Response to Joint Attention	After caregiver ask/gives a query, child vocalizes a canonical vocalization, word, or words answering query in conjunction with gaze alternation & positive affect to the caregiver	Caregiver & child are reading a book about a bear. Caregiver asks child, "What is the bear eating" and child responds, "apple".
Nonverbal Response to Joint Attention	Eye gaze: Child looks between object & caregiver in conjunction with gaze alternation & positive affect to the caregiver (e.g., smiling, laughing). or Point: Child extends finger toward object in conjunction with gaze alternation & positive affect to the caregiver	Child & caregiver are reading a book about a bear. Child points to the bear & alternates eye contact to the caregiver
Vocal Initiation of Joint Attention	Child vocalizes a canonical vocalization word, or words about the book to their caregiver with gaze alternation and positive affect to the caregiver	Child & caregiver are reading a book about bears. Child says to caregiver, "brown bear".
Non Vocal Initiation of Joint Attention	Child initiates joint attention with eye contact or point & positive affect	Child & caregiver are reading a book about a bear. As caregiver turns page, child see that bear on the page & alternates eye contact between bear & caregiver

**Table 3-4. Definitions and examples of expressive language sample done by child**

Type of expressive language	Definition	Example
Canonical vocalization	Characterized as a rhythmic productions of one or more consonant-vowel (CV or CVCV)	Child holds up an apple and says, "ap"
Word	Any single word utterance	Child says, "apple"
Word Combinations	Any utterance in which the child uses multiple words	Child says, "red apple"

## CHAPTER 4 RESULTS

The purpose of this study was to determine the effectiveness of an intervention designed for caregivers to use with their child with autism. The research questions were:

1. Will training caregivers to use Meaningful Interaction through Storybooks (MITS) intervention increase their use of the four reading strategies?
2. Does caregiver utilization of the four reading strategies during shared storybook reading facilitate joint attention skills in their child?
3. Does the MITS intervention result in an increase in verbal expressive language in children?

This chapter presents the results of the study.

### **Interobserver Agreement**

Interobserver agreement (IOA) was calculated for each child's *Unstructured Joint Attention Assessment* to establish the reliability of the scores. In addition, interobserver agreement was calculated for 33% (23 sessions total) of each dyad's sessions, divided evenly across baseline, intervention, maintenance, and generalization phases. Each session was watched for the caregiver's use of the MITS strategies, the child's joint attention behaviors, and the child's expressive language. Interobserver agreement was computed for these strategies and behaviors.

### **Interobserver Agreement for Unstructured Joint Attention Assessment**

The *Unstructured Joint Attention Assessment* averaged 85% interobserver agreement across all four children. For Jon (Dyad 1), IOA was 85%, Jess (Dyad 2) 90%, Dave (Dyad 3) 80%, and at 85% for Jay (Dyad 4).

### **Interobserver Agreement for Child's Expressive Language During Play Session**

Interobserver agreement for child's expressive language (i.e., canonical vocalizations, words, and word combinations) was 82.5% across all four children. For Jon (Dyad 1), IOA was 85%, Jess (Dyad 2) 85%, Dave (Dyad 3) 80%, and at 80% for Jay (Dyad 4).

### **Interobserver Agreement for Primary Dependent Variables**

As stated previously, to obtain IOA, a graduate assistant independently viewed and coded 33% of the video recordings across all phases and participants.

### **Interobserver agreement for caregiver's MITS strategies**

For Dyad 1 interobserver agreement was calculated on 6 out of 17 sessions and ranged from 78.7% to 91.5%. Mean agreement was 85.4%. Interobserver agreement was calculated on 6 out of 18 sessions for Dyad 2 and ranged from 80.4% to 93.2% with a mean agreement of 86.8%. For Dyad 3 agreement was calculated on 5 out of 17 sessions and ranged from 80.2% to 97.3%. Mean agreement was 95.2%. Finally, agreement was calculated on 6 out of 17 sessions for Dyad 4. Interobserver agreement ranged from 80.2% to 94.7% with a mean agreement of 91.3%.

### **Interobserver agreement for child's JA behaviors**

For Jon (Dyad 1) interobserver agreement was calculated for 6 out of 17 sessions and ranged from 80.1% to 87.5%. Mean agreement was 83.6%. Interobserver agreement was calculated on 6 out of 18 sessions for Jess (Dyad 2) and ranged from 85.2% to 91.4% with a mean agreement of 88.7%. For Dave (Dyad 3) agreement was calculated on 5 out of 17 sessions and ranged from 80.1% to 94.2%. Mean agreement was 87.7%. Finally, agreement was calculated on 6 out of 17

sessions for Jay (Dyad 4). Interobserver agreement ranged from 85.3% to 95.7% with a mean agreement of 90.8%.

### **Interobserver agreement for child's expressive language.**

For Jon (Dyad 1) interobserver agreement was calculated for 6 out of 17 sessions and ranged from 79.3% to 87.2%. Mean agreement was 85.7%.

Interobserver agreement was calculated on 6 out of 18 sessions for Jess (Dyad 2) and ranged from 82.3% to 90.1% with a mean agreement of 86.5%. For Dave (Dyad 3)

agreement was calculated on 5 out of 17 sessions and ranged from 81.3% to 94.3%.

Mean agreement was 89.3%. Finally, agreement was calculated on 6 out of 17

sessions for Jay (Dyad 4). Interobserver agreement ranged from 83.2% to 94.7% with a mean agreement of 90.7 %.

### **Intervention Results**

Baseline, intervention, maintenance, and generalization phases were conducted with each dyad. For each phase, the researcher calculated the rate of MITS strategies the caregiver used (Figure 4-1). Furthermore, the researcher calculated the rate of the child's response to and initiation of joint attention. These results are presented in Figure 4-1. Caregiver's use of MITS strategies and child's use of joint attention behaviors are presented on the same graph to determine if caregiver utilization of the four reading strategies during shared storybook reading facilitated joint attention skills in the child.

The MITS strategy rate was determined by dividing the total number of strategies the caregiver used (i.e., attention directing, query, model response, or feedback) by the total number of minutes in the session. The rate of the child's joint attention behaviors was calculated by dividing the total number of behaviors the child produced (i.e., verbal response to joint attention, non verbal response to joint attention, verbal initiation of joint

attention, and nonverbal initiation of joint attention) by the total number of minutes in the session (Gast, 2010).

In addition, the average number of the caregiver's MITS strategies used per minute per phase was calculated and displayed in Figure 4-2 and are discussed below. For each phase, the researcher also calculated each child's average joint attention behaviors per minute (Figure 4-3). Moreover, each child's expressive language was measured throughout the study, calculated per minute, presented in Figure 4-4, and are discussed below.

### **Dyad 1:**

Jon's caregiver was the first to participate in the study. The dyad recorded five shared reading book sessions during the first week of the study.

#### **Baseline phase for Dyad 1: Jon's caregiver.**

For the baseline phase, Jon's caregiver was instructed to read to Jon like she normally would using books found around their home. After baseline sessions were analyzed and calculated she averaged a rate of 1.17 MITS, with a range of 0.65 to 2.4 (Figure 4-1). His caregiver used the Attention Directing strategy 0 times throughout baseline. In addition, Jon's caregiver used the Query strategy an average of 0.41 time per minute (range = 0 to 1.23), no Model Response strategy, and the strategy of Feedback averaged 0.82 per minute (range= 0 to 1.23) (Figure 4-2).

#### **Baseline phase for Dyad 1: Jon.**

During the baseline storybook reading sessions, Jon averaged 1.62 joint attention behaviors per minute, with a range of 0.65 to 2.88 (Figure 4-1). Jon vocally responded to joint attention bids from his caregiver an average of 1.15 per minute, and initiated joint attention bid an average of 0.9 per minute. During this time, Jon did not

answer or initiate any joint attention bids nonverbally. For expressive language, Jon used an average of 0.08 canonical vocalization, 0.49 single words, and 1.3 word combinations per minute (Figure 4-4).

### **Intervention phase for Dyad 1: Jon's caregiver.**

After establishing a stable baseline, the researcher met with Jon's caregiver to begin instruction on the MITS reading strategies. Following the MITS instruction, Jon's caregiver was instructed to present 3 storybooks (from the books provided by the researcher) to Jon and allow him to choose a book.

After the first initial intervention training session, an immediate increase in MITS strategies was seen, as Jon's caregiver produced an average of 12.5 MITS strategies per minute. Throughout the intervention phase, his caregiver averaged 11.2 MITS strategies per minute (a range of 10 to 12.5). His caregiver continued to use 0 Attention Directing strategies throughout the intervention phase. The use of the Query strategy was an average of 5.73 per minute. The Model Response strategy was used an average of 0.06 per minute. In addition, Jon's caregiver utilized the Feedback strategy an average of 5.73 per minute (Figure 4-2).

After the initial MITS instruction, Jon's caregiver was able to produce 7 or more MITS strategies per minute consistently for 3 sessions. As a result, the caregiver was placed in the maintenance phase.

### **Intervention phase for Dyad 1: Jon.**

After Jon's caregiver received instructions on the MITS strategies, his joint attention behaviors increased, averaging 9.03 joint attention behaviors per minute in this phase, ranging from 8.25 to 9.53 (Figure 4-1). Throughout the intervention phase, Jon averaged 8.76 verbal responses per minute, while his nonverbal responses averaged

1.91 per minute (Figure 4-3). In addition, Jon verbally initiated joint attention 0.9 times per minute, while he did not produce any nonverbal bids to initiate joint attention. The results of Jon's joint attention behaviors showed an accelerating trend, as well as a positive change in level between the baseline and intervention phase.

Jon's verbal expressive communication averaged 0.08 canonical vocalization, 0.49 single words, and 1.23 multiple word combinations during these sessions. The results of Jon's expressive communication showed a positive change in level between baseline and intervention phases.

#### **Maintenance phase for Dyad 1: Jon's caregiver.**

Jon's caregiver was then instructed to continue to read to Jon, using the books the researcher gave to her during the intervention phase. The researcher collected the videos after every session to ensure that the caregiver was using at least 5 MITS strategies per minute. Although there was an initial drop of the caregiver's use of MITS strategies 5.8 per minute, an accelerating trend can be seen in Figure 4-1. Jon's caregiver averaged 8.12 MITS per minute during the maintenance phase. A breakdown of the data shows that the caregiver used 0 Attention Directing strategies, an average of 4.89 Queries, 0 Modeling Responds, and 3.22 Feedback strategies per minute respectively. The data showed that Jon's caregiver continued to use the MITS strategies once the coaching sessions were removed.

#### **Maintenance phase for Dyad 1: Jon.**

During the maintenance phase of the study, Jon averaged 6.97 joint attention behaviors per minute during the sessions (range = 4.9 to 7.8) (Figure 4-1). His verbal responses to joint attention bids were 3.83 per minute, while Jon's nonverbal responses

averaged 0.7. His verbal and nonverbal initiations of joint attention per session were 1.53 and 0.15 respectively (Figure 4-3).

For expressive language, Jon did not use any canonical vocalizations, though he did average 2.24 single words and 1.44 multiple word combinations per minute.

#### **Generalization phase for Dyad 1: Jon's caregiver.**

Following the last session of the maintenance phase, the caregiver continued to video tape their reading sessions using 4 new books given to the dyad by the researcher. Jon's caregiver was asked to complete 3 reading sessions, however she completed and recorded 4 sessions. During the generalization phase, the caregiver averaged 7.6 MITS strategies per minute (Figure 4-1). This calculated to the use of the Attention Directing and the Model Response strategy to 0 times per minute. The Query strategy calculated to an average of 3.92 per minute. In addition, Jon's caregiver utilized the Feedback strategy an average of 3.92 per minute (Figure 4-2).

#### **Generalization phase for Dyad 1: Jon.**

During the generalization phase, Jon averaged 6.2 joint attention behaviors per minute (range = 5.3 to 7) (Figure 4-1). Verbal response to joint attention bid was used an average of 3.92 per minute. Jon produced less than 1 nonverbal response per minute. Verbal initiation of joint attention did occur an average of 1.07 per minute, though no nonverbal initiations were recorded.

Jon averaged 1.9 single words and 1.3 multiple word combinations for expressive language. No canonical vocalizations were used during his generalization phase.

## **Dyad 2: Jess' caregiver**

During baseline phase, Jess' caregiver video recorded 2 probe sessions the first week of the study, once Dyad 1 entered intervention phase, Jess' caregiver began true baseline.

### **Baseline phase for Dyad 2: Jess' caregiver.**

For the baseline phase, Jess' caregiver was told to read to Jess like she normally would using books found around their home. After baseline sessions were analyzed and calculated she averaged 2.19 MITS per minute, with a range of 0.96 to 3.5 (Figure 4-1). His caregiver used the Attention Directing strategy an average of 0.19 per minute. During baseline, Jess' caregiver used the Query strategy an average of 1.16, no Model Responses were used, and the strategy of Feedback averaged 1.16 per minute (Figure 4-2).

### **Baseline phase for Dyad 2: Jess.**

Jess averaged 1.24 joint attention behaviors per minute (range of 0.96 to 2) as most reading sessions lasted approximately a minute during baseline. Jess vocally responded to joint attention bids from his caregiver an average of 1.35 per minute, being the only joint attention behavior he used during baseline. Canonical vocalization was the only form of expressive language Jess used, averaging 1.93 per minute.

### **Intervention phase for Dyad 2: Jess' caregiver.**

After determining the stability of the baseline data, the researcher met with Jess' caregiver and began to instruct her on using the four MITS reading strategies. Like Dyad 1, Jess' caregiver was given 4 storybooks based on Jess' interest and 4 storybooks of the researcher's choice. She was instructed to present 3 storybooks to Jess and allow him to choose a book.

Following the first initial intervention training session, Jess' caregiver produced an average of 8.19 MITS strategies per minute (Figure 4-1). Throughout the intervention phase, his caregiver averaged 8.5 MITS strategies per minute (a range of 7.77 to 9.24). For Attention Directing strategies, his caregiver used 0.89 per minute. The use of the Query strategy was an average of 4.26 per minute. The Model Response strategy was not used throughout this phase session. This was unlike the Feedback strategy that Jess' caregiver utilized an average of 3.06 per minute.

After the first MITS instruction session, Jess' caregiver was able to produce 7 or more MITS strategies per minute constantly over 3 sessions. As a result, the caregiver was placed in the maintenance phase.

