EFFECTS OF A MODIFIED MILIEU THERAPY INTERVENTION ON THE SOCIAL COMMUNICATIVE BEHAVIORS OF YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS

By

GREGORY RICHMOND MANCIL

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2007

ACKNOWLEDGEMENTS

How do I begin to thank each individual who in his or her own way played a part on this portion of my journey in life, which has been one of the best paths I have decided to meander down? Thanks, first and foremost, to all of the families of children with autism who I have had the pleasure to work with and learn from over the years. Without their dedication and desire to improve their children's lives, I never would have stayed on this trail. I thank Suzie for allowing me to pursue my passion despite the emotional costs. I thank my children Vladimir and Melody for all the smiles, kisses, and hugs at the end of a long day. Although my family provided a lot of support, it was the support of my chair Maureen Conroy who guided me on this path and has helped me obtain my goal. I have been lucky to have a chair who is a great mentor, colleague, and friend. Maureen is one of the few people I have met who is a true educator in every sense of the word. Maureen, I thank her for all the opportunities she has given that allowed me to become a better researcher and scholar. I also thank her for developing a collegial relationship that will surely last well beyond my doctoral program and modeling how a professor should treat students. Finally, I thank her for "keeping my spirits up" during the times I doubted myself. If I become just a mere shadow of her as a professor, I will consider myself successful. Each of the other committee members, Terry Scott, Hazel Jones, James McLesky, and Mark Lewis, also has contributed to my education. Terry taught me the importance of working with teachers, staying grounded in reality, and choosing interventions that someone will actually implement. Hazel taught me how to support graduate students. James taught me important lessons in the mechanics of presenting and writing. Mark taught me the importance of looking at all the literature, including the medical research. I owe a special thanks to Alex Jordan because he mentored me at

my first job working with children with autism. Without his support and guidance, I may have chosen a different path.

In addition, I would like to thank all of my fellow doctoral students who have become and will continue to be great friends and colleagues. I owe a special thanks to Brian Boyd, Melissa Miller, and Todd Haydon. I thank Brian for teaching me the intricacies of the doctoral program. I will never forget our first conference and our Saturday morning breakfast. I thank Melissa for her support in everything she did and continues to do. I thank Todd for the jokes and conversations on behavior. The music always will be great. I thank the office staff: Shaira Rivas-Otero, Michell York, and Vicki Tucker, for every travel request completed, every office supply given, and every joke told. I will miss everyone in the Department of Special Education at the University of Florida.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

EFFECTS OF A MODIFIED MILIEU THERAPY INTERVENTION ON THE SOCIAL COMMUNICATIVE BEHAVIORS OF YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS

By

Gregory Richmond Mancil

August 2007

Chair: Maureen A. Conroy
Major: Special Education

Children with autism spectrum disorder (ASD) typically have difficulty speaking and communicating, with 40% of these individuals never developing speech. They also have social deficits, which are exacerbated by their communication problems. Concurrent with these deficits, individuals with ASD exhibit high levels of aberrant behaviors such as screaming, hitting, and biting, creating substantial obstacles for parents and other individuals charged with their education and well-being. In addition to these deficits, children with ASD have difficulty generalizing skills to natural settings. Children with ASD often learn skills in isolation and do not apply the skills to other settings such as their homes. Such issues with communication deficits, aberrant behaviors, and generalization difficulties, combined with the increase in the prevalence of autism demands that the field respond and provide effective practices to meet these individuals' needs at home and in educational settings (school).

To address both the communication and behavioral needs of children with ASD, researchers have investigated the use of applied behavior analysis interventions such as functional communication training (FCT) and milieu therapy. The researchers typically

have used FCT to address aberrant behaviors and milieu therapy to address communication skills. However, FCT researchers have not addressed generalization or overall improvement in communication. In a similar respect, milieu therapy researchers have not addressed aberrant behaviors.

The purpose of the current study was to examine the effects of an intervention that combined FCT and milieu therapy for intervening with children's communication and aberrant behaviors in a natural setting (i.e., their home). The results suggest that the children increased unprompted communication, while aberrant behavior decreased to zero. These results also generalized to the teacher in the classroom and maintained in both settings. Future research should examine the effects of the intervention with peers and the effects on other behaviors such as the parent's use of language. In addition, future research should extend the outcomes of the current study to a larger sample and other individuals with different characteristics on the autism spectrum.

CHAPTER 1
INTRODUCTION

The purpose of this chapter is to provide an introduction to the literature on the communication and behavioral needs of children with autism spectrum disorders (ASD). Additionally, a rationale for investigating the use of a combined intervention for students with ASD incorporating the principles of functional communication training with milieu therapy in natural environments will be discussed. An introduction of autism spectrum disorder (ASD) initially is given with a description of the history, incidence, and characteristics associated with ASD. Second, a description of applied behavior analysis (ABA), a conceptual approach adhered to by many researchers to address needs of children with ASD is provided. Third, a brief description of two evidence-based intervention practices that are based on ABA principles [i.e., functional communication training (FCT) and milieu therapy] and are used to address aberrant behaviors and communicative behaviors, respectively, is provided. This chapter concludes with a discussion of the contributions the current study makes to both research and practice.

Overview of Autism Spectrum Disorders

Autism Spectrum Disorders (ASD) is a developmental disorder affecting the lives of thousands of children. ASD was first described by Leo Kanner in 1943, who initially labeled the disorder autism. He studied the case histories of 11 children and noted that their characteristics differed significantly from children with schizophrenia. He suggested that a separate category was needed to account for these unique characteristics. Since the initial autism description in 1943, the disorder has evolved into a spectrum disorder (i.e., ASD) with the number and percentage of persons identified increasing each year (Center for Disease Control and Prevention, 2005).

According to the Centers for Disease Control and Prevention (CDC), two to six per 1,000 children (ages 3 to 10 years of age) have ASD (CDC, 2005). The Autism Society of America (Autism Society of America, 2006) suggests that ASD is even more prevalent, and reports that 1 in 150 children born today will develop this disorder. The Autism Society of America (ASA) also notes that 1.5 million Americans including children and adults have ASD, while another 15 million Americans (e.g., family, educators, and health care workers) are affected by this disorder. In sum, ASD incidence and prevalence rates indicate that millions are affected by the disorder.

