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STRATEGY INSTRUCTION FOR TYPICALLY DEVELOPING CHILDREN:

JOINT BOOK READING WITH CHILDREN WITH AUTISM SPECTRUM

DISORDER WHO REQUIRE AUGMENTATIVE AND ALTERNATIVE

COMMUNICATION

A Dissertation in

Communication Sciences and Disorders

by

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ABSTRACT

As a result of their inherent difficulty with social interaction and communication, children with autism spectrum disorder (ASD) frequently require support to communicate and engage in successful social interactions. However, most communicative partners, both adults and typically developing children, do not naturally provide this support. To address this critical problem, the current study implemented a single-subject, A-B case study design with five replications, to investigate an instructional program for child communication partners of children with ASD who required augmentative and alternative communication (AAC). Each typically developing child was taught to implement an interaction strategy involving: (a) reading the text on the page of the book, (b) waiting (i.e., expectant delay), and (c) responding to the child with ASD with a topic related response. Instruction was implemented in accordance with current principles of strategy instruction and lasted a maximum of 2.25 hours. All five typically developing children demonstrated acquisition of the "read, wait, and respond" strategy and used the strategy during joint book reading interactions with the children with ASD. Each typically developing child also generalized strategy use to a novel book reading medium and maintained use of the strategy for two months post-intervention. Results, future research directions and limitations are discussed.

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Steele, 1992, p. 75

"Trust in the Lord with all your heart, on your own intelligence rely not; in all your ways be mindful of Him, and He will make straight your paths."
Proverbs 3:5-6

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CHAPTER ONE

Introduction and Review of the Literature

Introduction and Review of the Literature

According to the *Diagnostic and Statistical Manual – Fourth Edition* (DSM-IV), diagnosis of an autism spectrum disorder (ASD) requires impairment in three areas of development including social interaction, communication, and stereotypic and repetitive behaviors (American Psychiatric Association, 2000). These characteristic deficits manifest themselves in a variety of ways forming a population of children with a wide range of skills, needs, and levels of functioning. Despite this variability in characteristics, these deficit areas will affect the lives of children with ASD both socially and educationally throughout their lifespan (National Research Council, 2001).

Impairments in social interaction may arguably be the single most defining feature of ASD (Kanner, 1943; Rogers, 2000) and are potentially the feature that impacts daily functioning and quality of life most severely. Inadequate social interaction skills often lead children with ASD to have difficulty establishing and maintaining relationships and interactions with others (Frea, 1995; Travis & Sigman, 1998). This typically leads to their eventual exclusion from peer culture (Schuler & Wolfberg, 2000), and further exacerbates their difficulties participating in social situations and environments.

In addition to difficulties with social interaction, children with ASD also demonstrate difficulties in the area of communication. It has been suggested that between 14 and 20% of children with ASD will not develop functional speech and language skills for meeting their everyday communication needs (Lord, Risi & Pickles, 2004). For these children, augmentative and alternative communication (AAC) systems are often used to help them communicate within their environments (Mirenda, 2001; 2003). These AAC systems may be unaided, that is, communication via a mode that requires only parts of the body, such as the use of sign language,

or aided, communication using external materials, such as low-technology communication boards and books, or high-technology computer based systems with speech output (Beukelman & Mirenda, 2005). The need to use AAC to assist with communication could potentially create yet another barrier to social interaction and inclusion in peer culture for many children with ASD.

Children with ASD who require AAC may have particularly complex profiles of skills and needs in terms of social development. This is due to the specific characteristics inherent in the diagnosis of ASD (APA, 2000) as well as the identified potential barriers to social competence for individuals who require AAC (Light, 2003). For this reason, the implications of both the diagnosis of ASD as well as the need for AAC should be considered when designing interventions to address social participation with the population of individuals with ASD who require AAC. Strategies specifically aimed at facilitating social skill learning will need to be part of communication interventions for this population of individuals (Light, Roberts, DiMarco & Greiner, 1998; Mirenda & Mathy-Laikko, 1989).

For children with ASD who require AAC, improved social functioning should be considered one of the most important intervention outcomes (Rogers, 2000). Along with this outcome, development of communicative competence, in particular, social competence is critical (Light, 1997). Social competence refers to attainment of adequate knowledge, judgment and skills in both the sociolinguistic aspects of communication, as well as the sociorelational aspects of communication (Light, 1989; 2003). Sociolinguistic aspects of communication relate to discourse strategies (initiations, topic maintenance, turn-taking, etc.) and sociorelational aspects of communication are associated with characteristics inherent in the individual AAC user, such as motivation to communicate, participation within social interactions, and demonstrating an

interest in communication partners (Light, 1989; Light, Arnold & Clark, 2003). Children with ASD who require AAC will have particular challenges in developing social competence, not only because of their need for AAC tools and strategies for communication, but also because of the nature of the core deficits of ASD.

Social competence is not something that a child with ASD who requires AAC can attain without the support of, and interaction with, other individuals. Children learn and acquire skills related to attaining social competence through interactions with other adults (e.g., parents, family members, teachers, educational assistants) and children (e.g., siblings, cousins, friends, school-mates). Because communication is a dynamic and interactive process that requires two individuals to actively engage in the sending and receiving of messages (Owens, Metz & Haas, 2002), conversational partners influence each other and the course of the interaction through what is said and done. As a result, the skills of communication partners are critically important for successful communicative acts during interactions with individuals who require AAC. Individuals who require AAC (including children with ASD who require AAC) need communication partner support in order to fulfill communicative opportunities and to participate in everyday social interactions (e.g., Kent-Walsh, 2003; Light, 1997; Light, Collier & Parnes, 1985a, 1985b; Light, Binger & Kelford-Smith, 1994). However, most communicative partners, both adults and typically developing children, do not naturally provide these supports (e.g., Carter & Maxwell, 1998; Light, Binger & Kelford-Smith, 1994; Light et al., 1985a, 1985b). In fact, communication partners have been observed to dominate communicative interactions; ask predominantly yes/no questions; take the majority of conversational turns; provide few opportunities for individuals using AAC to initiate conversation or to respond in conversation; frequently interrupt the utterances of individuals using AAC; and focus on the communication

technology or technique instead of the individual using AAC or his/her message (Kent-Walsh, 2003; Kent-Walsh & McNaughton, 2005; Light, Collier & Parnes, 1985a). Given the need for communication partners to provide more appropriate conversational support to individuals who require AAC (Cumley & Beukelman, 1992; Light, 1997, Sigafoos, 1999), emphasis should be placed on changing these communicative behaviors in communication partners through education and training.

<div align="center">Communication Partner Instruction in AAC</div>

Numerous authors have indicated that communication partner (both adult and typically developing child) instruction is a critical component in intervention programs for individuals who require AAC (e.g., Culp & Carlisle, 1988; Beukelman & Mirenda, 2005; Glennen & DeCoste, 1997; Kent-Walsh, 2003; Kent-Walsh & McNaughton, 2005; Light & Binger, 1998). Typically developing children can play a significant role in facilitating and developing social interaction and communication skills (e.g., Odem et al., 1992; Ostrosky et al., 1993). Thus, instruction for these communication partners (i.e., child communication partners) cannot be overlooked. A variety of peer-mediated interventions have been used to increase social interaction and communication skills with children with ASD.

Interaction with Typically Developing Children

Theoretically, social skills are learned through observation of, and interaction with, more competent language users (Rogoff, 1990). For this reason, it is logical that for a child with ASD who requires AAC to develop the skills necessary for the development of social competence, he or she will need to have the opportunity to observe and interact with typically developing children, who are the more competent language users in a school environment. However, simply placing typically developing children and a child with ASD in the same environment may not

inherently provide enough exposure and interaction to promote the acquisition of the social

participation skills that are necessary for the development of social communicative competence

and social inclusion (e.g., Gresham, 1984; Myles, Simpson, Ormsbee & Erikson, 1993; Rogers,

2000). Opportunities for interaction and development of sociolinguistic and sociorelational skills

will only exist for a child with ASD who requires AAC when typically developing children

understand how to interact with the child with ASD who requires AAC and recognize the AAC

system that the child with ASD uses as an acceptable form of communication (von Tetzchner,

Brekke, Sjøthun & Grindheim, 2005). This implies a need for training for typically developing

children in order to promote social interaction with children with ASD who require AAC (von

Tetzchner et al., 2005).

Peer-mediated Interventions and Children with ASD

Multiple investigators in the field of ASD have focused on providing training to parents,

teachers, siblings and peers, of children with ASD in order to increase understanding and

interaction between children with ASD and other people within their natural environments (e.g.,

Jones & Schwartz, 2004; Kamps et al., 2002; Laushey & Heflin, 2000). These interventions have

consistently demonstrated that changing the communicative environment of a child with ASD

through training a communication partner positively impacts the communication, interaction

skills, and social competence of the child with ASD in inclusive settings. These interventions

have taken several approaches to training communication partners of children with ASD, and

particularly typically developing child partners.

Altering the interaction situation. There are several interventions that involve

manipulating the interaction situation to promote social interaction between a child with ASD

and typically developing children. These interventions increase the likelihood that typically

developing children will interact with a child with ASD because they create environments or situations that encourage or facilitate interaction (DiSalvo & Oswald, 2002). One intervention of this type is integrated play groups. During integrated play groups, as used by Wolfberg and Schuler (1993, 1999), an adult facilitator provides a structured environment and guides participation between a child with ASD and typically developing children. The key element to this intervention approach is to provide a supportive play environment that encourages and optimizes interaction (DiSalvo & Oswald, 2002). This approach has been demonstrated to increase interaction with typically developing children, decrease the amount of repetitive play and increase the amount of functional play in children with ASD in several research investigations (e.g., Wolfberg & Schuler, 1993; 1999).

Other interventions that alter the interaction environment are peer buddy (e.g., Laushey & Heflin, 2000) and peer tutor (e.g., Kamps, et al., 1994) approaches. These approaches focus on dyadic interactions. The key element for these approaches is the consistent presence of a typically developing child with the child with ASD. In these approaches, a typically developing child is assigned to a child with ASD, and is told to stay in close proximity to the child with ASD. The typically developing child is informed that he or she should interact with the child with ASD, play with and talk with him or her (DiSalvo & Oswald, 2002). In this intervention approach, the typically developing child is reinforced for helping and/or interacting with the child with ASD. This reinforcement increases the typically developing child's motivation to interact with the child with ASD and creates an environment or interaction situation where the child with ASD is consistently approached and included by a typically developing child in the classroom. These approaches can increase the frequency and length of the social interactions

between a child with ASD and a typically developing child (e.g., Kamps, Dugan, Potcek & Collins, 1999; Laushey & Heflin, 2000).

   Teaching skills to typically developing children. Another type of intervention involves teaching typically developing children specific social skill strategies to facilitate interaction with a child with ASD (DiSalvo & Oswald, 2002). Two specific interventions of this type include pivotal response training and peer networks.

   Pivotal response training is a behavioral intervention that focuses on modifying key "pivotal" behaviors through the provision of multiple models of a desired behavior. In this intervention, typically developing children are taught how to model "pivotal" behaviors through naturalistic role-play techniques (e.g., Pierce & Schreibman, 1997a, 1997b). Some of the "pivotal" skills that have been taught in this type of intervention include: (a) providing choices, (b) paying attention to the child with ASD, (c) modeling appropriate social behavior, (d) encouraging conversation, (e) taking turns, and (f) narrating play activities. This approach has been effective in increasing the social behaviors of children with ASD, and has been shown to have generalizing effects on other typically developing children who have not been part of the formal training and intervention (e.g., Pierce & Schreibman, 1997a, 1997b).

   Peer network interventions provide typically developing children with information that facilitates the development of an understanding of, and interest in, a child with ASD, and aim to increase their desire for social interactions with this child (DiSalvo & Oswald, 2002). In this type of intervention, groups of typically developing children are taught how to interact with, and provide support for, a child with ASD. Teaching typically developing children the skills required for understanding ASD and interaction with the child with ASD is the key element to this intervention. These skills facilitate an understanding of ASD and increase the typically

developing children's motivation to interact with the child with ASD (DiSalvo & Oswald, 2002). This approach has also been demonstrated in several research investigations to increase acceptance of children with ASD by typically developing children as well as increase the duration and frequency of social interactions between children with ASD and typically developing children (e.g., Haring & Breen, 1992; Kamps, Potucek, Lopez, Kravitz & Kemmerer, 1997).

The intervention approaches discussed above have demonstrated efficacy in improving and increasing interactions between typically developing children and children with ASD. These "peer-mediated" approaches appear to gain their effectiveness by using typically developing children as the interventionists, thereby eliminating the need for the child with ASD to transfer learning from an adult partner to a child communication partner (Rogers, 2000). While the results of previous investigations utilizing these instructional approaches have produced positive results, many of the investigations have targeted behaviors that are not grounded in an understanding of child-child social engagement. That is, the studies targeted social behaviors that adults expect from children, but that children do not necessarily expect from each other (e.g., being polite, showing affection, giving praise). Further, many of the intervention approaches discussed above are reliant on adult reinforcement of the typically developing children. Finally, many of the instructional approaches have only been investigated with children with ASD who are able to communicate functionally via speech. Research is needed to expand the use of these intervention approaches to target socially valid interaction patterns between children with ASD and typically developing children, to demonstrate how interactions between children with ASD and typically developing children can occur without adult reinforcement or other support, and to

build interactions between typically developing children and children with ASD who are not able to use speech to functionally communicate to meet all their needs.

Typically Developing Children, Children with ASD and AAC

Providing typically developing children with the skills needed to initiate and maintain interactions with children with ASD may be a direction toward building social competence and encourage social inclusion for children with ASD who require AAC. The creation of a shared communication environment between children with ASD and typically developing children is imperative for true social inclusion of children with ASD who require AAC (Sigafoos & Drasgow, 2001; von Tetzchner et al., 2005). However, there remains a dearth of empirical data on the efficacy of interventions targeting the interaction skills of the typically developing child communication partners of children with ASD who require AAC.

To date, there has been just one published investigation that has implemented an intervention designed to promote social interaction between typically developing children and a child with ASD who requires AAC. Garrison-Harrell, Kamps and Kravitz (1997) used a single-subject multiple baseline design and a peer network intervention approach to teach 15 typically developing children (five per one child with ASD) to do the following: (a) use the AAC system (low technology) of the child with ASD (b) initiate and respond in conversations, (c) take appropriate turns, and (d) share, and expand the utterances of the child with ASD. The instruction followed a published curriculum that involved modeling of the target skill by the investigator and practice with other peer network members (practice was reported to last approximately 20 minutes per skill). During practice, feedback was provided to the typically developing children by the investigator. Total training time was reported to be 4 hours (8, 30-minute sessions). Garrison-Harrell, Kamps and Kravitz also provided instruction for the children

with ASD. These children were taught how to use a low technology AAC system, and also participated in two of the eight training sessions with their peer network. The dependent variables for the intervention included: (a) durations of the social interaction time, (b) use of the AAC system by the children with ASD and the typically developing children, (c) language use during 10-minute language samples, and (d) disruptive behavior. The results of this investigation showed that the peer network intervention increased the frequency and duration of interactions between typically developing children and the child with ASD who required AAC in the school environment. Results also indicated that after training both groups of children, the children with ASD and their peers used the AAC system more frequently during their interactions with each other. These results suggested that typically developing children were valuable communication partners for children with ASD who required AAC, and further support the findings that typically developing children, like other groups of communication partners of children who require AAC, require specific training in order to adequately engage in social interactions and communicate with children with ASD who require AAC. As a result, additional communication partner instructional programs for typically developing children should be developed and evaluated.

Though the results of this investigation were promising, there are several limitations to this investigation that should be noted. The researchers did not measure the children's actual use of any of the social skills that were taught. Instead they measured the duration of the social interaction, and provided no information regarding which, if any, of the learned social skills were used by the typically developing children within these interactions. Further, the investigators did not measure generalization or maintenance of the skills taught to either group of children. Therefore there is no information regarding the ability of the children to use the learned skills in

other contexts or with other individuals, and prevents determination of the long-term learning

based on the instruction that was provided.

Research is needed to expand the knowledge in the field relative to effective procedures

for teaching typically developing children skills for promoting social competence in children

with ASD who require AAC. Research is also needed to determine what skills should be taught

to typically developing children to provide them with the ability to facilitate social interaction

and the development of social competence in children with ASD who require AAC.

<div align="center">Instruction for Typically Developing Children</div>

In light of the need for more research regarding effective procedures for teaching

typically developing child communication partners skills and strategies for building the social

competence of children with ASD who require AAC, an instructional program for this group of

child communication partners was designed. In order to design an appropriate instructional

program for this purpose, the researcher considered three primary issues: (a) the content of the

communication partner instructional program (i.e., what to teach), (b) the format of the

instructional program (i.e., how to teach the content), and (c) the context of the instructional

program (i.e., when and where to teach the content). The issues considered for the current project

in relation to these three areas are discussed in more detail below.

Instruction for Typically Developing Children: Content

Little is presently known about what skills are needed by typically developing children

in order for interactions with children with ASD who require AAC to occur. It is possible that

through provision of exposure to an AAC system, as well as instruction in an interaction

strategy, typically developing children will be able to structure social interactions with children

with ASD who require AAC. Exposure to an AAC system may include providing basic

information about how it is turned on and off, how screens are changed, and how messages can be retrieved, etc. The interaction strategy may need to include components that are easy to learn and simple enough for a child to use without adult assistance.

More is known about teaching skills and strategies to adult and typically developing child communication partners of individuals who require AAC, but who do not have ASD. The research literature in these areas has been relatively consistent in identifying specific skills taught to communication partners, and as the skills taught to children are similar to those taught to adults, the combined results of this body of literature are quite robust. Four interaction skills for adult partners and three interaction skills for typically developing child partners have been repeatedly identified as critical when interacting with individuals who require AAC. These skills, for child communication partners, include: (a) using open-ended questions to sustain/initiate an interaction, (b) responding to the communicative attempts and turns of the individual who requires AAC, and (c) establishing eye contact and waiting (i.e., use of an expectant delay) to mark a communicative opportunity (e.g., Carter & Maxwell, 1998; Hunt, Alwell, & Goetz, 1988; Hunt, et al., 1990; Hunt, Alwell, & Goetz, 1991; Hunt, et al., 1996). For adult communication partners, the previous three skills with the addition of modeling AAC system use have been taught in various combinations with success across multiple investigations (Kent-Walsh, 2003).

These interaction skills are generally taught to communication partners in isolation. Recently a few studies by Kent-Walsh and colleagues have shown how these skills can be taught to adult communication partners in the form of a strategy (e.g., Read, Ask, Answer) to promote social interaction and language development in children who require AAC (e.g., Binger, et al., 2008; Kent-Walsh, 2003; Kent-Walsh, Hasham & Stewart, 2004). However, very few attempts

have been made to date to integrate some or all of these component skills into a strategy that can be taught to typically developing child communication partners.

For the current investigation, a strategy approach, similar to that utilized by Kent-Walsh and colleagues but simplified for child communication partners, may help typically developing children learn an interaction strategy that would allow them to alter their interaction patterns with children with ASD who require AAC as well as become more familiar with the AAC system itself. These changes in interaction styles of the typically developing children may in turn allow the children with ASD who require AAC to interact and participate more equally in academically and socially valued activities within the school environment. Two component skills that have been shown to be simple enough for children to learn and use in interactions with children who require AAC include provision of contingent responses and an expectant delay (e.g., Carter & Maxwell, 1998; Hunt et al., 1990; Hunt, Alwell & Goetz, 1991). These component skills were considered, and ultimately chosen for the current investigation, because of the fact that research has shown that responding contingently is beneficial to the development of communication and language skills in young children with developmental disabilities, including children with ASD (e.g., Warren, Yoder, Gazdag, Kim, & Jones, 1993; Yoder, Kaiser, Alpert, & Fischer, 1993; Yoder & Warren, 1998). Additionally, expectant delay has been demonstrated to be an effective technique for promoting communicative participation with individuals who require AAC (e.g., Carter & Maxwell, 1998; Glennen & Calculator, 1985; Light, Binger, Agate & Ramsey, 1999). Results of previously published research have shown that use of an expectant delay is effective because it clearly marks the opportunity for communication for the individual who requires AAC. This communicative technique has also been shown to increase communicative participation because it provides the individual who requires AAC with extra time to process

incoming information and to formulate a response. Therefore, these two component skills were

considered appropriate for inclusion in the instructional program in the current investigation.

Instruction for Typically Developing Children: Format

Previous research investigations involving instruction to child communication partners of

children who require AAC have used a variety of instructional formats including: (a) workshops

(Lilienfeld & Alant, 2005), (b) group instruction (Carter & Maxwell, 1998), (c) on-line

instruction within ongoing interactions (Hunt et al., 1996), and (d) individual training (Hunt et

al., 1990; Hunt et al., 1991). The investigations that have used individual training for child

communication partners have reported the training to have been very brief, 5-minutes in

duration, and to involve demonstration and role-play components (Hunt et al., 1990; Hunt et al.,

1991). Further, in these investigations child communication partner training was only one

component of the independent variable.

Kent-Walsh (2003; 2004) demonstrated that the eight-step approach to teaching strategies

outlined by Ellis, Deshler, Lenz, Schumaker, and Clark (1991) can be employed to effectively

train adult communication partners of children who require AAC. The steps in this model

included: (a) pretest and make commitments; (b) describe the strategy; (c) model the strategy; (d)

verbal practice of the strategy steps; (e) controlled practice and feedback; (f) advanced practice

and feedback; (g) post-test and make commitments to long-term strategy use; and (h)

generalization of strategy use. For an outline of the purposes and procedures of each of these

strategy instruction steps, please see Kent-Walsh and McNaughton (2005). Its high level of

success in teaching an interaction strategy to adult communication partners (i.e., educational

assistants; Kent-Walsh, 2003) made it appealing for consideration for use with younger

communication partners. Additionally, this approach has been shown to provide adult

communication partners with a level of strategy acquisition that can be generalized and maintained over time. Previous research investigations involving child communication partners of children who require AAC have not assessed maintenance of skill or strategy learning over time. Further, the instructional format used by Kent-Walsh (2003) is well organized, providing detailed sequential steps that may be easier to replicate in future investigations. For these reasons, the strategy instructional format for the current investigation was a modified version of this framework.

Instruction for Typically Developing Children: Context

Many interactions between typically developing children and children with ASD occur within the school setting (e.g., Kaiser, Hester & McDuffie, 2001; Rogers, 2000; von Tetzchner, 2005), therefore, an activity for promoting interaction between typically developing children and children with ASD who require AAC would need to be one that would naturally occur within this environment. It would also have to be an activity that would create a joint frame of reference between a typically developing child and the child with ASD who requires AAC and allow for balanced contributions by both partners (Kaiser, et al., 2001). Further, the chosen activity also would need to support opportunities for participation and allow both the typically developing child and the child with ASD who required AAC to receive enrichment from the interaction (Kaiser et al., 2001). One such activity that would meet these requirements is joint book reading. Joint book reading is also a socially valued task for school age children, in that it is a task that children engage in regularly within their natural environments (Devescovi & Baumgartner, 1993) and an academically valued task that is acceptable and encouraged in many school environments (Bus, van IJzendoorn & Pellegrini, 1995). Therefore, this context was considered appropriate for a social interaction between a typically developing child and a child with ASD who requires

AAC, especially in light of the ages of children who were participants in the cases in this investigation (i.e., 5-10).

Research Objectives

In light of the limited empirical evidence related to the nature of interactions between typically developing children and children with ASD who require AAC, the current study sought to investigate an instructional program for typically developing child communication partners. The instructional program included five cases in which a typically developing child was instructed to participate in structured social interactions and provide opportunities for social interaction and social participation during joint story reading interactions with a child with ASD who required AAC. This was accomplished by instructing each typically developing child to read a page of the book and then wait, in order to clearly mark an opportunity for the child with ASD to participate within the joint book reading interaction, and then respond to any participation by the child with ASD.

Specifically, the study had the following objectives: (a) to describe the interaction patterns of the typically developing child during joint book reading pre- and post- instruction in the "read, wait and respond" strategy; and (b) to describe the participation patterns of the child with ASD who required AAC after the instructional program for the typically developing child.

CHAPTER TWO

Method

Research Design

The current study utilized a single subject, A-B case study design with five replications (McReynolds & Kerns, 1983; Richards, Taylor, Ramasamy & Richards, 1999). Each replication involved one dyad consisting of one typically developing child and one child with ASD who required AAC (hereafter referred to as child with ASD). It is important to note that the design used in this investigation did not establish experimental control. For this reason, it was not possible to determine a direct relationship between the independent variable and the dependent variable.

The independent variable for the investigation was the instruction of each typically developing child in use of the target strategy, "read, wait and respond", within joint book reading interactions. The dependent variable was the frequency of each typically developing child's use of the "read, wait and respond" strategy during 15-minute joint book reading interactions with a child with ASD. Data for a collateral measure regarding the frequency of participation turns by each child with ASD during the 15-minute book reading interaction (or total number of participation turns throughout the interaction) was also collected. Each typically developing child participated in five phases: baseline, instruction, intervention, generalization, and maintenance, and each child with ASD who required AAC participated in four phases: baseline, intervention, generalization and maintenance.

Participants

Criteria for Participation

Children were recruited through a school district in central Pennsylvania including: a) children with ASD between the ages of 5 and 7; and b) typically developing children between the

ages of 8 and 10. Per the requirements of the Office for Research Protections at The

Pennsylvania State University, permission was sought through appropriate avenues (e.g., school

boards) prior to initiating recruitment. The investigator met with teachers from various

classrooms (i.e., kindergarten, and third grade) and described the study in detail. During the

meetings with the kindergarten teachers, the teacher and the investigator determined the students

with ASD who may have been appropriate for inclusion. After this discussion, a letter describing

the study and the participation of the child with ASD in the study was sent home to the parents of

these children with ASD. Additionally, after meeting with the third grade teachers, the researcher

and the teacher agreed to send a letter describing the study and the participation of the typically

developing child in the study home to the parents of 10 students determined, subjectively by the

teacher, to be the "best" readers in the class. Each typically developing child was selected for

further screening prior to participation in the study on a first come, first served basis based on the

return of a signed permission letter, and according the number of children with ASD recruited

from the same school.

Each older typically developing child (ages 8-10) was paired with a younger child with

ASD (ages 5-7) to form a dyad, or one case, in the investigation. An older typically developing

child was paired with a younger child with ASD for two reasons. First, 8 to 10 year old children

are typically past the "learning to read" phase of academic instruction, and have entered the

period of learning where they are "reading to learn". Second, many schools and school systems

have cross-age reading programs in place, and therefore have established that reading between

children of slightly different age levels is beneficial for the children as well as a priority at the

school or in the school system (Bus, van IJzendoorn & Pellegrini, 1995).

To qualify for participation in the study, each typically developing child who qualified for participation in the study had: (a) no known disability, (b) hearing or corrected hearing that was within normal limits, (c) vision or corrected vision that was within normal limits, and (d) receptive and expressive language within normal limits. To qualify for participation in the study, each child with ASD had: (a) hearing or corrected hearing that was adequate for participation in social interactions in a quiet room, (b) vision or corrected vision that was adequate for accessing their AAC system, (c) speech that was not adequate for meeting all of their communication needs, (d) verification of an ASD diagnosis by an outside professional using *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; APA 2000) criteria, and (e) the ability to use symbols to represent concepts. The first five children with ASD who met the above criteria were selected for participation in this investigation. See section below (assessment of participant skills) for descriptions on how these participant criteria were measured and determined.

<center>*Assessment of Participant Skills*</center>

For each typically developing child participant, parent questionnaires were used to determine age, vision functioning, and the lack of a previously known disability. For each participant with ASD, parent records and parent and/or teacher report were used to determine age, hearing and vision functioning, history of AAC system use, and for verification of the ASD diagnosis. The following assessment procedures were used to determine whether or not each of the potential participants met the other participation criteria.

Typically Developing Children

Hearing functioning. Hearing functioning was established through an informal hearing screening using a battery operated portable audiometer. Each typically developing child's hearing was screened at the frequencies of 500, 1000, 2000 and 4000 Hz at 20dB. Hearing levels

were considered to be within functional limits if the child responded to a 20-25dB pure tone at all frequencies bilaterally.

Language functioning. Expressive, receptive, and pragmatic language functioning was assessed using the *Comprehensive Assessment of Spoken Language (CASL).* The CASL was chosen as the standardized measure for use within this investigation because it reported adequate reliability and validity data for all three areas of language functioning to be assessed for this investigation (i.e., expressive, receptive and pragmatic). Each typically developing child participated in five sub-tests (antonyms, syntax construction, paragraph comprehension, nonliteral language and pragmatic judgment), the core language assessment subtests for children between the ages of 7 and 10 years of age. For each of these sub-tests, the mean was 100 with a standard deviation of 15, therefore a score between 85 and 115 was considered to be within normal limits.

The selection criteria for this investigation required that the typically developing child participants achieve scores within normal limits in all three areas of language to be assessed (i.e., expressive, receptive and pragmatic). The language skills of the typically developing children were considered to be within normal limits if the standard scores on the *CASL* were within one standard deviation of the mean standard score for the normative data reported for the typically developing child's chronological age group.