#### **Intervention phase for Dyad 2: Jess.**

Jess' joint attention behaviors increased after his caregiver received instructions on how to implement the MITS strategies. He averaged 4.7 joint attention behaviors per minute in this phase, ranging from 3.6 to 5.78 (Figure 4-1). Verbal response to joint attention bids averaged 3.88 per minute. Jess nonverbal responses averaged 0.44 per minute. For verbal initiation of joint attention, Jess averaged 0.37 per minute, while he did not produce any nonverbal initiation bids. The data showed a positive change in level between the baseline and intervention phase.

The majority of Jess' verbal expressive communication was through canonical vocalization as he produced 3.96 per minute. In addition, Jess average 0.29 single words a minute, though no word combinations were used. A positive change in level between baseline and intervention phases was seen.

### **Maintenance phase for Dyad 2: Jess' caregiver.**

Jess' caregiver read to Jess twice a week for two weeks using the books from the intervention phase. Videos were collected after every session to ensure that the caregiver was using at least 5 MITS per minute. Jess' caregiver was able to maintain the use of the MITS strategies, even with the removal of coaching. Jess' caregiver averaged 8.01 MITS per minute during the maintenance phase (range = 6.32 to 9.25) (Figure 4-1). A breakdown of the data showed that the caregiver used 0.25 Attention Directing strategies, an average of 3.62 Queries, 0 Modeling Responses, and 3.37 Feedback strategies per minute respectively. A visual analysis of the data showed that Jess' caregiver continued to use the MITS strategies when the coaching component was not present.

### **Maintenance phase for Dyad 2: Jess.**

The data showed that Jess produced an average of 5.07 joint attention behaviors per minute during the maintenance sessions of this study (range = 2.2 to 7) (Figure 4-1). Jess' verbal responses to joint attention bids were 3.88 per minute, while Jess' nonverbal responses averaged 0.19 per minute. His verbal and nonverbal initiations of joint attention per minute were 0.43 and 0 respectively (Figure 4-3).

For expressive language Jess used an average of 4.47 canonical vocalizations per minute, 0.32 single words per minute, and 0 word combinations per maintenance session.

### **Generalization phase for Dyad 2: Jess' caregiver.**

Following the last maintenance session, the caregiver was asked to continue to video record their reading sessions, this time using 4 new books given to the dyad by the researcher. Like Dyad 1, Jess' caregiver was asked to complete 3 reading

sessions, though she completed and recorded 4 sessions. During the generalization phase, the caregiver averaged 8.5 MITS strategies per minute (range = 7.2 to 12.09) (Figure 4-1). The MITS strategy of Attention Directing was produced an average of 0.43 per minute. The Query strategy averaged 4.46 per minute. The Model Response strategy was not used during the generalization phase. In addition, Jess' caregiver utilized the Feedback strategy an average of 3.94 per minute (Figure 4-3). These data showed that the caregiver was able to generalize the use of the MITS strategies at a level that was higher than the baseline data.

### **Generalization phase for Dyad 2: Jess.**

Jess averaged 5.99 joint attention behaviors per minute (range = 4.06 to 9.1) during the generalization phase (Figure 4-1). He used an average of 4.9 verbal responses per minute to joint attention bid per session. Jess produced an average of less than 1 per minute nonverbal responses. Verbal initiation of joint attention did occur on an average of 0.43 per minute, though no nonverbal initiations were recorded.

Jess continued to use canonical vocalization as his primary communication form throughout the generalization phase, averaging 4.9 per minute. He did average 0.35 single words per minute, though no word combinations were used.

### **Dyad 3: Dave's caregiver**

During baseline phase, Dave's caregiver video recorded 2 probe sessions during the first week of the study, and 1 the second week. Once Dyad 2 finished true baseline, Dave's caregiver began true baseline do to scheduling issues.

### **Baseline phase for Dyad 3: Dave's caregiver.**

For the baseline phase, Dave's caregiver was told to read to Dave like she normally would using books found around their home. Baseline sessions were analyzed and calculated and Dave's caregiver averaged 3.22 MITS per minute, with a range of 0.85 to 3.8 (Figure 4-1). His caregiver used the Attention Directing strategy an average of 0.16 per minute throughout the baseline sessions. During baseline, Dave's caregiver used the Query strategy an average of 1.27 times per minute, no Model Response strategies were used, and the strategy of Feedback averaged 1.39 per minute.

### **Baseline phase for Dyad 3: Dave.**

Dave averaged 1.79 joint attention behaviors per minute (range of 1.1 to 2.5) during the baseline sessions (Figure 4-1). Dave vocally responded to joint attention bids from his caregiver an average of 1.59 per minute, though he did not produce any nonverbal responses. Dave did verbal initiate joint attention 0.16 times per minute; however he did not use the nonverbal initiation behavior. For expressive language Dave used an average of 0.86 canonical vocalizations per minute, 0.57 single words per minute, and 0.32 word combinations per maintenance session.

### **Intervention phase for Dyad 3: Dave's caregiver.**

After determining the stability of the baseline data, the researcher met with Dave's caregiver and introduced the four MITS reading strategies to her. Like Dyads 1 and 2, the Dave's caregiver was given 4 storybooks based on Dave's interest and 4 storybooks of the researcher's choice. During the reading sessions, Dave's caregiver was instructed to present 3 storybooks to Dave and prompted him to choose a book.

After the first initial intervention training session Dave's caregiver produced an average 9.55 MITS strategies per minute. The caregiver averaged 8.43 MITS strategies per minute (a range of 7.14 to 9.55) throughout the intervention phase (Figure 4-1). His caregiver used 0.04 Attention Directing per minute during intervention session. The Query strategy was utilized an average of 4.17 per minute. Dave's caregiver produced 0.42 Model Response strategies per minute and the Feedback strategy was used more frequently with an average of 3.19 times per minute.

After the first MITS instruction session, Dave's caregiver was able to produce 7 or more MITS strategies per minute constantly over 3 sessions, therefore was placed in the maintenance phase.

### **Intervention phase for Dyad 3: Dave.**

After Dave's caregiver received instructions on how to implement the MITS strategies his joint attention behaviors increased. Dave averaged 4.6 joint attention behaviors per minute in this phase, ranging from 3.37 to 5.03 (Figure 4-1). Dave's verbal response to joint attention bids averaged 3.62 per minute and his nonverbal responses averaged 0.21 per minute. For verbal initiation of joint attention, Dave averaged 0.72 per minute, though nonverbal was less than 1 per session (0.04). The data showed a positive change in level between the baseline and intervention phase.

Dave's expressive communication showed an average of 1.02 canonical vocalizations per minute. He did average 1.96 single words per minute. In addition, Dave used 1.32 multiple word combinations per minute. A positive change in level between baseline and intervention phases was seen.

### **Maintenance phase for Dyad 3: Dave's caregiver.**

Dave's caregiver read to Dave twice a week for two weeks using the books from the intervention phase. The videos were collected after every session to ensure that Dave's caregiver was able to maintain the use of the MITS 5 strategies per minute, even with the removal of coaching. Dave's caregiver averaged 7.63 MITS per minute during the maintenance phase (range = 7.35 to 7.8) (Figure 4-1). The data showed that the caregiver did not use any Attention Directing strategies during the maintenance sessions, but averaged 3.7 Queries per minute. For the strategy of Modeling Response, Dave's caregiver averaged 0.46 per minute and feedback strategies averaged 3.80 per minute. A visual analysis of the data showed that Dave's caregiver continued to use the MITS strategies after the coaching component was removed.

### **Maintenance phase for Dyad 3: Dave.**

During the maintenance phase, the data showed that Dave produced an average of 5.13 joint attention behaviors per minute during the sessions (range = 3.9 to 6.58) (Figure 4-1). Verbal responses to joint attention bids were 3.61 per minute. His nonverbal responses to joint attention bids averaged 0.08 per minute. Dave's verbal initiation of joint attention calculated to 1.01 per minute and his nonverbal initiation of joint attention was less than 1 per minute (0.05).

Dave's expressive communication data showed an average of 0.7 canonical vocalizations per minute. He also produced 1.96 single words and 1.32 multiple word combinations per minute, respectively.

### **Generalization phase for Dyad 3: Dave's caregiver.**

Following the last maintenance session, Dave's caregiver was asked to continue to video tape their reading sessions, this time using 4 new books chosen by the

researcher. Like Dyad 1 and 2, Dave's caregiver was asked to complete 3 reading sessions, she completed and recorded a total of 3 sessions. The caregiver averaged 8.47 MITS strategies per minute (range = 8 to 8.98) during the generalization phase (Figure 4-1). The Attention Directing strategy was not used during this phase. However, the MITS strategy of Query averaged 4.6 per minute. Dave's caregiver used the Model Response strategy an average of 0.18 per minute. In addition, she utilized the Feedback strategy an average of 3.80 per minute. The data showed that Dave's caregiver was able to generalize the use of the MITS strategies at higher level than her baseline data.

#### **Generalization phase for Dyad 3: Dave.**

During the generalization phase, Dave averaged 5.7 joint attention behaviors per minute (range = 5 to 5.89) (Figure 4-1). For verbal responses he averaged 4.9 verbal responses to joint attention bid per minute. Dave produced an average of less than 1 nonverbal response per minute. He also produced on average 0.62 verbal initiation of joint attention per minute, though no nonverbal initiations were recorded.

Dave averaged 3.61 canonical vocalizations per minute during the generalization phase. In addition, he averaged 3.17 single words per minute. Dave also produced 2.11 multiple word combinations per minute.

#### **Dyad 4: Jay's caregiver**

During the baseline phase, Jay's caregiver video recorded 4 probe sessions during the first two weeks of the study. Due to scheduling conflicts Jay's caregiver began true baseline after Dyad 3 had a stable true baseline.

**Baseline phase for Dyad 4: Jay's caregiver.**

During the baseline phase, Jay's caregiver was instructed to read to Jay like she normally would using books found around their home. The researcher analyzed and calculated the baseline sessions. During this phase, Jay's caregiver averaged 0.67 MITS per minute, with a range of 0 to 1.25 (Figure 4-1). The Attention Directing strategy was averaged 0.14 per minute throughout the baseline sessions. Jay's caregiver used the Query strategy an average of 0.06 times per minute, no Model Responses were used, and the strategy of Feedback averaged 0.42 per minute.

**Baseline phase for Dyad 4: Jay.**

During baseline sessions, Jay averaged 0.7 joint attention behaviors per minute (range of 0 to 2.09) (Figure 4-1). Although he did not produce any verbal responses, Jay did average 0.3 per minute for nonverbal response to joint attention. In addition, low amounts of verbal initiation and nonverbal initiation were seen, 0.18 and 0.12 per minute, respectively.

For expressive language Jay did not use any canonical vocalizations. He did average 0.12 single words per minute, and 0.18 multiple word combinations per baseline session.

**Intervention phase for Dyad 4: Jay's caregiver.**

After establishing a stable baseline, the researcher introduced Jay's caregiver to the four MITS reading strategies. Like the previous Dyads, Jay's caregiver used 4 storybooks based on Jay's interest and 4 storybooks chosen by the researcher. During the intervention reading sessions, Jay's caregiver was instructed to present 3 storybooks to Jay and allow him to choose a book.

Immediately following the first initial intervention training session Jay's caregiver produced an average 8 MITS strategies per minute. Throughout the intervention phase, the caregiver averaged 8.07 MITS strategies per minute (a range of 7 to 9.22) (Figure 4-1). Jay's caregiver used 0.40 Attention Directing per minute. The MITS Query strategy was utilized an average of 3.5 per minute. Jay's caregiver produced an average of 0.33 Model Responses per minute. The Feedback strategy was used more frequently calculating to 3.77 per minute.

After the first MITS instruction session, Jay's caregiver was consistently able to produce 7 or more MITS strategies per minute over 3 sessions. As a result, the caregiver was placed in the maintenance phase.

#### **Intervention phase for Dyad 4: Jay.**

Jay's joint attention increased after his caregiver implemented the MITS strategies, as he averaged 4.46 joint attention behaviors per minute in this phase, ranging from 3.9 to 5.7 (Figure 4-1). Jay averaged 2.2 verbal responses to joint attention bids per minute. His nonverbal responses averaged 1.26 per minute. Jay's nonverbal initiation of joint attention averaged 0.14 per minute and his verbal initiation averaged 0.87 per minute. The data showed a positive change in level between the baseline and intervention phase.

Jay's expressive communication showed an averaged of 1.15 canonical vocalizations per minute. In addition, Jay averaged 0.93 single words per minute. He also used an average of 1.08 single word combinations per minute. A positive change in level between baseline and intervention phases was seen.

#### **Maintenance phase for Dyad 4: Jay's caregiver.**

Jay's caregiver read to Jay twice a week for two weeks using the books for the intervention phase. The videos were collected after every session to ensure that Jay's caregiver was able to maintain the use of at least 5 or more MITS strategies, even with the removal of coaching. Jay's caregiver averaged 8.3 MITS per minute during the maintenance phase (range = 5.9 to 9.7) (Figure 4-1). The data showed that the caregiver averaged 0.24 Attention Directing strategies per minute during the maintenance sessions. In addition, Jay's caregiver averaged 3.98 Queries per minute. For the strategy of Modeling Response, Jay's caregiver averaged 0.19 per minute. Feedback strategies averaged 3.78 per minute. A visual analysis of the data showed that Jay's caregiver was able to continue to use the MITS strategies even when the coaching component was removed, although a downward trend was observed in the data.

#### **Maintenance phase for Dyad 4: Jay.**

During the maintenance phase sessions, Jay averaged of 5.12 joint attention behaviors per minute (range = 2.7 to 6.88) (Figure 4-1). Verbal responses to joint attention bids were calculated at 2.2 per minute. His nonverbal responses to joint attention bids averaged 0.69 per minute. In addition, Jay's verbal initiation of joint attention calculated to less than 1 per minute (0.54) and did not display any nonverbal initiation of joint attention.

For expressive language Jay averaged 0.99 canonical vocalizations per minute. Jay averaged 1.74 single words per minute and 1.5 multiple word combinations per minute.