Significant impairments in social interaction and communication skills and a highly restricted area of activities and interests are the defining features of ASD (American Psychiatric Association, 2000). Social interaction problems may be exhibited through an impairment in nonverbal behaviors (e.g., eye to eye gaze, body postures, facial expressions) and/or failure to create developmentally appropriate peer relationships. For example, a child with ASD may have difficultly directly looking into a person's eyes, even though the child may appear to be staring directly at the person.

Coinciding with impairments in social interaction, children with ASD have communication skill deficits. These deficits often include a delay in or absence of spoken language. Children that do develop speech may not initiate or sustain conversations with others. Further, these children may develop stereotyped and repetitive use of language or idiosyncratic language. For example, a child with ASD may repeat a phrase over and over, which can be used in a functional (i.e., as a mand to get a preferred item) or nonfunctional manner (i.e., no apparent connection to stimuli).

In addition to social interaction and communication problems, children with ASD may exhibit restricted, repetitive, and stereotyped patterns of behavior, interests, and activities. Often,

they demonstrate a preoccupation with idiosyncratic interests to a level considered abnormal in intensity and focus. For example, a child may know every phone number in his or her local telephone book, but not demonstrate understanding of basic arithmetic. They also may demonstrate inflexible, nonfunctional rituals and routines (e.g., turning a doorknob over and over in each direction before leaving their home). Further, many children with ASD have stereotyped and repetitive motor mannerisms. For example, a child may engage in repeated hand flapping with no apparent purpose during instructional times in the classroom or during free time alone.

Concurrent with the aforementioned features, many children with ASD exhibit high levels of aberrant behaviors toward others or themselves that interfere with their learning, such as screaming, hitting, and biting (Sigafoos, 2000). Some children will repeatedly pinch themselves or they may aggress toward other children or adults (e.g., hit others). These aberrant behaviors create substantial obstacles for individuals responsible for their education and care (Durand & Merges, 2001).

Many parents experience stress when their children engage in aggression or tantrums. Unlike others, parents of children with ASD usually cannot determine the reason for the tantrum because of their child's deficits in communication. The combination of these characteristics (i.e., social interaction impairments, communication deficits, repetitive behaviors, and aberrant behaviors), the negative effects on the children and families, and the increase in the prevalence of ASD present a critical demand for the field of special education to respond and provide effective practices to meet these children's needs at home and in educational settings.

Several researchers have responded to this need by examining the relationship between aberrant behaviors and communication abilities of children with ASD (e.g., see Bott, Farmer, & Rhode, 1997; Chung, Jenner, Chamberlain, & Corbett, 1995; Sigafoos, 2000; Schroeder,

Schroeder, Smith, & Dalldorf, 1978). Chung et al. found an inverse relation between communication ability and the display of aberrant behaviors such as self-injury and aggression in children with ASD. Similarly, Bott et al. (1997) determined that individuals with more developed speech skills exhibited a lower rate of aberrant behaviors than those with impaired speech skills. In a more recent study, Sigafoos (2000) hypothesized that impaired communication development in children with ASD and other developmental disabilities may actually cause aberrant behaviors. When children lack the appropriate communication skills to communicate, they may use aberrant behaviors for communication purposes.

To address both the communication and behavioral needs of children with ASD, researchers have investigated the use of applied behavior analysis interventions (Durand & Carr, 1987; Wacker et al., 1990). Applied behavior analysis (ABA) addresses the events surrounding behavior, both antecedent events (occurring prior to a behavior) and consequent events (occurring after a behavior), in order to manipulate those variables and produce behavior change (Baer, Wolf, & Risley, 1968).

ABA is based on several principles, two of which are particularly noteworthy for the current study. First, behaviors are learned through an individual's interactions with his or her environment via operant conditioning, which involves the relationship between stimulus-response-consequences (Skinner, 1953). A discriminative stimulus is one type of antecedent factor that sets the occasion for behavior to occur and signals the availability of a reinforcer (or consequent event). The consequence that follows the behavior determines the probability of the behavior reoccurring in the presence of the same or a similar stimulus. Therefore, the individual's environment must be assessed to determine the antecedents and consequences surrounding the target behavior in order to understand their effects on that behavior (Baer, Wolf,

& Risley, 1968)). Second, behavior analysis research should identify and investigate procedures that reliably produce significant behavior change (Bailey & Burch, 2002). Two of the most prominent ABA intervention strategies in the literature that are applicable to children with ASD and address the areas of aberrant behavior and communication are: (a) functional communication training (FCT), and (b) milieu therapy. An overview of each of these interventions strategies follows.

Functional Communication Training

Functional communication training (FCT) is one intervention strategy that has been used to address both the communication and aberrant behavioral needs of children with ASD (Carr & Durand, 1985; Durand & Merges, 2001; Wacker et al., 1990). FCT involves assessing the function (i.e., outcome, consequence) of a behavior (e.g., attention, escape, tangible, or sensory) through analogue assessment methodology referred to as functional analysis, and then replacing the aberrant behavior by teaching a communicative response that serves the same function (Durand & Carr, 1987).

A number of researchers have demonstrated the positive effects of this intervention with children with ASD and children with other developmental disabilities. In this body of research, communicative responses effectively have replaced aberrant behaviors in each of the studies reviewed. For example, Wacker et al. (2005) demonstrated FCT was an effective intervention for addressing attention and escape functions for children with aggressive behaviors, self-injurious behaviors, and destructive behaviors (e.g., destroying property). Despite these positive findings, FCT research with children with ASD has not examined the generality of this intervention to natural settings. For example, many of the researchers of the studies reviewed have performed FCT interventions only in clinical settings without sufficiently analyzing

generalization to other people and settings and predominantly limiting change agents to clinicians and researchers. In contrast, other behavioral intervention strategies focusing on communication skills, such as milieu therapy, have expanded research into the natural environment (e.g., home and school) with natural change agents (e.g., parents and teachers).