Children with ASD

Parent and teacher reports were used to determine the age, vision status, hearing status, history of AAC use, modes of communication currently used by the child, and for verification of an ASD diagnosis. The following assessment procedures were used to determine whether or not children with ASD met the remaining participation criterion.

Symbolic communication. To ensure that each child with ASD met the symbolic communication criterion (i.e., they could use symbols to express concepts), a caregiver for each child completed the *Communication Matrix Especially for Parents* (Rowland, 2004). This assessment tool consisted of a checklist that parents filled out by marking the communication skills their child had mastered or that were emerging. This tool is not standardized, and does not report reliability and validity data for its use or interpretation. The information gathered from this tool is subjective and is based on parent report of a child's skills and abilities. The tool is appropriate for individuals at the earliest stages of communication, and is appropriate for individuals with any type or degree of disability (Rowland, 2004). The *Communication Matrix* gathers information regarding four reasons for communication: a) refusal/rejection of items that are not desirable, b) attainment of items that are desired, c) engagement in social interactions, and d) provision or attainment of information. The *Communication Matrix* is organized into seven levels of communicative behavior, including: a) pre-intentional behavior (child's behavior is not intentionally communicative), b) intentional behavior (child's behavior is intentional, but the child does not yet communicate intentionally), c) unconventional communication (pre-symbolic behaviors [unconventional gestures, e.g., leading]) are used intentionally by the child, the child is not yet communicating symbolically), d) conventional communication (pre-symbolic behaviors (conventional gestures, e.g., nodding head) are used intentionally by the child, the child is not yet communicating symbolically), e) concrete symbols (child uses partial objects, sounds, "iconic" gestures (e.g., patting a chair to communicate "sit down"), and picture symbols to communicate intentionally and symbolically), f) abstract symbols (child communicates via speech, manual signs, Brailled and/or written words), and g) language (the child combines symbols into two-word utterances or longer). The children with ASD had to obtain a level V

(concrete symbols) or higher in at least one of the four communication domains (i.e., refuse, obtain, social or information) to qualify for participation in the current investigation.

The investigator also informally assessed symbolic communication during classroom observation of all of the children with ASD, and through teacher and educational assistant report on expressive communication abilities. Each child with ASD was observed by the researcher for at least 30 minutes to determine expressive communication modes used in the classroom environment as well as typical turn transfer times. After this observation, the teacher and/or educational assistant who was working with the child was asked if the communication modes observed and the response methods/frequencies observed were typical of the individual child. In instances where speech or speech approximations were observed, but were not intelligible to the researcher, the teacher and/or educational assistant was asked about the meanings of these communications. For example, two children occasionally used Pennsylvania Dutch words that were unfamiliar to the researcher. The teacher or educational assistant provided the researcher with the meanings of these words (i.e., "bathroom" and "rest") as they were observed.

The *Communication Matrix* and informal observation were chosen as the methods for assessment of symbolic communication because they allowed the researcher to obtain information about the child's communication but did not require specific oral responses or formal testing of the child with ASD. Formal testing with this population of children is often difficult, and standardized testing is only necessary to establish that a child is significantly different from other children with regards to the skills being assessed (Paul, 2007). For the population of children with ASD, standardized testing was not required to make this determination.

Participant Demographics

A total of five typically developing children (two boys and three girls) participated in the current study. These children ranged in age from 8 years, 3 months to 9 years, 2 months. All of these children were in the same third grade classroom in an elementary school in rural Pennsylvania. None of these typically developing children had personal experience with children with ASD or AAC systems prior to their involvement in the current investigation. The parents of these typically developing children reported that none of them had a history of speech, language or hearing impairments. All of the typically developing children demonstrated the ability to read the selected children's books with ease. None of the typically developing children implemented the target strategy during pre-instruction (i.e., baseline) reading activities. In order to protect the confidentiality of the participants, pseudonyms have been used to identify each child.

A total of five children with ASD (three boys and two girls) participated in the present investigation. These children ranged in age from 5 years, 7 months to 6 years, 5 months. Of these participants, four were Caucasian and one was Hispanic. All of the children with ASD attended the same kindergarten classroom in rural Pennsylvania. In accordance with the selection criteria, each of the children had a diagnosis of ASD (all diagnoses were received from medical professionals when the children were between 2 and 3 years of age) and speech that was not functional for meeting all of their daily communication needs. Further, it was determined through observation and parental report that all of the children with ASD were using modes (e.g., signs, picture symbols) in addition to their limited speech to communicate. If speech had been functional for meeting all of the communication needs of the children, it is likely that they would use speech in all instances, as speech is the most efficient and effective mode of communication available (Glennen & DeCoste, 1997). All five children with ASD were reported to use some

words, word approximations, signs, sign approximations, picture symbols and gestures to communicate. Parents estimated that the number of words/concepts the children were able to express (across all five children) via these modes ranged from 6 to 25. Other interventions these children were involved in (either in school or at home) included: diet modifications, pharmaceutical interventions, verbal behavior programs, speech-language therapy, and applied behavior analysis with discrete trial training. As with the typically developing children, pseudonyms have been used to identify the children with ASD. The first letter of each pseudonym for the typically developing child corresponds with the first letter of the pseudonym of the child with ASD with whom he or she interacted during the joint book reading sessions.

Participating Dyad Profiles

Dyad A

     Typically Developing Child (Alice). Alice was a 9 year, 0 month old Caucasian female student in a mainstream third grade classroom in an elementary school in rural Pennsylvania. Alice's parents provided information indicating that Alice's last vision and hearing screenings both produced results within normal limits. For the purpose of this investigation, Alice's hearing was re-screened to ensure hearing functioning within normal limits bilaterally. She responded to tones presented at 20dB at 500, 1000, 2000 and 4000Hz in each ear.

     Prior to participation in the current study, Alice was also administered the *CASL* and achieved a standard score of 105 on the antonyms sub-test, 104 on the syntax construction sub-test, 109 on the paragraph comprehension sub-test, 125 on the nonliteral language sub-test and a 116 on the pragmatic judgment sub-test. Alice's overall language standard score of 114 indicated her expressive, receptive and pragmatic language skills were within normal limits for her chronological age.

Child with ASD (Annie). The child with ASD, Annie, who read with Alice, was a 5 year, 7 month old girl at the outset of the investigation. Annie was reported to have a diagnosis of Autism. According to parental report, this diagnosis was received from a medical professional when Annie was two-and-a-half-years old. Parental report also indicated that Annie's hearing and vision were within normal limits, and in informal observation of Annie throughout the baseline sessions it appeared that her hearing and vision were adequate to meet her needs within the classroom and school environment. She did not wear corrective aids (e.g., glasses and/or hearing aids), responded to visual stimuli (e.g., changes in the computer screen, familiar people in the environment) and to comments made by the investigator and/or an educational assistant (e.g., sit with Alice) throughout the baseline sessions.

At the onset of this investigation, Annie was attending school for a full-day kindergarten program, and was receiving 60 minutes per week of itinerant speech and language services. Annie's parents reported that she received applied behavior analysis with discrete trial training and wrap-around behavioral support on a daily basis in the home environment. Annie was ambulatory and appeared to have adequate fine and gross motor skills. She was observed to stand, walk and sit in a standard chair independently. She was also observed to hold a standard pencil using a traditional pincer grasp, and was able to manipulate standard size marbles independently. Annie was also observed to be able to isolate her index finger to point. It was reported by Annie's parents that she could express approximately 25 concepts (using all modes available to her, spoken words, signs, and pictures) consistently, however a list of these concepts was not provided.

It was reported through parent completion of the *Communication Matrix*, that Annie communicated at the abstract symbol level to refuse/reject items. Her parents and teacher

reported that Annie typically used abstract symbols such as spoken words (e.g., *no*) and manual

signs for this communicative purpose. Annie also communicated at the abstract symbol level to

obtain desired objects or items. Her parents and teacher reported that she typically used the

spoken words (e.g., *book*), picture symbol (e.g., *COOKIE*) and/or the manual sign (e.g., READ)

for an item to indicate a request. Further, Annie communicated at the conventional

communication level to engage in social interactions. Her parents and teacher reported that she

used facial expressions (e.g., smiling), waving and simple conventional gestures such as

pointing, hugging and kissing, giving and showing to engage in social interaction and to express

affection. Her mom reported, however that Annie used abstract symbols such as the spoken word

and manual sign to greet people (e.g., *hi*, *bye*). Finally, Annie communicated at the concrete

symbol level for the purpose of information transfer. Annie's parents and teacher reported that

she most commonly used pointing to ask questions, but that she also used spoken words (e.g.,

Dora), picture symbols (e.g., *COMPUTER*) and manual signs (e.g., BALL) to name things and

people.

Information obtained from the classroom teacher and assessments of basic language and

learning skills completed by the teaching staff indicated that Annie responded to her name 100%

of the time, followed directions to do a preferred activity (e.g., "jump on the trampoline"),

followed instructions to do an enjoyable task out of context (e.g., when seated at a table she

followed the instruction to "go jump on trampoline"), followed a routine (e.g., completed at least

three steps to "wash hands"), followed instructions to give a named object (e.g., "give me the

shoe") and completed a simple motor action (e.g., "clap"), selected one of two pictures of

common items (e.g., given pictures of a dog and a shoe, she selected the requested item),

accurately touched up to 10 body parts upon request, and followed 2-step instructions with a visual prompt, such as pointing (e.g., "touch the shoe and the cup").

Dyad B

Typically Developing Child (Beth). Beth was an 8 year, 3 month old Caucasian female student in a mainstream third grade classroom in an elementary school in rural Pennsylvania. Beth's parents provided information indicating that Beth's last vision and hearing screenings both produced results within normal limits. For the purpose of this investigation, Beth's hearing was re-screened to ensure hearing functioning within normal limits bilaterally. She responded to tones presented at 20dB at 500, 1000, 2000 and 4000Hz in each ear.

Prior to participation in the current study, Beth was also administered the *CASL* and achieved a standard score of 100 on the antonyms sub-test, 109 on the syntax construction sub-test, 109 on the paragraph comprehension sub-test, 120 on the nonliteral language sub-test and a 124 on the pragmatic judgment sub-test. Beth's overall language standard score of 114 indicated her expressive, receptive and pragmatic language skills were within normal limits for her chronological age.

Child with ASD (Brenda). The child with ASD, Brenda, who read with Beth, was a 5 year, 7 month old girl at the outset of the investigation. Brenda is the twin sister of Annie, and was reported to have a diagnosis of Autism. According to parental report, this diagnosis was received from a medical professional when Brenda was two-and-a-half-years old. Parental report also indicated that Brenda's hearing and vision were within normal limits, and in informal observation of Brenda throughout the baseline sessions it appeared that her hearing and vision were adequate to meet her needs within the classroom and school environment. She did not wear corrective aids (e.g., glasses and/or hearing aids) and responded to visual stimuli (e.g., changes in

the computer screen, familiar people in the environment) and to comments made by the investigator and/or educational assistant (e.g., sit with Beth) throughout the baseline sessions. At the onset of this investigation, Brenda was attending school for a full-day kindergarten program, and was receiving 60 minutes per week of itinerant speech and language services. Brenda's parents reported that she received applied behavior analysis with discrete trial training and wrap-around behavioral support on a daily basis in the home environment. Brenda was ambulatory and demonstrated adequate fine and gross motor skills. She was observed to stand, walk and sit in a standard chair independently. She was also observed to hold a standard pencil using a traditional pincer grasp, and was able to manipulate standard size marbles independently. Annie was also observed to be able to isolate her index finger to point. It was reported by Brenda's parents that she could express approximately 15 concepts (using all modes available to her, spoken words, signs, and pictures) consistently, however a list of these concepts was not provided.

It was reported through parent completion of the *Communication Matrix*, that Brenda communicated at the concrete symbol level to refuse/reject items. Her parents and teacher reported that Brenda typically used simple gestures (e.g., pushing away an object or person) and concrete symbols (i.e., rejecting a photo or drawing of an unwanted item by throwing it on the ground) for this communicative purpose. However, her parents indicated that her ability to use abstract symbols such as spoken words (e.g., *no*) and manual signs (e.g., STOP) was emerging. Brenda communicated at the abstract symbol level to obtain desired objects or items. Her parents and teacher reported that she typically used the manual sign (e.g., SWING) for an item to indicate a request. Further, Brenda communicated at the conventional communication level to engage in social interactions. Her parents and teacher reported that she used facial expressions (e.g., smiling), waving and simple conventional gestures such as pointing, hugging and kissing,

giving and showing to engage in social interaction and to express affection. Her mom reported, however that Brenda used abstract symbols such as the spoken word and manual sign to greet people (e.g., *hi*, *bye*). Finally, Brenda communicated at the concrete symbol level for the purpose of information transfer. Brenda's parents and teacher reported that she most commonly used photos (e.g., *DAD*) and pictures (e.g., *BOOK*; when available) to name things and people and to make comments.

Information obtained from the classroom teacher and assessments of basic language and learning skills completed by the teaching staff indicated that Brenda responded to her own name 80% of the time with a prompt, followed instructions to touch a common item if held in front of her (e.g., "touch the pen"), given two pictures of common items, Brenda selected the requested picture (e.g., given pictures of a dog and a shoe, she selected the requested item), and accurately touched up to 4 body parts upon request.

Dyad C

Typically Developing Child (Connor). Connor was a 9 year, 0 month old Caucasian male student in a mainstream third grade classroom in an elementary school in rural Pennsylvania. Connor's parents provided information indicating that Connor's last vision and hearing screenings both produced results within normal limits. For the purpose of this investigation Connor's hearing was re-screened to ensure hearing functioning within normal limits bilaterally. He responded to tones presented at 20dB at 500, 1000, 2000 and 4000Hz in right ear, and at 25dB in his left ear.

Prior to participation in the current study, Connor was also administered the *CASL* and achieved a standard score of 102 on the antonyms sub-test, 107 on the syntax construction sub-test, 113 on the paragraph comprehension sub-test, 118 on the nonliteral language sub-test and a

117 on the pragmatic judgment sub-test. Connor's overall language standard score of 113

indicated his expressive, receptive and pragmatic language skills were within normal limits for

his chronological age.

Child with ASD (Chris). The child with ASD, Chris, who read with Connor, was a 6 year,

5 month old boy at the outset of the investigation. Chris was reported to have a diagnosis of

PDD-NOS (Pervasive Developmental Disorder – Not Otherwise Specified). According to

parental report, this diagnosis was received from a medical professional when Chris was three-

years old. Parental report also indicated that Chris's hearing and vision were within normal

limits, and informal observation of Chris throughout the baseline sessions confirmed that his

hearing and vision were adequate to meet his needs within the classroom and school

environment. He did not wear corrective aids (e.g., glasses and/or hearing aids) and responded to

visual stimuli (e.g., changes in the computer screen, familiar people in the environment) and to

comments made by the investigator and/or educational assistant (e.g., sit with Connor)

throughout the baseline sessions. At the onset of this investigation, Chris was attending school

for a full-day kindergarten program, and was receiving 60 minutes per week of itinerant speech

and language services. Chris's parents reported that he did not receive intervention or treatment

in the home environment. Chris was ambulatory and demonstrated adequate fine and gross motor

skills. He was observed to stand, walk, and sit in a standard chair independently. He was also

observed to hold a standard pencil using a traditional pincer grasp, and was able to manipulate

standard size marbles independently. Chris was also observed to be able to isolate his index

finger to point. It was reported by Chris's parents that he could express approximately 20

concepts (using all modes available to him, speech and signs) consistently, however a list of

these concepts was not provided.

It was reported through parent completion of the *Communication Matrix*, that Chris communicated at the abstract symbol level to refuse/reject items. His parents and teacher reported that Chris typically used abstract symbols (e.g., *no*) to communicate refusal, however he sometimes used the holophrase "all done" for this communicative purpose. Chris communicated at the abstract symbol level to obtain desired objects or items. His parents and teacher reported that Chris typically used spoken words (e.g., *ball*) and/or the manual sign (e.g., CUP) for an item to indicate a request. Further, Chris communicated at the conventional communication level to engage in social interactions. His parents and teacher reported that Chris used facial expressions (e.g., smiling), waving and simple conventional gestures such as pointing, hugging and kissing, giving and showing to engage in social interaction and to express affection. Finally, Chris communicated at the conventional communication level for the purpose of information transfer. Chris's parents and teacher reported that he most commonly used pointing to ask questions, but that his ability to use spoken words (e.g., *train*) and manual signs (e.g., BOY) to name things and people was emerging.

Information obtained from the classroom teacher and assessments of basic language and learning skills completed by the teaching staff indicated that Chris responded to his name 100% of the time, followed directions to do a preferred activity (e.g., "jump on the trampoline"), followed instructions to do an enjoyable task out of context (e.g., when seated at a table he followed the instruction to "go jump on trampoline"), followed a routine (e.g., completed at least three steps to "wash hands"), followed instructions to give a named object (e.g., "give me the shoe") and completed a simple motor action (e.g., "clap"). Chris also selected one of two pictures of common items (e.g., given pictures of a dog and a shoe, he selected the requested

item), accurately touched up to 10 body parts upon request, and followed 2-step instructions with a visual prompt, such as pointing (e.g., "touch the shoe and the cup").

Dyad D

Typically Developing Child (Diane). Diane was a 9 year, 2 month old Caucasian female student in a mainstream third grade classroom in an elementary school in rural Pennsylvania. Diane's parents provided information indicating that Diane's last vision and hearing screenings both produced results within normal limits. For the purpose of this investigation Diane's hearing was re-screened to ensure hearing functioning within normal limits bilaterally. She responded to tones presented at 20dB at 500, 1000, 2000 and 4000Hz in each ear.

Prior to participation in the current study, Diane was also administered the *CASL* and achieved a standard score of 113 on the antonyms sub-test, 99 on the syntax construction sub-test, 134 on the paragraph comprehension sub-test, 116 on the nonliteral language sub-test and a 100 on the pragmatic judgment sub-test. Diane's overall language standard score of 114 indicated her expressive, receptive and pragmatic language skills were within normal limits for her chronological age.

Child with ASD (Dylan). The child with ASD, Dylan, who read with Diane, was a 6 year, 3 month old boy at the outset of the investigation. Dylan was reported to have a diagnosis of Autism as well as a moderate seizure disorder. According to parental and classroom records Dylan had approximately 3-4 tonic-clonic seizures per week. Both the autism and the seizure disorder were diagnosed when he was 2 years old according to parent report. Parental report also indicated that Dylan's hearing and vision were within normal limits, and informal observation of Dylan throughout the baseline sessions confirmed that his hearing and vision were adequate to meet his needs within the classroom and school environment. He did not wear corrective aids

(e.g., glasses and/or hearing aids) and responded to visual stimuli (e.g., changes in the computer screen, familiar people in the environment) and to comments made by the investigator and/or an educational assistant (e.g., sit with Diane) throughout the baseline sessions. Further, Dylan's parents reported that Pennsylvania Dutch and English were spoken in the home environment. At the onset of this investigation, Dylan was attending school for a half-day kindergarten program, and was receiving 60 minutes per week of itinerant speech and language services. Dylan's parents reported that he did not receive intervention or treatment in the home environment. Dylan took Carbatrol and Sabrill to manage his seizure disorder and began the Ketogenic (high fat, moderate protein, low carbohydrate) diet one month prior to his involvement in the current study. Dylan was ambulatory and demonstrated adequate fine and gross motor skills. He was observed to stand and walk independently, though an adult usually held his hand while walking secondary to his seizure disorder. He was observed to sit in a chair with a belt, and to hold a pencil using a traditional pincer grasp. He was also observed to be able to isolate his index finger to point. It was reported by Dylan's parents that he could express approximately 12 concepts (using all modes available to him, spoken words, signs, and pictures) consistently between his two languages, however a list of these concepts was not provided.

It was reported through parent completion of the *Communication Matrix*, that Dylan communicated at the abstract symbol level to refuse/reject items. His parents and teacher reported that Dylan typically used conventional gestures (e.g., shaking head "no"), and the spoken words *no* or *done* to communicate refusal or rejection. Dylan communicated at the concrete symbol level to obtain desired objects or items. His parents and teacher reported that Dylan typically used a photo or conventional gesture (e.g., pointing) to indicate what he wanted, however they also reported that his use of abstract symbols was emerging, and that at times he

would use speech to make a request (e.g., word for "bathroom" in Pennsylvania Dutch). Further, Dylan communicated at the conventional communication level to engage in social interactions. His parents and teacher reported that Dylan used facial expressions (e.g., smiling), waving and conventional gestures such as pointing, hugging and kissing to engage in social interaction and express affection. His mom reported that Dylan used abstract symbols such as the spoken word and manual sign to greet people (e.g., *hi*, *bye*). Finally, Dylan communicated at the conventional communication level for the purpose of information transfer. Dylan's parents and teacher reported that he most commonly used head nods and shakes to answer yes and no questions and used photos (e.g., *SWING*) or pictures (e.g., *PLAYGROUND*; when available) to name things and people.

Information obtained from the classroom teacher and assessments of basic language and learning skills completed by the teaching staff indicated that Dylan responded to his own name 80% of the time with a prompt, followed instructions to do an enjoyable activity with a physical prompt (e.g., "go play with beads"), and selected a common item when named (e.g., when shown a cup and asked to "touch cup", he touched the requested item).

Dyad E

Typically Developing Child (Eli). Eli was a 8 year, 8 month old Caucasian male student in a mainstream third grade classroom in an elementary school in rural Pennsylvania. Eli's parents provided information indicating that Eli's last vision and hearing screenings both produced results within normal limits. For the purpose of this investigation, Eli's hearing was re-screened to ensure hearing functioning within normal limits bilaterally. He responded to tones presented at 20dB at 500, 1000, 2000 and 4000Hz in each ear.

Prior to participation in the current study, Eli was also administered the *CASL* and achieved a standard score of 107 on the antonyms sub-test, 93 on the syntax construction sub-test, 107 on the paragraph comprehension sub-test, 105 on the nonliteral language sub-test and a 113 on the pragmatic judgment sub-test. Eli's overall language standard score of 106 indicated his expressive, receptive and pragmatic language skills were within normal limits for his chronological age.

Child with ASD (Eric). The child with ASD, Eric, who read with Eli, was a 6 year, 3 month old boy at the outset of the investigation. Eric is the twin brother of Dylan, and was reported to have a diagnosis of Autism as well as a mild seizure disorder. According to parental and classroom records Eric had approximately 1-2 tonic-clonic seizures per week. Both the autism and the seizure disorder were diagnosed when he was 2 years old according to parent report. Parental report also indicated that Eric's hearing and vision were within normal limits, and informal observation of Eric throughout the baseline sessions confirmed that his hearing and vision were adequate to meet his needs within the classroom and school environment. He did not wear corrective aids (e.g., glasses and/or hearing aids) and responded to visual stimuli (e.g., changes in the computer screen, familiar people in the environment) and to comments made by the investigator and/or an educational assistant (e.g., sit with Eli) throughout the baseline sessions. Further, Eric's parents reported that Pennsylvania Dutch and English were spoken in the home environment. At the onset of this investigation, Eric was attending school for a half-day kindergarten program, and was receiving 60 minutes per week of itinerant speech and language services. Eric's parents reported that he did not receive intervention or treatment in the home environment, however Eric took Carbatrol and Sabrill to manage his seizure disorder and began the Ketogenic (high fat, moderate protein, low carbohydrate) diet approximately six weeks

prior to involvement in the current investigation. Eric was ambulatory and demonstrated adequate fine and gross motor skills. He was observed to stand and walk independently, though an adult usually held his hand while walking secondary to his seizure disorder. He was observed to sit in a chair with a belt, and to hold a pencil using a traditional pincer grasp. He was also observed to be able to isolate his index finger to point. It was reported by Eric's parents that he could express approximately 6 concepts (using all modes available to him, spoken words, signs and pictures) consistently between his two languages, however a list of these concepts was not provided.

It was reported through parent completion of the *Communication Matrix*, that Eric communicated at the unconventional communication level to refuse/reject items. His parents and teacher reported that Eric typically used body movements and simple gestures (e.g., pushing an object away) to communicate refusal. Eric communicated at the concrete symbol level to obtain desired objects or items. His parents and teacher reported that Eric typically used a photo (e.g., a picture of a cow) or would mimic the sound of an item (e.g., *moo* to request a toy cow) to indicate what he wanted. Further, Eric communicated at the conventional communication level to engage in social interactions. His parents and teacher reported that Eric used facial expressions (e.g., smiling), waving and conventional gestures such as pointing, hugging and kissing to engage in social interaction and express affection, and that he used abstract symbols such as the spoken word and manual sign to greet people (e.g., *hi*, *bye*). Finally, Eric communicated at the conventional communication level for the purpose of information transfer. Eric's parents and teacher reported that he most commonly used head nods and shakes to answer yes and no questions and used photos (e.g., *SWING*) or pictures (e.g., *PLAYGROUND*; when available) to name things and people.

Information obtained from the classroom teacher and assessments of basic language and learning skills completed by the teaching staff indicated that Eric responded to his name approximately 80% of the time with a prompt, and followed instructions to touch a common item if held in front of him (e.g., "touch the pen").

Materials

At the outset of this investigation, parents/caregivers, teachers and educational assistants of each child with ASD were interviewed regarding the child's book preferences and a list of books that were motivating, interesting and familiar to each child was generated for each child with ASD who required AAC. Books selected for this study had: (a) illustrations that could be scanned for use in a high technology AAC system; (b) characters that were interesting and motivating to the child with ASD based on the information gathered from parents, teachers and other professionals who work with the child with ASD in the school environment; and (c) at least ten double-page spreads (i.e., 20 pages).

Nine familiar books that met all of the criteria were chosen based on the information gathered and were used during the joint book reading interactions between each child with ASD and typically developing child throughout the intervention. A total of nine books were chosen for each child based on pilot data that indicated that approximately 3 books of the specified length could be read during the 15-minute joint book reading interactions. With nine books, three sets of three books could be established for each dyad/case. This way book sets could be rotated to ensure that the same book was not read in two consecutive sessions. Books that were familiar and motivating to the child with ASD were used to potentially increase the likelihood that the child with ASD would have an interest and desire to engage in the book reading activity, and would therefore be more motivated to participate in the investigation.

AAC Systems

A high technology dynamic display AAC system that supported the software program Speaking Dynamically Pro™ was used for the purpose of this intervention. Within this AAC system, book-based communication displays were created for each double page spread for each book used in the study. Each communication display was created using a visual scene layout consisting of a scanned image of each double page spread with embedded "hotspots" (invisible buttons created over elements in the storybook picture that produce output when touched) to provide vocabulary for discussion and interaction surrounding the text and pictures on the double page spread (Light & Drager, 2007; Shane, 2006).

This type of AAC system was chosen for several reasons. For some children with ASD technology is motivating (Moore & Calvert, 2000). Additionally, preliminary evidence suggests that AAC systems with this design may also facilitate social interaction and participation in interactions by children with ASD (Drager, Light & Finke, in press). Further, preliminary research has suggested that young children (i.e., beginning communicators) represent language concepts and vocabulary within context (Lund, Millar, Herman, Hinds & Light, 1998). Therefore, it was appropriate, given the language and communication skills of the children in the current investigation, to use an AAC system with a layout that could accommodate the organization of vocabulary within context. Visual scene displays preserve the conceptual and visual relationships among the symbols that occur in life (in this case, in the books) and embed concepts into the contexts in which they occur. Additionally, children with ASD frequently seek out "sameness" and familiarity, both of which are a diagnostic criterion of the disorder. Because of this, visual scene displays may be important for use with children with ASD as they preserve the familiarity of the activity and look exactly like what they are representing. By scanning the

page of the book into the AAC system, the page of the book could be used to create a visual scene display. The scene in Figure 1 is an example of a visual scene display used in the current investigation. The left side shows the page with the "hotspots" outlined. The children in the investigation never saw the page appear this way. The right side shows the page as the children saw it during their interactions.

Figure 1: Example of Visual Scene Display
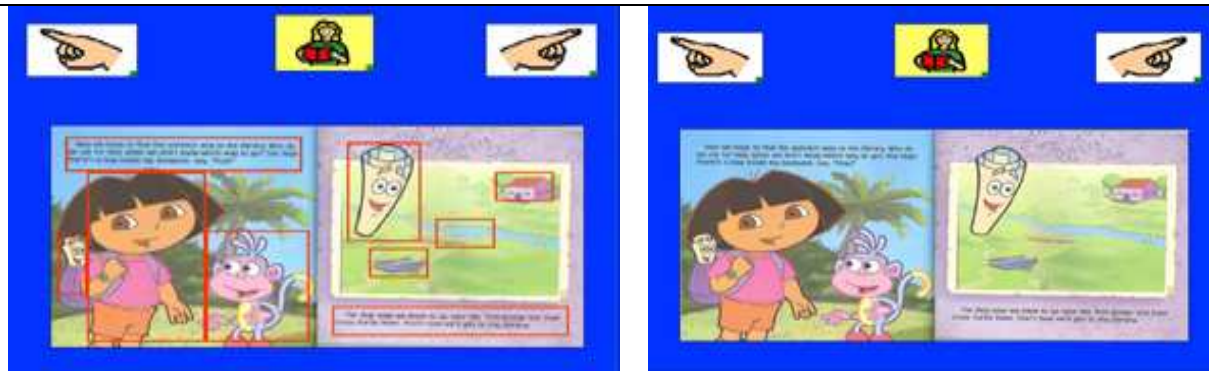
Finally, this type of AAC system was chosen for use within the current investigation based on the results of a series of studies by Drager, Light and colleagues that have shown that AAC systems using visual scene displays are easier for young typically developing children to learn to use than AAC systems with other organizational designs (e.g., Drager, Light, et al., 2004; Drager, Light, et al., 2003). The typically developing children in the current investigation had no previous experience with or exposure to AAC systems, for this reason, it was important to consider the use of an AAC system layout that may require little or no training for the typically developing children to learn to use.