### **Generalization phase for Dyad 4: Jay's caregiver.**

Following the last maintenance session, Jay's caregiver was also asked to continue to video tape their reading sessions, this time using 4 new books chosen by the researcher. Like previous Dyads, Jay's caregiver was asked to complete 3 reading sessions. During the generalization phase, the caregiver averaged 5.3 MITS strategies per minute (range = 4.8 to 6.2) (Figure 4-1). Attention Directing was used an average of 0.12 per minute. However, the use of the MITS strategy Query was more frequent, as Jay's caregiver averaged 2.6 per minute. In addition, Jay's caregiver used the Model Response strategy an average of 0.24 per minute and the Feedback strategy was used an average of 2.5 per minute. Like previous Dyads, these data showed that Jay's caregiver was able to generalize the use of the MITS strategies at a level higher than her baseline data.

### **Generalization phase for Dyad 4: Jay.**

During the generalization phase, Jay averaged 3.97 joint attention behaviors per minute (range = 3.14 to 5.6) (Figure 4-1). Jay averaged 3.2 verbal responses per minute and less than 1 nonverbal response per minute (0.3). Jay also produced less than 1 verbal initiation of joint attention per minute (0.54) and there were no nonverbal initiations were recorded.

Jay's averaged 1.15 canonical vocalizations per minute during the generalization phase. He also averaged 1.2 single words per minute and produced an average of 1.15 multiple word combinations per minute during this phase.

### **Social Validation Measure**

Following the researcher's collection of generalization data, each caregiver was asked to complete the social validity questionnaire. The questionnaire was comprised

of eight, 5-point Likert-type scale items and one free response question to obtain their opinion regarding the investigation.

For the eight Likert-type items, caregivers selected from the following choices: strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree. All caregivers either agreed or strongly agreed that MITS training provided by the researcher was useful. Each caregiver either agreed or strongly agreed that the MITS intervention helped them to interact with their child during storybook reading. Furthermore, all caregivers disagreed that the training was too time consuming. When asked if they felt their child's joint attention skills had improved due to the MITS intervention 3 caregivers indicated that they agreed, while one caregiver indicated that they neither agreed nor disagreed. Each caregiver also indicated that they either agreed or strongly agreed that they would continue to use the MITS readings strategies in the future and they felt more confident when they read to their child. As a result of the intervention, all caregivers agreed or strongly agreed that they believed they had more interaction with their child during storybook reading than before the intervention. All caregivers strongly agreed that other parents who have a child on the spectrum would be interested in learning the MITS strategies.

For the free response question, when asked to share any additional comments or concerns about the MITS interventions two caregivers indicated that they have incorporated some of the MITS strategies into their everyday routine when talking to their child. One caregiver clarified their statement about neither agreeing nor disagreeing that their child's joint attentions skills had improved by stating, "I feel that the true benefits of this program will become more obvious over a longer period of time

than the duration of the study. For now, our skills at engaging our ASD child have improved remarkably”.

### **Summary**

The purpose of this study was to determine if training caregivers to use the MITS intervention increased their use of the four reading strategies, if those four reading strategies facilitated joint attention skills in their child, and if the MITS intervention resulted in an increase in verbal expressive language in each child. The data demonstrated that caregivers could be trained to use the four reading strategies, as no caregiver needed additional coaching after the intervention phase. Furthermore, caregivers could generalize the MITS strategies to unfamiliar books and continued to use the MITS strategies at higher rates than during baseline. Also, the results showed that when each caregiver used the four reading strategies an increase was observed in each child’s joint attention skills. In addition, the data demonstrated that there was an increase in verbal expressive language for each child.

The results of the social validation measure were promising. Caregivers agreed that the intervention was easy to implement and had a positive effect on increasing their interaction with their child during shared storybook reading.

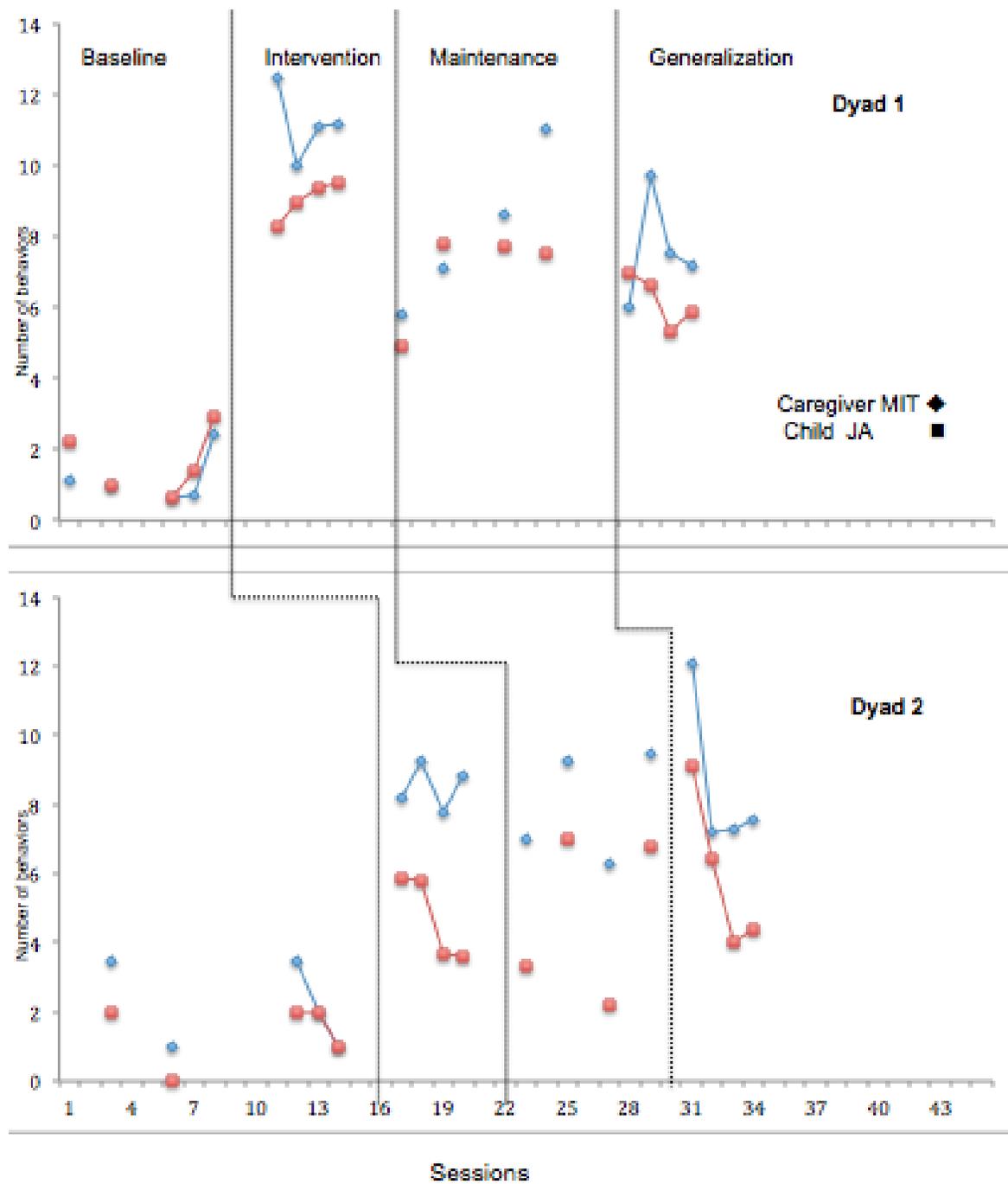


Figure 4-1. Caregiver and child behaviors per minute

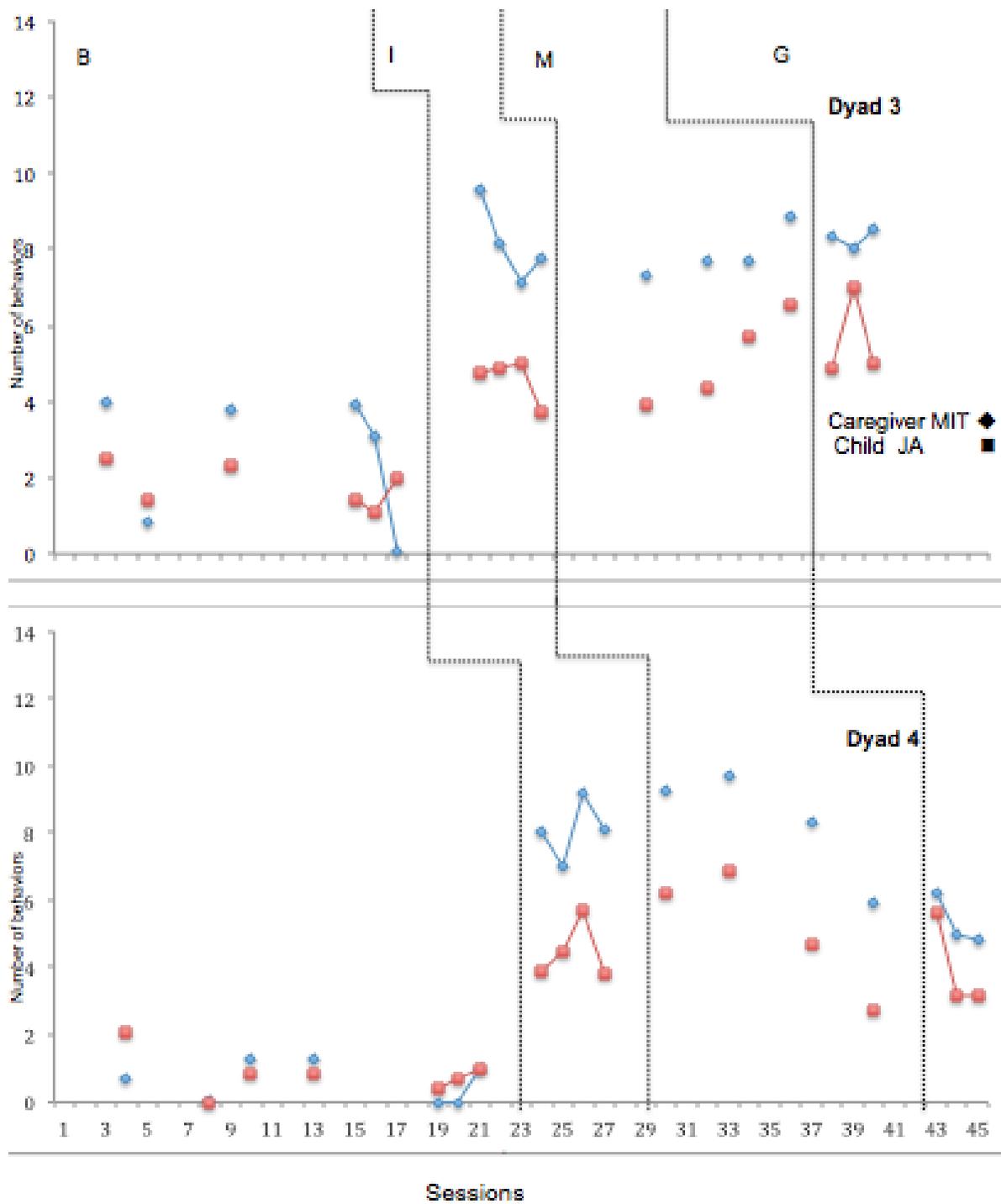


Figure 4-1 continued.

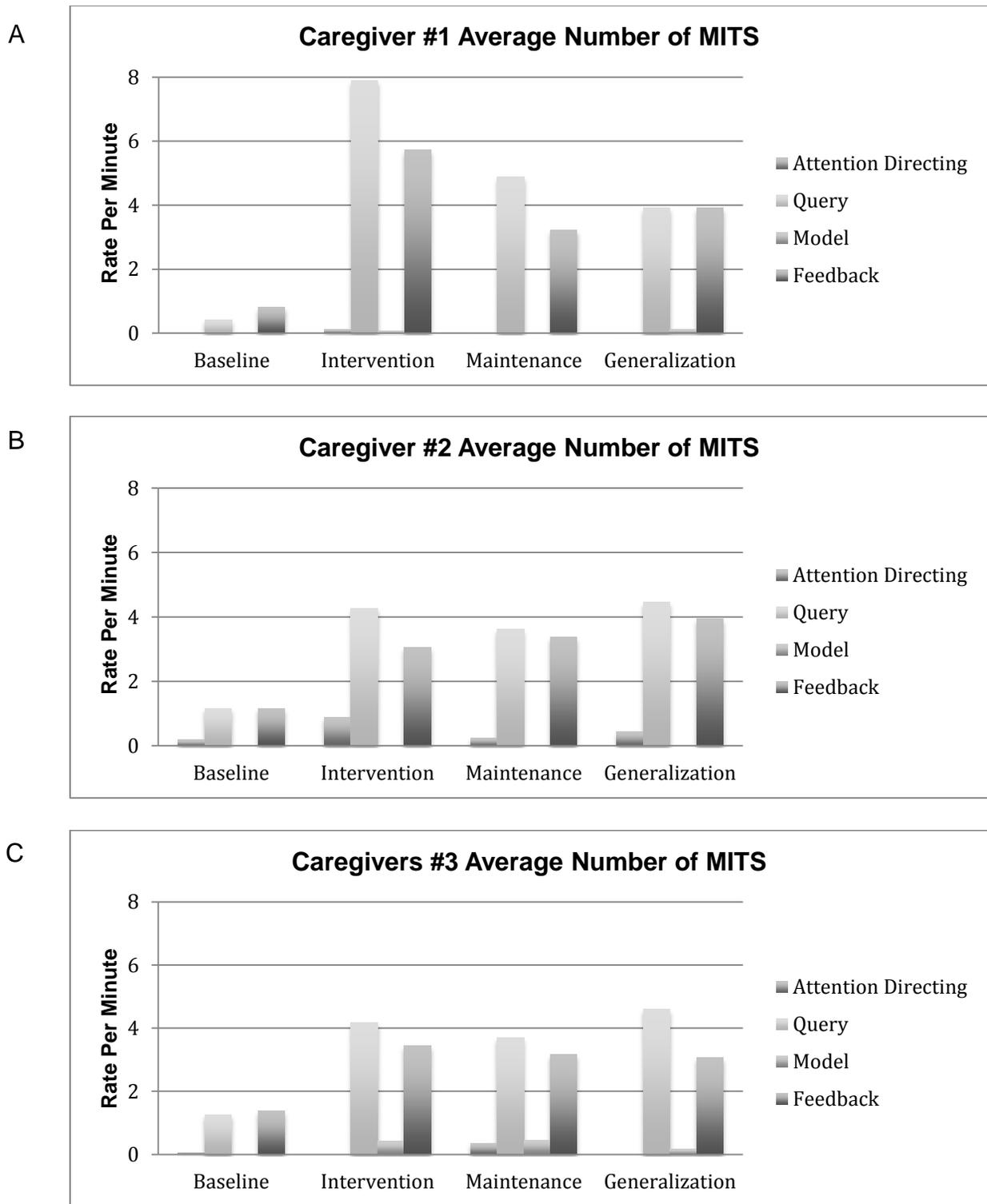


Figure 4-2. Caregiver MITS per minute per phase. A) Caregiver #1 MITS strategies B) Caregiver #2 MITS strategies C) Caregiver #3 MITS strategies D) Caregiver #4 MITS strategies