Milieu Therapy

Milieu therapy is another behavioral intervention with a plethora of studies demonstrating that it has been effectively used with children with developmental disabilities and/or communication disorders (e.g., Hester, 1995; Yoder & Warren, 2002) and children with ASD (e.g., Hancock & Kaiser, 2002). In contrast to FCT, milieu therapy focuses on teaching children new communication skills and behaviors within their natural environments (Kaiser, 1993). The natural environment may refer to any setting, including the home, school, or an inclusive educational setting where the child typically would spend time (Schwartz, 2003).

Researchers have used four basic milieu procedures [i.e., (a) modeling desired responses and correcting responses, (b) providing a mand and then modeling/correcting if needed, (c) time delay, and (d) incidental teaching] in the natural environment to demonstrate significant increases in children's communication and language skills (Hancock & Kaiser, 2002). Researchers have accomplished this by focusing research with parents and teachers as natural change agents within the natural environment. Teaching communication skills in natural environments has many advantages including: (a) increases in vocabulary (Yoder et al., 1995), (b) generalization of communication skills (Hancock & Kaiser, 2002), (c) maintenance of communication skills (Spradlin & Siegel, 1982), and (d) unprompted use of language (Yoder & Warren, 2002). Milieu therapy is a behavioral practice that has been demonstrated to successfully increase communication skills in children with ASD. In contrast to the FCT

literature reviewed, the focus of milieu therapy has been on teaching children new skills and behaviors within their natural environments (e.g., home and school).

Summary of FCT and Milieu Therapy Procedures

Although both FCT and milieu therapy research have been demonstrated to be effective in teaching communication skills to children with ASD, these techniques have focused on different aspects of the development of communication skills. The majority of the FCT research has focused on replacing aberrant behavior with a single communication response. In contrast, milieu therapy research has focused on increasing communication within the child's natural setting and has not focused on replacing aberrant behaviors with functional communication skills.

Statement of the Problem

As previously mentioned, individuals with ASD typically have difficulty speaking and communicating, with 40% of these individuals never developing speech (Sigafoos, Arthur-Kelly, & Butterfield, 2006). They also have social deficits, which are exacerbated by their communication problems. Concurrent with these deficits, individuals with ASD exhibit high levels of aberrant behaviors such as screaming, hitting, and biting (Sigafoos, 2000), creating substantial obstacles for parents and other individuals charged with their education and well being (Durand & Merges, 2001). In addition to these deficits, children with ASD have difficulty generalizing skills to natural settings. They often learn skills in isolation and do not apply the skills to other settings such as their homes (Sigafoos et al., 2006). Such issues with communication deficits, aberrant behaviors, and generalization difficulties, combined with the increase in the prevalence of ASD demands that the field respond and provide effective practices to meet these individuals' needs at home and in educational settings.

Significance of the Study

The current study examined the effectiveness of an intervention that combines FCT and milieu therapy for intervening with children's communication and aberrant behaviors in a natural setting (i.e., their home). Additionally, this study examined generalization of newly acquired skills to classroom settings. Finally, this study examined the maintenance of newly acquired skills in home settings. These aspects of the research project are particularly important; given the difficulty children with ASD have generalizing skills across individuals and settings.

Purpose of the Study

The overall goal of this study was to examine a modified milieu therapy intervention (i.e., combined FCT and milieu therapy) toward teaching young individuals with ASD functional communication skills. The following research questions were addressed:

(a) Does the implementation of a modified milieu therapy intervention increase communication skills and decrease dependence on prompts in children with ASD in a natural setting?

(b) Do newly acquired communication skills in children with ASD generalize to an untrained setting?

(c) Do newly acquired communication skills in children with ASD maintain over time?

(d) Does the implementation of a modified milieu therapy intervention result in a decrease of aberrant behaviors in children with ASD in a natural setting?

CHAPTER 2
LITERATURE REVIEW

The purpose of this chapter is to provide an integrative literature review of the studies examining the effectiveness of using functional communication training (FCT) or milieu therapy with young children with ASD. First, an introduction of autism spectrum disorder (ASD) is given with a description of the history, incidence, and characteristics associated with ASD. Second, a description of applied behavior analysis (ABA), a conceptual approach used to address behavioral skills deficits and excesses of children with ASD is provided. Third, a description of two intervention practices based on ABA principles [i.e., functional communication training (FCT) and milieu therapy] used to address aberrant behaviors and communicative behaviors, respectively, is provided. Finally, the empirical literature in reference to functional communication training and milieu therapy with children with ASD is reviewed. Emphasis is placed on evaluating the research in regard to the environments and change agents involved in the research and the effectiveness of FCT and milieu therapy with children who have a diagnosis of ASD. Analyses of the characteristics of the participants, environment, research designs, target behaviors, interventions, major findings, reliability, and treatment fidelity across studies are provided. In addition, a critique of the findings to address strengths, limitations, and implications for future researchers is provided.

Overview of Autism Spectrum Disorders

ASD is a developmental disorder affecting the lives of thousands of children. ASD was first described by Leo Kanner in 1943 through the case histories of 11 children. Kanner observed that the characteristics of these children differed significantly from other children; therefore, he suggested a separate diagnosis entity was needed to describe their unique characteristics. Since Kanner's first description of autism, the disorder has evolved into a spectrum disorder (i.e.,

ASD) with the number and percentage of diagnoses increasing each year (Center for Disease Control and Prevention, 2005).

According to the Centers for Disease Control and Prevention (CDC), two to six per 1,000 children (ages 3 to 10 years of age) have ASD (CDC, 2005). Whereas the Autism Society of America (Autism Society of America, 2006) suggests it is more prevalent and reports that 1 in 150 children born today will eventually be diagnosed with ASD. The Autism Society of America (ASA) also notes that 1.5 million Americans including children and adults have ASD, while another 15 million Americans (e.g., family, educators, and health care workers) are affected by this disorder. In sum, the incidence and prevalence rates of ASD appears to be growing at alarming rates.