"Hotspots" were identified by the investigator for each book on a page-by-page basis. Occasionally, "hotspots" were added to a book based on the participation patterns of the children within the joint book reading interaction. For example, if a child tried to access a "hotspot"

where a "hotspot" did not exist, a "hotspot" for that item was added before the next session. Because of this individualized approach to "hotspot" selection, items with "hotspots" may not have been the same for every page of a book for every dyad, even if two dyads had access to the same book. These additional "hotspots" were added during the baseline phase and during the first 3 utilization sessions in the intervention phase; however, "hotspots" were not added to every book or to books for every dyad. Added "hotspots" tended to cover characters or pictures that were smaller in size in relation to the pictures on the page (e.g., "hotspots" were added to the story "Dora's Backpack" for "troll bridge", "turtle river" and "library" which were the places Dora needed to go to accomplish her mission in the story). Average numbers of "hotspots" per page and per book varied across the cases. Please see Table 1 for a summary of this information on a case-by-case basis. Specific information about the "hotspots" for each story for each dyad are listed in Appendices A, B, C, D and E.

Table 1: Average Numbers of Hotspots Per Dyad

Dyad	Average Number of "Hotspots" Per Book	Average Number of "Hotspots" Per Page
Alice and Annie	87	7
Beth and Brenda	86	7
Connor and Chris	94	7
Diane and Dylan	65	5
Eli and Eric	65	5

A high technology AAC system that supported the use of visual scene layout was used consistently across all dyads. This AAC system and layout were new to each child with ASD as none of the five had been exposed to high technology AAC systems prior to this investigation. The AAC systems used regularly by the children with ASD prior to this investigation included picture-based light technology and unaided sign systems. None of the children with ASD received any instruction regarding the "hotspots" available on the communication display during

any phase of this investigation. These communication displays were made available to each child during all phases of the investigation, including baseline.

Setting

Every effort was made to preserve the naturalness of the interactions between the child with ASD and the typically developing child in each dyad. The locations for data collection during all phases of the investigation were agreed upon by the researcher, the classroom teacher and/or school administrator prior to initiation of each session with each dyad. The most natural location available, preferably in the school library (i.e., an environment where joint book reading interactions would naturally occur) was sought when possible. The setting for the joint book reading interactions was always a quiet room in which the two children, the researcher and occasionally an educational assistant were the only people in the room. None of the other children involved in the investigation were present at any time during the book reading interactions between other dyads. During the videotaped interactions, the researcher was positioned next to the dyad but remained as unobtrusive as possible in order to facilitate as natural an interaction as possible between the children and to minimize changes in behavior as a result of adult presence within the joint book reading interactions. The video camera was mounted on a tripod, and remained stationary throughout the videotaping of each joint book reading interaction.

<div align="center">Procedures</div>

There were five phases in this investigation: baseline, instruction in strategy use, intervention, generalization, and maintenance. The procedures for each will be discussed in detail in the section below.

Baseline Phase

Baseline measures for the dependent variable and collateral measure were collected prior

to the initiation of the instructional program for the typically developing children to establish

both participants' current levels of functioning. During the baseline phase for each dyad, the

typically developing child and the child with ASD were observed while interacting with each

other during a joint book reading activity. The only difference between the baseline and the

intervention phases was the introduction of the independent variable (Richards, et al., 1999), the

instruction for the typically developing child regarding the strategy for providing communicative

opportunities (i.e., "read, wait and respond"). During all of the baseline phase sessions, the AAC

system was placed on the table in front of both of the children. The children sat side by side so

that the screen on the AAC system was visible and accessible to them both. The children were

not facing each other, but were seated on the same side of a table next to each other facing the

AAC system. The researcher encouraged each typically developing child to read the book on the

AAC system as they would read any other book to a younger child. Prior to the first baseline

session, the typically developing children were provided with information on how to "turn the

page" of the book using the navigational tools on the touch screen of the AAC system. Each

dyad was asked to maintain the joint book reading activity for 15 minutes or until the researcher

informed them that they were finished with the activity. The dyad was provided with books

chosen from the list of books familiar to the child with ASD for each baseline session (see

Appendix F for a list of the books available to each dyad). Appropriate AAC system

communication displays were provided for each book that the children chose to read together.

The child with ASD chose the "set" (three books per set) of books that he or she wanted to read

throughout the session from a menu screen with three "buttons". Each "button" showed the

covers of the books that would be available if the child selected that set "button". Once the child with ASD selected the "set" of books to read during the session the screen on the high technology AAC system changed to present another menu screen where the covers of the three books were presented as "buttons". The child with ASD was allowed to choose the order in which the books in the chosen set were read by selecting the cover of the desired book. If the child with ASD tried to choose the same book twice in a session, the child was informed that the book was "finished" and was redirected to the other book(s) still available to be chosen during that session.

Baseline measurements for the dependent variable and collateral measure were collected during joint book reading activities. The baseline sessions were videotaped so that they could be reviewed and coded at a later date. Taping of the baseline sessions for each dyad/case began immediately upon commencement of each joint book reading interaction. A 15-minute segment in the middle of each interaction (if the session lasted longer than 15 minutes) was analyzed and coded for data collection purposes. Fifteen-minute segments were chosen for analysis in order to minimize the impact of being observed and videotaped on the behavior of the children and to allow for the natural flow of the book reading interaction between the children to be established.

At least three baseline sessions, over the course of 5 to 6 school days, were collected with each dyad. Baseline sessions continued until a pattern of behavior for the dependent variable with little variation, and with no evidence of an increasing trend from one measurement to the next was observed (Kazdin, 1982; McReynolds & Kearns, 1983). Variation for the typically developing child's use of target strategy (i.e., "read, wait and respond") was defined in terms of frequency. Baseline frequency of target strategy implementation was considered to be stable if the number of times the strategy was used by the typically developing child during a baseline

session did not increase or decrease from one baseline session to the next by more than 2 correct implementations.

Data for a collateral measure of frequency of participation by the child with ASD during the joint book reading interaction were also collected. Participation was defined as the child with ASD doing any of the following: (a) making a selection on the AAC system (i.e., accessing a "hotspot" by pointing to (directly selecting) a picture), (b) pointing to a picture without activating a "hotspot" either on the AAC system or in a regular paperback storybook, (c) using speech or a recognized speech approximation, and/or (c) using a sign or recognized sign approximation. Meanings of speech approximations and sign approximations were obtained from the classroom teacher or educational assistants. The total frequency of participation was determined by counting the total number of the above listed behaviors exhibited by the child with ASD throughout the 15-minute segment of the book reading interaction.

Instructional Phase

After establishing a stable baseline for the dependent variable, the instructional program was initiated with the typically developing child in each dyad (McReynolds & Kearns, 1983; Richards et al., 1999). The children with ASD did not participate in this phase of the investigation. The instructional procedures employed in this phase of the study included a series of instructional steps. These steps were adapted from those described by Kent-Walsh (2003) and Kent-Walsh and McNaughton (2005) for teaching an interaction strategy to partners of individuals who required AAC.

Introductory sessions. The introductory sessions incorporated the following instructional steps: (1) commitment, (2) strategy description, (3) demonstration, (4) verbal practice of target skills, and (5) controlled practice with feedback.

Commitment. During this stage of the instructional phase, the typically developing child engaged with the investigator in a discussion about ASD and how it affects the people who have it. During this stage the investigator also discussed with the typically developing child that the goal of the joint book reading interaction with the child with ASD was to increase the child with ASD's level of participation throughout the book reading interaction by helping him or her to take more participation turns. Finally the typically developing child committed to working with the researcher to learn how to promote participation for the child with ASD by writing his or her name on a commitment form. This form contained the goals of the intervention as well as the expectations for participation for the typically developing child (see Appendix G).

Strategy description. The purpose of this stage of instruction was to clearly describe the intervention and the strategy to the typically developing child and to discuss the positive effects that might occur if this strategy was used consistently during joint book reading interactions with the child with ASD. The strategy that was learned was described as "read, wait and respond". The typically developing child was informed that he or she would be taught a strategy with three distinct elements that should be used on each page of each storybook read during the joint book reading interactions (at least once, but he or she could use all or some of the strategy more than once if he or she wanted to). These elements included: (a) reading the text on the page of the story or activating the "hotspot" around the text so that the text was read by the AAC system (i.e., "read"); (b) waiting for the child with ASD to participate (specific lengths of time for waiting were determined on a case by case basis for each child with ASD) while looking at the child with ASD (i.e., "wait"); and (c) responding to the child with ASD when he or she participated (i.e., "respond"). Wait times were determined using the method recommended by Light and Binger (1998) for establishing wait time (or expectant delay). Using this procedure, the

investigator observed each child with ASD within several naturally occurring interactions and determined the average length of time that it took the child with ASD to take a turn after the typically developing child had finished his or her previous turn. After this average turn transfer time was established, five seconds was added to this time to establish the "wait" time for the typically developing child with that individual child with ASD (Light & Binger, 1998; see Table 2 for the specific "wait" times established for each dyad). Additionally, the typically developing child was instructed to respond to anything that was "said" (any type of participation turn) by the child with ASD during a book reading interaction and respond with a comment that was brief and directly related to the participation of the child with ASD (i.e., a topic-related response).

Table 2: "Wait" times for each dyad

Dyad	Established "Wait" Time
Alice and Annie	6 seconds
Beth and Brenda	6 seconds
Connor and Chris	6 seconds
Diane and Dylan	7 seconds
Eli and Eric	7 seconds

Also during this strategy description stage, the typically developing child viewed two videotapes. The first videotape showed the typically developing child interacting with the child with ASD during a joint storybook reading interaction during a baseline session (i.e., while not using the "read, wait and respond" strategy). The second videotape showed the researcher using the "read, wait and respond" strategy with the child with ASD during a joint book reading interaction. After watching these tapes, the typically developing child and the researcher engaged in a discussion that highlighted the ways that using the "read, wait and respond" strategy helped to reach the goal of increasing the child with ASD's participation turns within the interaction. Through this activity, the typically developing child learned about the strategy, as well as

determined for him or herself how using the target strategy could help to reach the goal of increasing the participation of the child with ASD during joint book reading interactions.

Model the strategy. In this stage of instruction, the researcher engaged in a joint storybook reading interaction with the typically developing child and demonstrated how to use the "read, wait and respond" strategy with the AAC system. During this stage of the strategy instruction, the investigator modeled and described (i.e., thought aloud) all of the opportunities for use of the "read, wait and respond" strategy in its various combinations during a joint book reading interaction. An opportunity to use the full "read, wait and respond" strategy was described as anytime a page was turned, or anytime when text remained on the page that had not yet been read. That is, if a double page spread had two or three sections of text, that same number of opportunities to use the "read, wait and respond" strategy in its entirety was present. An opportunity to use the "wait and respond" portion of the strategy was explained to be present when there was no more text to be read on the page. An opportunity for using the "respond" portion of the strategy was explained to exist when the child with ASD initiated participation in the interaction, regardless of the amount of text still unread on the page. See Table 3 for the opportunities for correct implementations of the "read, wait and respond" strategy. The combinations of strategy implementation "read only" and "read, respond" are not included in Table 3 due to the fact there were no opportunities for correct implementation of these variations of the "read, wait and respond" strategy. These variations of the target strategy were always considered incorrect implementations.

Table 3: Description of Opportunities for Correct Strategy Use

Strategy Combination	Opportunity for Correct Strategy Implementation
Read, Wait and Respond	The page of the book is turned, or text remains on the current page that has not yet been read. The typically developing child (TDC) reads, then waits for up to the designated "wait" time. The child with ASD (CWA) participates and the TDC responds with a topic-related response.
Read, Wait	The page of the book is turned, or text remains on the current page that has not yet been read. The TDC reads and then waits for up to the designated "wait" time, but the CWA does not participate.
Wait, Respond	No text remains on the page to be read, but the TDC waits for up to the designated "wait" time to provide the CWA with an additional opportunity to participate. The CWA participates and the TDC responds with a topic-related response.
Wait only	No text remains on the page to be read, but the TDC waits for up to the designated "wait" time to provide the CWA with an additional opportunity to participate. The CWA does not participate.
Respond only	TDC responds with a topic-related response when the CWA initiates participation.

Verbal practice. This stage of instruction was designed to ensure that the typically developing child had a solid understanding of the "read, wait and respond" strategy he or she would implement with the child with ASD. During this stage the typically developing child was asked to individually describe the strategy in detail and to explain the goal of the intervention. The child was also asked to explain the importance of utilizing the "read, wait and respond" strategy to reaching the goal of increasing the child with ASD's participation to the best of his or her ability. The researcher and the typically developing child used rote verbal rehearsal to learn to "read, wait and respond to help participate".

Controlled practice and feedback. During this stage of instruction, each typically developing child was given the opportunity to practice the target strategy with researcher

prompting and feedback. The researcher again demonstrated the use of the target strategy using one of the designated storybooks. After this demonstration, the researcher and the typically developing child switched roles, and the researcher took on the role of the child with ASD in the interaction. This allowed the typically developing child the opportunity to practice using the target strategy within a joint book reading interaction. The typically developing child was encouraged to speak aloud about his or her thought, or decision making, process while he or she implemented the strategy with the researcher. Through this process of "thinking aloud" the researcher was able to observe the typically developing child's thought process about the opportunities present for using the "read, wait and respond" strategy and its context-dependent variations. Through this process, the researcher was able to provide information about a missed opportunity to use the "read, wait and respond" strategy and to observe if this additional information influenced the way the typically developing child thought about future opportunities to use the strategy. The typically developing child was also encouraged to ask the researcher for prompting (i.e., instructions) if he or she was unsure about how to proceed (e.g., if he or she did not know which variation of the strategy should be used, or if the child forgot some portion of the strategy in the middle of the interaction). The researcher also provided corrective feedback when necessary. When the typically developing child had developed proficiency with implementation of the strategy (i.e., the child correctly implemented the strategy at least 90% of the time strategy implementation was attempted), he or she was deemed ready to move on to the next phase of the project, the intervention phase. In order to meet these instructional goals, each typically developing child participated in 3 to 4 introductory sessions.

Intervention Phase

  Utilization sessions. The utilization sessions took place following the introductory instructional sessions with each typically developing child. The goal of the utilization sessions was to give the typically developing child the opportunity to utilize the target strategy with the child with ASD in the natural environment. During these sessions, the typically developing child received instruction and guidance on an as-needed basis from the researcher while engaging in joint book reading interactions with the child with ASD.

  During joint book reading interactions with the child with ASD, the typically developing child was informed that he or she could ask the researcher questions or for prompts if he or she forgot what he or she should do (i.e., "read, wait and respond") while book reading with the child with ASD. Initially (i.e., for the first 10 double page spreads read) the typically developing child was given feedback on his or her use of the target strategy after each page (e.g., That was great waiting! Don't forget to wait. Nice response! Don't forget to respond.). After these first few double spread pages, the researcher gradually faded the feedback. Intervention sessions lasted approximately 15-minutes and continued for five to six sessions (over a period of 10 to 15 school days, or one session every 2-3 school days) in order to observe changes in the typically developing child's behavior during the joint book reading interactions (i.e., did they use the "read, wait and respond" strategy consistently in these interactions?). If the typically developing child's use of the "read, wait and respond" strategy decreased by more than 20% from original strategy acquisition levels (i.e., correct use of target strategy in 90% of implementations), "booster" instructional sessions were provided until the 90% accuracy criterion was again achieved and subsequently maintained for two consecutive joint book reading interaction sessions.

Generalization Phase

Generalization measures were taken to determine whether each typically developing child was able to generalize the use of the "read, wait, respond" strategy to a different book reading medium. Each dyad engaged in two generalization sessions. During these sessions, the typically developing child and the child with ASD engaged in a modified joint book reading interaction. This activity differed from the utilization sessions in that the books for these sessions were not embedded in an AAC system. The books used in these sessions were regular paperback storybooks. The paperback storybooks available to read during the generalization sessions were the same as those that were available during the utilization sessions. This generalization measure was chosen over other potential generalization measures (i.e., generalization to another child with ASD, generalization to novel books, etc.) because this book reading context mirrored more closely the joint book reading interactions that were likely to occur within the school environment. The children with ASD participated in these sessions by pointing to the pictures in the storybooks. Though no voice output feedback was provided in this condition, the action used by the child with ASD for participation was very similar to touching or selecting a "hotspot" in the other phases of the investigation.

The generalization sessions were conducted one to two weeks following completion of the intervention phase. Data on the collateral measures regarding the frequency of the child with ASD's participation were also collected during these sessions.

Maintenance Phase

Maintenance probes were conducted during joint book reading interactions using books embedded in an AAC system (as in the baseline, instructional and intervention phases), one month and two months following the completion of the intervention phase to ensure that the

positive changes observed in the behaviors of the typically developing child were maintained over time. Probes were conducted to measure the maintenance of strategy use. If the typically developing child's implementation of the target strategy (i.e., "read, wait and respond") had dropped below 90% correct implementation, instructional "booster" sessions would have been conducted until the 90% criterion for accurate implementation of the strategy was reached again.

Procedural Reliability

A procedural standard for each phase of the investigation was developed prior to the implementation of the study (See Appendix H). The researcher trained the reliability coder on all instructional procedures within this standard. Training continued until the investigator and the coder reached 90% compliance with the standard instructional procedures (i.e., as measured by checklists of steps and components to be included in a given instructional or intervention session). Procedural reliability measures were collected for at least 20% of the videotaped sessions (Neuman & McCormick, 1995). These sessions were randomly selected and stratified across cases and study phases. The procedural reliability was calculated as follows: number of steps instructed according to the procedural standard divided by the number of steps correct, incorrect, and omitted. An average reliability of 98.75% (range = 95% to 100%) was maintained across all five cases, suggesting consistent implementation of instructional procedures. It should be noted that procedural reliability was completed for overall steps in the instructional procedures, not for each individual instance of an element within an instructional step. For example, in the introductory sessions during controlled practice and feedback it was considered correct if the researcher and typically developing child role played within the session, however, each instance of a role play was not coded for procedural reliability purposes. If procedural reliability had fallen below 90% accuracy at any point in the investigation, the researcher would

have reviewed the instructional procedures by viewing videotaped sessions where the training was and was not implemented correctly, and then reviewing the procedural standard in order to restore procedural integrity. However, such additional review was not required. Please see Appendices I, J and K for the procedural reliability forms.

<div align="center">Measures</div>

Dependent Measure

There was one dependent variable for the current investigation. This dependent measure was the typically developing child's use of the target strategy during joint book reading interactions with a child with ASD. Specifically, data related to the frequency of accurate implementations of any of the acceptable variations of the target strategy during the 15-minute book reading interaction were collected. Please see Table 3 for the contexts in which different variations of the "read, wait and respond" strategy were considered correct.

Coding of all data was completed through repeated viewings of videos of the joint book reading interactions. All videos were edited to be a standard 15-minutes for each session across all of the dyads. All coding was done in accordance with the following operational definitions for each portion of the dependent measure.

The accurate implementation of the target strategy by each typically developing child was operationally defined as the correct implementation of the following strategy components in the following combinations: (a) read, wait and respond, (b) read, wait, (c) wait, respond, (d) wait only, and (e) respond only. The operational definitions of each component were:

1. Reading

Opening a book/turning the page and either reading orally or activating the "hotspot" over the text to retrieve the digitized recording of the book text.

2. Waiting

Pausing for an individually predetermined period of time (i.e., typical turn transfer time for the child with ASD + 5 seconds), while looking directly at the child with ASD to convey expectation for him/her to participate.

3. Responding

The production of a turn that served as a direct reply to the child with ASD's prior participation. This reply must have shared the topic of the child with ASD's prior participation turn, have acknowledged the child with ASD's prior participation turn (i.e., re-stated the child with ASD's participation turn by naming the picture that was pointed to or selected), and/or have fulfilled the communicative intent of the prior participation turn (e.g., expanded on the participation turn of the child with ASD by further describing the picture that was pointed to or selected, answering a question, or turning the page).

Each typically developing child's use of the complete target strategy (i.e., "read, wait and respond") was coded as "correct" if all appropriate elements of the target strategy were implemented, or when an acceptable variation of the target strategy was implemented in the correct context (see Table 3, above). Use of the target strategy was considered "incorrect" if the typically developing child did not implement an element of the target strategy where it would be expected for that step to be implemented.

A total frequency of correct implementations of the target strategy was calculated for each 15-minute book reading session. Please see Appendix L for the data collection form used to gather these data. Frequencies of the occurrence of each variation of the target strategy are reported in the Results chapter.

Collateral Measure

In order to document the participation of the child with ASD during the joint book reading interactions, a collateral measure related to the participation of the child with ASD was collected with each dyad. Specifically, the frequency of participation turns by the child with ASD during the book reading interaction was measured for each child with ASD. As described above, a participation turn was defined as the child with ASD doing any of the following: (a) making a selection on the AAC system (i.e., accessing a "hotspot" by pointing to (directly selecting) a picture), (b) pointing to a picture without activating a "hotspot" either on the AAC system or in a regular paperback storybook, (c) using speech or a recognized speech approximation, and/or (c) using a sign or a recognized sign approximation. Meanings of speech approximations and sign approximations were obtained from the classroom teacher or educational assistants, and were passed on to the typically developing children by the researcher. The total frequency of participation turns was determined by counting the total number of the above listed behaviors exhibited by the child with ASD throughout the 15-minute segment of the book reading interaction.

Data were coded for the frequency of participation turns by the child with ASD during each 15-minute joint book reading interaction. This was measured in terms of number of total participation turns during the 15-minute interaction. A participation turn was defined by the course of the interaction between the typically developing child and the child with ASD. That is, a boundary for participation, or the end of a participation turn, was defined by the typically developing child responding to the participation of the child with ASD, the typically developing child waiting for the designated "wait" time and then moving on (if the child with ASD did not participate), or by a pause in the interaction after the child with ASD participated (if the typically

developing child did not respond). If the child with ASD selected two "hotspots" in a row the

participation turn boundary was defined by the response of the typically developing child. If the

typically developing child responded to each selection then that portion of the interaction was

coded as two participation turns, however, if the typically developing child responded to both

selections with one response then that portion of the interaction was coded as one participation

turn. Please see Appendix M for the data collection form used to gather these data.

Data Reliability

Interobserver reliability was calculated on 20% of all data collected (dependent measure

and the collateral measure) within this investigation. A trained coder viewed the edited videos of

a sample of sessions that was stratified across all of the cases and all of the phases of the

investigation. The reliability coder coded sessions for both the dependent measure (using the

contexts for correct strategy implementation shown in Table 3) and the collateral measure

following the definition of participation turns provided above. Agreement was calculated for the

accurate implementation of the target strategy by the typically developing child as well as for the

participation turns of the child with ASD on a book by book and page by page basis, that is for

each page read in each book the codes regarding the frequency of strategy implementations by

the typically developing child and the participation turns of the child with ASD (what and how)

were compared across the reliability coders. Agreement was calculated by dividing the number

of agreements by the sum of the agreements and disagreements. This ratio was then multiplied

by 100 to produce a percentage of agreement between the two data coders for the data being

compared. Based on Kazdin's (1982) recommendations for base rates and chance agreement,

90% agreement between coders will rarely occur by chance. Therefore, reliability agreement

percentages of 90% or above were considered sufficient for this investigation. For data sessions

where reliability scores fell below 90%, disagreements were discussed until a common resolution could be agreed upon. If a common resolution could not have been found, a third data coder would have been asked to view the segment in which the disagreement occurred and provide a third code for that portion of the interaction to resolve the disagreement. An average reliability score of 99% (range = 94% to 100%) was maintained for the dependent measure of correct strategy implementation. An average of 92.8% (range = 73% to 100%) was maintained for the collateral measure of frequency of participation of the child with ASD.

<div align="center">Data Analyses</div>

The data for this investigation were graphed and visually inspected for changes in the trend, slope, and level of data (Kazdin, 1982). The trend was analyzed to determine any change in directionality of the dependent variable after the intervention when compared to baseline measures taken before the intervention. The analysis of the slope indicated the magnitude of the trend, and inspection of the level of the data indicated the overall increase or decrease of the dependent measures before and after intervention began. The percentage of non-overlapping data (PND) or the percentage of data points in the instructional phase that exceed the highest data point in the baseline phase (Kazdin, 1982) was also calculated to determine the percentage of data points in the intervention phase that did not overlap with data points from the baseline phase. PND was calculated by dividing the number of intervention data points that exceeded the highest baseline data point by the total number of intervention points, and then multiplying this quotient by 100 to obtain a percentage (Scruggs, Mastropieri, & Casto, 1987).

Social Validation

Social validity measures are critical in that they determine the "real-life" functionality of the intervention (Schlosser, 1999). Social validity for this investigation was assessed in two

ways. First, the typically developing children who participated in each of the dyads in the intervention were provided with the opportunity to tell the investigator what they thought about the joint book reading interactions with the child with ASD and the "read, wait and respond" strategy they were taught to use. After the investigation was completed, they were asked to inform the researcher about the ease of use of the target strategy, and their feelings regarding the impact that use of the target strategy had on their ability to interact with the child with ASD during joint book reading. They were also asked if they thought using the target strategy helped them to meet the predetermined goal of helping the child with ASD's increase his or her participation within joint book reading interactions. Specifically the typically developing children were asked: (a) if they would participate in the same or a similar program again, (b) if they would recommend the program to other students in their class, (c) if they noticed any changes in the participation of the child with ASD from the start of the project, (d) what they thought the best parts of the program were, (e) if they thought anything about the program should be changed, and (f) how they felt about participating in the program (See Appendix N).

The second measure of social validity was taken with the general education classroom teacher of the classroom in which the typically developing children who participated in this investigation were members. The teacher viewed 2-3-minute segments of two randomly selected videotaped joint book reading interactions between a typically developing child and a child with ASD (one from baseline and one from post-instructional sessions) in random order. The teacher was blind to the status of the videotapes (i.e., baseline or intervention). After viewing the segments, the teacher was asked to respond to several questions to determine her perceptions about the project and the tapes that were viewed (Kent-Walsh, 2003; Light, Dattilo, English, Gutierrez & Hartz, 1992). Specifically she was asked: (a) if she noticed any differences between

the interactions in the two video tapes, (b) if she would allow other students in her class to participate in the program or one like it, (c) if she would recommend the program to other teachers/classroom or schools, (d) what she thought were the best parts of the program, (e) what changes should be made, from her perspective, to the program, and (f) about her feelings about the program (See Appendix O).

CHAPTER THREE

Results

Data are presented collectively for all of the five dyads. Results relative to the dependent variable, each typically developing child's frequency of accurate implementation of the targeted interaction strategy, are presented first. Second, the data related to the collateral measure, each child with ASD's participation turns, are presented. Finally, the social validation data are presented.

Typically Developing Children's Implementation of Targeted Interaction Strategy

Rate of Acquisition

The total number of introductory sessions (in the instructional phase) in which each typically developing child participated ranged from 3 to 4 sessions (i.e., a total of 1.5 to 2.25 hours of instruction). Alice, Beth, Diane and Eli required a total of three introductory sessions to reach 90% accuracy of implementation of the target strategy with the investigator. Connor required a total of four introductory sessions to reach this 90% accurate implementation criterion. Please see Table 4 for data summarizing the number of sessions and the amount of time each typically developing child required to reach the 90% strategy acquisition criterion.

Table 4: Instructional Session Details for Each Typically Developing Child

Typically Developing Child	Number of Sessions to Criterion	Average Length of Instructional Sessions in Minutes	Total Instructional Time (in hours)	Total Elapsed Time (in days) from Last Baseline Session to First Utilization Session
Alice	3	30	1.5	5
Beth	3	35	1.75	5
Connor	4	34	2.25	6
Diane	3	30	1.5	5
Eli	3	40	2	6

Each of the participating typically developing children achieved criterion levels of accurate implementation of the targeted strategy following completion of the introductory

sessions. None of the typically developing children in any of the five cases practiced the use of

the targeted strategy with the child with ASD prior to the utilization sessions. These percentages

of accuracy were achieved during role-play interactions with the researcher. As is illustrated in

Table 4, introductory sessions occurred over a period of time of 5 to 6 days. This was the same

period of time that elapsed for any 3 or 4 sessions in any of the phases.