D

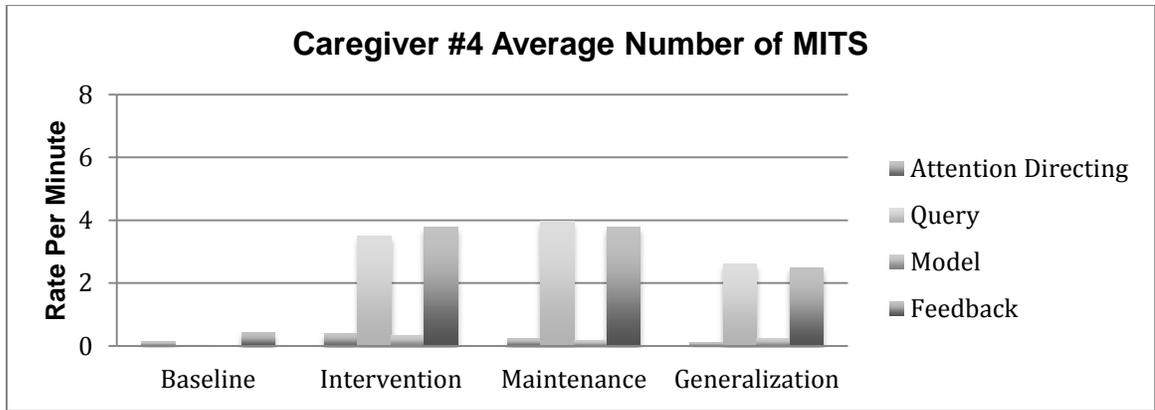
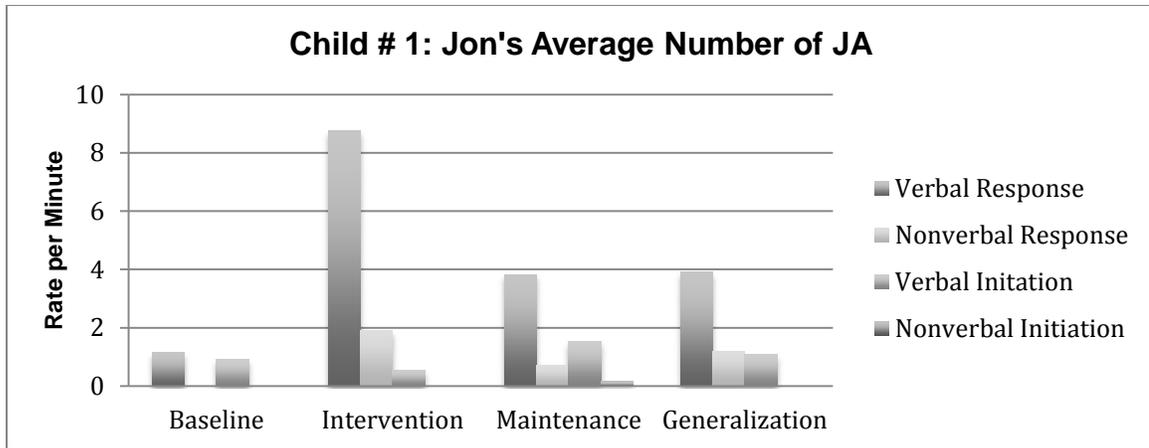
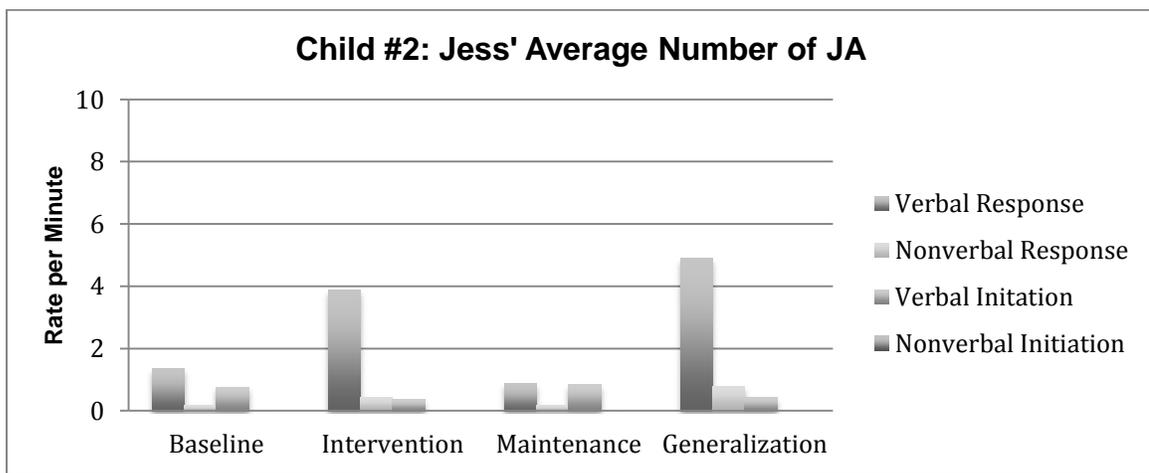


Figure 4-2 Continued.

A



B



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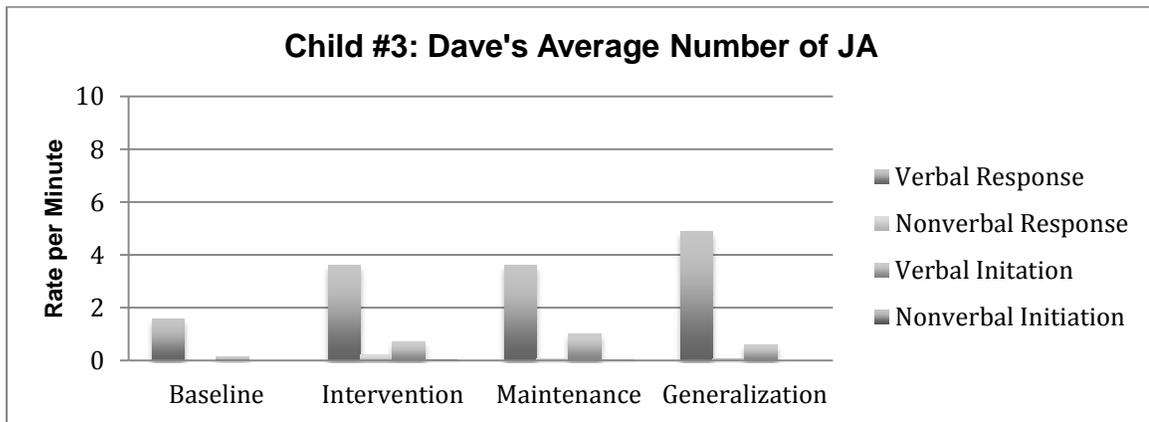


Figure 4-3. Child's Joint Attention behaviors per minute per phase A) Child #1 average number of JA behaviors B) Child #2 average number of JA behavior C) Child #3 average number of JA behavior D) Child #4 average number of JA behavior

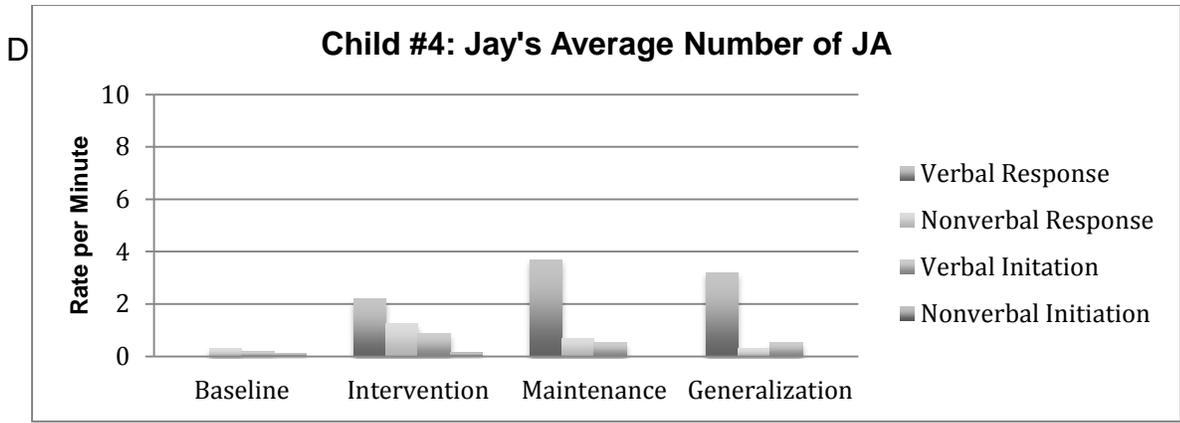
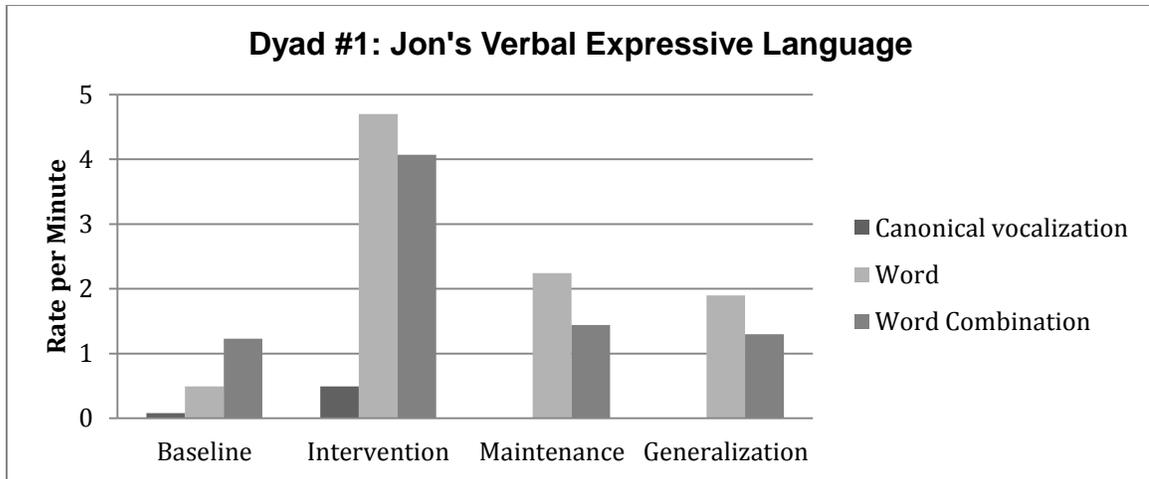
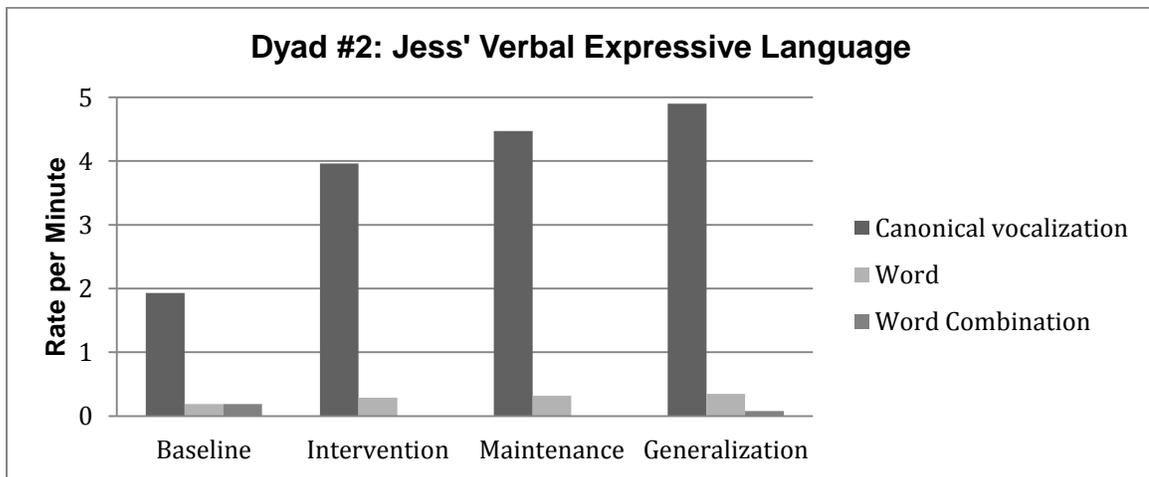


Figure 4-3. Continued.