The essential features of ASD include significant impairments in social interaction and communication skills and a highly restricted area of activities and interests (American Psychiatric Association, 2000). Social interaction problems may be exhibited through an impairment in nonverbal behaviors (e.g., eye to eye gaze, body postures, facial expressions) and/or failure to create developmentally appropriate peer relationships. For example, a child with ASD is less likely to initiate peer-related social interactions or respond to social bids from peers.

In addition to social interaction problems, children with ASD have communication skill deficits. Often, these deficits include a delay in or absence of spoken language (e.g., 40% never obtain speech). Children that do develop speech may have difficulty initiating or sustaining conversations with others. Further, these children may develop stereotyped and repetitive use of language or idiosyncratic language (e.g., repeating nonfunctional phrases over and over). Coinciding with impairments in social interaction and communication, children with ASD may

exhibit restricted, repetitive, and stereotyped patterns of behavior, interests, and activities. They often demonstrate a preoccupation with idiosyncratic interests to a level considered abnormal in intensity and focus (American Psychiatric Association, 2000). For example, a child may know every fact about the makes and models of cars and sustain conversations related to this topic for hours, but remain unable to hold conversations about any other topic. They also may engage in inflexible, nonfunctional rituals and routines such as turning a doorknob over and over in each direction before leaving their home. Although these rituals and routines initially may appear to decrease anxiety, the routines typically impede an individual's ability to socialize and function properly within society (Heflin & Alaimo, 2006). Further, many children with ASD have stereotyped and repetitive motor mannerisms (e.g., hand flapping). For example, a child may engage in repeated hand flapping, for no apparent purpose. Concurrent with the aforementioned features, many children with ASD exhibit high levels of aberrant behaviors toward others or themselves that interfere with their learning, such as screaming, hitting, and biting (Sigafoos, 2000). For instance, some children may repeatedly bite themselves or they may aggress toward other children or adults (e.g., scratch others). Aberrant behaviors such as biting create substantial obstacles for individuals responsible with their education and care (Durand & Merges, 2001). Many parents experience stress when their children engage in aggression or tantrums. Unlike other parents, parents of children with ASD may have difficulty determining the reason for the tantrum because of the child's deficits in communication. It is difficult for an individual who does not have any communication skills to explain what may be the cause of the tantrum. These characteristics (i.e., social interaction impairments, communication deficits, repetitive behaviors, and aberrant behaviors) and their negative effects on the children and families combined with the increase in the prevalence of ASD present a critical demand for the field of special education to

respond and provide effective practices to meet these children's needs at home and in educational settings.

One area of important research is investigating methods aimed at increasing communication skills, decreasing aberrant behavior, and determining the relation between communication abilities and aberrant behaviors. A number of researchers have responded by examining the relation between aberrant behaviors and communication abilities of children with ASD (e.g., see Bott, Farmer, & Rhode, 1997; Chung, Jenner, Chamberlain, & Corbett, 1995; Sigafoos, 2000; Schroeder, Schroeder, Smith, & Dalldorf, 1978). Chung et al. found an inverse relation between communication ability and the display of aberrant behaviors such as self-injury and aggression in children with ASD. Similarly, Bott et al. (1997) determined that individuals with more developed speech skills exhibited a lower rate of aberrant behaviors than those with impaired speech skills. Further, Sigafoos hypothesized in a more recent study that impaired communication development in children with ASD and other developmental disabilities may actually cause aberrant behaviors. He suggested that when children lack the appropriate skills to communicate, they might actually use aberrant behaviors for communication purposes.

To address both the communication and behavioral needs of children with ASD, several researchers have developed intervention practices based on a framework of applied behavior analysis (Durand & Carr, 1987; Wacker et al., 1990). The framework of applied behavior analysis (ABA) involves analyzing the events surrounding behavior, both antecedent events (occurring prior to a behavior) and consequence events (occurring after a behavior), and manipulating those variables to produce behavior change in the desired direction (Baer, Wolf, & Risley, 1968; 1987). ABA is comprised of several principles, two of which are particularly noteworthy for the current study. First, most behaviors are learned through an individual's

interactions with his or her environment. Behavior typically is learned via operant conditioning, which involves the stimulus-response-consequence relationship (Skinner, 1953). A discriminative stimulus sets the occasion for behavior to occur and signals the availability of a reinforcer. The consequence that follows the behavior determines the probability of the behavior reoccurring in the presence of the same or a similar stimulus. If the subsequent event following a behavior (i.e., consequence) is a reinforcer, the future probability of the behavior occurring increases; however, if the subsequent event serves as a punisher, the behavior will decrease. Therefore, the individual's environment must be assessed to determine behavioral effects of the antecedent and consequences surrounding the target behavior (Baer, Wolf, & Risley, 1968; 1987). Second, the primary goal of applied behavior analysis research is to discover procedures that can reliably produce clinically significant behavior change (Bailey & Burch, 2002).

An important component of examining behavior change is evaluating not only the experimental significance, but the social significance of the change as well (Bailey & Burch, 2002). The decision of what constitutes a significant behavior change should also include the participant's input, rather than decided by the researcher alone (Schwartz, 2003). It seems logical that the more involved the participant is in aspects of the intervention process, the greater the likelihood the change in the behavior will be meaningful. Researchers could accomplish this by consulting consumers about important problems to research, appropriateness of the interventions, and effectiveness of the outcomes (Schwartz, 2003). Two of the most prominent strategies based on ABA techniques in the literature that are applicable to children with ASD and addresses the areas of aberrant behavior and communication are: (a) functional communication training (FCT), and (b) milieu therapy. Each of these interventions employs different aspects of ABA practices. A descriptive overview of each intervention practice follows.