<div style="text-align:center">*Level of Acquisition*</div>

Figure 2 illustrates the frequency of each typically developing child's accurate

implementation of the correct combinations of the "read, wait, and respond" strategy during 15-

minute book reading interactions with the child with ASD. The baseline phase was conducted

prior to the introductory sessions (i.e., prior to the typically developing child being taught the

target strategy) and the intervention phase, or the utilization sessions, were conducted after each

typically developing child had learned the targeted strategy in the instructional phase. All five of

the typically developing child participants demonstrated 100% non-overlapping data and

maintained an increase of at least 20 accurate target strategy implementations over baseline

levels (range = 20 – 90) during 15-minute book reading interactions during the intervention

phase.

At baseline, all typically developing children accurately implemented the strategy 0 times

during book reading. During the baseline sessions, the typically developing children usually read

the text on the page of the story (or activated the "hotspot" over the text) and then immediately

turned the page. If the children with ASD participated in some way, the typically developing

children sat quietly and did not respond to, or look at, the child with ASD. In these situations, the

typically developing child looked at the researcher for prompting for what to do, and when no

prompting was provided, they turned the page in the book to continue reading the next page.

Figure 2.   Frequency of Typically Developing Children's Accurate Implementations of Targeted Strategy during 15 minute Book Reading Interactions
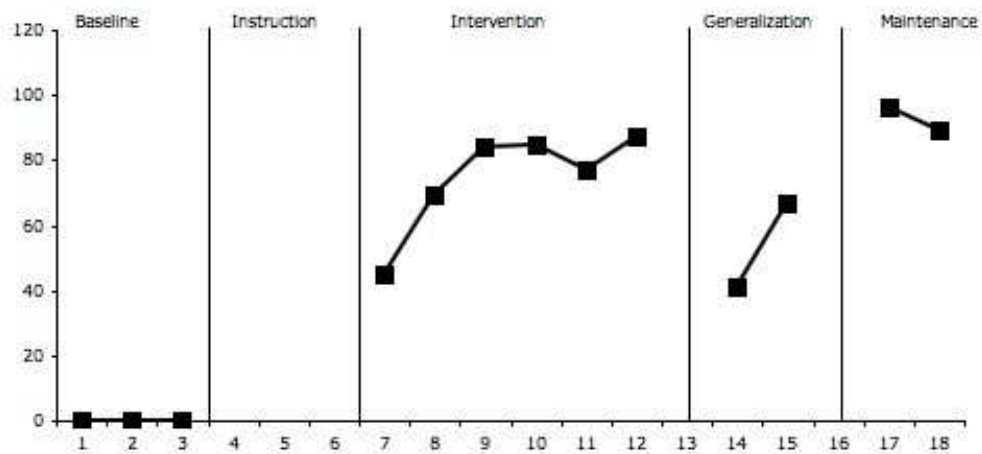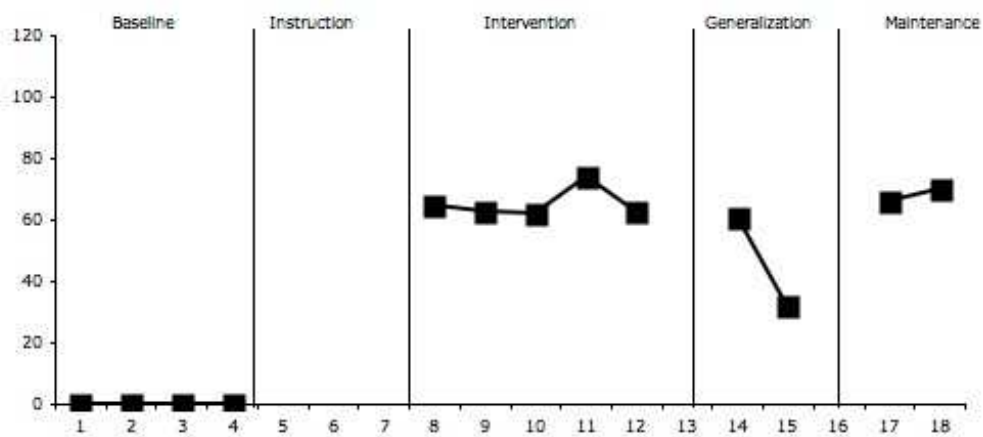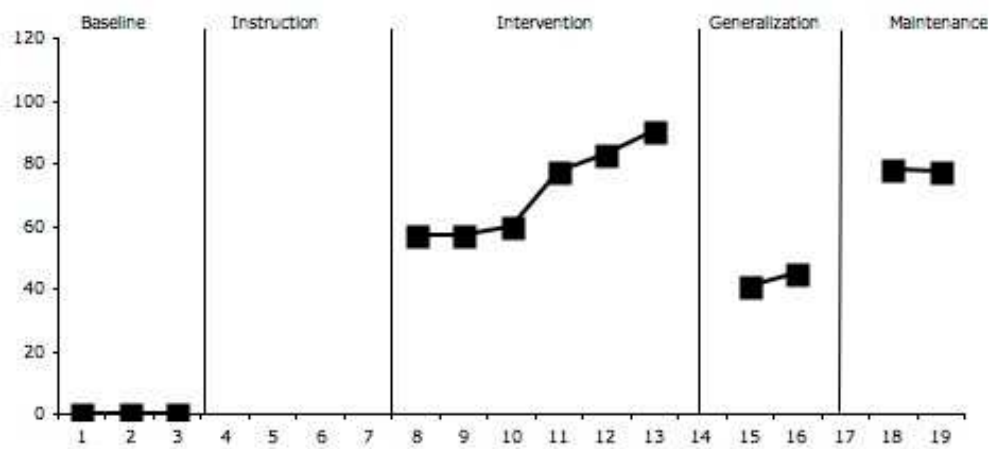
Figure 2.   Frequency of Typically Developing Children's Accurate Implementations of
Targeted Strategy during 15 minute Book Reading Interactions

Diane

Eli
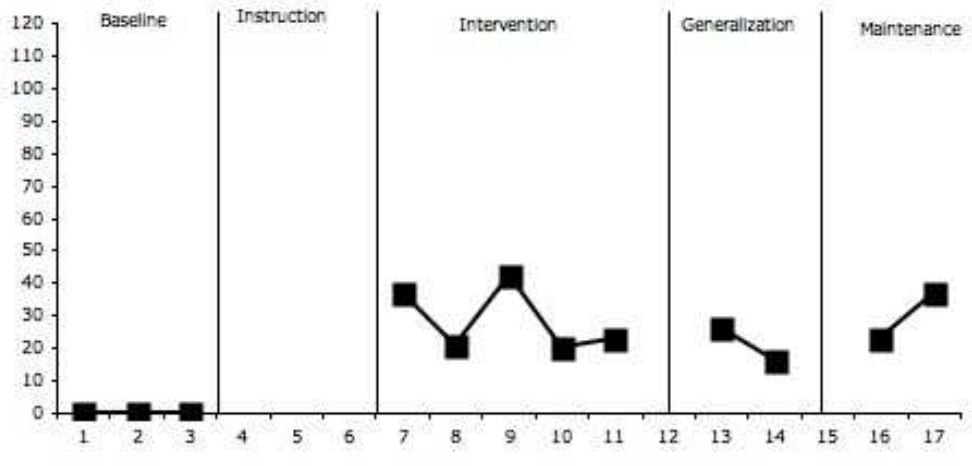
Sessions

Following targeted strategy instruction, all five of the typically developing children exhibited immediate increases in the frequency of accurate strategy implementations and changes in their patterns of interaction with the children with ASD. During the intervention phase, the typically developing children accurately implemented the "read, wait and respond" strategy within the range of 20 – 90 times during the 15-minute interactions. It is important to note the high variability in the number of correct implementations across dyads. Low data points, that is, fewer numbers of correct implementations of the target strategy, do not necessarily indicate lack of strategy use on the part of the typically developing child. Instead, it reflects the variation in the average number of pages read during the 15-minute interactions across the cases. The pages read ranged from 12 to 38 across the cases (See Table 6 page 92 in chapter 4, Discussion).

Generalization

Analysis of the data suggested that all five typically developing children evidenced generalized use of the targeted interaction strategy to a different book reading medium. The "Generalization" portion of each of the case graphs in Figure 2 depicts the frequency of accurate implementation of the targeted strategy in book reading interactions where the books were not embedded within a high technology AAC system. These books were standard paperback children's storybooks involving the same storybooks that were used in the intervention phase. As evidenced in Figure 2, the accurate implementation frequencies ranged from 16 to 67 per 15-minute book reading interaction in the generalization sessions.

Maintenance

Sessions were also conducted to determine if the typically developing children's frequency of accurate implementation of the targeted interaction strategy would be maintained

over an extended period of time. Figure 2 also presents the maintenance data for the five

participating typically developing children's accurate implementation of the target strategy.

Maintenance sessions were conducted at intervals of one and two months post-intervention

sessions for each of the participating dyads. All participating typically developing children

demonstrated maintenance of the target strategy during 15-minute book reading interactions. The

accurate implementation frequencies during the maintenance phase ranged from 23 to 96 per 15-

minute book reading interaction.

<p align="center">Children with ASD's Participation</p>

<p align="center">*Frequency of Participation*</p>

Figure 3 depicts the frequency of the five children with ASD's participation during the

15-minute book reading interactions. Four of the five children with ASD demonstrated 100%

non-overlapping data from the baseline phase to the intervention phase. Dylan demonstrated

83% non-overlapping data. During the session in which Dylan took only 9 turns he had a seizure

approximately 15 minutes prior to the book reading session.

At baseline, the frequency of the participation of the children with ASD was within the

range of 4 to 48 participation turns during the 15-minute interactions. Annie's participation turns

during the baseline phase consisted of touching "hotspots" on the high technology AAC system

for book lines and for characters or objects on the page, as well as using speech to name

characters or objects on the book page. Her primary means for participation was use of the high

technology AAC system, as of the average 45 participation turns during a baseline session an

average of 6 participation turns per session were via speech and 39 via the AAC system.

Brenda's average frequency of participation was 32 participation turns per 15-minute interaction.

Her participation turns consisted of touching "hotspots" on the high technology AAC system for

characters or objects on the page. Brenda did not use speech, signs or any other mode of communication to participate during the baseline sessions. Chris's participation turns during the baseline phase consisted of touching "hotspots" on the high technology AAC system for book lines and for characters or objects on the page as well as using speech to name characters or objects on the book page. His primary means for participation was use of the high technology AAC system, as of the average 26 participation turns during baseline an average of 3 participation turns per session were via speech and 23 via the AAC system. Dylan's participation turns during the baseline phase consisted of touching "hotspots" on the high technology AAC system for book lines (i.e., text on the story page) and for characters or objects on the page, as well as using speech to name characters or objects on the book page in fact this was his primary mode of participation during the baseline sessions. Of the average 10 participation turns during baseline an average of 6 participation turns per session were via speech and 4 via the AAC system. Eric's participation turns during the baseline phase consisted of touching "hotspots" on the high technology AAC system for characters or objects on the page as well as using speech to name characters or objects on the book page. His primary means for participation was use of the high technology AAC system, as of the average 4 participation turns during baseline an average of 1 participation turn per session was via speech and 3 were via the AAC system.

Following strategy instruction with the typically developing children, four of the five of the children with ASD appeared to have exhibited changes, that is, increases, in their frequency of participation during the 15-minute book reading interactions. The exception is Annie, whose

Figure 3.   Frequency of Children with ASD's Participation during 15 minute Book
            Reading Interactions

Annie
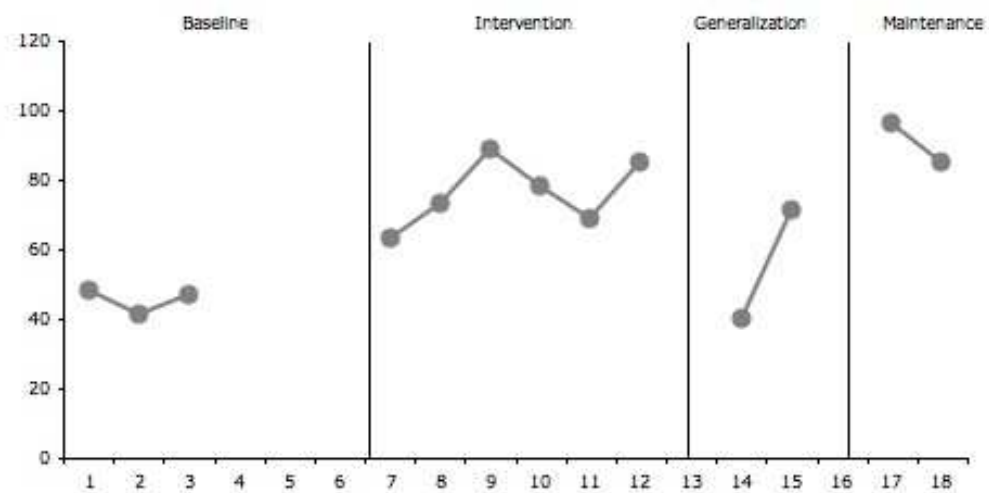
Brenda
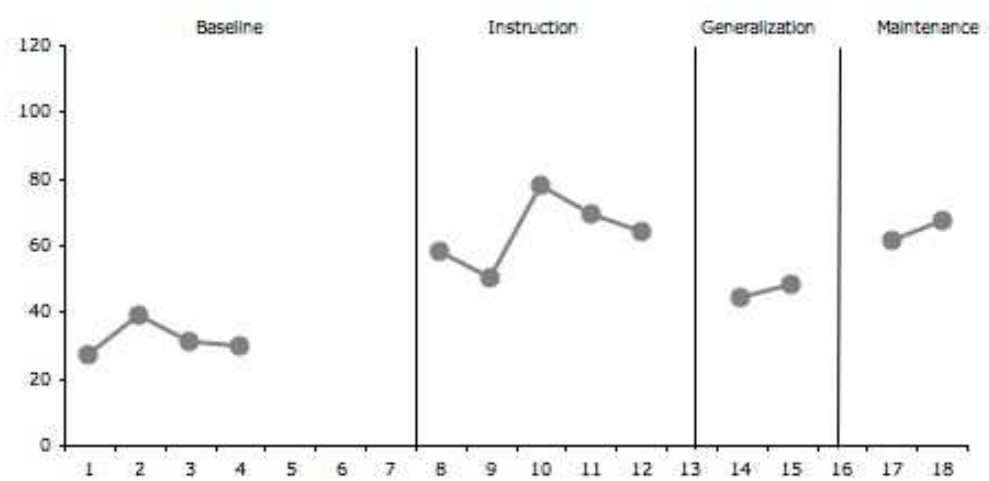
Chris
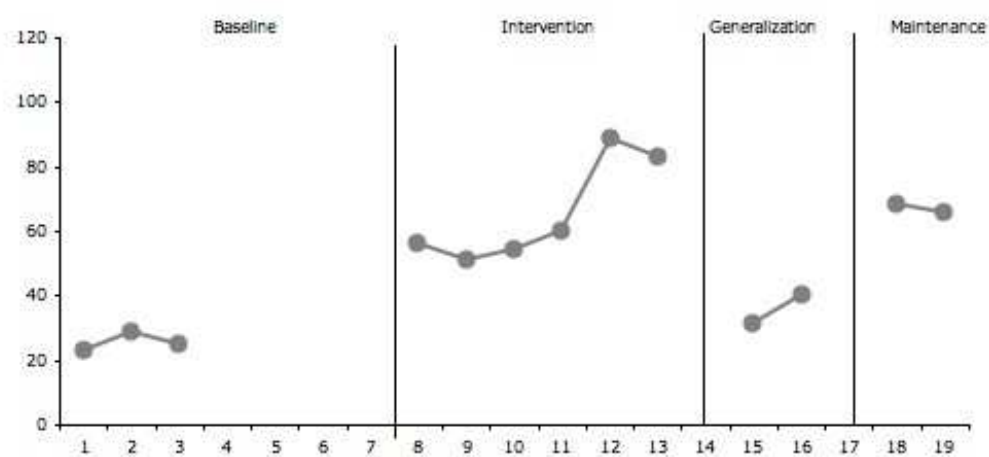
Frequency of Participation

Sessions

Figure 3.   Frequency of Children with ASD's Participation during 15 minute Book
            Reading Interactions

Dylan

Eric

Sessions
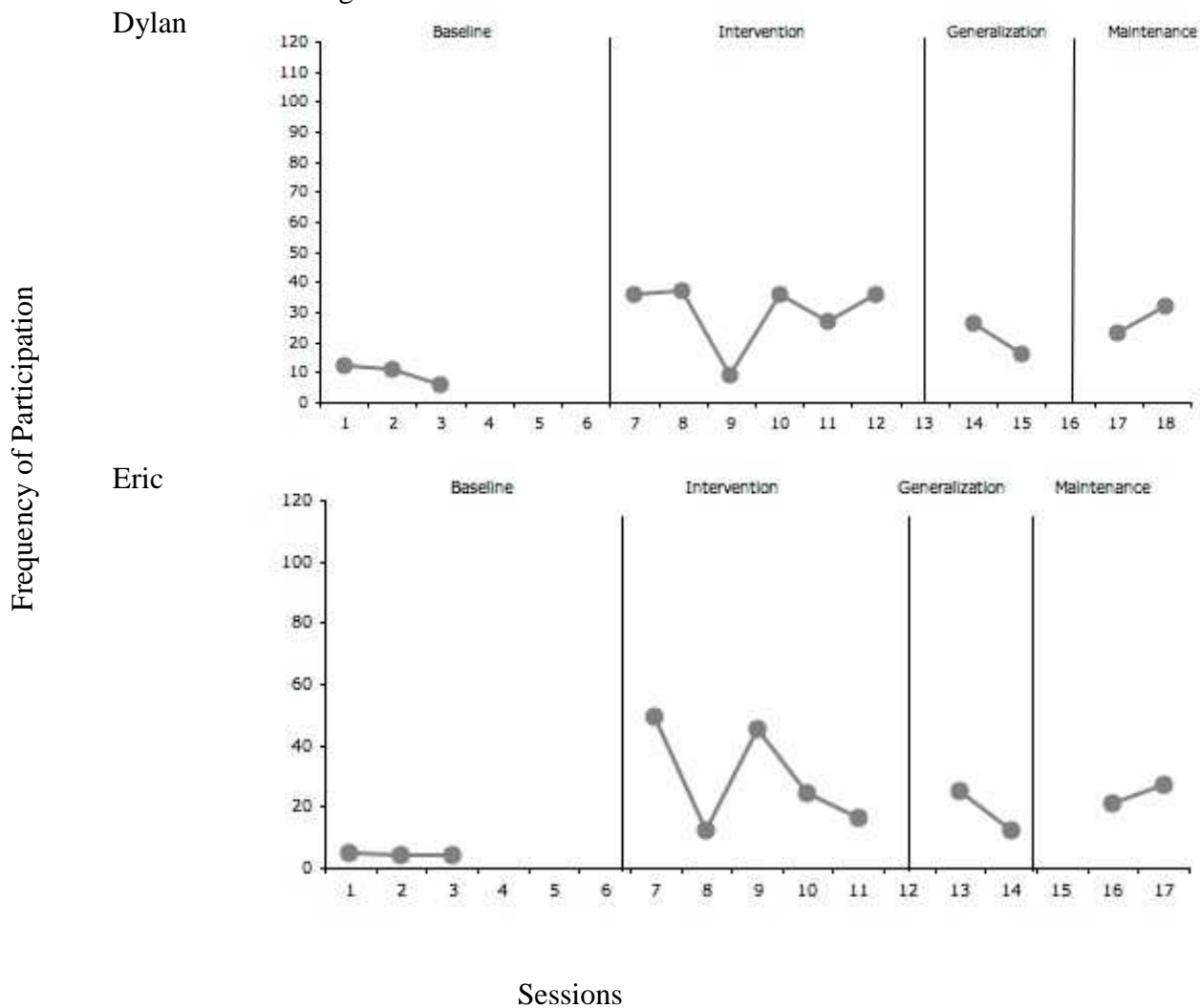
data shows an increasing trend from the baseline phase to the intervention phase. This trend in

the data makes it difficult to evaluate a change in her frequency of participation from one phase

to the next. During intervention, the frequency of the participation of the children with ASD

occurred within the range of 9 to 89 participation turns during the 15-minute interactions. Please

see the graphs in Figure 3 for data related to these frequencies.

Generalization

During the generalization phase of the investigation, the children with ASD seemed to

evidence moderately increased levels of participation during interactions involving a novel book

reading medium compared to baseline levels. Figure 3 depicts the frequency of participation by

the child with ASD when reading storybooks with the typically developing child that were not

embedded within an AAC system. Though the frequency of participation during the

generalization phase was lower for all of the children than in the intervention phase, the

participation turns remained slightly higher than baseline levels for four of the five children with

ASD. Annie was the only child with ASD whose frequency of participation dipped into the

baseline phase range, for one of the two generalization sessions, though it should be noted that

the frequencies of participation for all of the children with ASD were much more like baseline

phase levels during this phase than in the intervention or maintenance phases. During

generalization, the frequency of participation by the children with ASD occurred within the

range of 12 to 71 during the 15-minute interactions.

Maintenance

Throughout maintenance, the children with ASD evidenced an increase in frequency of

participation over baseline phase levels. As shown in the individual graphs in Figure 3,

frequency of participation appeared to increase to intervention phase levels when the use of the

books was embedded in a high technology AAC system at 1 and 2 months post-intervention.

During maintenance, the children with ASD's average frequency of participation turns ranged

from 21 to 96 during the 15-minute interactions, and again all five of the children with ASD

demonstrated 100% PND from baseline phase levels.

Participation by the Children with ASD

As the data summarized in the previous sections indicate, all five of the children with

ASD increased their frequency of participation during the 15-minute interactions from the

baseline phase to the intervention phase. It is important to note the gap in the data collection for

participation of the children with ASD during the period of time when the typically developing

children were in the instructional phase. Due to this gap, the increase in participation may not

have occurred immediately upon initiation of the intervention phase and potentially could be

explained by a number of other hypotheses (see chapter 4 for discussion of these). Participation

was accomplished through a variety of modes including speech and speech approximations,

signs and sign approximations, accessing "hotspots" in the high technology AAC system and

pointing to pictures. As can be seen in Table 5, all of the children (except Annie) doubled (or

more than doubled) the average number of their participation turns from the baseline phase to the

intervention and maintenance phases.

Table 5. Summary of Children with ASD's Participation

Participant	Phase	Annie	Brenda	Chris	Dylan	Eric
Average Total Participation Turns (range)	Baseline	45 (41 – 48)	32 (30 – 39)	26 (23 – 29)	10 (6 – 12)	4 (4 – 5)
	Intervention, Maintenance	80 (63 – 96)	64 (50 – 78)	66 (51 – 89)	30 (9 – 37)	28 (12 – 49)

Social Validation

Typically Developing Child Interviews

Data gathered through interviews with each of the typically developing children who participated in the dyads in this investigation indicated high levels of satisfaction with the instructional program. Appendix N contains the seven interview questions that all of the typically developing children were asked regarding their participation. All of the typically developing children indicated that the instructional program was a good use of their time. For example, Alice stated "I just really, really enjoyed being able to read because I love to read." Further, Connor commented: " It was fun with the responding and working with all the kids and stuff". The typically developing children also indicated that they would participate in the same or a similar instructional program again, if given the opportunity, In fact, Diane stated that "if you come again next year, do the fourth graders" because she would be in fourth grade and would like to participate in the project again. Further, they indicated that they would recommend the instructional program to other students in their class. Beth commented, "it was fun, the other kids would like it too. I think most of them wished they could do it now". Additionally, Eli commented, "I think it's very helpful for kids who don't know how to read, and helpful for the kids who show them how to read to help them learn how to show them better". Diane also stated: "I think a good bit of them would really learn how they're different, but also how they are the same as us". Finally, the typically developing kids expressed that they would not recommend any changes to the instructional program. For example, Diane stated: "No, it was perfect!" and Eli commented: "No, because everything is pretty good the way it is".

The typically developing children also noted changes in the children with ASD. In particular they commented on changes in their overall communication and participation, for

example, Alice stated: "I think she learned a little bit, and we shared taking turns". The typically

developing children also indicated that the children with ASD seemed to pay better attention to

the book reading during the interactions. Diane stated that Dylan "started to sit nicer and pay

more attention to it and everything". Finally, they indicated that the children with ASD appeared

to have an increased interest in books. Connor stated: "Chris started to like to read and find out

the riddles of Dora and stuff". The typically developing children shared that both the wait and

the respond components of the target strategy were beneficial in helping them read with the

children with ASD. For example Beth stated: "instead of just going on I learned that I can wait

and see what she does. And then if she touches something I can wait again or I can just go on".

Further Connor commented that "before I learned the 'read, wait and respond' strategy I was not

waiting and I was not taking any turns at all".

General Education Teacher Interview

In an additional effort to determine the value of the instructional program, the general

education teacher was asked to comment on pre- and post-instruction videotapes of one typically

developing child reading with one child with ASD. Please see Appendix O for the general

education teacher feedback interview questionnaire. It is important to note that only one teacher

participated in this social validation measure as all of the typically developing children were in

the same classroom and had the same general education teacher.

The general education teacher watched the pre- and post-instruction tapes and also

participated in an informal interview with the researcher. The purpose of this interview was to

further identify her feelings about the project and any recommendations for future projects of this

nature. In response to the researcher's questions, the general education teacher made positive

comments about the benefits of the program to the typically developing children. Specifically she

stated: "the boy with autism, Chris, kept touching the screen more. He didn't just sit there and he was looking at the screen. He seemed more willing to participate in the first video than in the second". She further expressed the benefits to the children in her classroom. She commented that: "I feel like in the end they really were able to have an interaction with each other. In the hallway afterwards, like throughout the day, or whatever, they would say, I mean before I think they had a stereotype of those kids. Like, oh their life skills kids, they're in that room down there. And now it's like they do have a little bit of a relationship with them because they'll say "Oh that's Chris" or "That's the twins" or, they'll, you know, And I think they help the other kids in the class realize, you know, okay they can help them out too". Further, the general education teacher stated she would allow children in her class to participate in a program like this one again. She specifically expressed that the program "helps them interact and communicate and then helps them to better understand how those kids feel and how those kids learn. I think that's really important" and therefore, would recommend the program to other teachers. She did not have any comments regarding changes that should be made to the program. When asked she stated: "I don't think so. I don't think there was anything I could think of".

CHAPTER FOUR

Discussion

Results of the current investigation indicate that the instructional program may have been effective in increasing the typically developing children's use of the "read, wait, and respond" strategy and in increasing the participation of the children with ASD who require AAC during joint book reading interactions. These results are discussed in this chapter, along with other potential explanations for the results reported, potential implications of the findings, limitations of the investigation, and directions for future research.

<div align="center">Summary of Results of the Instructional Program</div>

There are several research methodology limitations that limit the extent to which the results reported in chapter 3 may be attributed to the independent variable, the instructional program for the typically developing children. According to Schlosser and Raghavendra (2004), A-B case study designs offer one of the lowest levels of research evidence possible. This is due to the fact that when using this type of single-subject design experimental control is not established, and therefore any results obtained in an investigation utilizing this type of design cannot be directly attributed to the application of an independent variable. Because of this, other alternative explanations for the results reported, in addition to the independent variable, must be considered as possible causes for the results obtained. For the current investigation, the following four hypotheses will be considered and discussed: maturation, history/setting/current or ongoing events, human instrument, and finally, the effectiveness of the instruction (the independent variable).

<div align="center">*Maturation Hypothesis*</div>

Maturation as an alternative explanation for the results observed in the current investigation must be considered, particularly as an explanation of the changes observed in the participation of the children with ASD who require AAC. According to the description of the

children with ASD who participated in the current investigation in chapter 2, all of the children with ASD were beginning symbolic communicators. This is important because of the progression of typical development.

According to the normative information available for language development for typically developing children, when children are learning to communicate they progress through various stages of communication. These stages include the perlocutionary, the illocutionary and the locutionary stage. The last stage, the locutionary stage, is reached when children use words, signs, pictures or some other symbol to consistently and intentionally refer to environmental objects or events. Most researchers agree, that this stage is not necessarily reached when a child says his or her first word, but rather, is reserved for the period in development when children use adult-like words and language forms to communicate their intentions (Hoff, 2009). Once children enter the locutionary stage they start to build their vocabulary. During this period in development, the rate of word acquisition is initially rather slow, only a few new words are learned per month, however, a sudden spurt in vocabulary growth takes place once a child's productive lexicon reaches 50 words (Hoff, 2009).

Because the children with ASD were beginning symbolic communicators, and because of the gap in data collection between the baseline and the intervention phases, it could be possible that the change in the participation levels observed from the children with ASD were a result of language development, and a spurt in the children with ASD's word learning/acquisition, and not a result of the typically developing children's use of the "read, wait and respond" strategy. However, there is some evidence that suggests that this hypothesis may not be an explanation of the results reported in the current investigation. This evidence includes the fact that all of the baselines for the typically developing children were stable, and that all of the typically

developing children exhibited increases in their correct implementation of the "read, wait and respond" strategy after the instruction provided by the investigator.