A



B



C

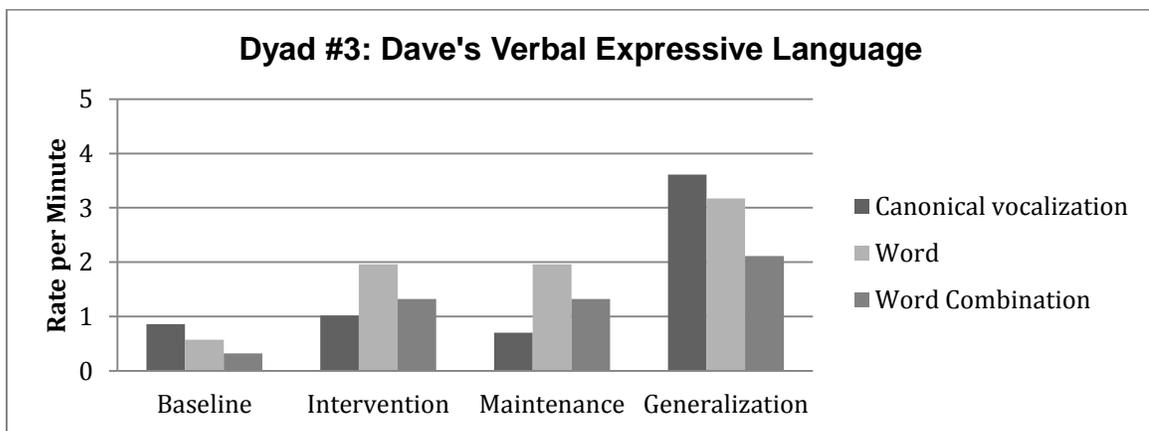


Figure 4-4. Child's Expressive Language per minute per phase A) Child #1 verbal expressive language B) Child #2 verbal expressive language C) Child #3 verbal expressive language D) Child #4 verbal expressive language

D

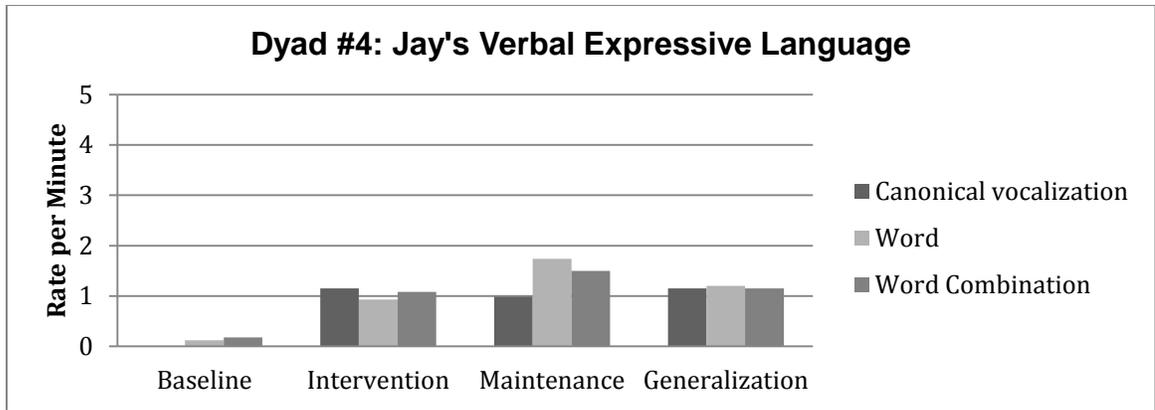


Figure 4-4.Continued.

## CHAPTER 5 DISCUSSION

Joint attention is a fundamental skill needed for language acquisition and social development (Jones & Carr, 2004; Murray et al., 2008; Vismara & Lyons, 2007). Research on teaching joint attention has established that caregivers are able to learn and implement intervention techniques aimed at increasing children's joint attention skills (Ingersoll & Gergans, 2005; Jones & Feeley, 2007; Klein et al., 2009; Schertz & Odom, 2007). In addition, the shared storybook reading body of literature has also recognized that a caregiver can effectively implement a variety of strategies to support a child's language as well as engagement during storybook reading. Although shared storybook reading is a natural activity that advocates caregiver and child participation through joint interactions, it has yet to be examined as a caregiver-implemented intervention to increase joint attention. Therefore, the purpose of this study was to determine the effects of training caregivers of children with autism on the Meaningful Interaction Through Storybooks (MITS) intervention during shared storybook reading.

The purpose of this chapter is to summarize and interpret the findings of the study in relation to the research questions and the current literature. The research questions guide the discussion and interpretation of major findings. Next, the implications of the findings for future research and practice will be discussed. Then, the chapter will conclude with a discussion of the limitations and summary of the study.

### **Research Question #1**

The first research question addressed the effectiveness of the MITS training to teach the caregivers to use the strategies. The researcher trained each caregiver on the four MITS reading strategies using explanations of the strategies. Each caregiver

practiced the four MITS reading strategies with the researcher and then was coached after the caregiver's reading session with the child. A multiple baseline design was used to assess how well the caregivers used the strategies during the shared storybook reading sessions with their child. Looking at the increase in the level of the data between baseline and intervention, one can see that each caregiver demonstrated an immediate increase in the use the of MITS strategies after the first MITS training (Figure 4-1). In addition, all caregivers were able to consistently produce seven or more MITS strategies per minute during the intervention phase. The data suggests that the training sessions and the coaching provided during the intervention phase, was effective for increasing their use of the MITS strategies during the shared storybook reading sessions.

The researcher may infer that the change observed in the dependent variable (i.e., caregivers' use of the four MITS reading strategies) was due to the introduction of the independent variable (i.e., MITS intervention training) sequentially across the 4 dyads at different points in time. The result was an immediate change in the dependent variable following the first MITS intervention training (Kazdin, 1982). This finding is consistent with previous studies in which caregivers were able to learn and implement interventions aimed at increasing the children's joint attention skills (Jones & Feeley, 2007; Kasari et al., 2010; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyon, 2007).

During the maintenance phase, caregivers read aloud to their child using the practiced MITS strategies. Dyads 1, 2, and 3 showed ascending trends during the maintenance phase (Figure 4-1). These results are similar to findings in previous

shared book reading studies, in which the caregivers either improved or sustained their newly found reading strategies during follow-up sessions (Dale & Cole, 1996; Crowe et al., 2004; Koppenhaver et al., 2001). Therefore, the caregivers were able to implement the MITS strategies by themselves (i.e., maintenance phase) with relative ease and quickness.

Although the caregiver in Dyad 4 (i.e., Jay's caregiver) showed a descending trend in the use of the MITS strategies during the maintenance phase, she did not fall below the 5 strategies per minute set prior to the phase as criterion for needing additional coaching. One possible explanation for this trend is Jay's caregiver said she was having difficulty finding time to implement the MITS intervention due to illness, family issues, and scheduling conflicts.

One possible reason that caregivers were able to increase and/or maintain 5 or more MITS strategies during the maintenance phase could be due to the fact that storybook reading is transactional in nature. In other words, the caregiver and child are naturally influenced one another (Bakeman & Adamson, 1984). For example, if after the first intervention session the caregiver's bids for joint attention increased (i.e., MITS behaviors) and the child's joint attention behavior would have decreased or remained constant, it would be likely that the caregiver's bids for joint attention would decrease, as the lack of interaction would not be reinforcing for the caregiver to continue the reciprocal interaction needed in shared storybook reading (Carpenter et al., 1998). Due to the transactional nature of shared storybook reading, one could hypothesize that if there was not an increase in the child's joint attention behaviors the likeliness of the

caregiver continuing to place bids for joint attention would be slim, though further research is needed to answer this question.

During the generalization phase, the caregivers were instructed to continue using the MITS strategies but to use unfamiliar books (e.g., books that were not used during the intervention and maintenance phases). All caregivers continued to use a higher number of MITS strategies than at baseline, indicating that the caregivers were able to incorporate the reading strategies into their reading style as well as generalize the skills with unfamiliar books.

It is important to note that once each caregiver implemented the MITS strategies on their own, none of caregivers required additional coaching sessions during the maintenance phase. This meant that all caregivers continued to produce 5 or more MITS strategies per minute without the guidance of the researcher. Data levels during the maintenance and generalization phase for all caregivers continued to be above baseline data. One may concluded that the framework and frequency of the MITS instruction was adequate enough to change each caregiver's behavior in the context of reading a story with their child.

**Caregivers use of each MITS strategies.** When examining the use of the caregiver's four MITS strategies more closely, two strategies, Query and Feedback, were used more often than the Attention Directing and Model Response strategies. Similar results were seen during the pilot study. The findings are discussed in more detail below.

**Query.** All four caregivers showed the greatest gain in the Query strategy. This indicated that caregivers were able to go beyond just reading the text; they were able to

incorporate relevant questions about the story into the reading session. One possible explanation for the caregiver's frequent use of this strategy may be that they found it the easiest to implement. Additionally, asking questions resulted in increased interaction between the caregiver and child. The natural back and forth conversation created by asking questions may have prompted the caregiver to use this strategy in order to continue the conversation. Another possibility for the increase may be that the children were quicker to respond to the bids for joint attention, as some of the selected books were based on their interest. Using storybooks with the interest of the child may have potentially motivated the child to engage in joint attention. Although further research is needed in this area, previous investigations found that children are more likely to respond to bids for joint attention when interventions create opportunities that specifically played to their interest (e.g., Isaksen and Per Holth, 2009; Jones & Feeley, 2007; Rocha et al., 2007; Vismara & Lyons, 2007).

**Feedback.** Use of the Feedback strategy also significantly increased for the four caregivers throughout the study. This strategy allowed caregivers to expand on the child's answer through commenting, acknowledging, extending, restating, or clarifying the response of the child. This strategy provided an opportunity for the caregiver and child to discuss the material presented in the storybook. Previous research on shared storybook reading supports the notion that children are provided with opportunities to develop new concepts, increase vocabulary, develop listening comprehension skills, and engage in conversations about text through questions and answer sessions (Hay & Fielding-Barnsley, 2007).

**Attention Directing.** Although all caregivers used the Attention Directing strategy, it was not utilized as often as the Query and Feedback strategies. The intent of the Attention Directing strategy was to create any verbal or nonverbal initiation (e.g., point) to establish joint focus (e.g., attention to the book) on pictures, events, attributes, or text in the storybook. It is possible that the caregivers decided not to use this strategy because their child's focus was already on the book. Dyad 2, Jess' caregiver, utilized the Attention Directing strategy the most out of all the caregivers. It may be that because he was the youngest child in the study (26 months) and his attention had to be recruited more often.

Another possible reasons for the lack of the Attention Directing strategy may be due to the fact that the children exhibited some joint attention skills before the intervention took place, as noted in the *Unstructured Joint Attention Assessments* (Loveland & Landry, 1986). Finally, it may not have been necessary to use this strategy because many of the storybooks were based on each child's interest and they were already engaged and focused on the book. Previous research also suggests that a child is more likely to engage with their caregiver when they are focused on the same object (e.g., storybook) reducing the need to recruit the child's attention (Paparella & Kasari, 2004).

**Model Response.** The Modeling Response strategy was not produced as often as the Query and Feedback strategies. This strategy was contingent on a response to the Query, meaning if the child did not respond to the Query in verbal or nonverbal way within 5 seconds, the caregiver was to model the appropriate response. The majority of the time the child responded to the caregiver's Query as they were engaged in the

storybook, therefore the need for the caregivers to use this MITS strategy might not have been necessary.

## **Research Question #2**

The second research question addressed the effect's of the caregiver's use of the MITS strategies during shared storybook reading on the joint attention skills of the child. Data were collected on the child's response to and initiation of joint attention during the reading. The results indicated that when the caregivers used the reading strategies during the reading session, each child increased their overall rate of joint attention behaviors. This finding is consistent with previous research in which caregivers were able to learn and implement interventions aimed at increasing joint attention behaviors or engagement during storybook reading with their child who had a disability (e.g., Bellon et al., 2000; Crowe et al., 2004; Dale & Cole, 1996; Fielding-Barnsley & Purdie, 2003; Jones & Feeley, 2007; Justice et al., 2011; Kasari et al., 2010; Koppenhaver et al., 2001; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyon, 2007; Vogler-Elias, 2009).

**Children's use of joint attention behaviors.** When examining the children's use of joint attention behaviors, the data indicated that the verbal and nonverbal response behaviors (i.e., response to joint attention bids by the caregiver) were used more often than the verbal and nonverbal initiation behaviors (i.e., the child getting the caregiver to attend with him). This finding is also consistent with previous studies where researchers found that children with ASD frequently responded more to joint attention bids than initiating their own joint attention behaviors (e.g., Ingersoll & Schreibman, 2006; Kasari et al., 2010; Whalen and Schreibman, 2003). It should be noted that Jess' (Dyad 2) third data point in the maintenance phase for rate of joint attention behaviors

was close to his baseline levels. Although Jess' caregiver produced 6.32 MITS strategies per minute during that session, providing numerous joint attention bids, a closer review of the video reading session revealed that Jess did not have joint focus on the book. One possible reason for the lack of focus and consequently lack of joint attention behaviors could be the book was not based on his interest (i.e., *Touch and Feel ABCs*). When looking at the average number of Jess' joint attention skills over phases, his data was stable throughout the intervention, maintenance, and generalization phases. These findings are discussed in more detail below.

**Verbal response behavior.** All four of the children displayed the greatest gains in their verbal responses to joint attention bids. This in part was due to the increase in their caregiver's Query strategy. During the study as the caregiver's bids for joint attention increased or decreased (i.e., MITS strategies), the child's joint attention skills seem to follow the same pattern. This was displayed in Jon's (Dyad 1) variability throughout the study. For example, Jon's greatest gains were seen during the intervention phase. He produced an average of 9.03 verbal responses to joint attention bids per minute, as his caregiver averaged 11.2 MITS strategies (i.e., bids for joint attention) per minute. During the maintenance phase, Jon's verbal response decreased to an average of 3.83 per minute, as his caregiver's bids for joint attention also decreased, averaging 8.12 per minute. During the generalization phase, Jon's verbal response seemed to stabilize with an average of 3.92 behaviors per minute, as his caregiver recorded an average of 7.6 MITS strategies per minute. These results were similar to the rate of MITS strategies observed during the maintenance phase.

Verbal response behaviors in Jess (Dyad 2), Dave (Dyad 3), and Jay (Dyad 4) increased during the intervention phase and remained relatively consistent throughout the remainder of the study. This may be attributed to the relatively consistent rate in which their caregiver's produced MITS strategies.

***Nonverbal response behavior.*** Three of the children produced minimal gains in their nonverbal response behavior. Jay (Dyad 4) produced an average of 1.26 nonverbal responses per minute during intervention phase but decreased during the maintenance and generalization phases. One possible reason for the decrease in nonverbal response behavior was an increase in Jay's verbal response behavior to 3.7 per minute during the maintenance phase and 3.2 per minute during the generalization phase.

During the intervention phase, Jon (Dyad 1) produced an average of 1.91 nonverbal responses per minute, decreasing to 0.7 per minute during the maintenance phase and increasing to 1.88 per minute during the generalization phase. Like Jon's verbal response behavior, one possibility for the decrease in nonverbal response behavior was the decrease in his caregiver's use of MITS strategies.

Jess' (Dyad 2) nonverbal response behaviors remained constant through the intervention, maintenance, and generalization phases. It is likely that this behavior didn't change because his verbal responses increased and he did not have a need to use nonverbal responses.

Dave (Dyad 3) did not use the nonverbal response behavior throughout the study. It is possible that the lack of nonverbal responses was because he came into the study with a higher use of the verbal response behavior.