Functional Communication Training

Functional communication training (FCT) is one ABA intervention strategy that has been used to address both the communication and aberrant behavior problems of children with ASD (Carr & Durand, 1985; Durand & Merges, 2001; Wacker et al., 1990). Developed in the mid-1980s, FCT involves assessing the function (i.e., outcome, consequence) of a behavior (e.g., attention, escape, tangible, or sensory) through analogue assessment methodology referred to as functional analysis and then replacing the aberrant behavior by teaching a communicative response that serves the same function (Durand & Carr, 1987). Three steps typically are followed in the FCT process. First, an assessment of the function of a behavior (e.g., attention, escape, tangible, or sensory) through a functional analysis (FA) is conducted. Next, a communicative response that matches the function is identified. Finally, an intervention plan that replaces the aberrant behavior with a communicative response that serves the same function is implemented.

Functional Analysis and Functional Behavior Assessment: Step One

To identify the function, researchers typically complete a FA by manipulating consequences, such as escape from demands, obtaining attention, and or obtaining preferred tangible items, contingent on the aberrant behavior to conclusively determine the function of the behavior. One important component of FA is that the results of each of these probe conditions must be compared to the other conditions as well as a control condition to determine the function of the behavior (i.e., tangible, free play, alone, or escape). For example, if the aberrant behavior increases more during the attention condition in comparison to the other conditions, the researcher concludes the behavior is maintained by attention. The condition in which the aberrant behavior occurs at the highest stable rate (i.e., escape, attention, tangible) determines the

function of the behavior. Prior to conducting a FA, some researchers use descriptive functional behavioral assessments to hypothesize a function and help to inform the FA process (Mancil, 2006). These functional behavioral assessment components may include indirect assessments and direct observations (Brady & Halle, 1997).

Indirect assessments. Indirect assessment instruments can be categorized into three formats: (a) checklists, (b) questionnaires, and (c) interviews. Checklists typically contain items related to functions of aberrant behavior that requires an adult (e.g., parent, teacher) familiar with the child's behavior to respond to on a Likert scale. The parent and/or teacher must then score the instrument, leading to a hypothesis of the function of the aberrant behavior. For example, the Motivation Assessment Scale (MAS) (Durand & Crimmons, 1996) is a checklist commonly completed by teachers and other professionals. For this checklist, a Likert scale of 0 to 6 is used, with 0 being never and 6 being always. There are 16 questions with four questions related to each possible function (i.e., sensory, escape, attention, and tangible), which are randomly grouped. The points are totaled for each function and the one with the greater number of points and highest relative ranking is the hypothesized function.

Many questionnaires contain similar content, but usually consist of open-ended questions. For example, a question may be presented as "When does the child engage in the behavior?" There then may be some additional stipulated follow-up questions about the context in which the aberrant behavior occurs (e.g., Does the child engage in the behavior during an academic task or mostly during transitions?).

In contrast, interviews generally involve initial questions that are vague and set the occasion for the interviewer to probe for more detail and guide the process with specific follow-up questions. For example, the interviewer may ask, "How often does the behavior occur?" If

the respondent answers, “The child screams all morning.” the interviewer may follow-up by asking “Does he scream often or for extended periods?” The interview provides more room for a detailed assessment, but also requires both additional time and skill level of the interviewer. After the interview is complete, the interviewer compiles the provided answers and hypothesizes a function.

Direct observations. Unlike indirect assessments that are designed to gain information through a third party (e.g., teacher, parent), direct observations consist of directly observing the behavioral and communicative behaviors of the children in various settings such as the clinic, classroom, and playground. For example, a researcher may observe a child and record what occurs before (antecedent) and after (consequence) the aberrant behaviors. Both indirect assessments (e.g., checklists, questionnaires, interviews) and direct observations aid in developing a hypothesis of the behavior’s function (e.g., the interview and direct observation may suggest that attention is the function because every time the aberrant behavior was observed, the teacher or parent gives the child attention).

Identifying a Communicative Response: Step Two

After determining the behavioral function, the next step in the FCT process involves identifying a communicative response that matches the identified function of the aberrant behavior. This replacement communicative response may be in the form from one of the following categories: verbal language, picture communication, gestures, or assistive technology devices (Brady & Halle, 1997). The selection of this response is based on four criteria (Dunlap & Duda, 2005; Horner & Day, 1991). First, change agents should consider the child’s capability of completing the response. For example, if the child lacks the verbal abilities to request a desired tangible item, the researcher may choose picture communication or a gestural response to

teach the child to use in replacement of the aberrant behavior. Second, researchers, teachers, and parents should consider the ease of teaching the response. If a child is non-verbal, it may be difficult and time consuming to teach a verbal response; thus, another response such as picture communication or gesture would be more efficient. Third, researchers, teachers, and parents should consider whether or not others are able to understand and acknowledge the response. If no individual in the child's life knows sign language, the researcher should choose a response people could easily understand and acknowledge such as a picture or an assistive technology device. Finally, researchers, teachers, and parents should further consider how efficient and effective the response serves its function in the community at large. For example, if other individuals in the child's environment (e.g., store) are unable to understand the response and/or the child has difficulty completing the communicative response, the response may not necessarily serve its function.

Development of Treatment Plan: Step Three

After the functional communication response is selected, an intervention plan is designed to teach the target child the response (Lalli, Casey, & Kates, 1995). Typically, discrete trial procedures have been used to teach the target child the communicative replacement response. Discrete trial procedures involve removing the target child from the natural routine and providing direct and repeated trials over and over requiring the child to respond to the researcher's mand (i.e., request) with the trained communicative response until mastery criterion is met. In this research literature, this criterion typically involves the child providing a correct response 10 consecutive times. For example, a child may be taught to say, "help" or to perform a gesture that represents the word, "help" to replace screaming as the method for obtaining attention. Additionally, a child may be taught to hand a picture of a desired tangible item to

adults to replace aberrant behaviors such as hitting another individual to gain the tangible item. The final component in FCT involves placing the aberrant behavior on extinction (i.e., withholding reinforcement for the behavior) and prompting and reinforcing the child's use of the functional communicative response that replaces the aberrant behavior (Lalli et al., 1995). For example, if the target child engages in a tantrum to obtain a desired tangible item, the adult ignores the tantrum, prompts the child to ask for the tangible item using the functional communicative response and provides the child access to the tangible item following the appropriate communicative response. A number of researchers have demonstrated that the FCT treatment process successfully produces a decrease in aberrant behaviors, while increasing appropriate functional communication skills (e.g., see Carr & Durand, 1985; Durand & Merges, 2001; Wacker et al., 1990).