History, Setting, Current or Ongoing Events Hypothesis

Another alternative hypothesis that should be considered as an explanation of the results reported in this investigation is related to the setting or ongoing events of the children involved in the current investigation. This hypothesis must be considered as an explanation of the results of this study because all of the participants, the typically developing children and the children with ASD who required AAC, attended the same school. Further, all of the typically developing children were in the same third grade class and all of the children with ASD were in the same kindergarten class. Therefore, the children involved in these dyads were also exposed to the same instruction and interventions as each other in their classroom environments.

The potential exists that something occurred within the classroom setting between when the baseline and intervention measurements were collected that caused the typically developing children to change their behavior and use the components of the "read, wait and respond" strategy and this change was not related to the instruction provided by the researcher at all. Further, since the typically developing children were in the same classroom it is possible that they talked with each other about the "read, wait and respond" strategy and/or practiced using the "read, wait and respond" strategy with each other or other children outside the context of the instruction and practice sessions with the researcher. It is important to note that the researcher specifically asked the children to keep the strategy "a secret", and the typically developing children did express that the secretive nature of the program was fun.

It is also possible that some event, intervention or instruction occurred in the kindergarten class between baseline and intervention that caused the change in participation levels of the

children with ASD that were observed between baseline measurements and intervention measurements, this hypothesis is especially worth considering in light of the gap in the measurement of the dependent variable with the typically developing children and collateral measure with the children with ASD who required AAC between the baseline and intervention phases. This may be the most plausible of the alternative hypotheses presented.

Human Instrument Hypothesis

A third alternative explanation for the results observed in the current investigation that should be considered is the impact of having one person, the researcher, collect all of the data and act as the primary coder of the data. This could have affected the results of this investigation due to the fact that the researcher knew the goals of the investigation and desired to see an impact on the dependent measure and collateral measure as a result of the independent variable. This hypothesis as a potential explanation of the results reported is slightly less compelling than the previous two hypotheses as interobserver reliability measures were collected for both the dependent variable and the collateral measure for 20% of the total data collected (see chapter 2).

Though any one, or combination of these three hypotheses could possibly be the true explanation for the results reported in the current investigation, the remainder of this discussion will focus on the last explanation presented, that is, that the results obtained were a result of the independent variable, or the instruction for the typically developing children in the "read, wait and respond" strategy.

The Independent Variable Hypothesis

The independent variable, or the instruction for the typically developing children, also must be considered as an explanation for the results obtained in the current investigation. The results showed changes in the behavior of the typically developing children; they were able to

learn the strategy, and use it during interactions with children with ASD who require AAC. After instruction all of the typically developing children used the strategy accurately, but to varying degrees of frequency ranging from 20 to 90 times in 15 minutes. Changes were also noted in the participation of the children with ASD who required AAC from the data collected from the baseline phase to the intervention phase. Children with ASD who required AAC participated an average of 31 more times per 15-minute interaction during the intervention phase than in the baseline phase.

This hypothesis must be considered as an explanation of the results of this investigation because all of the typically developing children showed increases in their accurate implementation of the target strategy. The fact that none of the typically developing children correctly implemented the "read, wait and respond" strategy during the baseline phase, and all of the typically developing children correctly implemented the 'read, wait and respond" strategy after the instruction phase lends credibility to the independent variable as the cause of this change in behavior. These results indicate that it is possible that the typically developing children learned the target strategy and increased their use of this strategy because of the instruction provided by the investigator.

It is also possible that the instruction provided by the investigator, and the subsequent learning of and use of the "read, wait and respond" strategy by the typically developing children affected the participation of the children with ASD who required AAC during the book reading interactions. The strategy instruction for the typically developing children in the current study focused on social communication and participation skills. The use of the strategy may have provided the children with ASD who required AAC with increased opportunities to participate during joint book reading interactions. This may indicate that the instruction for the typically

developing child communication partners and the subsequent changes in their behavior during the book reading interactions was the cause of the increases in participation of the children with ASD who required AAC.

Comparison of Results to Past Research

The results of the current investigation, if attributed to the independent variable hypothesis, lend support to those reported by Garrison-Harrell, Kamps and Kravitz (1997) in which child communication partners of a child with ASD who required AAC were taught to use specific skills and strategies to increase communication and social participation during interactions with children with ASD who require AAC. In that study, the typically developing children were taught to initiate, respond, take turns, share and expand on utterances during specific social activities (e.g., lunch, language arts, reading, computer, etc.). In addition to being taught how to use these social skills during the specified activities, the typically developing children were taught to use a low-technology AAC system. The present study may also add limited support to the results reported from investigations involving peer and child communication partners from other populations of children who require AAC (e.g., Carter & Maxwell, 1998; Hunt, Alwell & Goetz, 1991; Lilienfeld & Alant, 2005). The results of these studies have indicated that typically developing child communication partners can learn strategies to facilitate interactions and communication with children who require AAC.

The potentially most robust finding from the current investigation is that the typically developing children were able to learn a strategy that allowed them to be "good" communication partners for the children with ASD who required AAC. This appears to be the case due to the fact that the way the typically developing children interacted with the children with ASD during baseline phase was different from the way they interacted during the intervention, generalization

and maintenance phases. During baseline, the typically developing children were present in the environment with the children with ASD, but were not part of an interaction with them. This is evidenced in the fact that the typically developing children did not talk to the children with ASD at all during the baseline sessions. Instead, they read the text on the pages of the storybook and then turned the page. Even when the children with ASD participated in some way, the typically developing children did not acknowledge this during baseline. After instruction, however, the typically developing children responded to the children with ASD as if they were intentionally communicative and symbolic. This was evidenced through their acknowledgement and response to the children with ASD's participation in the book reading interaction (i.e., the typically developing children's use of the "respond" component of the "read, wait and respond" strategy). Because of this change in behavior, it is likely that these results of the current investigation corroborate the results reported in other investigations in the child communication partner literature.

It should be noted, however, that the skills/strategies taught (e.g., "stay-play-talk" vs. "read, wait and respond"), as well as the dependent and collateral variables measured (e.g., measurement of communicative turns vs. measurement of participation) in these other investigations were different from the current investigation. Therefore, it is difficult to make direct comparisons of the typically developing child outcomes (or child with ASD who requires AAC outcomes) in the current investigation to those in prior investigations.

Further, few of the previously published research investigations reported on the generalization of child communication partner use of targeted interaction skills to a novel communication medium. Hunt, Alwell and Goetz (1991) and Goldstein, English, Shafer and Kaczmarek (1997) reported that the peer communication partners who participated in their

instructional programs generalized the use of the interaction skills they learned (i.e., "stay-play-talk" and "ask, respond, wait, respond") to other target children and/or different settings (i.e., classroom or nonclassroom) and activities (i.e., game activities). Similar results were found in these generalization conditions as were found in the generalization phase of the current investigation. Typically developing child communication partners evidenced generalized use of the targeted strategies, but at lower levels than during the intervention conditions.

The current investigation also investigated maintenance data. The data for the typically developing children in the current investigation all fall within the same range as the data for the intervention phase at one and two months post the last intervention session. This may indicate that the "read, wait, and respond" strategy was relatively easy for the children to remember and implement over an extended period of time.

Factors Potentially Contributing to the Independent Variable Hypothesis

The research literature relating to communication partner instruction in AAC and strategy learning in typically developing children suggests a number of factors that may increase the strength of the independent variable hypothesis as the most accurate explanation for the results obtained in the current investigation. These factors include elements of: (a) the instructional content, (b) the instructional format, and (c) the instructional context.

The instructional content. First, the content of the instructional program in the current investigation may contribute to the probability of the independent variable hypothesis because the component skills of the strategy taught to the typically developing children have been empirically validated in previous research investigations. As outlined in chapter 1, previously published research indicates that child communication partners for individuals who require AAC have been successfully taught to: (a) use an expectant delay (i.e., look at the child with ASD and

wait; e.g., Carter & Maxwell, 1998), and (b) respond contingently to the utterances/communications of the child with ASD who requires AAC (e.g., Carter & Maxwell, 1998; Hunt, Alwell & Goetz, 1991). Further the component skills of the strategy were simple enough for children to learn and be able to use in interactions with children with ASD who require AAC. Additionally, both waiting and responding have been shown to be effective at promoting communication and interaction with individuals who require AAC (see chapter 1 for more detailed review).

The instructional format. As mentioned above, the wait and respond portions of the strategy taught in the current investigation have been taught, in various combinations, and with various other strategy elements (e.g., asking an open ended question) to child communication partners of children who require AAC in published investigations. The format for providing instruction in the current investigation has been used in previous investigations involving adult communication partners of individuals who require AAC (e.g., Binger, et al., 2008; Kent-Walsh, 2003).

Though this study represents the first documented attempt to use this type of format in child communication partner instruction in AAC, this format of strategy instruction has been successfully used with populations of children with disabilities including learning impairments. It has been used with this population of individuals in investigations that taught strategies for meeting the demands of a classroom environment (e.g., Ellis, Deshler & Schumaker, 1989) and for homework completion (e.g., Hughes, Ruhl, Schumaker & Deshler, 2002). Due to the successful use of this type of strategy instruction with children with learning impairments, it is probable that the typically developing children in the current investigation were able to learn to use the "read, wait and respond" strategy using similar instructional format and procedures.

Generalization of the Read, Wait, Respond Strategy

All five of the typically developing children appeared to be able to generalize the use of the "read, wait and respond" strategy to another book reading medium. This may indicate that the "read, wait and respond" strategy may be utilized in book reading interactions in which the storybook is not embedded within a high technology AAC device.

If the independent variable hypothesis is the true explanation of the results, it may not be surprising that the typically developing children were able to generalize the use of the "read, wait and respond" strategy to regular storybooks. This is because the instructional format did not focus on the technology (i.e., the AAC system), but rather on the typically developing children implementing the "read, wait, and respond" strategy on every page of any book that was read. During the instructional phase the typically developing children were given many opportunities to practice the strategy while reading books, and even though all practice was completed with computer programmed storybooks, the typically developing children continued to demonstrate levels of strategy use, and interaction patterns that were different from the baseline phase, in the generalization phase with a different book condition.

As can be observed in Figure 2, the frequency of accurate implementations of the "read, wait and respond" strategy was reduced for all of the typically developing children in the generalization phase. It is not clear exactly why this reduced frequency occurred, however, it could simply be a product of the change in the way the book reading activity was set up. For the generalization phase the books were no longer embedded within a high technology AAC system. This could have affected the appeal of the activity for both groups of children. This also could have affected the frequency of accurate implementation because the typically developing children no longer had the voice output from the computer to aid them in determining when the

child with ASD had participated. Additionally, without the time delay from the voice output, it may have been harder for the typically developing children to "keep up" with the children with ASD, or remember all of the pictures that had been pointed to. Further, the voice output could have provided the typically developing children with a few extra seconds to think of a response, which they no longer had once the voice output component was removed.

Maintenance of the Read, Wait, Respond Strategy

The fact that the typically developing children appeared to be able to maintain high levels of accurate strategy implementation over a period of two months post the intervention phase may also add credibility to the independent variable hypothesis for the results of the current investigation. Long-term effects similar to those reported in the current investigation have also been reported for children with learning disabilities who were taught strategies using a similar instructional approach (e.g., Ellis et al., 1989; Hughes et al., 2002). The instructional steps in this investigation were designed to help the typically developing children to be able to accurately implement the target strategy frequently throughout joint book reading interactions. The use of a strategy instruction approach may have contributed to the children's long-term use of the strategy, because, as outlined in chapter 2, the strategy instruction approach utilized not only taught the children the "read, wait, and respond" strategy, but also provided them with the opportunity to: (a) make commitments to learning the strategy; (b) observe models of the "read, wait, and respond" strategy; (c) practice the strategy in controlled and natural settings; and (d) evaluate the effects of using the strategy on the communicative participation of the child with ASD.

Participation of the Children with ASD

The following results are also presented from the perspective of the independent variable

hypothesis. The reader is reminded however, that there is a gap (i.e., period of time in which

baseline data were not collected prior to the initiation of the intervention phase) in the data that

are presented for the participation of the children with ASD. This gap occurred during the period

of time in which the typically developing children were receiving instruction in the "read, wait

and respond" strategy. No information is available regarding other events and factors that may

have impacted the participation patterns of the children with ASD during this time period.

Because of this gap in data collection, it is not possible to determine that the change in

participation occurred before the time that the intervention phase began rather than at the onset

of the intervention phase. It is possible that the trend lines for all of the children with ASD would

have looked like Annie's, having a steady increasing slope, and not a sudden change at the onset

of the intervention phase, if data had been collected throughout the period of time in which the

typically developing children were in the instructional phase. This confound to the results of the

investigation will be discussed further in the limitations section below. Therefore, as discussed

above, there may be several other compelling explanations for the results that are discussed in

this section.

In addition to the increases in frequency of accurate strategy implementation observed in

the typically developing children, a collateral measure on the quantity of participation of the

children with ASD who required AAC was also collected. Increases in the quantity of

participation of the children with ASD during 15-minute joint book reading interactions over

baseline phase levels were evident, throughout the intervention, generalization and maintenance

phases of this investigation. However, it is important to note, that Annie's final baseline data

point was an increase from the previous data point. This makes it more difficult to evaluate an increase in her participation levels between the baseline phase and intervention phase than it is for the other four children with ASD. The data points for Annie, when graphed next to each other seem to be a straight line, and do not show an obvious increase from one phase to the next as would be expected if the independent variable had had a significant impact on her frequency of participation. The data from the children with ASD in the other four cases, however, do show a noticeable increase from baseline frequencies of participation to intervention phase frequencies of participation.

Further, the collateral data for the children with ASD also revealed that as the quantity of their participation increased from the baseline phase to other phases of the intervention, the number of pages read per session remained relatively consistent within the dyads. See Table 6, below.

Table 6. Analysis of Pages Read by Each Dyad/Case during the Book Reading Interactions.

Participant	Phase	Alice/Annie	Beth/Brenda	Connor/Chris	Diane/Dylan	Eli/Eric
Average # of Pages Read	Baseline	26 (19 – 30)	24 (17 – 29)	26 (23 – 28)	22 (19 – 25)	15 (14 - 16)
	Intervention, Generalization, Maintenance	26 (19 – 38)	25 (17 – 33)	27 (17 – 37)	18 (14 – 25)	15 (12 - 20)

Variability was noted, however in the quantity of participation of some of the children with ASD, particularly Dylan and Eric. The variability in the participation of these children may have been a result of their limited exposure to technology outside of the school environment, or because of the bilingual nature of their language learning experiences (both were learning Pennsylvania Dutch and English, with Pennsylvania Dutch being the dominant language in their home environment). Further, it could be that these children with ASD were simply less

sophisticated in their understanding of the dynamic nature of interactions. Both of these children with ASD were reported to have very low receptive language abilities and were minimally symbolic in terms of their expressive language abilities (see Participant Demographics in chapter 2). Additionally, it is possible that the stories read in these dyads were too difficult for these children with ASD, and because the stories were too complex, Dylan and Eric were unable to participate in the book reading interactions with the typically developing children. Finally, fewer pages per 15-minute interaction were read in Dylan and Eric's dyads. This could have resulted from a larger burden being placed on the typically developing children in these dyads (i.e., Diane and Eli) to "carry" these interactions. In these situations, the typically developing children may have had a hard time discerning when it was appropriate for them to take another turn in the interaction or move on to the next page in the story book because they were not given as much feedback from their communication partner and the interactions were less reciprocal.

Comparison of Results to Past Research

There are several previously published research studies that have investigated teaching child communication partners of children who require AAC (e.g., Hunt et al., 1991; Lilienfeld & Alant, 2005) and a child with ASD who required AAC (Garrison-Harrell et al., 1997) strategies for improving or increasing interaction (see chapter 1). These studies, like the current study, also collected data on behaviors related to the child(ren) who required AAC. The data from these studies and the data from the current investigation (from the perspective of the independent variable hypothesis) have suggested that instructional programs and strategies taught to typically developing child communication partners may affect changes in the behavior of the children with ASD and the children who required AAC. However, the collateral measures collected across these studies were different from each other and different from the current investigation.

For example, Hunt, Alwell and Goetz (1991) and Hunt, Alwell, Goetz and Sailor (1990) measured conversation "turntaking" and initiation of a conversation. Both of these variables involved the measurement of symbolic communication by the child who required AAC via his or her natural speech or AAC system (i.e., communication book). Additionally, these measures were not only related to the behavior(s) of the child who required AAC, but also required response from or acknowledgement from the communication partner (i.e., the typically developing child) in order to ensure the communicative and reciprocal nature of the interaction and the turns taken. This is different from the collateral measure collected on the behavior of the children with ASD who required AAC in the current investigation because these variables require social referencing of the partner to indicate intentionality and the communicative nature of the turn taken. The operational definition for the collateral measure in the current investigation did not require social referencing of the communication partner; therefore the participation reported for the children with ASD may not have been intentional or communicative in all instances. Because of the fundamental difference in the variables reported in previously published literature and the current investigation it is difficult, if not impossible, to compare the results of the current investigation in relation to the participation of the children with ASD who required AAC to the previously published literature. Further, the instructional programs and the skills taught to the typically developing child communication partners were different in these investigations than in the current investigation, therefore the results in these areas are also not directly comparable.

Factors Potentially Contributing to Increased Participation

The interaction strategy taught in the current investigation contained several component skills (i.e., wait and respond); therefore, it is not possible to identify the specific contributions of

each skill to the potential success of the strategy as a whole. Research supports the possibility that each of these component skills could have contributed to the positive changes in the children with ASD who require AAC's participation patterns as a result of the typically developing children's accurate implementation of the "read, wait, and respond" strategy.

The "wait" component. The "wait" component of the interaction strategy included two components of an expectant delay (i.e., conversational pause time (calculated by taking the typical turn transfer time of the child with ASD and adding 5 seconds) and eye contact with the child with ASD). This "wait" time ensured that the children with ASD who required AAC had a sufficient amount of time to participate in the interaction and were provided with an expectation that the time being given was for that purpose. Past research investigations have shown that this skill (i.e., waiting) can yield increased levels of communicative participation and interaction when implemented by child communication partners of individuals who require AAC (e.g., Carter & Maxwell, 1998; Hunt, Alwell & Goetz, 1991).

The "respond" component. The "respond" component of the "read, wait, and respond" strategy may have provided reinforcement to the children with ASD after their attempts to participate. Reinforcement has been shown to be important in increasing the frequency of communicative behaviors exhibited by children with ASD (e.g., Koegel, 1995) as well as for children who require AAC (e.g., Beukelman & Mirenda, 2005; Harwood, Warren & Yoder, 2002). Further, previous research on training child communication partners of children who require AAC that have included responding as part of the intervention (e.g., Carter & Maxwell, 1998; Hunt, Alwell & Goetz, 1991), have demonstrated that this type of support can be effective at increasing communicative interaction and social participation of individuals who require AAC.

It is important to note that the data reported regarding the participation by the children with ASD who require AAC do not necessarily indicate that learning took place for the child with ASD. These data merely indicate that the children with ASD demonstrated an increase in participation, which they had previously done during the baseline phase (i.e., all of the children with ASD participated during the book reading interactions prior to the typically developing children being instructed in how to use the "read, wait, and respond" strategy). Further, all of the children with ASD who required AAC in the current investigation were intentional and at least minimally symbolic prior to their participation in the current project. Although it is possible the children with ASD learned some new vocabulary items as a result of the book reading interactions, it is not possible to know this information definitely based on the data that were collected. It is possible that the quality of the interaction did not change as a result of the typically developing children's use of the "read, wait and respond" strategy. The communicative nature of the participation by the children with ASD cannot be determined from the data collected in the current investigation. All that can be determined from the current data is that the quantity of participation in the interactions by the children with ASD increased.

As reported in chapter 3, the quantity of participation during the generalization phase was similar (only slightly higher) to the quantity exhibited during the baseline phase. There are several possible explanations, within the independent variable hypothesis, for this decrease in participation. First, during the generalization phase, the children with ASD did not have access to the high technology AAC system, the main mode for participation for most of the children with ASD who required AAC in the other phases of this investigation (see chapter 3). Because of this, their modes for participation were fewer than in any other phase of the investigation. Second, the change in the pattern of accurate strategy implementation by the typically developing children

during the generalization phase could have impacted the participation patterns of the children with ASD. Because the typically developing children were accurately implementing the strategy at a lower frequency during this phase than during the intervention and maintenance phases, the children with ASD may have had fewer opportunities to participate in the book reading interaction during this phase. Finally, the children with ASD were not provided with any instruction regarding the fact that they could point to the pictures in the storybook to participate. In order to take advantage of this acceptable form of participation within the interaction, the child with ASD had to discover to this form of participation on his or her own. This may have been difficult for the children with ASD who were beginning communicators who may not have been able to make such adjustments intuitively.

Implications of the Findings

Clinical Implications

There is one potential clinical implication of the current investigation. The results of this investigation suggest that typically developing children can learn a communicative strategy that allowed them to change the way they interacted with children with ASD who require AAC during book reading activities. This instructional program potentially reduced the knowledge, skill and attitude barriers of the typically developing children that may have contributed to their lack of interaction with the children with ASD who required AAC prior to their involvement in the current investigation. The social validity data gathered from the typically developing child participants and their general education teacher may support this conclusion.

While this is a potentially important clinical implication of the current investigation, this study represents only the first step in a line of research focused on building interactions between children with ASD who require AAC and typically developing children. It has been suggested,

through the results of the cases in the present study, that typically developing child communication partners can be provided with instruction in an interaction strategy that may promote more equal participation in book reading interactions. However, further experimentally controlled studies should be conducted to determine with more confidence if an instructional program, such as the one used in the current investigation, can actually effect changes in the behaviors of typically developing children and children with ASD who require AAC.

<div align="center">Limitations of the Study</div>

Despite the relatively consistent pattern of results across the cases in the current investigation, the following limitations must be considered when interpreting the results of this study and in identifying future research directions. The first and major limitation is the A-B case study design. Though this investigation reported data for five cases, A-B designs are the weakest of the single subject designs because the relationship between the dependent variable and the independent variable cannot be firmly established. Although the changes reported in the behaviors of the typically developing children and the children with ASD who require AAC have been discussed in relation to the independent variable hypothesis, it is important to note that the other hypotheses or explanations of the results are possible (see discussions of these above; Richards, et al., 1999). Though some strength may be added to the results reported due to the fact that all five cases responded to the intervention with similar results, a cause and effect relationship cannot be definitely established. Therefore, while all of the participating typically developing children demonstrated positive outcomes, replication of the study using a stronger single subject design is required to strengthen the internal and external validity of these results. Investigation of the effects of the instructional program on additional groups of children, other than children with ASD, who require AAC is also warranted.

A second limitation of the current investigation is the gap in the data collection between the baseline and intervention phases. Because of this gap in data collection the predictability function of the baseline data was removed, and internal validity was jeopardized. Stability of the baseline may also have been compromised by this gap in data collection. It cannot be determined if an increasing trend would have been observed if these data had been continually collected until the onset of the intervention phase. The gap in the data prevents determination of the true level of skill of the children with ASD and the typically developing children prior to the intervention phase. Future studies could avoid this limitation by continually collecting data for the dependent variable and the collateral measure throughout the instructional phase of the study. This limitation could also be avoided by completing the instructional phase in a shorter amount of time, that is, the amount of time that would typically be present between data collection sessions.

A third limitation of the current investigation was the lack of information about the language skills of the children with ASD. Though some information was gathered, through the use of observation, parent and teacher report and the *Communication Matrix*, all of these are descriptive measures and not reliable forms of assessment. In the future, in addition to using a more standard, valid and reliable method of collecting information about language functioning (e.g., use of the *MacArther Communication Development Inventory*), more information regarding expressive and receptive language skills of the five children would be helpful (a) in assuring that the storybooks selected were not only interesting and motivating to the child with ASD, but also matched their language levels; (b) in providing instruction to the typically developing children regarding what the children would understand in terms of responses; (c) in making sure "hotspots" available were appropriate given the child with ASD's language level; (d) in determining what an increase in performance indicates in terms of language and communication;

and (e) in determining how the results of the investigation might generalize to other children with ASD.

The fourth limitation of this investigation was the way that the procedural and interobserver reliability measures were collected. In terms of procedural reliability, these measures are typically collected for each individual instance of an element within a procedural step. However in the current investigation, the procedural reliability was collected at the broader whole step level. Because of the use of this nontraditional method of procedural reliability in the current investigation, it is impossible to be sure that the procedures were followed exactly in every instance they were implemented across the investigation. There could have been some variation in the procedures for some individual instances of an element of the instructional procedures that impacted the results of the investigation, or the learning for the typically developing children. In terms of the interobserver reliability, agreement was calculated for the accurate implementation of the target strategy by the typically developing child as well as for the participation of the child with ASD on a book by book and page by page basis, that is for each page read in each book the codes regarding the frequency of strategy implementations by the typically developing child and the participation of the child with ASD (what and how) were compared across the reliability coders. It is possible that because a videotape time counter was not used, that the point by point reliability may not have been accurate, however because of the high number of agreements between the coders related to both the dependent measure and the collateral measure it is not likely that agreement levels would have changed dramatically, or fallen below 90% if timer counter numbers had been used instead of book and page comparisons.

Directions for Future Research

Based on the results of the current investigation there are several potential directions for future research. The greatest priority for future research is to replicate the results of the current investigation utilizing a research design that establishes experimental control, such as a multiple baseline design. After effects of the intervention are established in an experimentally controlled study, other future studies should include other children with ASD as well as children from other disability categories (other than ASD), and use a variety of AAC systems (other high tech AAC systems and low tech communication systems). This, of course, would require modifications to the procedures of the current investigation in that with other AAC systems the storybooks may not be able to be embedded within the AAC system.

Another possible direction for future research would be to examine the typically developing children's ability to transfer accurate implementation of the "read, wait, and respond" strategy to other children with ASD who require AAC, other children with ASD who do not require AAC, as well as other children who require AAC (who do not have a diagnosis of ASD) who did not directly participate in the instructional program. This extension of the current investigation may increase the generalizability of the implementation of this strategy with other child populations, and may show the significance of the strategy as a joint book reading strategy for other types of reading dyads.

In a further effort to investigate the generalization of the current instructional program, it may be important to implement the instructional program with younger same-age peers, parents, teachers and other school personnel. This would allow the benefits for the children with ASD who require AAC to be extended to other contexts (e.g., the home environment) and maintained throughout the school day. It is also important to determine whether the current instructional

program could be used to teach same age peers of children with ASD who require AAC, so that social interactions between children within the same classroom and age range can be examined in various social settings and activities.

Further investigations to determine the relative contributions of the individual strategy steps will be helpful in determining the most appropriate modifications and additions to the current strategy. It would be important to determine whether similar results could be obtained by teaching typically developing child communication partners a strategy with a greater or fewer number of components. Increasing or decreasing the components in the strategy could be investigated in terms of facilitating development of different social interaction and language skills for children with ASD.

Furthermore, the "cost efficiency" of the program may be increased by examining the effect of including of fewer instructional activities in the instructional program to teach the "read, wait, and respond" strategy. For example, future research may reveal that similar positive outcomes could be obtained without including as many steps in the introductory sessions (i.e., strategy description, commitment, model the intervention, verbal practice, controlled practice and feedback).

Finally, although the current investigation suggested that the instructional program may be effective in increasing the participation of the children with ASD who require AAC during joint book reading interactions, other potential communication, language and literacy outcomes should also be investigated. Therefore, the addition of components to the instructional protocol that would allow the child dyads to interact during activities promoting quality of communicative interactions (instead of quantity of participation as in the current investigation), language and literacy skills would be logical next steps in increasing the benefits of the program for the

children with ASD who require AAC. For example, it may be beneficial to the children with ASD who require AAC to target, and collect data regarding, their use of intentional and symbolic communicative turns, certain specific vocabulary items or grammatical structures through modifications to the instructional protocol used in the current investigation.

Conclusion

The current study contributes some information to suggest that child communication partner instruction may causes changes in the behavior of typically developing children during interactions with children with ASD who require AAC. Overall, the results of the current investigation provide only limited evidence of using a strategy instruction approach for child communication partner instruction in AAC. Results also indicate that it may be possible to increase the participation of children with ASD who require AAC during joint book reading interactions. Finally, the generalization and maintenance data suggest that the strategy learned by the typically developing children may be generalized to another book reading medium, and that the strategy may have been easy enough for the children to learn and remember to use the strategy over an extended period of time (i.e., at least two months).