**Verbal initiation and nonverbal initiation behaviors.** Child participants did not show significant gains in these initiations of joint attention behaviors. These results are similar to the results of previous studies as initiation of joint attention skills are more complex skills to teach, learn, and maintain (e.g., Ingersoll & Schreibman, 2006; Karsari et al., 2010; Schertz & Odom, 2007; Whalen & Schreibman, 2003). One possible explanation for the lack of these initiation behaviors could be because the MITS strategies the caregiver utilized during the reading sessions required responses from the child and did not teach the child initiation skills.

### **Research Question #3**

The final research question addressed the child's use of expressive language. The results of the current study indicated that after the caregivers received the MITS training and used the strategies during the reading sessions, each child increased their rate of verbal expressive language (Figures 4-4). This finding is consistent with previous research in which caregivers learned a shared storybook reading intervention, implemented the strategies, and the results showed an increase in the language of their child who had a disability (e.g., Crowe et al., 2004; Koppenhaver et al., 2001; Vogler-Elias, 2009).

**Children's expressive language.** In the present study, three of the four children increased the number and variety of expressive language they used to communicate with their caregiver. The only child who did not demonstrate an increase in the variety of verbal expression was Jess (Dyad 2). As mentioned in the participant description section of Chapter 3, Jess had speech production difficulties, which may have accounted for his lack of improvement. Dave's (Dyad 3) increase in single word and multiple word combinations was observed during the generalization phase. One

explanation for the increase could be that Dave found the books more engaging in the generalization phase. During the generalization phase, the choice of books came from any set of books not used in the intervention and maintenance phases. Therefore, the likelihood of selecting a book of interest was high. Jon (Dyad 1) began to use more single words and multiple word combinations while decreasing the amount of canonical vocalization. This is not unusual since children will reduce the less sophisticated expressions when they find a more understandable and responsive method of communicating (words and word combinations). Similar results were seen in Jay's (Dyad 4) expressive language, as he had an increase in all three areas of expressive language. An explanation for the growth in all the children's expressive language could be the increase in the caregiver's use of the MITS strategies. Increasing bids for attention to the books created a more transactional experience between the caregiver and child (Crowe et al., 2004).

The purpose of using the MITS strategies during shared-storybook reading was to promote reading storybooks as a transactional activity. As a result, this study demonstrated the effectiveness of the strategies and the importance of their use by these caregivers to facilitate language, particularly when the child has a language impairment (Bakeman & Adamson, 1984; Dale & Cole, 1996; Crowe et al., 2003; Lovelace & Stewart, 2007; Justice et al., 2011). Complementary to the findings in the joint attention and shared storybook literature, scaffolding questions is commonly used to expand communication in a meaningful way between the adult and child. Bellon-Harn and Harn (2008) define scaffolding as "a systematic application of prompts and models that facilitate language development" (p.112). Scaffolding was incorporated in

the MITS strategies. Through the use of these MITS strategies in the storybook reading sessions, the caregiver facilitated language and speech patterns that increased, elaborated, and modeled new and unfamiliar vocabulary words which helped expand their child's vocabulary (Bellon-Harn and Harn, 2008; Justice & Kaderavek, 2002; Lane & Wright, 2007).

### **Implications**

The results of this study provided evidence that caregivers were able to effectively learn and implement the MITS intervention. Furthermore, the increase in the caregivers' use of the MITS strategies provided numerous joint attention bids, or opportunities, for their child to become an active participant in the storybook session. These opportunities enabled the child to use their joint attention behaviors (i.e., verbal response, nonverbal response, verbal initiation, and nonverbal initiation). Consequently, through the increase in interaction between the caregiver and child, growth of expressive language was seen in each child participant.

This study adds to the literature base as it combines two bodies of rich literature. This study created interactive reading strategies that advocated caregiver and child participation through shared storybook reading, ultimately increasing joint attention. It is important to highlight that the children utilized in this study were on the autism spectrum, a population with limited research in shared storybook reading. The results have several implications for researchers and practitioners, and are discussed below.

### **Implications for Future Research**

As previously stated, the caregiver-child relationship is transactional in nature, signifying that caregiver and child mutually influence one another (Carpenter et al., 1998). The caregivers in this study were taught to go beyond reading the storybook and

to actively engage with their child during the shared reading sessions. The MITS intervention encouraged the caregivers to bring joint focus to the storybook (i.e., the Attention Directing strategy), follow the child's lead, ask questions (i.e., the Query strategy), model unanswered questions (i.e., Model Response strategy), and provide feedback (i.e., Feedback strategy). Using the MITS strategies during shared storybook reading allowed the caregiver and child to have joint focus on an object of interest, thus providing more opportunities for the child to respond and initiate joint attention bids. For caregivers, these strategies created a natural turn-taking activity. Due to the naturalistic flow the MITS strategies, caregivers could replicate the strategies across different settings (i.e., play time) providing more opportunities for interaction between the caregiver and child that go beyond storybook time.

A recommended area for future research would be to take a closer look at the specific types of Query questions the caregivers used (i.e., request for label, request for action, cloze procedure, binary choice, or open-ended question). Looking at the particular types of questions used most often, least, or not at all could provide researchers with valuable information when working with children with autism.

In the examination of the joint attention studies in Chapter 2 it was noted that many studies used objects of the child's interest to elicit joint attention behaviors from child. Results of those studies showed that using objects of preferred interest motivated children with ASD to engage with their caregiver therefore naturally increasing joint attention (e.g., Jones and Feeley, 2007; Rocha et al., 2007; Vismara & Lyon, 2007; Whalen & Schreibman, 2003). In addition, an examination of the shared storybook reading literature suggests that exposing children to books that they are interested in is

a critical factor in their success (Ortiz et al., 2001). Therefore, using books based on the child's interest were selected and used in this study to increase the likelihood of joint attention occurring, though it should be noted that the caregiver also used storybooks of noninterest. It appears that using storybooks of interest combined with the MITS strategies helped create numerous opportunities for meaningful child-caregiver interaction that were mutually reinforcing, consequently increasing joint attention and MITS strategies. On the other hand, when a caregiver used books not of the child's stated interest there was little if not no effect on the child's joint attention behavior than when the caregiver used a book of stated interest. Further research is needed, as it is unclear if the child's joint attention behaviors were significantly affected by the selection of interest or noninterest book.

Naturalistic early interventions, such as the MITS intervention, allow caregivers and interventionists to work together to help teach and develop critical skills in children with disabilities. The importance of including caregivers in the intervention process has been well documented throughout the literature (Bagnato, 2007; Cosden, Koegel, Koegel, Greenwell, & Klein, 2006; Crowe, Norris, & Hoffman, 2000). The literature also indicated that greater maintenance and generalization of previously acquired skills are achieved in new environments when caregivers are involved because they are able to practice and implement these new found skills throughout the day (Fletcher, Perez, Hooper, & Claussen, 2005; Schertz & Odom, 2007). Caregivers in this study were able to maintain and generalize the MITS strategies, but due to the relatively short time this intervention focused on maintenance and generalization skills, further research is warranted.

The MITS intervention allowed the caregiver and child to read in their natural environment, creating a predictable routine. This predictability and stability allows children to feel secure in their environment while giving the caregiver opportunities to facilitate interactions which focus on the communicative and linguistic development (Bellon, Ogletree, and Harn, 2000; Ingersoll & Gergans, 2005; Jones & Feeley, 2007; Koppenhaver et al., 2001; Vogler-Elias, 2009). Children participating in this study showed an increase in expressive language throughout the MITS intervention. Further research is needed to see if the children's use of expressive language can be generalized beyond the storybook sessions.

Although the researcher conducted a coaching component during the intervention phase of the study, it was not done using a systematic method across participants. It is important to note that during this current study caregivers were active participants who reflected on their performance when watching their reading sessions on video, but due to the lack of treatment integrity for the coaching component, it would be difficult to report. Further research is needed to create and use a more methodical manner of coaching when viewing the reading sessions with the caregivers.

Another area of future research should focus on how the child's response to joint attention bids are measured and reported. As each MITS strategy required a response from the child (i.e., vocal response and nonverbal response to joint attention) it would benefit the researcher to look at the caregiver's bids for joint attention (i.e., MITS strategies) and report whether or not the child responded. Therefore reporting the child's responses as a percentage of opportunities (i.e., the total number of vocal and nonverbal joint attention occurrences divided by the total number of MITS strategies

used, multiplied by 100) would be a more accurate way to measure the child's response to joint attention behaviors (Gast, 2010).

### **Implications for Practice**

The MITS strategies are interactive strategies that could potentially be beneficial for educators working with children with autism. Exposing children to important literacy experiences becomes complex for practitioners when their preschool students with ASD have deficits in joint attention. This is due to the fact that joint attention is a prerequisite skill for acquiring emergent literacy skills. Therefore, it is vital for early educators to work on increasing joint attention with children with ASD throughout the school day. As illustrated by the lack of research, there is a need for further research in the area of shared storybook reading with young children on the spectrum. Current ASD research has focused on hyperlexia and sight word instruction, in lieu of the acquisition of early literacy skills, such as joint attention (Koppenhaver & Erickson, 2003; Watson et. al, 2004). Below are some suggestions on how educators could use components of the MITS intervention to support joint attention and language development in their classroom.

First, practitioners could utilize the MITS strategies during circle time, allowing them to work on a variety of skills with numerous children in a relatively short amount of time. The results of this study showed that adults using MITS strategies create opportunities (or bids) for joint attention to occur. Through the use of these strategies the practitioners could ask questions, prompt, and provide feedback. Therefore, the practitioners become active listeners while the children are able to become active participants (Whitehurst et al., 1994).

Second, the MITS strategies provide practitioners with the opportunity to become creative when introducing new language and vocabulary. During the storybook experience, adults can engage children in meaningful dialog using new vocabulary in the context of the story. Through the use of child-friendly definitions and repeating unfamiliar words, children will be able to acquire additional oral language (Beauchat et al., 2009; Lane & Wright, 2007).

Third, throughout the MITS strategies the use of a 5 second wait time is implemented. Educators on average wait less than 1 second for a child to respond before they answer the question for the child or ask another question (Rowe, 1986). The addition of a 5 seconds wait time is an easy way to increase the number of opportunities a child has to communicate.

Lastly, this study touches on the idea that using materials and objects of interest to the child could potentially motivate the child and naturally boost their engagement. Practitioners can use this knowledge when preplanning and setting up their classroom to support more natural joint attention exchanges.

### **Limitations**

A number of factors may limit the findings of this study and should be consider when interpreting the results. First, the frequency in which the caregiver participated in shared storybook reading sessions outside the study's allotted time is unknown. That is, the parents were asked to videotape at least 7 sessions. They may have read aloud with their child during other times then those that were video recorded. This might have affected their use of the MITS strategies. Second, although the investigator followed the MITS Treatment Fidelity Checklist, which outlined the components that were taught during the training sessions, the investigator's behavior during the training sessions may

have been different for each caregiver. These differences may have influenced the caregivers' behaviors or their ability to learn the MITS intervention (Rocha, et al., 2007). Third, the presence of the investigator and use of video camera may have caused caregivers to utilize the MITS strategies at higher rates. Such may have been the case for Dyad 1, Jon's caregiver, during the intervention phase, as she displayed the most MITS strategies during this time. The intervention phase was the only time in the study that the researcher was present for the caregiver/child reading sessions. Fourth, despite the positive benefits of using a multiple probe, multiple baseline across participants design, the baseline data should have been longer for Dyads 3 and 4, but due to scheduling restrictions such data was not possible to collect. Fifth, there was no treatment integrity on the coaching during the intervention phase. The amount of coaching could have varied across caregivers, as there was not a systematic method to ensure all received the same amount. Keeping these limitations in mind, the results should be interpreted with caution.

### **Conclusion**

Teaching children with autism to acquire joint attention skills comes with a unique set of challenges. To state that a single intervention will alleviate the deficit in joint attention that young children with autism have would be over simplistic, but research strongly supports the impact that early joint attention interventions can have. Children with a deficit in joint attention will have difficulties with shared experiences. The lack of shared interactions makes it significantly difficult to acquire language, as the emergent of joint attention skills are a critical developmental milestone (Woods & Wetherby, 2003). The results of this study suggest that caregivers can effectively implement the MITS strategies during shared storybook reading. These interactive strategies, paired

with a storybook that has the child's interest in mind, encourage the caregiver and child to become actively involved, thus increasing joint attention and language opportunities. More research is needed to understand how best to assist children with ASD in acquiring joint attention skills that are necessary for language development. Unless future research is done on how to best facilitate these essential skills, the gaps in effective interventions will remain for children with ASD.

APPENDIX A  
TABLES OF JOINT ATTENTION STUDIES ORGANIZED BY TOPICS

Table A-1. Summary of joint attention interventions using discrete trial training

Study	Participants	Experimental Design	Intervention	Type of JA measure	Results
Martin & Harris (2006)	N=3	multiple baseline by participants	DTT Time delay, preferred objects, tangible and social reinforcement	RJA	Positive
Taylor & Hoch (2008)	N=3	multiple baseline by participants	DTT Prompting, social reinforcement, least-to-most prompting	RJA IJA	Positive
Klein et al. (2009)	N=3	multiple baseline by participants	DTT Time delay, contingent activation of a toy	IJA	Positive
Isaken & Per Holth (2009)	N=4	multiple baseline by participants	DTT Eye gaze and pointing prompts, reinforcement of preferred toys	RJA IJA	Positive

DTT= discrete trial training. RJA= response to joint attention. IJA= initiation to joint attention.

Table A-2. Summary of joint attention interventions using pivotal response training

Study	Participants	Experimental Design	Intervention	Type of JA measure	Results
Ingersoll & Schreibman (2006)	N=5	Multiple baseline across participants	PRT Reinforcement verbal praise, model, least-to-most prompts, eye-gaze shifting	RJA: eye-gaze shift IJA	RJA: Positive IJA: Mixed
Schertz & Odom (2007)	N=3	Mixed methods  Multiple baseline across participants, interviews, and parent notes	PRT Parent training, focus on face, eye contact, turn-taking, social commenting	RJA IJA	RJA: Mixed IJA: Mixed
Vismara & Lyon (2007)	N=3	Mixed methods  Single subject reversal design and qualitative measure for interaction	PRT Parent training, contingent rewards, natural reinforcers, toys based on perseverative interest	IJA	Positive
Kasari et al. (2010)	N=38	Experimental Group Design	PRT Parent training, follow child's led	RJA IJA	Mixed RJA: Positive IJA: Negative

PRT= pivotal response training. RJA= response to joint attention. IJA= initiation to joint attention.