In sum, FCT is one ABA intervention practice that has been demonstrated to effectively increase functional communication skills in children with ASD and reduce aberrant behaviors. Researchers have demonstrated FCT is effective with various functions and topographies of aberrant behavior. Although FCT has many strengths, it is not the only approach used to increase communication skills with children with ASD. In the next section, milieu therapy, another successful approach, will be reviewed.

Milieu Therapy

Milieu therapy is a second strategy with a plethora of studies demonstrating that it has been effectively used to teach communication skills to children with developmental disabilities and/or communication disorders (e.g., Hester, 1995; Yoder & Warren, 2002) and to a lesser extent, children with ASD (e.g., Hancock & Kaiser, 2002; Ross & Greer, 2003). In milieu therapy, the focus is teaching children new skills and behaviors within their natural

environments (Kaiser, 1993). The natural environment may refer to any setting that the child would naturally spend time regardless of his or her disability, including the home, school, or an inclusive educational setting (Schwartz, 2003). As demonstrated in the literature, teaching communication skills in natural environments has many advantages including: (a) increases in vocabulary (Yoder et al., 1995), (b) generalization (Hancock & Kaiser, 2002), (c) maintenance (Spradlin & Siegel, 1982), and (d) unprompted use of language (Yoder & Warren, 2002).

Milieu therapy includes the following basic procedures: (a) providing a model of desired responses and correcting child responses, (b) providing a mand and then modeling/correcting if needed, (c) using a time delay, and (d) employing incidental teaching strategies (Hancock & Kaiser, 2002). One of the strategies used in milieu therapy to promote communication in natural environments is modeling correct responses and correcting the target child's responses. This involves modeling a target behavior and then providing correction to the child as necessary (Alpert & Kaiser, 1992). For example, while outside on the playground, a child may tap on the adult's arm and look at the toy dump truck. The adult gains the child's attention and provides a verbal prompt that matches the child's communication skill level, such as "Want truck?" If the child says, "Want truck," the adult provides praise, repeats the child's phrase (e.g., says, "yes, want truck") and provides the child the toy dump truck. Otherwise, the adult provides a corrective model repeatedly, "Want truck" until the target child correctly models the response. However, if the child does not respond in a reasonable time frame (e.g., two to three seconds), as predetermined by the researcher, parent, and/or teacher, the adult provides a model and gives the object to the child. The purpose of modeling and correcting responses is to provide the target child the necessary prompts and instructions in natural situations to assist in skill development.

Another component of milieu therapy is the mand-model technique. The mand-model technique involves giving a direct instruction (commonly referred to in the literature as a mand) within a naturally occurring activity and context. The mand is a vocal operant that is maintained by a reinforcer (e.g., obtaining a preferred item such as a toy car) and is evoked by the discriminative stimuli for that reinforcer (Skinner, 1957). For example, if a child says, "Water please" and receives the water, it is likely that this is a mand. Also, it is important to recognize that responses are deemed mands based on their controlling variables and not on their topography. Sign language and picture cards can function as mands the same as vocal responses function as mands. When necessary, this mand would be followed by a model and a correction similar to the description above. The mand-model is performed by first gaining the child's attention and then providing a prompt for a target behavior. After the prompt, a guided model (i.e., assisting the child in performing the target behavior) is provided when necessary. For instance, a child is given apple juice for snack and reaches to pick it up with his hands. The adult provides a response block (e.g., blocks his hands), obtains the child's attention, and says, "Tell me what you want" (mand), places the communication card with the picture of juice on it in the child's hand, and physically guides his hand to the adult who has the apple juice (corrective model). If the child continues to ask for juice by using the picture card, the adult provides the juice paired with positive praise (e.g., "Good job asking"). If the child attempts to grab the juice again without using the communication card, the adult repeats the process. The purpose of the mand/model strategy is to develop independent skills by providing the child with a prompt and an example of performing the communicative response correctly. The adult continues with this procedure until a performance criterion is met (e.g., child perform the task correctly for two days).

Time delay is another procedure often used in milieu therapy that involves the adult providing a stimulus and then waiting approximately 5 to 30 seconds, based on the child's developmental and mental age, for a child-initiated response (Kaiser, 1993). Time delay typically is combined with other techniques such as the mand-model. If the child does not respond, the adult provides a mand-model. For example, a child may want his coat, but need help getting it from the shelf. While attending to the child, the adult waits for a period of 5 to 30 seconds (depending on the child's developmental level) for the child to request help. If the child requests by using a communicative response such as a picture card or vocalization, the adult provides immediate praise and a correct model, "You want your coat?" If the child does not independently request help within the time delay, the adult provides a mand-model. The amount of time delay chosen depends on the child's level. The longer the wait period, the greater the chance of losing the child's interest; therefore, care is needed in choosing the appropriate time delay. The purpose of time delay is to decrease the child's dependence on adult prompting, instructions, and models; thus, promoting independent and spontaneous (i.e., unprompted) communication.

Incidental teaching is another strategy often employed within the framework of milieu therapy. Incidental teaching is a process where communication skills are learned in naturally occurring interactions or interactions arranged in natural contexts, which may be the reason the terms incidental teaching and milieu therapy have been used interchangeably at times. Hart and Risley (1968; 1975) described incidental teaching as an interaction between an adult (e.g., parent) and a child during unstructured situations such as free play where the child controls the incidences in which teaching occurs by signaling interest in the environment. For example, while playing with toy cars, a child may point to a car and say, "ca". The adult reinforces this

behavior by providing positive praise and giving the child the toy car. Incidental teaching typically is combined with the other procedures and is applied during situations when children are requesting either vocally or non-vocally. Prompts are provided if necessary. Further, access to desired objects are contingent upon correct responses, which are followed by behavior specific praise. For example, an adult may create a situation by ”accidentally” forgetting to give a child her milk during snack (i.e., sabotaging the environment). The adult then would use the aforementioned techniques to enhance communication by giving a prompt when needed, praising the child for correct responses, and giving the child the milk (contingent access) for correct responses. The purpose of incidental teaching is to promote fluency and expand skills of children with delayed language skills, which may include children with ASD (e.g., see Hart & Risley, 1975; MacDuff, Krantz, MacDuff, & McClannahan, 1988).