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APPENDIX A

Hotspots for Books Read by Alice and Annie

Dyad	Book	Double Page Spread	Hotspots	Total Hotspots on Double Page Spread
Alice Annie	What to Do Blue?	1	Text (book line) Window Chair Blue Phone	4
		2	Text #1 (book line) Tree Blue Shovel Pail Sand Castle Text #2 (book line) Shovel Pail	9
		3	Text #1 (book line) Blue Clue Mrs. Pepper Mr. Salt Paprika Text #2 (book line) Mr. Salt Mrs. Pepper Paprika	10
		4	Text #1 (book line) Tickety Tock Blue Text #2 (book line) Tickety Tock	5
		5	Text #1 (book line) Slippery Soap Blue Text #2 (book line) Slippery Soap Bubble	6
		6	Text #1 (book line) Blue's house Flowers Tree Blue	8

	Mailbox	
	Text #2 (book line)	
	Mailbox	
7	Text #1 (book line)	7
	Felt Friends	
	Blue	
	Book	
	Clue	
	Text #2 (book line)	
	Felt Friends	
8	Text #1 (book line)	8
	Blue	
	Text #2 (book line)	
	Text #3 (book line)	
	Text #4 (book line)	
	Blue	
	Blue	
	Blue	
9	Text #1 (book line)	11
	Blue	
	Text #2 (book line)	
	Text #3 (book line)	
	Blue	
	Shovel & Pail	
	Mr. Salt	
	Mrs. Pepper & Paprika	
	Tickety Tock	
	Slippery Soap	
	Mailbox	
10	Text #1 (book line)	12
	Blue	
	Shovel & Pail	
	Mr. Salt	
	Mrs. Pepper	
	Paprika	
	Tickety Tock	
	Text #2 (book line)	
	Slippery Soap	
	Mailbox	
	Felt Friends	
	Blue	
11	Text #1 (book line)	12
	Shovel	
	Pail	
	Felt Friends	
	Tickety Tock	

			crayon	
			Text #2 (book line)	
			Blue	
			Mailbox	
			Slippery Soap	
			Crayon	
			Mr. Salt & Mrs. Pepper	
		12	Text #1 (book line)	7
			Mailbox	
			Shovel & Pail	
			Felt Friends	
			Tickety Tock	
			Mr. Salt, Mrs. Pepper & Paprika	
			Blue	
Alice Annie	Meet Diego	1	Text #1 (book line)	4
			Dora	
			Boots	
			Anteater	
		2	Text #1 (book line)	6
			Dora	
			Boots	
			Baby Bear	
			Text #2 (book line)	
			Diego	
		3	Text #1 (book line)	9
			Dora	
			Boots	
			Diego	
			Text #2 (book line)	
			Map	
			Rain forest	
			Cave	
			Waterfall	
		4	Text #1 (book line)	13
			Dora	
			Diego	
			Boots	
			Ladder	
			Text #2 (book line)	
			Rung (x6)	
			Rope	
		5	Text #1 (book line)	4
			Diego	
			Dora	
			Boots	
		6	Text #1 (book line)	7

	Dora	
	Diego	
	Boots	
	Swiper	
	Text #2 (book line)	
	Swiper	
7	Text #1 (book line)	6
	Dora	
	Diego	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
8	Text #1 (book line)	11
	Diego	
	Dolphin	
	Text #2 (book line)	
	Backpack	
	Flashlight	
	Book	
	Yo-yo	
	Rope	
	Doll	
	Soap	
9	Text #1 (book line)	6
	Diego	
	Dora	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
10	Text #1 (book line)	7
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
	Eagle	
11	Text #1 (book line)	6
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
12	Text #1 (book line)	6
	Mom Jaguar	
	Baby Jaguar	
	Boots	

			Dora	
			Diego	
Alice	Joe Moves	1	Text #1 (book line)	4
Annie	In		Blue	
			Joe	
			Boris	
		2	Text #1 (book line)	5
			Steve	
			Mailbox	
			Text #2 (book line)	
			Boris	
		3	Text #1 (book line)	6
			Sun	
			Tickety Tock	
			Text #2 (book line)	
			Boris	
			Blue	
		4	Text #1 (book line)	8
			Slippery Soap	
			Toothbrush	
			Text #2 (book line)	
			Boris	
			Toothpaste	
			Water	
			Joe	
		5	Text #1 (book line)	9
			Shirts	
			Text #2 (book line)	
			Blue	
			Yellow	
			Read	
			Green	
			Orange	
			Purple	
		6	Text #1 (book line)	11
			Joe	
			Mr. Salt & Mrs. Pepper	
			Eggs	
			Cereal	
			Toast	
			Milk	
			Text #2	
			Mr. Salt & Mrs. Pepper	
			Paprika	
			Boris	
		7	Text #1 (book line)	9

	Grey dog	
	Brown dog	
3	Text #1 (book line)	7
	House	
	Brown dog	
	Little dog	
	Text #2 (book line)	
	Emily Elizabeth	
	Tree	
4	Text #1 (book line)	6
	Clifford	
	Emily Elizabeth	
	Text #2 (book line)	
	Clifford	
	Emily Elizabeth	
5	Text #1 (book line)	8
	Emily Elizabeth	
	Clifford	
	Stick	
	Text #2 (book line)	
	Clifford	
	Emily Elizabeth	
	Policeman	
6	Text #1 (book line)	7
	Emily Elizabeth	
	Clifford	
	Text #2 (book line)	
	Clifford	
	House	
	Emily Elizabeth	
7	Text #1 (book line)	7
	Moon	
	Clifford	
	Emily Elizabeth	
	Bed	
	Text #2	
	House Clifford	
8	Text #1 (book line)	6
	Emily Elizabeth	
	Text #2 (book line)	
	Clifford	
	Car	
	Emily Elizabeth	
9	Text #1 (book line)	7
	Clifford	
	Lion	

			Zookeeper	
			Text #2 (book line)	
			Clifford	
			Emily Elizabeth	
		10	Text #1 (book line)	7
			Clifford	
			Shoe	
			Shoe Store	
			Text #2 (booline)	
			Emily Elizabeth	
			Clifford	
		11	Text #1 (book line)	6
			House	
			Doghouse	
			Text #2 (book line)	
			Clifford	
			Pig	
		12	Text #1 (book line)	8
			Clifford	
			Emily Elizabeth	
			Boys	
			Text #2 (book line)	
			Emily Elizabeth	
			Clifford	
			Bath	
		13	Text #1 (book line)	7
			Clifford	
			Emily Elizabeth	
			Text #2 (book line)	
			Clifford	
			Brown dog	
			Grey dog	
		14	Text #1 (book line)	5
			Big dog	
			Spotted dog	
			Black dog	
			Little dog	
		15	Text #1 (book line)	4
			Clifford	
			House	
			Emily Elizabeth	
Alice	Dora and	1	Text #1 (book line)	4
Annie	Little Star		Dora	
			Boots	
			Moon & star	
		2	Text #1 (book line)	6

	Comet	
	Little Star	
	Moon	
	Dora	
	Boots	
3	Text #1 (book line)	9
	Dora	
	Boots	
	Little Star	
	Text #2 (book line)	
	Map	
	Moon	
	Troll Bridge	
	Tico's Tree	
4	Text #1 (book line)	17
	Dora	
	Boots	
	Little Star	
	Star (x5)	
	Text #2 (book line)	
	Troll	
	Star (x5)	
	Bridge	
5	Text #1 (book line)	6
	Dora	
	Little Star	
	Text #2 (book line)	
	Boots	
	Tico's Tree	
6	Text #1 (book line)	7
	Tico	
	Dora	
	Little Star	
	Boots	
	Tico's Tree	
	Swiper	
7	Text #1 (book line)	8
	Little Star	
	Dora	
	Boots	
	Text #2 (book line)	
	Moon	
	Big Mountain	
	Swiper	
8	Text #1 (book line)	5
	Boots	

			Little Star	
			Dora	
			Moon	
		9	Text #1 (book line)	6
			Dora	
			Boots	
			Text #2 (book line)	
			Little Star	
			Moon	
		10	Text #1 (book line)	6
			Boots	
			Dora	
			Tico	
			Little Star	
			Moon	
		11	Text #1 (book line)	4
			Dora	
			Boots	
			Tico	
		12	Text #1 (book line)	6
			Tico	
			Dora	
			Boots	
			Little Star	
			Moon	
Alice Annie	Blue Skidoos to the Farm	1	Text #1 (book line)	4
			Blue	
			House	
			Steve	
		2	Text #1 (book line)	5
			Steve	
			Footprints	
			Footprints	
			Blue	
		3	Text #1 (book line)	7
			Steve	
			Bird	
			Worm	
			Text #2 (book line)	
			Bunny	
			Blue	
		4	Text #1 (book line)	8
			Shovel	
			Pail	
			Beehive	
			Text #2 (book line)	

	Bird	
	Blue	
	Pond	
5	Text #1 (book line)	6
	Phone	
	Chair	
	Picture frame	
	Blue	
	Steve	
6	Text #1 (book line)	6
	Steve	
	Blue	
	Farm	
	Text #2 (book line)	
	Barn	
7	Text #1 (book line)	8
	Duck	
	Frog	
	Sheep	
	Horse	
	Pig	
	Cow	
	Barn	
8	Duck	8
	Frog	
	Sheep	
	Text #1 (book line)	
	Horse	
	Pig	
	Cow	
	Barn	
9	Text #1 (book line)	10
	Blue	
	Steve	
	Sheep	
	Clue	
	Horse	
	Pig	
	Cow	
	Frog	
	Barn	
10	Text #1 (book line)	8
	Steve	
	Notebook	
	Pig	
	Frog	

			Sheep	
			Horse	
			Cow	
		11	Text #1 (book line)	6
			Blue	
			Steve	
			Notebook	
			Text #2 (book line)	
			Steve	
		12	Text #1 (book line)	5
			Blue	
			Duck	
			Mr. Salt	
			Mrs. Pepper	
Alice Annie	Friendly, Frosty Monsters	1	Text #1 (book line)	4
			Elmo	
			Fish	
			Car	
		2	Text #1 (book line)	5
			Fairy	
			Snuffleupigus	
			Alice	
			Big Bird	
		3	Text #1 (book line)	6
			Big Bird	
			Cookie Monster	
			Elmo	
			Grover	
			Bert & Ernie	
		4	Text #1 (book line)	15
			Sheep (x5)	
			Little Bo Peep	
			Text #2 (book line)	
			Elmo	
			Fairy	
			Sheep (x5)	
		5	Text #1 (book line)	6
			Baby Bear	
			Super Grover	
			Jack	
			Jill	
			Sled	
		6	Text #1 (book line)	6
			Count Dracula	
			Count's Mom	
			Super Grover	

			Baby Bear	
			Little Bo Peep	
		7	Text #1 (book line)	6
			Bert	
			Little Red Riding Hood	
			Wolf	
			Rabbit	
			Bird	
		8	Text #1 (book line)	7
			Elmo	
			Ernie	
			Bert	
			Oscar the Grouch	
			Grouch	
			Snowman	
		9	Text #1 (book line)	7
			Cookie Monster	
			Big Bird	
			Elmo	
			Fairy	
			Oscar the Grouch	
			Snowballs	
		10	Text #1 (book line)	8
			Grover	
			Bert	
			Elmo	
			Fairy	
			Ernie	
			Big Bird	
			Oscar the Grouch	
		11	Text #1 (book line)	4
			Ernie	
			Pink Twiddle	
			Blue Twiddle	
		12	Text #1 (book line)	3
			Elmo	
			Fish	
Alice Annie	Blue's Big Parade	1	Text #1 (book line)	7
			Purple Kangaroo	
			Joe	
			Blue	
			Periwinkle	
			Magenta	
			Green Puppy	
		2	Text #1 (book line)	8
			Green Puppy	

Blue
Periwinkle
Text #2 (book line)
Purple Kangaroo
Magenta
Joe
3   Text #1 (book line)   7
Tickety Tock
Periwinkle
Text #2 (book line)
Magenta
Blue
Mr. Salt & Mrs. Pepper
4   Text #1 (book line)   11
Blue
Magenta
Mr. Salt
Periwinkle
Text #2 (book line)
Green Puppy
Mrs. Pepper
Purple Kangaroo
Joe
Tickety Tock
5   Text #1 (book line)   5
Magenta
Green Puppy
Periwinkle
Blue
6   Text #1 (book line)   8
Blue
Green Puppy
Text #2 (book line)
Purple Kangaroo
Magenta
Periwinkle
Tickety Tock
7   Text #1 (book line)   7
Joe
Magenta
Text #2 (book line)
Blue
Periwinkle
Purple Kangaroo
8   Text #1 (book line)   9
Green Puppy

			Magenta	
			Blue	
			Text #2 (book line)	
			Periwinkle	
			Purple Kangaroo	
			Joe	
			Tickety Tock	
		9	Text #1 (book line)	8
			Blue	
			Text #2 (book line)	
			Purple Kangaroo	
			Magenta	
			Periwinkle	
			Green Puppy	
			Tickety Tock	
		10	Text #1 (book line)	8
			Blue	
			Magenta	
			Text #2 (book line)	
			Green Puppy	
			Periwinkle	
			Purple Kangaroo	
			Tickety Tock	
		11	Text #1 (book line)	10
			Blue	
			Green Puppy	
			Mr. Salt, Mrs. Pepper & Paprika	
			Magenta	
			Text #2 (book line)	
			Purple Kangaroo	
			Joe	
			Mailbox	
			Periwinkle	
		12	Text #1 (book line)	4
			Yellow firework	
			Orange firework	
			Blue firework	
Alice Annie	Dora's Backpack	1	Text #1 (book line)	4
			Dora	
			Backpack	
			Boots	
		2	Text #1 (book line)	9
			Map	
			Dora	
			Boots	
			Text #2 (book line)	

	Map	
	Troll Bridge	
	Turtle River	
	Library	
3	Text #1 (book line)	6
	Dora	
	Boots	
	Text #2 (book line)	
	Troll	
	Net	
4	Text #1 (book line)	9
	Dora	
	Backpack	
	Umbrella	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
5	Text #1 (book line)	12
	Rain cloud	
	Dora	
	Text #2 (book line)	
	Boots	
	Backpack	
	Umbrella	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
6	Text #1 (book line)	11
	Dora	
	Umbrella	
	Boots	
	Text #2 (book line)	
	Backpack	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
7	Text #1 (book line)	12
	Boots	
	Rope	
	Text #2 (book line)	

	Dora	
	Backpack	
	Umbrella	
	Scissors	
	Books	
	Band-aid	
	Life jackets	
	Boat	
8	Text #1 (book line)	5
	Swiper	
	Dora	
	Boots	
	Boat	
9	Text #1 (book line)	4
	Dora	
	Boots	
	Library	
10	Text #1 (book line)	4
	Dora	
	Boots	
	Door	
11	Text #1 (book line)	11
	Dora	
	Boots	
	Book (x4)	
	Book (x4)	
12	Text #1 (book line)	4
	Dora	
	Boots	
	Backpack	

APPENDIX B

Hotspots for Books Read by Beth and Brenda

Dyad	Book	Double Page Spread	Hotspots	Total Hotspots on Double Page Spread
Beth Brenda	What to Do Blue?	1	Text (book line) Window Chair Blue Phone	4
		2	Text #1 (book line) Tree Blue Shovel Pail Sand Castle Text #2 (book line) Shovel Pail	9
		3	Text #1 (book line) Blue Clue Mrs. Pepper Mr. Salt Paprika Text #2 (book line) Mr. Salt Mrs. Pepper Paprika	10
		4	Text #1 (book line) Tickety Tock Blue Text #2 (book line) Tickety Tock	5
		5	Text #1 (book line) Slippery Soap Blue Text #2 (book line) Slippery Soap Bubble	6
		6	Text #1 (book line) Blue's house Flowers Tree Blue	8

	Mailbox	
	Text #2 (book line)	
	Mailbox	
7	Text #1 (book line)	7
	Felt Friends	
	Blue	
	Book	
	Clue	
	Text #2 (book line)	
	Felt Friends	
8	Text #1 (book line)	8
	Blue	
	Text #2 (book line)	
	Text #3 (book line)	
	Text #4 (book line)	
	Blue	
	Blue	
	Blue	
9	Text #1 (book line)	11
	Blue	
	Text #2 (book line)	
	Text #3 (book line)	
	Blue	
	Shovel & Pail	
	Mr. Salt	
	Mrs. Pepper & Paprika	
	Tickety Tock	
	Slippery Soap	
	Mailbox	
10	Text #1 (book line)	12
	Blue	
	Shovel & Pail	
	Mr. Salt	
	Mrs. Pepper	
	Paprika	
	Tickety Tock	
	Text #2 (book line)	
	Slippery Soap	
	Mailbox	
	Felt Friends	
	Blue	
11	Text #1 (book line)	12
	Shovel	
	Pail	
	Felt Friends	
	Tickety Tock	

			crayon	
			Text #2 (book line)	
			Blue	
			Mailbox	
			Slippery Soap	
			Crayon	
			Mr. Salt & Mrs. Pepper	
		12	Text #1 (book line)	7
			Mailbox	
			Shovel & Pail	
			Felt Friends	
			Tickety Tock	
			Mr. Salt, Mrs. Pepper & Paprika	
			Blue	
Beth Brenda	Meet Diego	1	Text #1 (book line)	4
			Dora	
			Boots	
			Anteater	
		2	Text #1 (book line)	6
			Dora	
			Boots	
			Baby Bear	
			Text #2 (book line)	
			Diego	
		3	Text #1 (book line)	9
			Dora	
			Boots	
			Diego	
			Text #2 (book line)	
			Map	
			Rain forest	
			Cave	
			Waterfall	
		4	Text #1 (book line)	13
			Dora	
			Diego	
			Boots	
			Ladder	
			Text #2 (book line)	
			Rung (x6)	
			Rope	
		5	Text #1 (book line)	4
			Diego	
			Dora	
			Boots	
		6	Text #1 (book line)	7

	Dora	
	Diego	
	Boots	
	Swiper	
	Text #2 (book line)	
	Swiper	
7	Text #1 (book line)	6
	Dora	
	Diego	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
8	Text #1 (book line)	11
	Diego	
	Dolphin	
	Text #2 (book line)	
	Backpack	
	Flashlight	
	Book	
	Yo-yo	
	Rope	
	Doll	
	Soap	
9	Text #1 (book line)	6
	Diego	
	Dora	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
10	Text #1 (book line)	7
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
	Eagle	
11	Text #1 (book line)	6
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
12	Text #1 (book line)	6
	Mom Jaguar	
	Baby Jaguar	
	Boots	

			Dora	
			Diego	
Beth	Joe Moves	1	Text #1 (book line)	4
Brenda	In		Blue	
			Joe	
			Boris	
		2	Text #1 (book line)	5
			Steve	
			Mailbox	
			Text #2 (book line)	
			Boris	
		3	Text #1 (book line)	6
			Sun	
			Tickety Tock	
			Text #2 (book line)	
			Boris	
			Blue	
		4	Text #1 (book line)	8
			Slippery Soap	
			Toothbrush	
			Text #2 (book line)	
			Boris	
			Toothpaste	
			Water	
			Joe	
		5	Text #1 (book line)	9
			Shirts	
			Text #2 (book line)	
			Blue	
			Yellow	
			Read	
			Green	
			Orange	
			Purple	
		6	Text #1 (book line)	11
			Joe	
			Mr. Salt & Mrs. Pepper	
			Eggs	
			Cereal	
			Toast	
			Milk	
			Text #2	
			Mr. Salt & Mrs. Pepper	
			Paprika	
			Boris	
		7	Text #1 (book line)	9

	Grey dog	
	Brown dog	
3	Text #1 (book line)	7
	House	
	Brown dog	
	Little dog	
	Text #2 (book line)	
	Emily Elizabeth	
	Tree	
4	Text #1 (book line)	6
	Clifford	
	Emily Elizabeth	
	Text #2 (book line)	
	Clifford	
	Emily Elizabeth	
5	Text #1 (book line)	8
	Emily Elizabeth	
	Clifford	
	Stick	
	Text #2 (book line)	
	Clifford	
	Emily Elizabeth	
	Policeman	
6	Text #1 (book line)	7
	Emily Elizabeth	
	Clifford	
	Text #2 (book line)	
	Clifford	
	House	
	Emily Elizabeth	
7	Text #1 (book line)	7
	Moon	
	Clifford	
	Emily Elizabeth	
	Bed	
	Text #2	
	House Clifford	
8	Text #1 (book line)	6
	Emily Elizabeth	
	Text #2 (book line)	
	Clifford	
	Car	
	Emily Elizabeth	
9	Text #1 (book line)	7
	Clifford	
	Lion	

			Zookeeper	
			Text #2 (book line)	
			Clifford	
			Emily Elizabeth	
		10	Text #1 (book line)	7
			Clifford	
			Shoe	
			Shoe Store	
			Text #2 (booline)	
			Emily Elizabeth	
			Clifford	
		11	Text #1 (book line)	6
			House	
			Doghouse	
			Text #2 (book line)	
			Clifford	
			Pig	
		12	Text #1 (book line)	8
			Clifford	
			Emily Elizabeth	
			Boys	
			Text #2 (book line)	
			Emily Elizabeth	
			Clifford	
			Bath	
		13	Text #1 (book line)	7
			Clifford	
			Emily Elizabeth	
			Text #2 (book line)	
			Clifford	
			Brown dog	
			Grey dog	
		14	Text #1 (book line)	5
			Big dog	
			Spotted dog	
			Black dog	
			Little dog	
		15	Text #1 (book line)	4
			Clifford	
			House	
			Emily Elizabeth	
Beth Brenda	Dora and Little Star	1	Text #1 (book line)	4
			Dora	
			Boots	
			Moon & star	
		2	Text #1 (book line)	6

	Comet	
	Little Star	
	Moon	
	Dora	
	Boots	
3	Text #1 (book line)	7
	Dora	
	Boots	
	Little Star	
	Text #2 (book line)	
	Map	
	Moon	
4	Text #1 (book line)	16
	Dora	
	Boots	
	Little Star	
	Star (x5)	
	Text #2 (book line)	
	Troll	
	Star (x5)	
5	Text #1 (book line)	5
	Dora	
	Little Star	
	Text #2 (book line)	
	Boots	
6	Text #1 (book line)	7
	Tico	
	Dora	
	Little Star	
	Boots	
	Tico's Tree	
	Swiper	
7	Text #1 (book line)	7
	Little Star	
	Dora	
	Boots	
	Text #2 (book line)	
	Moon	
	Swiper	
8	Text #1 (booline)	5
	Boots	
	Little Star	
	Dora	
	Moon	
9	Text #1 (book line)	6
	Dora	

			Boots	
			Text #2 (book line)	
			Little Star	
			Moon	
		10	Text #1 (book line)	6
			Boots	
			Dora	
			Tico	
			Little Star	
			Moon	
		11	Text #1 (book line)	4
			Dora	
			Boots	
			Tico	
		12	Text #1 (book line)	6
			Tico	
			Dora	
			Boots	
			Little Star	
			Moon	
Beth Brenda	Blue Skidoos to the Farm	1	Text #1 (book line)	4
			Blue	
			House	
			Steve	
		2	Text #1 (book line)	5
			Steve	
			Footprints	
			Footprints	
			Blue	
		3	Text #1 (book line)	7
			Steve	
			Bird	
			Worm	
			Text #2 (book line)	
			Bunny	
			Blue	
		4	Text #1 (book line)	8
			Shovel	
			Pail	
			Beehive	
			Text #2 (book line)	
			Bird	
			Blue	
			Pond	
		5	Text #1 (book line)	6
			Phone	

	Chair	
	Picture frame	
	Blue	
	Steve	
6	Text #1 (book line)	6
	Steve	
	Blue	
	Farm	
	Text #2 (book line)	
	Barn	
7	Text #1 (book line)	8
	Duck	
	Frog	
	Sheep	
	Horse	
	Pig	
	Cow	
	Barn	
8	Duck	8
	Frog	
	Sheep	
	Text #1 (book line)	
	Horse	
	Pig	
	Cow	
	Barn	
9	Text #1 (book line)	10
	Blue	
	Steve	
	Sheep	
	Clue	
	Horse	
	Pig	
	Cow	
	Frog	
	Barn	
10	Text #1 (book line)	8
	Steve	
	Notebook	
	Pig	
	Frog	
	Sheep	
	Horse	
	Cow	
11	Text #1 (book line)	6
	Blue	

			Steve	
			Notebook	
			Text #2 (book line)	
			Steve	
		12	Text #1 (book line)	5
			Blue	
			Duck	
			Mr. Salt	
			Mrs. Pepper	
Beth Brenda	Friendly, Frosty Monsters	1	Text #1 (book line)	4
			Elmo	
			Fish	
			Car	
		2	Text #1 (book line)	5
			Fairy	
			Snuffleupigus	
			Alice	
			Big Bird	
		3	Text #1 (book line)	6
			Big Bird	
			Cookie Monster	
			Elmo	
			Grover	
			Bert & Ernie	
		4	Text #1 (book line)	15
			Sheep (x5)	
			Little Bo Peep	
			Text #2 (book line)	
			Elmo	
			Fairy	
			Sheep (x5)	
		5	Text #1 (book line)	6
			Baby Bear	
			Super Grover	
			Jack	
			Jill	
			Sled	
		6	Text #1 (book line)	6
			Count Dracula	
			Count's Mom	
			Super Grover	
			Baby Bear	
			Little Bo Peep	
		7	Text #1 (book line)	6
			Bert	
			Little Red Riding Hood	

			Wolf	
			Rabbit	
			Bird	
		8	Text #1 (book line)	7
			Elmo	
			Ernie	
			Bert	
			Oscar the Grouch	
			Grouch	
			Snowman	
		9	Text #1 (book line)	7
			Cookie Monster	
			Big Bird	
			Elmo	
			Fairy	
			Oscar the Grouch	
			Snowballs	
		10	Text #1 (book line)	8
			Grover	
			Bert	
			Elmo	
			Fairy	
			Ernie	
			Big Bird	
			Oscar the Grouch	
		11	Text #1 (book line)	4
			Ernie	
			Pink Twiddle	
			Blue Twiddle	
		12	Text #1 (book line)	3
			Elmo	
			Fish	
Beth Brenda	Blue's Big Parade	1	Text #1 (book line)	7
			Purple Kangaroo	
			Joe	
			Blue	
			Periwinkle	
			Magenta	
			Green Puppy	
		2	Text #1 (book line)	8
			Green Puppy	
			Blue	
			Periwinkle	
			Text #2 (book line)	
			Purple Kangaroo	
			Magenta	

	Joe	
3	Text #1 (book line)	7
	Tickety Tock	
	Periwinkle	
	Text #2 (book line)	
	Magenta	
	Blue	
	Mr. Salt & Mrs. Pepper	
4	Text #1 (book line)	11
	Blue	
	Magenta	
	Mr. Salt	
	Periwinkle	
	Text #2 (book line)	
	Green Puppy	
	Mrs. Pepper	
	Purple Kangaroo	
	Joe	
	Tickety Tock	
5	Text #1 (book line)	5
	Magenta	
	Green Puppy	
	Periwinkle	
	Blue	
6	Text #1 (book line)	8
	Blue	
	Green Puppy	
	Text #2 (book line)	
	Purple Kangaroo	
	Magenta	
	Periwinkle	
	Tickety Tock	
7	Text #1 (book line)	7
	Joe	
	Magenta	
	Text #2 (book line)	
	Blue	
	Periwinkle	
	Purple Kangaroo	
8	Text #1 (book line)	9
	Green Puppy	
	Magenta	
	Blue	
	Text #2 (book line)	
	Periwinkle	
	Purple Kangaroo	

			Joe	
			Tickety Tock	
		9	Text #1 (book line)	8
			Blue	
			Text #2 (book line)	
			Purple Kangaroo	
			Magenta	
			Periwinkle	
			Green Puppy	
			Tickety Tock	
		10	Text #1 (book line)	8
			Blue	
			Magenta	
			Text #2 (book line)	
			Green Puppy	
			Periwinkle	
			Purple Kangaroo	
			Tickety Tock	
		11	Text #1 (book line)	10
			Blue	
			Green Puppy	
			Mr. Salt, Mrs. Pepper & Paprika	
			Magenta	
			Text #2 (book line)	
			Purple Kangaroo	
			Joe	
			Mailbox	
			Periwinkle	
		12	Text #1 (book line)	4
			Yellow firework	
			Orange firework	
			Blue firework	
Beth Brenda	Dora's Backpack	1	Text #1 (book line)	4
			Dora	
			Backpack	
			Boots	
		2	Text #1 (book line)	6
			Map	
			Dora	
			Boots	
			Text #2 (book line)	
			Map	
		3	Text #1 (book line)	6
			Dora	
			Boots	
			Text #2 (book line)	

	Troll	
	Net	
4	Text #1 (book line)	9
	Dora	
	Backpack	
	Umbrella	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
5	Text #1 (book line)	12
	Rain cloud	
	Dora	
	Text #2 (book line)	
	Boots	
	Backpack	
	Umbrella	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
6	Text #1 (book line)	11
	Dora	
	Umbrella	
	Boots	
	Text #2 (book line)	
	Backpack	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
7	Text #1 (book line)	11
	Boots	
	Rope	
	Text #2 (book line)	
	Dora	
	Backpack	
	Umbrella	
	Scissors	
	Books	
	Band-aid	
	Life jackets	
8	Text #1 (book line)	4

	Swiper	
	Dora	
	Boots	
9	Text #1 (book line)	4
	Dora	
	Boots	
	Library	
10	Text #1 (book line)	4
	Dora	
	Boots	
	Door	
11	Text #1 (book line)	11
	Dora	
	Boots	
	Book (x4)	
	Book (x4)	
12	Text #1 (book line)	4
	Dora	
	Boots	
	Backpack	