Table A-3. Summary of joint attention interventions using both discrete trial training and pivotal response training

Study	Participants	Experimental Design	Intervention	Type of JA measure	Results
Whalen & Schreibman (2003)	N=5	Multiple baseline by participants	DTT: inter-trial intervals, prompting PRT: following child's interest, receiving access to object of child's interest as a response-reinforcer	RJA IJA	RJA: positive IJA: mixed
Kasari, Freeman, & Paparella (2006)	N= 56	Experimental Group Design	DTT: inter-trial intervals, least-to-most prompts PRT: floor play, follow child's led	RJA IJA	RJA: positive in JA group and symbolic play group, not control IJA: positive in JA group and symbolic play group, not control
Jones & Feeley (2007)	N= 3	Multiple probe across behaviors	Parent training, DTT: inter-trial intervals, least-to-most prompts, high rates of reinforcement PRT: objects of child's interest, natural social reinforcements	RJA IJA	Positive
Rocha, Schreibman, & Stahmer (2007)	N=3	Multiple baseline by participants	Parent Training DTT: inter-trial intervals, prompting PRT: following child's interest, receiving access to object of child's interest as a response-reinforcer	RJA	RJA: Positive IJA: increased although not directly targeted

Table A-3. Continued

Study	Participants	Experimental Design	Intervention	Type of JA measure	Results
Kaale, Smith, & Sponheim (2012)	N=61	Experimental Group Design	Preschool Teacher and Parent Component DTT: inter-trial intervals, adult driven PRT: floor play, child led	RJA (joint engagement) IJA	Statistically significant effects were seen in the experimental group's RJA and IJA than the control group

DTT= discrete trial training. PRT= pivotal response training. RJA= response to joint attention. IJA= initiation to joint attention.

APPENDIX B  
TABLES OF SHARED STORYBOOK READING STUDIES ORGANIZED BY TOPICS

Table B-1. Summary of shared reading interventions with language and developmental delays children

Study	Participants	Development & Language Delays	Setting & Caregiver Component	Experimental Design	Intervention	Results
van Kleeck, Vander Woude, Hammett (2006)	N= 30 Age= 46-60 months	Language impairments	Preschool setting No caregiver component	randomized control group design	One-on-one literal and inferential language skill intervention	Positive
Lovelace & Stewart (2007)	N= 5 Age= 48-60 months	Language impairment	Early learning center No caregiver component	Multiple-probe design across subjects	Print concept shared storybook reading intervention	Positive
Bellon-Hard & Harn (2008)	N=1 Age= 72 months	Development delays: gross-motor, fine motor, language, social, & self-help	Clinical setting No caregiver component	Multielement design across two conditions (Scaffolding & Scaffolding with AAC)	Scaffolding & Scaffolding with AAC: including wh-questions, modeling, & expansion	Scaffolding: Positive Scaffolding with AAC: Positive; more communicative behaviors
Dale & Cole (1996)	N= 33 Ages= 36-72 months	Language delays	Caregiver's home Caregivers implemented intervention	Experimental design	Dialogic reading intervention or Conversational language training	Positive
Fielding-Barnsley & Purdie (2003)	N= 26 Ages: 70.2-70.5 months	Deemed "at-risk" if one or more had a history of reading disability	Caregiver's home Caregivers implemented intervention	Quasi-experimental	Dialogic reading intervention	Positive
Crowe, Norris, & Hoffman (2004)	N=6 Ages: 38-41 months	Language impairments	Caregiver's home Caregivers implemented intervention	Multiple-baseline across participants	Complete Reading Cycle	Positive

Table B-1. Continued

Study	Participants	Development & Language Delays	Setting & Caregiver Component	Experimental Design	Intervention	Results
Justice, Skibbe, McGity, Piasta, Petrill (2011)	N= 62 Ages: 48-60 months	Language impairment	Caregiver's home Caregivers implemented intervention	Quasi-experimental	Print-referencing, Picture-focus, or Sound-focus	Positive

Table B-2. Summary of shared reading interventions for children with autism

Study	Participants	Autism Spectrum Disorder	Setting & Caregiver Component	Experimental Design	Intervention	Results
Bellon, Ogletree, & Harn (2000)	N= 1 Age= 46 months	High-functioning autism; speech & language delays	Clinical setting No caregiver component	Single-subject design	Repeated storybook reading, <i>wh</i> -questions, and scaffolding	Positive
Koppenhaver, Erickson, & Skoto (2001)	N= 4 Age= 39-72months	Rett syndrome	Caregiver implemented intervention	Multiple-baseline across behaviors across participants	Shared Storybook Reading;	Positive
Vogler-Elias (2009)	N=7 Age= 36-60 months		Caregiver's home Caregiver implemented intervention	Multiple-baseline across participants		Positive

APPENDIX C  
MITS COLLECTION CHECKLIST & CODING SHEET

Table C-1. Definition of MITS strategies to be implemented by caregivers

MITS strategy	Definition	Example
Attention Directing	<p>Any verbal or nonverbal initiation (e.g., point) to establish joint focus (e.g., attention to the book), such as the pictures, events, attributes, or text. The caregiver's attention directing can include a word or combination of words (e.g., "look", "see"), which serve to establish the topic or picture for discussion.</p> <ul style="list-style-type: none"> <li>• Point accompanied by a "look" or "see"</li> <li>• Point accompanied by a "look" or "see" plus label</li> <li>• Tapping counts, code at beginning of tap</li> <li>• Label plus pointing with no pause or tap is just considered normal reading behavior</li> <li>• If point prompt happens within 5 seconds of query it does not count</li> </ul>	Caregiver points to a picture of a dog and says, "Look! A big dog".
Query	<p>Any communicative act to volunteer or request information to be shared and to solicit a child's verbal or nonverbal response. Queries include requests for labels (e.g., "What's that?") or actions (e.g., "What's he doing?", "What's happening here?"). Cloze procedure (e.g., "He's eating ____.") and binary choice (e.g., "Should he walk or run?") also can be used as a query. Queries can be open-ended questions (e.g., "What will happen now?") or introduced with an attention directive plus query combination, (e.g., "Let's see what he did.", "Let's find out what happened next.", "Let's do it again"). Caregivers are taught to wait 5 seconds, to allow the child time to respond.</p> <ul style="list-style-type: none"> <li>• Must wait 5 seconds after question is asked</li> <li>• Label and wait 5 seconds</li> <li>• After caregiver states query, start 5 seconds. Record at 5 second mark or as soon as child answer query; whichever comes first</li> <li>• When feedback is in form of a query and/or inflection, mark as a query</li> <li>• If caregiver gives query and then prompts before 5 seconds is over do not count</li> </ul>	Caregiver give the child a binary choice, "Is that dog eating a bone or a hamburger?"

Table C-1. Continued

MITS strategy	Definition	Example
Model Response	<p>Any semantically contingent response to the Query, if the child did not respond to the Query in verbal or nonverbal way within 5 seconds. Model Response includes answering the Query requests for labels (e.g., “What’s that?” wait 5 seconds, then model “That is a _____.”) or actions (e.g., “What’s he doing?”, “What’s happening here?” wait 5 seconds, then model answer). Waiting 5 seconds, then modeling the cloze procedure (e.g., “He’s eating ____.”) and binary choice (e.g., “Should he walk or run?”, “He should _____”).</p> <ul style="list-style-type: none"> <li>• Code at the end of the model statement</li> </ul>	<p>After waiting 5 second for the child to respond, the caregiver them models the appropriate response: “That dog it eating a bone”.</p>
Feedback	<p>Any comment serving to acknowledge, extend, restate, or clarify the response of the child. Or provides an opportunity for the caregiver and child to discuss material presented in the storybook. The caregiver can clarify the accuracy of the child’s previous utterance or response.</p> <ul style="list-style-type: none"> <li>• When feedback is in form of a query, mark as query</li> <li>• Do not have to wait 5 second after feedback is given in order to be marked</li> <li>• Code feedback as soon as it happens</li> </ul>	<p>While reading a book about a dog, the child says, “big”. The caregiver acknowledges the child by saying, “You’re right, that is a big black dog”.</p>

**Table C-2. Definitions of Child's Joint Attention**

Type of joint attention	Definition	Examples
Vocal Response to Joint Attention (VR)	<p>After caregiver ask/gives a query, child vocalizes a canonical vocalization, word, or words answering query in conjunction with gaze alternation &amp; positive affect to the caregiver</p> <ul style="list-style-type: none"> <li>• If child reads along with book, does not count as VR</li> <li>• VR takes precedents over NVR</li> <li>• Child has echololcha</li> </ul>	Caregiver & child are reading a book about bear. Caregiver ask child, "What is the bear eating" and child responds, "apple".
Nonverbal Response to Joint Attention (NVR)	<p>Eye gaze: Child looks between object &amp; caregiver in conjunction with gaze alternation &amp; positive affect to the caregiver (e.g., smiling, laughing). Or Point: Child extends finger toward object in conjunction with gaze alternation &amp; positive affect to the caregiver</p>	Child & caregiver are reading a book about a bear. Child points to the bear & alternates eye contact to the caregiver
Vocal Initiation of Joint Attention (VI)	<p>Child vocalizes a canonical vocalization word, or words about the book to their caregiver with gaze alternation and positive affect to the caregiver</p> <ul style="list-style-type: none"> <li>• If child reads along with book does not count as VI</li> </ul>	Child & caregiver are reading a book about bears. Child says to caregiver, "brown bear".
Non Vocal Initiation of Joint Attention (NI)	Child initiates joint attention with eye contact or point & positive affect	Child & caregiver are reading a book about a bear. As caregiver turns page, child see that bear on the page & alternates eye contact between bear & caregiver

Table C-3. Definitions and examples of expressive language sample done by child

Type of expressive language	Definition	Example
Canonical vocalization	Characterized as a rhythmic productions of one or more consonant-vowel (CV or CVCV)	Child holds up an apple and says, "ap"
Word	Any single word utterance	Child says, "apple"
Words Combination	Any utterance in which the child uses multiple words	Child says, "red apple"

Coding Sheet

Dyad: \_\_\_\_\_

Session #: \_\_\_\_\_

Length: \_\_\_\_\_

Min 0	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										
Min 1	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										
Min 2	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										
Min 3	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										
Min 4	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										
Min 5	1	2	3	4	5	6	7	8	9	10
1-10										
11-20										
21-30										
31-40										
41-50										
51-60										

APPENDIX D  
UNSTRUCTURED JOINT ATTENTION ASSESSMENT

Adapted from Loveland & Landry (1986)

**Gesture-only task**

	+/-	+/-	+/-
<b>Shift gaze</b> after establishing eye contact with the child, the investigator shift gaze toward some object behind & to the side of the child			
<b>Pointing</b> the investigator points at some object and the child looks at or comments on the object indicated			
<b>Showing</b> the investigator holds out an object so that the child can easily see it; the child is to look at or comment on the object			
<b>Tapping Object</b> the investigator touches the object of attention; the child is to look at or otherwise attend to the object			
<b>Moving child's hand</b> the investigator physically place the child's hand on or around the object; the child must look at or comment on the object			

**Language-plus-gesture task**

	+/-	+/-	+/-
<b>Shift gaze</b> after establishing eye contact with the child, the investigator shift gaze toward some object behind & to the side of the child and says, "Look at the _____"			
<b>Pointing</b> the investigator points at some object and says, "What's that?" and the child looks at or comments on the object indicated			
<b>Showing</b> the investigator holds out an object so that the child can easily see it and says, "Look at this"; the child is to look at or comment on the object			
<b>Tapping Object</b> the investigator touches the object of attention and says, "What do I have?"; the child is to look at or otherwise attend to the object			
<b>Moving child's hand</b> the investigator physically place the child's hand on or around the object and says, "What do you have"; the child must look at or comment on the object			

APPENDIX E  
CAREGIVER HANDBOOK

## 4 MITS Initial Training Materials (Day 1)

### Strategy #1 Attention Directing

This is a good strategy to use when beginning the book or when you are trying to focus your child's attention back on the book. This strategy uses a word, a combination of words, or a gesture, when trying to get your child to focus on the book. Your verbal or nonverbal cues can be used towards pictures, events, attributes or text that are located in the book.

Verbal Examples	Nonverbal Examples
Say the word "Look" and point to a specific area in the book	Tap at a certain place in the book, to get child's attention
Say, "Look at the _____."	
Say the word "See" and point to a specific area in the book	Point to a certain place in the book
Say, "See at the _____."	

### Strategy #2 Query

Asking questions when reading to your child promotes language and is an important in way to expand your child's vocabulary. There are many types of questioning you can use to elicit responses from your child. Only ask one question at a time and give your child 5 seconds to respond.

Types of Questioning	Examples
Queries include requests for labels	What's that?
Request action	What's he doing? What's happening here?
Cloze procedure	He's eating ____.
Binary choice	Should he walk or run?
Open-ended questions	What will happen now?

## 4 MITS Initial Training Materials (Day 1) Continued

**Strategy #3 Model Response**

The strategy *Model Response* will be used if your child did not respond to your Query in verbal or nonverbal way within 5 seconds. When you use the *Model Response* strategy you will model the answer to the Query question you asked. Let's use the book "The Cat in the Hat" to practice.

<b>Types of Questioning</b>	<b>Wait 5 seconds</b>	<b>Model Response</b>
Label: What's that?	Wait 5 seconds	That is a _____.
Request action: What's he doing? What's happening here?	Wait 5 seconds	He is _____.
Cloze procedure: He's eating _____.	Wait 5 seconds	He's eating _____.
Binary choice: Should he walk or run?	Wait 5 seconds	He should _____.
Open-ended questions: What will happen next?	Wait 5 seconds	I think that _____.

**Strategy #4 Feedback**

The strategy *Feedback* is any comment serving to acknowledge, extend, restate, or clarify the response of your child. The feedback strategy in the MITS provides an opportunity for you and child to discuss material presented in the storybook. This strategy can also clarify the accuracy of the child's previous utterance or response. Let's use the book "The Cat in the Hat" to practice.

<b>Child's Response</b>	<b>Example of Feedback</b>
Answering a label: Rabbit	You're right! That's a furry rabbit.
Answering a request action He's running.	The furry rabbit is running very quickly.
Answering a cloze procedure: He's eating an apple.	He is eating a red juicy apple.
Answering binary choice: He should walk	You're right, he should walk. Why do you think he should walk?
Answering an open-ended questions: I think he is scared.	Why do you think the rabbit is scared?