In sum, milieu therapy is one practice that researchers have used to successfully demonstrate an increase in communication skills of children with ASD. In contrast to the FCT literature reviewed, the focus in milieu therapy is teaching children new skills and behaviors within their natural environments (e.g., home and school). This has been done using four basic procedures (a) modeling desired responses and correcting responses (i.e., model/correct), (b) providing a mand and then modeling/correcting if needed (i.e., mand/model/correct), (c) using time delay, and (d) employing incidental teaching which has resulted in skills generalizing to other settings and people.

Summary of FCT and Milieu Therapy Procedures

Although both FCT and milieu therapy research have been demonstrated to be effective in teaching communication skills to children with ASD, these techniques have focused on different aspects of the development of communication skills. The majority of the FCT research

has focused on identifying functions of aberrant behavior and replacing aberrant behavior with a single communication response. In contrast, milieu therapy research has focused on increasing communication within the child's natural setting and has not focused on replacing aberrant behaviors with functional communication skills. Both techniques are empirically validated and have their strengths and weaknesses. In the following section, a contrast between FCT and milieu therapy will be provided to highlight their similarities and differences

Contrast of FCT and Milieu Therapy

As apparent from the aforementioned descriptions of FCT and milieu therapy, a direct comparison of these two interventions reveals an array of similarities and differences. The following sections provide a contrast between FCT and milieu therapy. First, similarities of the two practices will be provided. Next, differences between the two practices will be highlighted.

Similarities. FCT and milieu therapy have similarities. First, both interventions partly include changing antecedents to behavior as an intervention strategy. That is, both interventions use prompts as an antecedent strategy to obtain the desired behavior (i.e., communication response); however, these prompts differ in each approach. Also, both interventions apply changes to consequences to increase appropriate communicative behavior. For FCT, the consequence involves obtaining access to the identified function of the behavior (e.g., tangible item, escape a situation) through skill instruction in a replacement behavior. In milieu therapy, the consequence is obtaining the requested item, which may or may not serve as a functional reinforcer. Finally, each addresses the communication deficit of children with ASD as previously detailed.

Differences. In addition to similarities, FCT and milieu therapy have prominent differences. As mentioned previously, prompt procedures are used within both FCT and milieu

therapy interventions. However, typical application of the prompts systematically differs between the two approaches. Prompts in FCT typically are based on the occurrence of aberrant behavior (Carr & Durand, 1985). A prompt often is given to the child to perform the communication response when the child engages in aberrant behavior. Although time delay may be used in FCT for prompts, there has not been a systematic description of the procedure in the FCT literature (Bourret, Vollmer, and Rapp, 2001; Mancil, 2006). In contrast, prompts within milieu therapy training are not based on aberrant behavior occurrences. Prompts are not given only in response to aberrant behaviors. Typically, the prompts in milieu therapy are connected to time delay procedures systematically (Hancock & Kaiser, 2002). For example, if a child does not communicate within 10s, a prompt may be given.

Another difference between the two procedures, apparent from the aforementioned descriptions, concerns the underlying purpose of the trained communication response. FCT always connects the communication response to function (Carr & Durand, 1985). The underlying purpose is to decrease aberrant behavior by replacing it with the communication response. Communication responses taught in milieu therapy, in contrast, are not necessarily tied to function systematically. If a child does not request an item, the child is given access to the item after several prompts have occurred (Kaiser, 1993). This does not occur in FCT because it may reinforce the inappropriate behavior.

Another difference is manipulation of the environment. Although FCT researchers may alter the environment, this is not mentioned in the research studies as an essential feature. In contrast, managing the environment is a prominent feature of milieu therapy (Kaiser, 1993). For example, an essential feature of milieu therapy involves setting up the environment to enhance

communication. For example, Kaiser (1993) described how to place desirable objects in view and out of reach of children; thus, increasing the likelihood from communication to occur.

A final difference between the two interventions, which requires emphasis, is that milieu therapy is in vivo. The child leads, so if he or she chooses to abandon one item/task, they are allowed to move on to another item. This is not the case with FCT. When using FCT procedures, following a correct response, children typically are returned to the task at hand and presented with another trial. However, as noted by Bourret, Vollmer, and Rapp (2001), many of the studies on FCT do not report explicitly how mand procedures are selected or conducted. Thus, a complete and confident comparison between FCT and milieu therapy cannot be provided. In the following section, the literature base examining the use of FCT and milieu therapy with children with ASD will be reviewed.

Functional Communication Training Literature Review

To identify relevant research studies, the FCT literature review consisted of a thorough review of the ERIC, Education, PsycINFO, and Academic Search Premier data bases using various combinations of the following terms: functional communication training, functional equivalence training, autism, autism spectrum disorder, and communication. A hand search was conducted of the following journals, covering the span of 1985 to the present: *Focus on Autism and Other Developmental Disabilities*, *Journal of Autism and Developmental Disorders*, *Journal of Applied Behavior Analysis,* and *Journal of Positive Behavior Interventions*. Next, after reviewing the retrieved articles, an archival search was conducted. These searches produced 30 articles in which FCT was the primary intervention addressing aberrant behaviors and communication deficits, of which eight included children with ASD. The following criteria were used for inclusion in this review: (a) at least one participant of the study was a child with an

autism spectrum disorder diagnosis, (b) the function of the aberrant behavior was determined by a functional behavior assessment, and (c) the primary intervention was functional communication training.

Eight articles that met the criteria were reviewed to determine the effectiveness of FCT with children with ASD. The studies were analyzed to determine the characteristics of the study participants, research settings, behaviors, interventions, research designs, reliability, treatment fidelity, and major findings across studies are provided.