APPENDIX C

Hotspots for Books Read by Connor and Chris

Dyad	Book	Double Page Spread	Hotspots	Total Hotspots on Double Page Spread
Connor Chris	I'll Teach My Dog 100 Words	1	Text (book line) Man Dog	3
		2	Text #1 (book line) Text #2 (book line) Dog Text #3 (book line) Dog Six	6
		3	Text #1 (book line) Text #2 (book line) Dog Text #3 (book line) Text #4 (book line) Dog Man Ten	8
		4	Text #1 (book line) Text #2 (book line) Text #3 (book line) Text #4 (book line) Dog Text #5 (book line) Text #6 (book line) Text #7 (book line) Dog Man	10
		5	Text #1 (book line) Elephant Mouse Text #2 (Book line) Dog Fat Thin Short Tall	9
		6	Text #1 (book line) Text #2 (book line) Dark	8

	Light	
	Text #3 (book line)	
	Text #4 (book line)	
	Day	
	Night	
7	Text #1 (book line)	11
	Text #2 (book line)	
	Cat	
	Man	
	Dog	
	Text #3 (book line)	
	Text #4 (book line)	
	Text #5 (book line)	
	Eat	
	Follow	
	Forty-three	
8	Text #1 (book line)	14
	Text #2 (book line)	
	Red	
	Blue	
	Green	
	Dog	
	Text #3 (book line)	
	Text #4 (book line)	
	Text #5 (book line)	
	Orange	
	Purple	
	Pink	
	Forty-nine	
	Dog	
9	Text #1 (book line)	11
	Text #2 (book line)	
	Man	
	Dog	
	Chair	
	Dog	
	Text #3 (book line)	
	Text #4 (book line)	
	Road	
	Dog	
	Underwear	
10	Text #1 (book line)	13
	Text #2 (book line)	
	Text #3 (book line)	
	Text #4 (book line)	
	People	

Dog
Text #5 (book line)
Text #6 (book line)
Text #7 (book line)
Dog
Fish
Phone
Dog
11   Text #1 (book line)   19
Text #2 (book line)
Text #3 (book line)
Dog
Lawn mower
Dog
Shoe
Comb
Mirror
Text #4 (book line)
Text #5 (book line)
Text #6 (book line)
Text #7 (book line)
Zoo
Broom
Dog
Bear
Brush
Eighty-two
12   Text #1 (book line)   10
Text #2 (book line)
Dog
Pig
Goose
Text #3 (book line)
Text #4 (book line)
Food
Mouse
Moose
13   Text #1 (book line)   14
Text #2 (book line)
Text #3 (book line)
Text #4 (book line)
Dog
Drum
Thumb
Birds
Text #5 (book line)

			Text #6 (book line)	
			Text #7 (book line)	
			Dog	
			One-hundred	
			People	
		14	Text #1 (book line)	3
			Dog	
			Man	
Connor Chris	Go, Dog. Go!	1	Text #1 (book line)	2
			Dog	
		2	Text #1 (book line)	4
			Big Dog	
			Text #2 (book line)	
			Little Dog	
		3	Text #1 (book line)	4
			Dog	
			Text #2 (book line)	
			Dog	
		4	Text #1 (book line)	6
			Blue Dog	
			In	
			Text #2 (book line)	
			Red Dog	
			Out	
		5	Text #1 (book line)	9
			Text #2 (book line)	
			Red Dog	
			Blue Tree	
			Blue Dog	
			Red Tree	
			Text #3 (book line)	
			Green Dog	
			Yellow Tree	
		6	Text #1 (book line)	4
			Big Red Dogs	
			Text #2 (book line)	
			Little Blue Dog	
		7	Text #1 (book line)	8
			Text #2 (book line)	
			Green Dog	
			Yellow Dog	
			Text #3 (booline)	
			Text #4 (book line)	
			Little Red Dog	
			Big Blue Dog	
		8	Text #1 (book line)	6

	Green Dog	
	Tree	
	Text #2 (book line)	
	Yellow Dog	
	Book	
9	Text #1 (book line)	7
	Blue House	
	Red Dog	
	Text #2 (book line)	
	Text #3 (book line)	
	Red Dog	
	Fish	
10	Text #1 (book line)	7
	Sun	
	Text #2 (book line)	
	Text #3 (book line)	
	Yellow Dog	
	Red House	
	Blue Dog	
11	Text #1 (book line)	5
	Yellow Dog	
	Blue Dog	
	Pink Dog	
	Red Car	
12	Text #1 (book line)	5
	Green Bird	
	Yellow Dog	
	Go	
	Red Car	
13	Text #1 (book line)	5
	Green Bird	
	Yellow Dog	
	Stop	
	Red Car	
14	Text #1 (book line)	8
	Green Bird	
	Go	
	Yellow Dog	
	Blue Dog	
	Green Dog	
	Red Dog	
	Red Car	
15	Text #1 (book line)	7
	Green Bird	
	Yellow Dog	
	Green Dog	

			Pink Dog	
			Red Car	
			Tree	
		16	Text #1 (book line)	7
			Red Cars	
			Dogs	
			Text #2 (book line)	
			Dogs	
			Tree	
			Ladder	
		17	Text #1 (book line)	4
			Dogs	
			Ladder	
			Tree	
		18	Text #1 (book line)	3
			Dogs	
			Ladder	
Connor Chris	Meet Diego	1	Text #1 (book line)	4
			Dora	
			Boots	
			Anteater	
		2	Text #1 (book line)	6
			Dora	
			Boots	
			Baby Bear	
			Text #2 (book line)	
			Diego	
		3	Text #1 (book line)	9
			Dora	
			Boots	
			Diego	
			Text #2 (book line)	
			Map	
			Rain forest	
			Cave	
			Waterfall	
		4	Text #1 (book line)	13
			Dora	
			Diego	
			Boots	
			Ladder	
			Text #2 (book line)	
			Rung (x6)	
			Rope	
		5	Text #1 (book line)	4
			Diego	

	Dora	
	Boots	
6	Text #1 (book line)	7
	Dora	
	Diego	
	Boots	
	Swiper	
	Text #2 (book line)	
	Swiper	
7	Text #1 (book line)	6
	Dora	
	Diego	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
8	Text #1 (book line)	11
	Diego	
	Dolphin	
	Text #2 (book line)	
	Backpack	
	Flashlight	
	Book	
	Yo-yo	
	Rope	
	Doll	
	Soap	
9	Text #1 (book line)	6
	Diego	
	Dora	
	Boots	
	Text #2 (book line)	
	Baby Jaguar	
10	Text #1 (book line)	7
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
	Eagle	
11	Text #1 (book line)	6
	Dora	
	Boots	
	Eagle	
	Baby Jaguar	
	Diego	
12	Text #1 (book line)	6

			Mom Jaguar	
			Baby Jaguar	
			Boots	
			Dora	
			Diego	
Connor Chris	Joe Moves In	1	Text #1 (book line)	4
			Blue	
			Joe	
			Boris	
		2	Text #1 (book line)	5
			Steve	
			Mailbox	
			Text #2 (book line)	
			Boris	
		3	Text #1 (book line)	6
			Sun	
			Tickety Tock	
			Text #2 (book line)	
			Boris	
			Blue	
		4	Text #1 (book line)	8
			Slippery Soap	
			Toothbrush	
			Text #2 (book line)	
			Boris	
			Toothpaste	
			Water	
			Joe	
		5	Text #1 (book line)	9
			Shirts	
			Text #2 (book line)	
			Blue	
			Yellow	
			Read	
			Green	
			Orange	
			Purple	
		6	Text #1 (book line)	11
			Joe	
			Mr. Salt & Mrs. Pepper	
			Eggs	
			Cereal	
			Toast	
			Milk	
			Text #2	
			Mr. Salt & Mrs. Pepper	

			Paprika	
			Boris	
		7	Text #1 (book line)	9
			Clue	
			Clue	
			Clue	
			Blue	
			Text #2 (book line)	
			Phone	
			Drawer	
			Notebook	
		8	Text #1 (book line)	8
			Shovel & Pail	
			Squirrel	
			Joe	
			Text #2 (book line)	
			Boris	
			Shovel	
			Pail	
		9	Text #1 (book line)	8
			Periwinkle	
			Boris	
			Text #2 (book line)	
			Ball	
			Wagon	
			Wheel	
			Marbles	
		10	Text #1 (book line)	4
			Mailbox	
			Boris	
			Text #2 (book line)	
		11	Text #1 (book line)	7
			Joe	
			Periwinkle	
			Table	
			Boris	
			Shovel & Pail	
			Mailbox	
		12	Text #1 (book line)	4
			Blue	
			Joe	
			Boris	
Connor Chris	Winnie the Pooh: The Blustery Day	1	Text #1 (book line)	7
			Pooh	
			Gopher	
			Text #2 (book line)	

	Broom	
	Piglett	
	Pooh	
2	Text #1 (book line)	8
	Pooh	
	Honey	
	Piglet	
	Text #2 (book line)	
	Pooh	
	Piglet	
	Kanga	
3	Text #1 (book line)	5
	Pooh	
	Piglet	
	Owl	
	House	
4	Text #1 (book line)	6
	Owl	
	Lamp	
	Text #2 (book line)	
	Piglet	
	Pooh	
5	Text #1 (book line)	7
	Piglet	
	Pooh	
	Text #2 (book line)	
	Owl	
	Piglet	
	Pooh	
6	Text #1 (book line)	12
	Christopher Robin	
	Eeyor	
	House	
	Owl	
	Piglet	
	Pooh	
	Text #2 (book line)	
	Christopher Robin	
	Eeyor	
	Pooh	
	Piglet	
7	Text #1 (book line)	5
	Eeyor	
	Text #2	
	House	
	Eeyor	

		8	Text #1 (book line)	9
			Eeyor	
			Pooh	
			Kanga	
			Roo	
			Rabbit	
			Christopher Robin	
			Owl	
			Piglet	
		9	Text #1 (book line)	6
			Eeyor	
			Piglet	
			Owl	
			Pooh	
			Christopher Robin	
		10	Text #1 (book line)	7
			Eeyor	
			Pooh	
			Piglet	
			Text #2 (booline)	
			Pooh	
			Piglet	
		11	Text #1 (book line)	9
			Christopher Robin	
			Eeyor	
			Owl	
			Pooh	
			Piglet	
			Rabbit	
			Kanga	
			Roo	
Connor Chris	Gerald McBoing Boing	1	Text #1 (book line)	4
			Mom	
			Dad	
			Gerald	
		2	Text #1 (book line)	9
			Mom	
			Dad	
			Gerald	
			Cake	
			Text #2 (book line)	
			Dad	
			Gerald	
			Bird	
		3	Text #1 (book line)	8
			Dad	

	Phone	
	Text #2 (book line)	
	Mom	
	Dad	
	Doctor	
	Gerald	
4	Text #1 (book line)	10
	Doctor	
	Bag	
	Dad	
	Mom	
	Gerald	
	Text #2 (book line)	
	Gerald	
	Boom	
	Dad	
5	Text #1 (book line)	6
	Mom	
	Dad	
	School	
	Text #2 (book line)	
	Gerald	
6	Text #1 (book line)	8
	Mom	
	Dad	
	Books	
	Text #2 (book line)	
	Mom	
	Gerald	
	Stool	
7	Text #1 (book line)	7
	Boys	
	Marbles	
	Text #2 (book line)	
	Gerald	
	Clang, Clang	
	Girls	
8	Text #1 (book line)	6
	Boys	
	Gerald	
	Text #2 (book line)	
	Dad	
	Gerald	
9	Text #1 (book line)	6
	Gerald	
	Tree	

			Text #2 (book line)	
			Gerald	
			Train	
		10	Text #1 (book line)	8
			Train	
			Man	
			Gerald	
			Text #2 (book line)	
			Gerald	
			Man	
			Dogs	
		11	Gerald	7
			Gong	
			Man	
			Toot	
			Text #1 (book line)	
			Man	
			Gerlad	
		12	Text #1 (book line)	8
			Dad	
			Mom	
			People	
			Cowboy	
			Gerald	
			Clop, Clop	
			Bang	
		13	People	5
			Limousine	
			Text #1 (book line)	
			Gerald	
			People	
		14	Gerald	6
			Boing, Boing	
			Children	
			School	
			Children	
			Train	
Connor Chris	Friendly, Frosty Monsters	1	Text #1 (book line)	4
			Elmo	
			Fish	
			Car	
		2	Text #1 (book line)	5
			Fairy	
			Snuffleupigus	
			Alice	
			Big Bird	

3	Text #1 (book line)	6
	Big Bird	
	Cookie Monster	
	Elmo	
	Grover	
	Bert & Ernie	
4	Text #1 (book line)	15
	Sheep (x5)	
	Little Bo Peep	
	Text #2 (book line)	
	Elmo	
	Fairy	
	Sheep (x5)	
5	Text #1 (book line)	6
	Baby Bear	
	Super Grover	
	Jack	
	Jill	
	Sled	
6	Text #1 (book line)	6
	Count Dracula	
	Count's Mom	
	Super Grover	
	Baby Bear	
	Little Bo Peep	
7	Text #1 (book line)	6
	Bert	
	Little Red Riding Hood	
	Wolf	
	Rabbit	
	Bird	
8	Text #1 (book line)	7
	Elmo	
	Ernie	
	Bert	
	Oscar the Grouch	
	Grouch	
	Snowman	
9	Text #1 (book line)	7
	Cookie Monster	
	Big Bird	
	Elmo	
	Fairy	
	Oscar the Grouch	
	Snowballs	
10	Text #1 (book line)	8

			Grover	
			Bert	
			Elmo	
			Fairy	
			Ernie	
			Big Bird	
			Oscar the Grouch	
		11	Text #1 (book line)	4
			Ernie	
			Pink Twiddle	
			Blue Twiddle	
		12	Text #1 (book line)	3
			Elmo	
			Fish	
Connor Chris	Blue's Big Parade	1	Text #1 (book line)	7
			Purple Kangaroo	
			Joe	
			Blue	
			Periwinkle	
			Magenta	
			Green Puppy	
		2	Text #1 (book line)	8
			Green Puppy	
			Blue	
			Periwinkle	
			Text #2 (book line)	
			Purple Kangaroo	
			Magenta	
			Joe	
		3	Text #1 (book line)	7
			Tickety Tock	
			Periwinkle	
			Text #2 (book line)	
			Magenta	
			Blue	
			Mr. Salt & Mrs. Pepper	
		4	Text #1 (book line)	11
			Blue	
			Magenta	
			Mr. Salt	
			Periwinkle	
			Text #2 (book line)	
			Green Puppy	
			Mrs. Pepper	
			Purple Kangaroo	
			Joe	

	Tickety Tock	
5	Text #1 (book line)	5
	Magenta	
	Green Puppy	
	Periwinkle	
	Blue	
6	Text #1 (book line)	8
	Blue	
	Green Puppy	
	Text #2 (book line)	
	Purple Kangaroo	
	Magenta	
	Periwinkle	
	Tickety Tock	
7	Text #1 (book line)	7
	Joe	
	Magenta	
	Text #2 (book line)	
	Blue	
	Periwinkle	
	Purple Kangaroo	
8	Text #1 (book line)	9
	Green Puppy	
	Magenta	
	Blue	
	Text #2 (book line)	
	Periwinkle	
	Purple Kangaroo	
	Joe	
	Tickety Tock	
9	Text #1 (book line)	8
	Blue	
	Text #2 (book line)	
	Purple Kangaroo	
	Magenta	
	Periwinkle	
	Green Puppy	
	Tickety Tock	
10	Text #1 (book line)	8
	Blue	
	Magenta	
	Text #2 (book line)	
	Green Puppy	
	Periwinkle	
	Purple Kangaroo	
	Tickety Tock	

		11	Text #1 (book line) Blue Green Puppy Mr. Salt, Mrs. Pepper & Paprika Magenta Text #2 (book line) Purple Kangaroo Joe Mailbox Periwinkle	10
		12	Text #1 (book line) Yellow firework Orange firework Blue firework	4
Connor Chris	Dora's Backpack	1	Text #1 (book line) Dora Backpack Boots	4
		2	Text #1 (book line) Map Dora Boots Text #2 (book line) Map	6
		3	Text #1 (book line) Dora Boots Text #2 (book line) Troll Net	6
		4	Text #1 (book line) Dora Backpack Umbrella Scissors Rope Books Band-aid Life jackets	9
		5	Text #1 (book line) Rain cloud Dora Text #2 (book line) Boots Backpack Umbrella	12

	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
6	Text #1 (book line)	11
	Dora	
	Umbrella	
	Boots	
	Text #2 (book line)	
	Backpack	
	Scissors	
	Rope	
	Books	
	Band-aid	
	Life jackets	
7	Text #1 (book line)	11
	Boots	
	Rope	
	Text #2 (book line)	
	Dora	
	Backpack	
	Umbrella	
	Scissors	
	Books	
	Band-aid	
	Life jackets	
8	Text #1 (book line)	4
	Swiper	
	Dora	
	Boots	
9	Text #1 (book line)	4
	Dora	
	Boots	
	Library	
10	Text #1 (book line)	4
	Dora	
	Boots	
	Door	
11	Text #1 (book line)	11
	Dora	
	Boots	
	Book (x4)	
	Book (x4)	
12	Text #1 (book line)	4
	Dora	

Boots
Backpack

APPENDIX D

Hotspots for Books Read by Diane and Dylan

Dyad	Book	Double Page Spread	Hotspots	Total Hotspots on Double Page Spread
Diane Dylan	The Alphabet Book	1	Text (book line) Ants Text #2 (book line) Bird Bike	5
		2	Text #1 (book line) Cow Car Text #2 (book line) Dog Drum	6
		3	Text #1 (book line) Egg Elephant Text #2 (book line) Text #3 (book line) Fox Fish Goose Guitar	9
		4	Text #1 (book line) Horse House Text #2 (book line) Baby Ice Cream	6
		5	Text #1 (book line) Text #2 (book line) Dog Pumpkin Kangaroo Keys Text #3 (book line) Text #4 (book line) Lion Lamb Mouse Moose	12
		6	Text #1 (book line)	10

			Text #2 (book line)	
			Bird	
			Nest	
			Octopus	
			Boat	
			Text #3 (book line)	
			Text #4 (book line)	
			Penguin	
			Parachute	
		7	Text #1 (book line)	6
			Queen	
			Quarter	
			Text #2 (book line)	
			Rabbit	
			Roller Skate	
		8	Text #1 (book line)	9
			Text #2 (book line)	
			Skunk	
			Turtle	
			Text #3 (book line)	
			Text #4 (book line)	
			Umpire	
			Umbrella	
			Dog	
		9	Text #1 (book line)	6
			Vulture	
			Violin	
			Text #2 (book line)	
			Walrus	
			Wig	
		10	Text #1 (book line)	7
			Text #2 (book line)	
			Santa	
			Reindeer	
			Yak	
			Text #3 (book line)	
			Zebra	
Diane Dylan	Dear Zoo	1	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		2	Text #1 (book line)	4
			Text #2 (book line)	
			Box	
			Giraffe	
		3	Text #1 (book line)	3
			Text #2 (book line)	

			Lion	
		4	Text #1 (book line)	3
			Text #2 (book line)	
			Camel	
		5	Text #1 (book line)	3
			Text #2 (book line)	
			Basket	
		6	Text #1 (book line)	4
			Text #2 (book line)	
			Box	
			Monkey	
		7	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		8	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		9	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		10	Text #1 (book line)	3
			Text #2 (book line)	
			Cage	
Diane Dylan	Brown Bear	1	Text #1 (book line)	3
			Text #2 (book line)	
			Brown Bear	
		2	Text #1 (book line)	3
			Text #2 (book line)	
			Red Bird	
		3	Text #1 (book line)	3
			Text #2 (book line)	
			Yellow Duck	
		4	Text #1 (book line)	3
			Text #2 (book line)	
			Blue Horse	
		5	Text #1 (book line)	3
			Text #2 (book line)	
			Green Frog	
		6	Text #1 (book line)	3
			Text #2 (book line)	
			Purple Cat	
		7	Text #1 (book line)	3
			Text #2 (book line)	
			White Dog	
		8	Text #1 (book line)	3
			Text #2 (book line)	

			Black Sheep	
		9	Text #1 (book line)	3
			Text #2 (book line)	
			Goldfish	
		10	Text #1 (book line)	3
			Text #2 (book line)	
			Teacher	
		11	Text #1 (book line)	2
			Children	
		12	Brown Bear	11
			Red Bird	
			Yellow Duck	
			Blue Horse	
			Green Frog	
			Purple Cat	
			White Dog	
			Black Sheep	
			Goldfish	
			Teacher	
			Text #1 (book line)	
Diane Dylan	The Snowball Fight	1	Little Bear	3
			Papa Bear	
			Text #1 (book line)	
		2	Text #1 (book line)	6
			Little Bear	
			Jacks	
			Text #2 (book line)	
			Papa Bear	
			Desk	
		3	Text #1 (book line)	6
			Tree	
			Footprint	
			Text #2 (book line)	
			Little Bear	
			Papa Bear	
		4	Text #1 (book line)	6
			Little Bear	
			Snowball	
			Text #2 (book line)	
			Papa Bear	
			Snowman	
		5	Text #1 (book line)	6
			Snowman	
			Little Bear	
			Text #2 (book line)	

			Papa Bear	
			Snowball	
		6	Text #1 (book line)	6
			Papa Bear	
			Text #2	
			Snowball	
			Snowman	
			Little Bear	
		7	Text #1 (book line)	6
			Papa Bear	
			Snowman	
			Text #2 (book line)	
			Little Bear	
			Tree	
		8	Text #1 (book line)	5
			Papa Bear	
			Snow	
			Text #2 (book line)	
			Little Bear	
		9	Text #1 (book line)	3
			Papa Bear	
			House	
		10	Text #1 (book line)	4
			Momma Bear	
			Little Bear	
			Fire	
Diane Dylan	Barn Dance	1	Barn	3
			Text #1 (book line)	
			Tree	
		2	Text #1 (book line)	4
			Rabbits	
			Dog	
			Rabbits	
		3	Text #1 (book line)	3
			Boy	
			Bed	
		4	Owl	4
			Barn	
			Text #1 (book line)	
			House	
		5	Text #1 (book line)	3
			Barn	
			Boy	
		6	Text #1 (book line)	10
			Fox	
			Horse	

	Goat	
	Donkey	
	Pig	
	Cow	
	Chicken	
	Rabbit	
	Scarecrow	
7	Text #1 (book line)	5
	Animals	
	Crow	
	Scarecrow	
	Boy	
8	Cow	8
	Donkey	
	Turkey	
	Skunk	
	Chicken	
	Pig	
	Mouse	
	Boy	
9	Text #1 (book line)	10
	Boy	
	Cow	
	Goats	
	Fox	
	Goose	
	Goose	
	Chicken	
	Scarecrow	
	Mouse	
10	Text #1 (book line)	9
	Boy	
	Goat	
	Chicken	
	Mouse	
	Mouse	
	Crow	
	Scarecrow	
	Chicken	
11	Text #1 (book line)	7
	Goat	
	Boy	
	Pig	
	Pig	
	Chicken	
	Goose	

		12	Owl Barn Text #1 (book line)	3
		13	Dog Text #1 (book line) Boy	3
		14	Boy Apple Text #1 (book line) Bed	4
		15	Text #1 (book line) Boy Apple Window	4
Diane Dylan	The Scarecrow's Hat	1	Text #1 (book line) Chicken Bird Scarecrow Hat	5
		2	Text #1 (book line) Chicken Badger Stick	4
		3	Crow Ribbon Text #1 (book line) Scarecrow Chicken	5
		4	Text #1 (book line) Chicken Sheep	3
		5	Text #1 (book line) Glasses Owl Chicken	4
		6	Text #1 (book line) Chicken Donkey Blanket	4
		7	Chicken Text #1 (book line) Feather (x2)	4
		8	Donkey Feathers Blanket Text #1 (booline)	5

			Chicken	
		9	Text #1 (book line)	8
			Chicken	
			Blanket	
			Owl	
			Text #2 (book line)	
			Chicken	
			Glasses	
			Sheep	
		10	Text #1 (book line)	8
			Chicken	
			Wool	
			Crow	
			Text #2 (book line)	
			Chicken	
			Ribbon	
			Badger	
		11	Text #1 (book line)	5
			Chicken	
			Hat	
			Scarecrow	
			Stick	
		12	Text #1 (book line)	4
			Chicken	
			Hat	
			Duck	
Diane	Little	1	Text #1 (book line)	3
Dylan	Quack		Momma Duck	
			Ducklings	
		2	Momma Duck	3
			Text #1 (book line)	
			Little Quack	
		3	Text #1 (book line)	3
			Ducklings	
			Momma Duck	
		4	Text #1 (book line)	3
			Widdle	
			Momma Duck	
		5	Text #1 (book line)	4
			Ducklings	
			Momma Duck	
			Widdle	
		6	Text #1 (book line)	3
			Waddle	
			Momma Duck	
		7	Text #1 (book line)	5

			Ducklings	
			Waddle	
			Widdle	
			Momma Duck	
		8	Text #1 (book line)	3
			Piddle	
			Momma Duck	
		9	Ducklings	6
			Text #1 (book line)	
			Momma Duck	
			Widdle	
			Waddle	
			Piddle	
		10	Paddle	3
			Little Quack	
			Text #1 (book line)	
		11	Little Quack	2
			Text #1 (book line)	
		12	Little Quack	7
			Text #1 (book line)	
			Momma Duck	
			Widdle	
			Waddle	
			Piddle	
			Paddle	
		13	Text #1 (book line)	2
			Little Quack	
		14	Text #1 (book line)	8
			Splish	
			Splash	
			Sploosh	
			Splosh	
			Text #2 (book line)	
			Little Quack	
			Momma Duck	
		15	Text #1 (book line)	7
			Little Quack	
			Momma Duck	
			Piddle	
			Paddle	
			Widdle	
			Waddle	
Diane Dylan	Clip, Clop	1	Text #1 (book line)	4
			Horse	
			Text #2 (book line)	
			Cat	

2	Text #1 (book line)	7
	Chicks	
	Horse	
	Cat	
	Text #2 (book line)	
	Text #3 (book line)	
	Dog	
3	Text #1 (book line)	6
	Dog	
	Text #2 (book line)	
	Cat	
	Horse	
	Pig	
4	Text #1 (book line)	8
	Text #2 (book line)	
	Duck	
	Text #3 (book line)	
	Pig	
	Dog	
	Cat	
	Horse	
5	Text #1 (book line)	7
	Duck	
	Pig	
	Text #2 (book line)	
	Dog	
	Cat	
	Horse	
6	Text #1 (book line)	7
	Text #2 (book line)	
	Horse	
	Cat	
	Dog	
	Pig	
	Duck	
7	Text #1 (book line)	7
	Duck	
	Pig	
	Text #2 (book line)	
	Dog	
	Cat	
	Horse	
8	Text #1 (book line)	5
	Duck	
	Pig	
	Dog	

			Cat	
		9	Text #1 (book line)	7
			Horse	
			Duck	
			Text #2 (book line)	
			Dog	
			Cat	
			Pig	
		10	Text #1 (book line)	7
			Bird	
			Text #2 (book line)	
			Duck	
			Pig	
			Dog	
			Cat	
		11	Text #1 (book line)	6
			Horse	
			Pig	
			Duck	
			Cat	
			Dog	
		12	Text #1 (book line)	7
			Horse	
			Dog	
			Text #2 (book line)	
			Pig	
			Duck	
			Cat	
		13	Text #1 (book line)	12
			Text #2 (book line)	
			Cat	
			Dog	
			Pig	
			Duck	
			Text #3 (book line)	
			Horse	
			Cat	
			Dog	
			Pig	
			Duck	
Diane Dylan	Big Red Barn	1	Text #1 (book line)	3
			Barn	
			Flowers	
		2	Text #1 (book line)	5
			Pig	
			Text #2 (book line)	

	Big Horse	
	Little Horse	
3	Text #1 (book line)	2
	Horse	
4	Text #1 (book line)	6
	Hay	
	Text #2 (book line)	
	Big Horse	
	Little Horse	
	Pig	
5	Text #1 (book line)	10
	Goat	
	Donkey	
	Sheep	
	Pig	
	Goose	
	Text #2 (book line)	
	Duck	
	Goat	
	Scarecrow	
6	Text #1 (book line)	3
	Mouse	
	Butterfly	
7	Text #1 (book line)	5
	Chicken	
	Text #2 (book line)	
	Chicken	
	Bird	
8	Text #1 (book line)	4
	Chicken	
	Text #2 (book line)	
	Cow	
9	Text #1 (book line)	7
	Cat	
	Kittens	
	Puppy	
	Text #2 (book line)	
	Dog	
	Puppies	
10	Text #1 (book line)	11
	Cow	
	Goat	
	Horse	
	Sheep	
	Text #2 (book line)	
	Barn	