### Additional 4 MITS Training Material (Day 2, 3, 4...)

#### Strategy #1 Attention Directing

This is a good strategy to use when beginning the book or when you are trying to focus your child’s attention back on the book. This strategy uses a word, a combination of words, or a gesture, when trying to get your child to focus on the book. Your verbal or nonverbal cues can be used towards pictures, events, attributes or text that are located in the book. Let’s use the book “The Cat in the Hat” to practice.

Verbal Examples	Nonverbal Examples
Say the word “Look” and point to a specific area in the book	Tap at a certain place in the book, to get child’s attention
Say, “Look at the _____.”	
Say the word “See” and point to a specific area in the book	Point to a certain place in the book
Say, “See at the _____.”	

#### Strategy #2 Query

Asking questions when reading to your child promotes language and is an important in way to expand your child’s vocabulary. There are many types of questioning you can use to elicit responses from your child. Only ask one question at a time and give your child 5 seconds to respond. Let’s use the book “The Cat in the Hat” to practice.

Types of Questioning	Examples
Queries include requests for labels	What’s that?
Request action	What’s he doing? What’s happening here?
Cloze procedure	He’s eating ____.
Binary choice	Should he walk or run?
Open-ended questions	What will happen now?

**Additional 4 MITS Training Material (Day 2, 3, 4...) Continued**

Strategy #3 Model Response

The strategy *Model Response* will be used if your child did not respond to your Query in verbal or nonverbal way within 5 seconds. When you use the *Model Response* strategy you will model the answer to the Query question you asked. Let's use one of the following books to practice: *If You Give a Mouse a Cookie*, *Goodnight Moon*, or *The Very Hungry Caterpillar*

<b>Types of Questioning</b>	<b>Wait 5 seconds</b>	<b>Model Response</b>
Label: What's that?	Wait 5 seconds	That is a _____.
Request action: What's he doing? What's happening here?	Wait 5 seconds	He is _____.
Cloze procedure: He's eating _____.	Wait 5 seconds	He's eating _____.
Binary choice: Should he walk or run?	Wait 5 seconds	He should _____.
Open-ended questions: What will happen next?	Wait 5 seconds	I think that _____.

## Additional 4 MITS Training Material (Day 2, 3, 4...) Continued

### Strategy #4 Feedback

The strategy *Feedback* is any comment serving to acknowledge, extend, restate, or clarify the response of your child. The feedback strategy in the MITS provides an opportunity for you and child to discuss material presented in the storybook. This strategy can also clarify the accuracy of the child's previous utterance or response. Let's use the book "The Cat in the Hat" to practice.

<b>Child's Response</b>	<b>Example of Feedback</b>
Answering a label:	
Answering a request action	
Answering a cloze procedure:	
Answering binary choice:	

APPENDIX F  
CHILD INTEREST INVENTORY

Your child's name: \_\_\_\_\_

Sex: \_\_\_\_\_

**We are collecting basic information to help us select storybooks that best fit your child's interest. Thank you for your help.**

1. Name the object(s) or toy(s) that your child plays with most often.

\_\_\_\_\_  
\_\_\_\_\_

2. Does your child take a particular interest in book(s)? Yes/No

If yes, please explain: \_\_\_\_\_

\_\_\_\_\_

3. Is your child strongly attached to a specific item (e.g. piece of clothing, doll, toy...)?

Yes/No

If yes, please specify: \_\_\_\_\_

\_\_\_\_\_

4. Does your child sort objects? Yes/No

If yes, what type of objects: \_\_\_\_\_

\_\_\_\_\_

How does your child sort object (e.g. size, shape, color, etc.) \_\_\_\_\_

\_\_\_\_\_

5. Does your child line up objects? Yes/No

If yes, what type of objects: \_\_\_\_\_

\_\_\_\_\_

How does your child line up object (e.g. size, shape, color, etc.) \_\_\_\_\_

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6. Does your child like to participate in sensory experiences? Yes/No

If yes, explain the type of sensory experiences (e.g. touching things, hearing specific sounds, lights, smells, tearing paper, etc.):\_\_\_\_\_

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7. Does your child like to participate in sports or games? Yes/No

What type of sports or games:\_\_\_\_\_

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8. Does your child like to see how things work? Yes/No

If yes, what types of objects (e.g. computers, radios, TVs, clocks, etc.)

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9. Does your child like a certain cartoon or TV character? Yes/No

If yes, please specify:\_\_\_\_\_

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10. Any additional information you believe would help us in selecting storybooks for your child, please feel free to share:\_\_\_\_\_

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APPENDIX G  
TREATMENT FIDELITY

The MITS Treatment Fidelity Checklist outlines the components that must be taught during the training sessions to ensure treatment fidelity between caregivers.

**MITS Treatment Fidelity Checklist**

Reading Strategy Component	Met	Partial	Absent
1. Discussed the importance of joint attention for children with ASD.			
2. Taught <i>Attention Directing</i> . <ul style="list-style-type: none"> <li>• Explained that this includes any verbal or nonverbal initiation to establish joint focus (e.g., attention to the book), such as the pictures, events, attributes, or text.</li> </ul>			
3. Taught <i>Query</i> . <ul style="list-style-type: none"> <li>• Explained that this is any communicative act to volunteer or request information to be shared and to solicit a child’s verbal or nonverbal response.</li> <li>• Includes requests for labels (e.g., “What’s that?”)</li> <li>• Request actions (e.g., “What’s he doing?”, “What’s happening here?”).</li> <li>• Cloze procedure (e.g., “He’s eating ____.”),</li> <li>• Binary choice (e.g., “Should he walk or run?”), open-ended questions (e.g., “What will happen now?”),</li> <li>• Introduced with an attention directive plus query combination, (e.g., “Let’s see what he did.”, “Let’s find out what happened next.”)</li> </ul>			
4. Taught <i>Model Response</i> . <ul style="list-style-type: none"> <li>• Explained that this includes any semantically contingent based on the child’s non-response to the query <u>after</u> waiting 5 seconds</li> <li>• Model response includes modeling the answer for desired Query requests for labels</li> </ul>			
5. Taught <i>Feedback</i> . <ul style="list-style-type: none"> <li>• Explained that is any comment serving to acknowledge, extend, restate, or clarify the response after the child’s response to Query (can be verbal or nonverbal).</li> <li>• The feedback strategy provides an opportunity for the caregiver and child to discuss material presented in the storybook.</li> <li>• The caregiver can clarify the accuracy of the child’s previous utterance or response.</li> </ul>			
6. Reviewed all 4 reading strategies: <i>attention directing, query, model response, and feedback</i> .			

APPENDIX H  
SOCIAL VALIDITY

**Social Validity Questionnaire**

**Read each statement carefully. Five possible choices as to your level of agreement and disagreement have been placed after each statement. For each of the statements, please circle the phrase that best describes your feelings about the statement. Circle only one phrase for each statement. Please be sure to answer every item.**

1. The Meaningful Interaction through Storybooks (MITS) intervention training helped me to interact with my child during storybook reading.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

2. The training was too time consuming.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

3. My child's joint attention skills have improved due to the MITS intervention.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

4. I will continue using the MITS reading strategies in the future.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

5. As a result of this intervention, I feel more confident when reading to my child.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

6. As a result of this intervention, I believe there is more interaction when reading to my child then before.

I strongly agree.      I agree.      I neither agree nor disagree.      I disagree.      I strongly disagree.

7. Other parents who have child on the autistic spectrum might be interested in learning MITS reading strategies.

**I strongly agree.    I agree.    I neither agree nor disagree.    I disagree.    I strongly disagree.**

8. The instruction provided by the researcher prior to the maintenance phase was useful.

**I strongly agree.    I agree.    I neither agree nor disagree.    I disagree.    I strongly disagree.**

9. Please feel free to share any additional comments or concerns about the MITS intervention.

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APPENDIX I  
LIST OF BOOKS USED IN STUDY

Book Title	Publication Year	Author
Touch and Feel: ABC (Touch & Feel)	2012	DK Publishing
John Deere: Touch and Feel: Tractor	2008	John Deere Co.
Dear Zoo: A Lift-the-Flap Book	1982	Rod Campbell
The Goodnight Train	2006	June Sobel
Zoo! Counting Book	2007	Lori C Froeb
That's Not My Car	2004	Fiona Watt
Baby Touch and Feel Colors and Shapes	2009	DK Publishing
Numbers	2009	Sara Anderson
Car Galore	2011	Pete Stein
Hooray for Fish!	2005	Lucy Cousins and Megan Blane
I Love Trains	2003	Philemon Sturges and Shari Halpern
Inside Freight Trains	2001	Donald Crews
Tails	2003	Matthew Van Fleet
Belly Button Book	2001	Sandra Boynton
Dogs in Space	1996	Nancy Coffelt
Zoom into Space with the Shiny Red Rocket	2009	TickTock Books Ltd
Roaring Rockets	2000	Tony Mitton and Ant Parker
Amazing Airplane	2005	Tony Mitton and Ant Parker
Fire Trucks Touch and Feel	2011	DK Publishing
On the Launch Pad	2004	Michael Dahl

APPENDIX J  
DEMOGRAPHIC & BACKGROUND INFORMATION

**Demographic & Background Information**

Please take your time and answer the questions carefully. The answers you will provide are very important and valuable for our research. If you have any questions, please feel free to ask. And if you do not wish to answer, please leave blank.

Questions about Caregiver:

1. Caregiver's Name: \_\_\_\_\_

2. Male \_\_\_\_\_ Female \_\_\_\_\_ (check one)

3. Caregiver's Date of Birth (MM/DD/YYYY): \_\_\_\_\_

4. Race/Ethnicity (please check one)

\_\_\_ White, non-Hispanic

\_\_\_ African America

\_\_\_ Hispanic

\_\_\_ Asian American

\_\_\_ Mexican-American

\_\_\_ Other (\_\_\_\_\_)

\_\_\_ American Indian/Alaskan Native

5. Education Level

Mother: \_\_\_\_\_

Father: \_\_\_\_\_

6. Mother's Occupation: \_\_\_\_\_

Father's Occupation: \_\_\_\_\_

**Demographic & Background Information Continue**

Please take your time and answer the questions carefully. The answers you will provide are very important and valuable for our research. If you have any questions, please feel free to ask. And if you do not wish to answer, please leave blank.

Questions about Child:

1. Child's Name: \_\_\_\_\_

2. Male \_\_\_\_\_ Female \_\_\_\_\_ (check one)

3. Child's Date of Birth (MM/DD/YYYY): \_\_\_\_\_

4. Race/Ethnicity (please check one)

\_\_\_ White, non-Hispanic

\_\_\_ African America

\_\_\_ Hispanic

\_\_\_ Asian American

\_\_\_ Mexican-American

\_\_\_ Other (\_\_\_\_\_)

\_\_\_ American Indian/Alaskan Native

5. Does your child have any other siblings? \_\_\_\_\_

If yes, how many? \_\_\_\_\_ Ages? \_\_\_\_\_

6. When was your child diagnosed with Autism Spectrum Diagnosis (age)?

\_\_\_\_\_

7. What is your child's Autism Spectrum Diagnosis? (circle one)

Autism or autistic disorder

Asperger's disorder

PDD-NOS

Rett's syndrome

Childhood disintegrative disorder

Unknown

\_\_\_\_\_  
(Line if explanation is needed)

8. Who diagnosed him/her? \_\_\_\_\_

\_\_\_\_\_

9. What diagnostic assessments or tools were used? \_\_\_\_\_

\_\_\_\_\_

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10. Schooling: Has your ever been enrolled in preschool? \_\_\_\_\_

Is your child currently enrolled in preschool? \_\_\_\_\_

If yes, what type of classroom (general/ special education): \_\_\_\_\_

If yes, how often and how long does he/she go? \_\_\_\_\_

11. Has your child received any outside services (examples: occupational therapy, speech, behavioral therapist)? \_\_\_\_\_

If yes, what type and for how long (example: speech; twice a week for 6 months):

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12. What are some areas of strengths you see in your child? \_\_\_\_\_

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13. What are some areas that you would like to see improvement in for your child? \_\_\_\_\_

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## BIOGRAPHICAL SKETCH

Kate's grandmother and mother were educators, so you could say her decision to become an educator was an inherent one. Some of her fondest childhood memories were of playing teacher after school in her mother's Kindergarten classroom. Kate was always creating art projects and helping other teachers' children with their homework; it was fun and familiar to her. Those experiences, as well as being surrounded by the educators in her family, undoubtedly played a part in leading Kate to her future career.

After graduating high school, Kate attended Florida State University (FSU). She only attended FSU for one year as Kate was recruited to play women's soccer at Saint Leo University, in St. Leo, Florida. While there, Kate majored in Elementary Education and minored in art. Kate attributes her time playing a collegiate sport as helping her understand the value of teamwork, leadership, time management, responsibility, and discipline. After graduating with a degree in Elementary Education, she was a classroom teacher for four years before deciding to go back part-time and get her master's degree in curriculum and instruction from the University of Central Florida. Kate's decision to go back to school stemmed from her desire to serve the needs of all her students in her multi-age classroom, where she was exposed to all types of learners. It was during that time that Kate's interest in Autism Spectrum Disorder was developed.

Through her graduate experience, Kate understood the power of curriculum and her knowledge of instruction grew so that she was able to use the proper tools and skills necessary to help all children feel successful and included within her classroom walls. After teaching in the elementary setting for 7 years, Kate decided to teach a year at Valencia Community College in Orlando, Florida. It was in this setting that she became

interested in teaching at the post-secondary level and her interest in research in early intervention began. As a doctoral student, Kate was supported by a federally funded grant from the USDOE Office of Special Education Programs, Project RELATE: Research in Early Literacy and Teacher Education, in the Department of Special Education, School Psychology, and Early Childhood Studies at the University of Florida. She graduated with her Doctor of Philosophy in Special Education in the summer of 2013. Kate believes that her experiences at UF have been invaluable, as they helped her to develop new tools and skills that have helped her as a researcher as well as a teacher educator.

Kate is currently working as an Assistant Professor at Kennesaw State University in their Inclusive Education Department. She is happily married to her incredibly supportive husband, Jeff. They have a son named Evan and two dogs, Rosco and Boss, whom at times, create quite a chaotic household- but also bring much joy and laughter. When Kate is not working or writing, she enjoys spending time with family and friends, watching football, running, and boating.