	Pig	
	Donkey	
	Cat	
	Dog	
11	Text #1 (book line)	7
	Cow	
	Pig	
	Text #2 (book line)	
	Big Horse	
	Little Horse	
	Donkey	
12	Text #1 (book line)	9
	Cow	
	Goat	
	Cat	
	Barn	
	Dog	
	Cat	
	Puppies	
	Pig	
13	Text #1 (book line)	11
	Horse	
	Cat	
	Donkey	
	Pig	
	Text #2 (book line)	
	Cow	
	Sheep	
	Dog	
	Goat	
	Chicken	
14	Text #1 (book line)	2
	Barn	
15	Text #1 (book line)	4
	Hay	
	Text #2 (book line)	
	Moon	
16	Text #1 (book line)	3
	Scarecrow	
	Moon	

APPENDIX E

Hotspots for Books Read by Eli and Eric

Dyad	Book	Double Page Spread	Hotspots	Total Hotspots on Double Page Spread
Eli Eric	The Alphabet Book	1	Text (book line) Ants Text #2 (book line) Bird Bike	5
		2	Text #1 (book line) Cow Car Text #2 (book line) Dog Drum	6
		3	Text #1 (book line) Egg Elephant Text #2 (book line) Text #3 (book line) Fox Fish Goose Guitar	9
		4	Text #1 (book line) Horse House Text #2 (book line) Baby Ice Cream	6
		5	Text #1 (book line) Text #2 (book line) Dog Pumpkin Kangaroo Keys Text #3 (book line) Text #4 (book line) Lion Lamb Mouse Moose	12
		6	Text #1 (book line)	10

Name	Book	Page	Item	Count
			Text #2 (book line)	
			Bird	
			Nest	
			Octopus	
			Boat	
			Text #3 (book line)	
			Text #4 (book line)	
			Penguin	
			Parachute	
		7	Text #1 (book line)	6
			Queen	
			Quarter	
			Text #2 (book line)	
			Rabbit	
			Roller Skate	
		8	Text #1 (book line)	9
			Text #2 (book line)	
			Skunk	
			Turtle	
			Text #3 (book line)	
			Text #4 (book line)	
			Umpire	
			Umbrella	
			Dog	
		9	Text #1 (book line)	6
			Vulture	
			Violin	
			Text #2 (book line)	
			Walrus	
			Wig	
		10	Text #1 (book line)	7
			Text #2 (book line)	
			Santa	
			Reindeer	
			Yak	
			Text #3 (book line)	
			Zebra	
Eli Eric	Dear Zoo	1	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		2	Text #1 (book line)	4
			Text #2 (book line)	
			Box	
			Giraffe	
		3	Text #1 (book line)	3
			Text #2 (book line)	

			Lion	
		4	Text #1 (book line)	3
			Text #2 (book line)	
			Camel	
		5	Text #1 (book line)	3
			Text #2 (book line)	
			Basket	
		6	Text #1 (book line)	4
			Text #2 (book line)	
			Box	
			Monkey	
		7	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		8	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		9	Text #1 (book line)	3
			Text #2 (book line)	
			Box	
		10	Text #1 (book line)	3
			Text #2 (book line)	
			Cage	
Eli	Brown Bear	1	Text #1 (book line)	3
Eric			Text #2 (book line)	
			Brown Bear	
		2	Text #1 (book line)	3
			Text #2 (book line)	
			Red Bird	
		3	Text #1 (book line)	3
			Text #2 (book line)	
			Yellow Duck	
		4	Text #1 (book line)	3
			Text #2 (book line)	
			Blue Horse	
		5	Text #1 (book line)	3
			Text #2 (book line)	
			Green Frog	
		6	Text #1 (book line)	3
			Text #2 (book line)	
			Purple Cat	
		7	Text #1 (book line)	3
			Text #2 (book line)	
			White Dog	
		8	Text #1 (book line)	3
			Text #2 (book line)	

			Black Sheep	
		9	Text #1 (book line)	3
			Text #2 (book line)	
			Goldfish	
		10	Text #1 (book line)	3
			Text #2 (book line)	
			Teacher	
		11	Text #1 (book line)	2
			Children	
		12	Brown Bear	11
			Red Bird	
			Yellow Duck	
			Blue Horse	
			Green Frog	
			Purple Cat	
			White Dog	
			Black Sheep	
			Goldfish	
			Teacher	
			Text #1 (book line)	
Eli Eric	The Snowball Fight	1	Little Bear	3
			Papa Bear	
			Text #1 (book line)	
		2	Text #1 (book line)	6
			Little Bear	
			Jacks	
			Text #2 (book line)	
			Papa Bear	
			Desk	
		3	Text #1 (book line)	6
			Tree	
			Footprint	
			Text #2 (book line)	
			Little Bear	
			Papa Bear	
		4	Text #1 (book line)	6
			Little Bear	
			Snowball	
			Text #2 (book line)	
			Papa Bear	
			Snowman	
		5	Text #1 (book line)	6
			Snowman	
			Little Bear	
			Text #2 (book line)	

			Papa Bear	
			Snowball	
		6	Text #1 (book line)	6
			Papa Bear	
			Text #2	
			Snowball	
			Snowman	
			Little Bear	
		7	Text #1 (book line)	6
			Papa Bear	
			Snowman	
			Text #2 (book line)	
			Little Bear	
			Tree	
		8	Text #1 (book line)	5
			Papa Bear	
			Snow	
			Text #2 (book line)	
			Little Bear	
		9	Text #1 (book line)	3
			Papa Bear	
			House	
		10	Text #1 (book line)	4
			Momma Bear	
			Little Bear	
			Fire	
Eli Eric	Barn Dance	1	Barn	3
			Text #1 (book line)	
			Tree	
		2	Text #1 (book line)	4
			Rabbits	
			Dog	
			Rabbits	
		3	Text #1 (book line)	3
			Boy	
			Bed	
		4	Owl	4
			Barn	
			Text #1 (book line)	
			House	
		5	Text #1 (book line)	3
			Barn	
			Boy	
		6	Text #1 (book line)	10
			Fox	
			Horse	

	Goat	
	Donkey	
	Pig	
	Cow	
	Chicken	
	Rabbit	
	Scarecrow	
7	Text #1 (book line)	5
	Animals	
	Crow	
	Scarecrow	
	Boy	
8	Cow	8
	Donkey	
	Turkey	
	Skunk	
	Chicken	
	Pig	
	Mouse	
	Boy	
9	Text #1 (book line)	10
	Boy	
	Cow	
	Goats	
	Fox	
	Goose	
	Goose	
	Chicken	
	Scarecrow	
	Mouse	
10	Text #1 (book line)	9
	Boy	
	Goat	
	Chicken	
	Mouse	
	Mouse	
	Crow	
	Scarecrow	
	Chicken	
11	Text #1 (book line)	7
	Goat	
	Boy	
	Pig	
	Pig	
	Chicken	
	Goose	

		12	Owl Barn Text #1 (book line)	3
		13	Dog Text #1 (book line) Boy	3
		14	Boy Apple Text #1 (book line) Bed	4
		15	Text #1 (book line) Boy Apple Window	4
Eli Eric	The Scarecrow's Hat	1	Text #1 (book line) Chicken Bird Scarecrow Hat	5
		2	Text #1 (book line) Chicken Badger Stick	4
		3	Crow Ribbon Text #1 (book line) Scarecrow Chicken	5
		4	Text #1 (book line) Chicken Sheep	3
		5	Text #1 (book line) Glasses Owl Chicken	4
		6	Text #1 (book line) Chicken Donkey Blanket	4
		7	Chicken Text #1 (book line) Feather (x2)	4
		8	Donkey Feathers Blanket Text #1 (booline)	5

			Chicken	
		9	Text #1 (book line)	8
			Chicken	
			Blanket	
			Owl	
			Text #2 (book line)	
			Chicken	
			Glasses	
			Sheep	
		10	Text #1 (book line)	8
			Chicken	
			Wool	
			Crow	
			Text #2 (book line)	
			Chicken	
			Ribbon	
			Badger	
		11	Text #1 (book line)	5
			Chicken	
			Hat	
			Scarecrow	
			Stick	
		12	Text #1 (book line)	4
			Chicken	
			Hat	
			Duck	
Eli Eric	Little Quack	1	Text #1 (book line)	3
			Momma Duck	
			Ducklings	
		2	Momma Duck	3
			Text #1 (book line)	
			Little Quack	
		3	Text #1 (book line)	3
			Ducklings	
			Momma Duck	
		4	Text #1 (book line)	3
			Widdle	
			Momma Duck	
		5	Text #1 (book line)	4
			Ducklings	
			Momma Duck	
			Widdle	
		6	Text #1 (book line)	3
			Waddle	
			Momma Duck	
		7	Text #1 (book line)	5

			Ducklings	
			Waddle	
			Widdle	
			Momma Duck	
		8	Text #1 (book line)	3
			Piddle	
			Momma Duck	
		9	Ducklings	6
			Text #1 (book line)	
			Momma Duck	
			Widdle	
			Waddle	
			Piddle	
		10	Paddle	3
			Little Quack	
			Text #1 (book line)	
		11	Little Quack	2
			Text #1 (book line)	
		12	Little Quack	7
			Text #1 (book line)	
			Momma Duck	
			Widdle	
			Waddle	
			Piddle	
			Paddle	
		13	Text #1 (book line)	2
			Little Quack	
		14	Text #1 (book line)	8
			Splish	
			Splash	
			Sploosh	
			Splosh	
			Text #2 (book line)	
			Little Quack	
			Momma Duck	
		15	Text #1 (book line)	7
			Little Quack	
			Momma Duck	
			Piddle	
			Paddle	
			Widdle	
			Waddle	
Eli Eric	Clip, Clop	1	Text #1 (book line)	4
			Horse	
			Text #2 (book line)	
			Cat	

2	Text #1 (book line)	7
	Chicks	
	Horse	
	Cat	
	Text #2 (book line)	
	Text #3 (book line)	
	Dog	
3	Text #1 (book line)	6
	Dog	
	Text #2 (book line)	
	Cat	
	Horse	
	Pig	
4	Text #1 (book line)	8
	Text #2 (book line)	
	Duck	
	Text #3 (book line)	
	Pig	
	Dog	
	Cat	
	Horse	
5	Text #1 (book line)	7
	Duck	
	Pig	
	Text #2 (book line)	
	Dog	
	Cat	
	Horse	
6	Text #1 (book line)	7
	Text #2 (book line)	
	Horse	
	Cat	
	Dog	
	Pig	
	Duck	
7	Text #1 (book line)	7
	Duck	
	Pig	
	Text #2 (book line)	
	Dog	
	Cat	
	Horse	
8	Text #1 (book line)	5
	Duck	
	Pig	
	Dog	

			Cat	
		9	Text #1 (book line)	7
			Horse	
			Duck	
			Text #2 (book line)	
			Dog	
			Cat	
			Pig	
		10	Text #1 (book line)	7
			Bird	
			Text #2 (book line)	
			Duck	
			Pig	
			Dog	
			Cat	
		11	Text #1 (book line)	6
			Horse	
			Pig	
			Duck	
			Cat	
			Dog	
		12	Text #1 (book line)	7
			Horse	
			Dog	
			Text #2 (book line)	
			Pig	
			Duck	
			Cat	
		13	Text #1 (book line)	12
			Text #2 (book line)	
			Cat	
			Dog	
			Pig	
			Duck	
			Text #3 (book line)	
			Horse	
			Cat	
			Dog	
			Pig	
			Duck	
Eli	Big Red	1	Text #1 (book line)	3
Eric	Barn		Barn	
			Flowers	
		2	Text #1 (book line)	5
			Pig	
			Text #2 (book line)	

	Big Horse	
	Little Horse	
3	Text #1 (book line)	2
	Horse	
4	Text #1 (book line)	6
	Hay	
	Text #2 (book line)	
	Big Horse	
	Little Horse	
	Pig	
5	Text #1 (book line)	10
	Goat	
	Donkey	
	Sheep	
	Pig	
	Goose	
	Text #2 (book line)	
	Duck	
	Goat	
	Scarecrow	
6	Text #1 (book line)	3
	Mouse	
	Butterfly	
7	Text #1 (book line)	5
	Chicken	
	Text #2 (book line)	
	Chicken	
	Bird	
8	Text #1 (book line)	4
	Chicken	
	Text #2 (book line)	
	Cow	
9	Text #1 (book line)	7
	Cat	
	Kittens	
	Puppy	
	Text #2 (book line)	
	Dog	
	Puppies	
10	Text #1 (book line)	11
	Cow	
	Goat	
	Horse	
	Sheep	
	Text #2 (book line)	
	Barn	

	Pig	
	Donkey	
	Cat	
	Dog	
11	Text #1 (book line)	7
	Cow	
	Pig	
	Text #2 (book line)	
	Big Horse	
	Little Horse	
	Donkey	
12	Text #1 (book line)	9
	Cow	
	Goat	
	Cat	
	Barn	
	Dog	
	Cat	
	Puppies	
	Pig	
13	Text #1 (book line)	11
	Horse	
	Cat	
	Donkey	
	Pig	
	Text #2 (book line)	
	Cow	
	Sheep	
	Dog	
	Goat	
	Chicken	
14	Text #1 (book line)	2
	Barn	
15	Text #1 (book line)	4
	Hay	
	Text #2 (book line)	
	Moon	
16	Text #1 (book line)	3
	Scarecrow	
	Moon	

APPENDIX F

Books Read by Each Dyad

Dyad	Book	Total Number of Double Page Spreads In Book
Alice and Annie	What to Do Blue?	12
	Meet Diego	12
	Joe Moves In	12
	Clifford the Big, Red Dog	15
	Dora and Little Star	12
	Blue Skidoos to the Farm	12
	Friendly, Frosty Monsters	12
	Blue's Big Parade	12
	Dora's Backpack	12
Beth and Brenda	What to Do Blue?	12
	Meet Diego	12
	Joe Moves In	12
	Clifford the Big, Red Dog	15
	Dora and Little Star	12
	Blue Skidoos to the Farm	12
	Friendly, Frosty Monsters	12
	Blue's Big Parade	12
	Dora's Backpack	12
Connor and Chris	I'll Teach My Dog 100 Words	14
	Go, Dog. Go!	18
	Meet Diego	12
	Joe Moves In	12
	Winnie the Pooh: The Blustery Day	11
	Gerald McBoing Boing	14
	Friendly Frosty Monsters	12
	Blue's Big Parade	12
	Dora's Backpack	12
Diane and Dylan	The Alphabet Book	10
	Dear Zoo	10
	Brown Bear	12
	The Snowball Fight	10
	Barn Dance	15
	The Scarecrow's Hat	12
	Little Quack	15
	Clip-Clop	13
	Big Read Barn	16

Eli and Eric	The Alphabet Book	10
	Dear Zoo	10
	Brown Bear	12
	The Snowball Fight	10
	Barn Dance	15
	The Scarecrow's Hat	12
	Little Quack	15
	Clip-Clop	13
	Big Read Barn	16

APPENDIX G

CONTRACT FOR PARTICIPATION

I, _____ agree to work with Erinn Finke and learn to use the

READ, WAIT, RESPOND strategy so that I can help _____ to take more

turns while we are reading books together. I know that for me to learn this strategy I will be

working with Erinn and we will be practicing and completing different activities to help me learn

the new way to read books. We have talked about all my questions, and I want to learn to use the

READ, WAIT, RESPOND strategy.

_____

Signature of student

_____

Erinn Finke, M.S., CCC-SLP/L

APPENDIX H

Instructional Standard

Session Type	Skill Instruction and Instructional Goals	Instructional Format and Content
BASELINE PHASE		
Baseline Session	<u>Pretest</u> • Discuss ASD with typically developing child (TDC) • Obtain pre-intervention measurements of TDC implementation of target skill and child with ASD who requires AAC communicative participation	<u>Child/Child Joint Book Reading Session</u> • No instruction will be provided in this phase • The researcher will unobtrusively videotape the joint book reading interaction.
INSTRUCTIONAL	**PHASE**	
Introductory Sessions	<u>Strategy Description</u> • Discuss goal of intervention with TDC • Familiarize the TDC with the "read, wait, respond" strategy • Familiarize the TDC with the steps that they will go through to learn the target strategy • Demonstrate the value of using the target strategy	<u>Individual Instructional Session</u> • Researcher and TDC watch one "pre" and one "post" videotaped interactions with a child with ASD who requires AAC. • Researcher and the TDC will discuss the differences in the interactions in the two videotapes. *Researcher Script Guide* "What differences did you see between the first tape and the second tape?" "I agree with you. I think the child with ASD was able to take more turns and be involved in the book reading more in the second tape too." "I think that the children with ASD were given more chances to take turns in the second tape." • The researcher and the TDC will discuss how the use of the target strategy may aid the TDC in helping the child with ASD to participate more in joint book reading interactions. *Researcher Script Guide* "While you are helping me with this project I will teach you to use a strategy that you can use when you are reading

books with the child with ASD."

"This strategy will help you to be able to let the child with ASD take more turns while the two of you are reading books."

"You will learn to "read" the book on the computer, and then you will "wait" and count to _____ in your head. If the child with ASD says something, or touches the computer to make it talk, then you will "respond" to them by saying something that is related to what they said or did."

Commitment
- Obtain TDC commitment to learn target skill.

"Don't worry if you think this is confusing. We will practice the steps together a lot before you will use them with the child with ASD."

"We will practice using role-plays where sometimes I will pretend to be the child with ASD, and sometimes you will pretend to be the child with ASD and I will pretend to be you."

Individual Instruction Session
- Researcher TDC review and sign the commitment form.
  Researcher Script Guide

Model the Intervention
- The researcher will provide the TDC with real-life models/demonstrations of the "ask and wait" target skill.

"Here is a contract that outlines what you will agree to do while you are working with me. Let's read and discuss it. You can ask me any questions you have about this form at any time. When I am finished we will write our names on this paper, and that will mean that we both agree to work together to learn the "read, wait, respond" strategy."

Individual Instructional Session
- The researcher and the TDC will role play a joint book reading interaction in which the researcher will pretend to be the TDC, and the TDC will pretend to be the child with ASD who requires AAC. The researcher will model use of the target skill while "thinking aloud" and using a high-technology aided AAC systems and visual scene layout of the storybook.
  Researcher Script Guide

Verbal Practice

- TDC demonstrates understanding and ability to use the target skill in joint book reading interactions with the researcher

"Now let's do a role play where you will pretend to be [child with ASD] and I will pretend to be you using the "read, wait, respond" strategy."

"I will think out loud, so you can hear how what I think about when I use the strategy while we are reading a book. You can ask any questions that you think of at any time, okay?"

Example of "thinking aloud" procedure

"First I am going to read the words on the page of the book. After that I am going to wait, and count to _____ in my head. If you say something, or make the computer say something, then I am going to respond to what you say with a comment that is related to what you said."

Controlled Practice and Feedback

- Researcher will provide the TDC with the opportunity to practice the implementation of the target skill during joint book reading interactions with the researcher in a controlled environment with necessary prompting and feedback.

Individual Instructional Session

- The researcher and the TDC rehearse the steps in the target skill.
- The TDC will describe the steps in the skill to the researcher
- The researcher and the TDC will rote rehearse the phrase "read, wait, respond"

Researcher Script Guide

"Let's practice saying the steps in the strategy – Read, Wait, Respond to help take turns"

"Let's say them together – over and over"

"Now you say the steps yourself 5 times, I'll count."

"Now I'll say the steps 5 times, you count"

"Now you say the steps 5 times again."

Individual Instructional Session

- TDC and the researcher will again role play the joint book reading interaction, but this time the researcher will play the role of the child with ASD who requires AAC and the TDC will

		play him/herself.
		• The researcher will provide the TDC with the necessary prompting and feedback for the TDC to utilize the target strategy correctly in the role play interactions.
		• These sessions continue until the TDC is able to utilize the target skill "read, wait, respond" with 90% accuracy in a 10 minute role play interaction. *Researcher Script Guide* "Now it's your turn to practice implementing the strategy, and I will pretend to be [child with ASD]. I will give you feedback as we read the story and I will help you by telling you what to do if you need it." "I want you to think aloud, like I did as we read the book so I will know how you are thinking about the strategy." Example of Feedback Nice job! You remembered all three steps in the strategy, and your response was great. It definitely went along with what I said." "Now I am going to start mixing up how I participate in the story. You know that [child with ASD] will not always do the same thing, so I want us to practice using the strategy when different types of things happen." "I will still help you if you have any troubles or forget what you should do."
INTERVENTION	**PHASE**	
Utilization Sessions	Intervention and Feedback • Research provides the TDC with the opportunity to utilize the target skill in joint book reading interactions with the child with ASD who requires AAC in the natural environment. If prompts are necessary for correct utilization of the target skill they will be provided and then faded.	Individual Instructional Session • TDC utilizes the "read, wait, respond" target strategy during joint book reading interactions with the child with ASD who requires AAC in the natural environment. • Session continues for at least 10-15 minutes • At least six intervention sessions will occur between the TDC and the child with ASD who requires AAC. *Researcher Script Guide*

		'Since you are now able to use the "read, wait, respond" strategy really well when we are practicing, I think it is time that you try to use the strategy with [child with ASD]." I will still be here to give you prompts and to help you if you need it. I will be giving you less and less help as you go on."
GENERALIZATION	**PHASE**	
Generalization Session	Post-test • The researcher will obtain measurements of the TDC use of the target strategy in novel book reading contexts.	TDC/Child with ASD Book Reading Sessions • The researcher will unobtrusively videotape two novel book reading activities in the classroom environment.
MAINTENANCE	**PHASE**	
Maintenance Sessions	Post-test • The researcher will obtain long-term, post-intervention measurements of the TDC use of the target strategy	TDC/Child with ASD Book Reading Sessions • The researcher will unobtrusively videotape classroom joint book reading interactions between the TDC and the child with ASD who requires AAC.
SOCIAL	**VALIDATION**	
Typically Developing Child	• The researcher will demonstrate the effects of the utilization of the target skill to the TDC. • The researcher will review how the utilization of the "read, wait, respond" strategy aided the TDC in helping them meet the goal of increasing the participation of the child with ASD in joint book reading interactions.	• The researcher and the TDC will watch one pretest videotape and one videotape of the TDC using the target skill with the child with ASD during a joint book reading interaction. *Researcher Script Guide* "You did such a great job using the strategy with [child with ASD]. Let's watch some 'before' and 'after' tapes and then talk about the differences that we can see in the things that you do, and in the things that [child with ASD] does." • The TDC will come up with a list of the ways that the child with ASD was participating in the joint book reading as a result of their use of the target strategy. *Researcher Script Guide* "What differences did you see in the

'before' and 'after' tapes?"

"How do you think working with and learning from me has changed you and [child with ASD]?"

"Do you think your other classmates would want to learn to "read, wait and respond"?"

Why or why not?

| General Education Teacher | • The researcher will demonstrate the effects of the utilization of the target skill to the general education teacher.
• The researcher will review how the utilization of the "read, wait, respond" strategy aided the TDC in helping to increase the participation of the child with ASD in joint book reading interactions. | • The researcher and the general education teacher will watch one pretest videotape and one videotape of a TDC using the target skill with a child with ASD during a joint book reading interaction.
Researcher Script Guide
Let's watch some 'before' and 'after' tapes and then talk about the differences that we can see in the things that the TDC does, and in the things that [child with ASD] does."
• The general education teacher will come up with a list of the ways that the child with ASD was participating in the joint book reading as a result of the use of the target strategy.
Researcher Script Guide
"What differences did you see in the 'before' and 'after' tapes?"<br>"How do you think working with and learning from me has changed the students in your class who participated in this project?"<br>"Do you think your other students should learn to "read, wait and respond"?"
Why or why not? |

APPENDIX I

INTRODUCTORY SESSION
Procedural Reliability

Dyad ID Code: _____

Instructional Step	Instructional Components	Implementation of Step	
		Correct	Incorrect
Describe and Make Commitments	View 2 videotapes		
	Discuss differences in tapes		
	Explain goal of instructional program		
	Discuss advantages of using targeted strategy		
	Review, complete, and sign contract		
Model	Role play – researcher plays role of typically developing child (TDC) and TDC plays role of child with ASD who required AAC		
	Researcher talks aloud during role play		
Verbal Practice	Researcher and TDC complete verbal practice of the "read, wait, respond" strategy		
Controlled Practice and Feedback	Role play – TDC plays role of TDC and researcher plays role of child with ASD who required AAC		
	Researcher provides prompts and/or feedback		
	Researcher encourages TDC to think aloud		
	Practice targeted skills sequentially and then together (as a complete strategy)		
TOTAL			

Calculations:

APPENDIX J

PRACTICE SESSIONS
Procedural Reliability

Dyad ID Code: _____   Training Session #:_____

Instructional Step	Instructional Components	Implementation of Step	
		Correct	Incorrect
Controlled Practice & Feedback	Role play – TDC plays role of TDC & researcher plays role of child with ASD who required AAC		
	Researcher provides prompts and/or feedback		
	Researcher encourages TDC to think aloud		
	Practice targeted skills sequentially & then together (as complete strategy)		
TOTAL			

Calculations

APPENDIX K

INTERVENTION SESSIONS
Procedural Reliability

Dyad ID Code: _____   Training Session #:_____

Instructional Step	Instructional Components	Implementation of Step	
		Correct	Incorrect
Advanced Practice	Story reading interactions – TDC practices targeted strategy with student with ASD who required AAC		
	Researcher provides prompts and/or feedback		
TOTAL			

Calculations

APPENDIX L

TYPICALLY DEVELOPING CHILD STRATEGY IMPLEMENTATION

Dyad ID Code: _____

Session: _____

Date of Session: _____

Length of Tape: _____

Legend:
R = Read Text; **W** = Wait (Expectant Delay); **Re** = Respond (Appropriate Response)

Session Phases: Baseline   Intervention   Generalization/Maintenance

Book	Double Page Spread #	Strategy NOT Imple-mented	Correctly Imple-mented Steps	Incorrectly Imple-mented Steps	Notes

Calculations:

Total Frequency Count: _____   Total # of Double Page Spreads: _____

NOTES:

APPENDIX M

STUDENT WITH ASD COMMUNICATIVE PARTICIPATION

Dyad ID Code: _____
Session: _____
Date of Session: _____
Length of Tape: _____

Sp = Speech or speech approximation; **UnSp** = Unintelligible Speech; **Sys** = AAC system; **P** = Pointing to picture in book; **Sign** = Sign or sign approximation.

Session Phases: Baseline   Intervention   Generalization/Maintenance

Book	Double Page Spread #	Mode	Turn Details Utterance Type (Message)

Calculations:

Total Frequency Count: _____   Total # of Double Page Spreads: _____

APPENDIX N

Typically Developing Child Questionnaire

1. Would you participate in this program or a similar program again, if given the opportunity? Please tell me why or why not.

2. Would you recommend this program to other students in your class? Why or why not?

3. Have you noticed any changes in the way the child with ASD participates or communicates since the start of the project?

4. What do you think are the best parts of the program/project?

5. What changes do you think I should make in the program if I ever do this program again?

6. Tell me your overall feelings about the program (e.g., was it a good reason to miss class?).

7. Do you want to tell me anything else you think about the project?

APPENDIX O

General Education Teacher Questionnaire

1. Would you let other children in your classroom participate in this program or a similar program again, if given the opportunity? Please tell me why or why not.

2. Would you recommend this program to other teachers/classrooms/schools in your class? Why or why not?

3. After watching the two tapes, did you notice any changes in the way the child with ASD participates or communicates since the start of the project?

4. What do you think are the best parts of the program/project?

5. What changes do you think I should make in the program if I ever do this program again?

6. Tell me your overall feelings about the program (e.g., was it a good reason to miss class?).

7. Do you want to tell me anything else you think about the project?

VITA

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Autism Spectrum Disorders, Augmentative and Alternative Communication, Social Interaction, Peer Relationships, Language Disorders, Language Development

PUBLICATIONS
Finke, E.H., Light, J.C. & Kitko, L. (2008). The effectiveness of nurse communication with patients with complex communication needs: A systematic review and focus on the utilization of augmentative and alternative communication. *Journal of Clinical Nursing, 17,* 2102-2115.

Drager, K.D.R., Finke. E., & Serpentine, E. (in press). Augmentative and alternative communication: An introduction. In J.S. Damico, M.J. Ball, & N. Muller (Eds.) *The Handbook of Language and Speech Disorders.* Malden, MA: Blackwell Publishers.

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Finke, E.H., McNaughton, D. & Drager, K. (submitted). "All children can and should have the opportunity to learn": General education teachers' perspectives on including children with ASD who require AAC. *Augmentative and Alternative Communication.*

SELECTED PRESENTATIONS
Finke, E.H., McNaughton, D.B. & Drager, K.D. (2008). *Teachers' Perspectives on Including Children with ASD who Require AAC.* Poster submitted for review for the Conference of the International Society for Augmentative and Alternative Communication, Montreal, Canada.

Serpentine, E.C., Finke, E.H., Drager, K.D.R. & Tarnai, B. (2008). *Decisions Making of Parents of Children with ASD Regarding AAC.* Poster submitted for review for the Conference of the International Society for Augmentative and Alternative Communication, Montreal, Canada.

Finke, E., Drager, K., Serpentine, E. (2007, November). *Teaming Interactions between Parents and Professionals Working with Children with ASD.* Poster presented at the Annual Conference of the American Speech –Language and Hearing Association, Boston, MA