Characteristics of Study Participants

A total number of 22 participants with ASD were investigated across all of the eight studies. The majority of researchers reported gender along with chronological (CA), language/communication levels (LA), and mental ages (MA). Eighteen (82%) of the participants were male and four (18%) were female. Although this may at first seem overrepresented by males, the ratio of males to females is representative of the overall population of individuals diagnosed with ASD (Lotter, 1966; Volkmar, Szatmari, & Sparrow, 1993). As shown in Table 2.1, participants ranged in age from 2.7 to 13 years (M = 8.0 years). The language age (LA) reported ranged from 1.8 to 13.3 years (M = 7.6 years), while the mental age reported ranged from 2.4 to 7.9 years (M = 5.0 years). When comparing CA, MA, and LA levels, a participant with a low chronological age could have a language and mental age higher than that of an older participant. Also, while some participants had a mental age greater than their language age, other participants' ages were opposite in correlation. For example, a participant may have a mental age of 5 years old and a language age of 3 years old. In contrast, another participant may have a mental age of 3 years old and a language age of 5 years old. There was no correlation between which should be higher, MA or LA.

Participants differed in their levels of language prior to the studies and whether or not they had concomitant diagnoses. Of the speech levels reported for 12 participants, five participants (42%) spoke in complete sentences; however, their sentences were not always functional. For example, some of the complete sentences were reported in the research as echolalic (i.e., repeated phrase over and over), while others were bizarre (e.g., a child saying, "the cat flew on a broom' without an apparent contextual reference). Also, of the participants who spoke in complete sentences, only 1 (1/5, 20%) was reported to speak spontaneously. Two participants (2/12, 16%) were nonverbal and did not communicate with signs or gestures. Of all these participants, only six (6/22, 27%) were reported to have additional diagnoses, which included communication disorders, seizure disorders, and severe/profound mental retardation.

Characteristics of Research Setting

The type of research environment the studies were conducted in was similar across most of the studies. With a few exceptions and unlike participant characteristics, the trainers and training sessions were removed from the natural environment and the research sessions were conducted in a clinical setting.

Trainer. As shown in Table 2.2, researchers and research assistants implemented the majority of the interventions (i.e., 6/8, 75%). Only one study (1/8, 12.5%) involved a teacher as an implementer, but she was not the participant's teacher. She was recruited by the researchers to conduct the study and served more in the role of a research assistant (Wacker et al., 1990). Further, only one study (1/8, 12.5%) used parents as trainers (Wacker et al., 2005).

Training sessions. The majority of trainers conducted training sessions in clinic rooms. For example, the majority of training (i.e., 6/8 studies,75%) occurred in separate rooms that usually contained only a table and chairs. These clinic rooms were not designed to mirror the

classroom. Two studies (2/8, 25%), however, were conducted in more natural environments (e.g., classroom and home). For example, O'Neill and Sweetland-Baker (2001) conducted a study in various locations of the participant's classroom, while Wacker et al. (2005) conducted training in designated rooms of the participant's home.

Characteristics of Behaviors, Interventions, and Research Designs

The type of aberrant behaviors and their functions varied among participants. Consequently, researchers implemented various interventions to address these functions. Differences identified across the studies can be organized in the following categories: (a) aberrant behaviors, (b) FBA procedures, (c) behavior functions, (d) communicative responses, and (e) FCT research designs.

Aberrant behaviors. As shown in Table 2.3, researchers reported eight different categories of aberrant behaviors, with many participants exhibiting more than one behavior. The categories included aggression (e.g., hitting, hair pulling), self-injurious behavior (e.g., hand biting), destroying property, tantrums (e.g., yelling), body rocking, hand flapping, oppositional behavior (e.g., refuse to do work), and walking away. Fourteen participants out of 22 (64%) exhibited aggression, self-injurious behavior, or destruction of property. Also, fourteen participants (14/22, 64%) exhibited more than one aberrant behavior. For example, one participant engaged in aggressive behavior, tantrums, self-injurious behavior, and property destruction (Carr & Durand, 1985).

FBA procedures. Basic FBA procedures used to analyze the various behaviors, for the most part, were similar across all studies. Each research team used a functional analysis (FA) as the primary method to derive at a behavioral function. However, as shown in table 3, three research teams (3 out of 8, 38%) also conducted FBA that included indirect assessments.

Prior to the FA, research teams in these three studies first collected information through indirect assessments with teachers or parents. Indirect assessments used in various studies differed in type and length. While some researchers reported interviews that were informal and short (Carr & Durand, 1985; Durand & Carr, 1987), others reported indirect assessments that were more formal and greater in length (Durand & Carr, 1992). Carr and Durand (1985) and Durand and Carr (1987) simply interviewed teachers and asked which of their students engaged in aberrant behavior and what supposed function the behavior served. Durand and Carr (1992) had teachers complete a problem behavior checklist and the *Motivation Assessment Scale* (MAS) to help hypothesize a behavioral function.

As mentioned previously, each research team conducted a FA to determine the function. Researchers used a traditional FA (i.e., analyzing consequences) with the exception of Carr and Durand (1985) who incorporated antecedent events into their functional analysis. Designs used and reported by the authors for the FA differed. As shown in Table 2.3, five studies (5/8, 63%) used alternating treatment designs where the assessment conditions were systematically alternated. For example, Carr and Durand alternated easy versus difficult tasks and a low (33%) versus high (100%) attention condition. Similarly, Wacker et al. (1990) alternated escape, tangible, alone, and social attention conditions. Durand and Carr (1987; 1992) used a reversal design to examine effects of different conditions. Wacker et al. and others (2005) used a multi-element design to compare assessment conditions (i.e., attention, escape, tangible, and free play) by counterbalancing them across sessions. These differences may be more in name than actual differences. For example, the multi-element and alternate treatment designs are derivatives of a reversal design.

Behavior functions. After the completion of the FBA procedures, behavioral functions definitively were identified in each study for all but one participant (Wacker et al., 2005) whose behavioral function was determined to be undifferentiated. Across all the studies, 12 participants (12/22, 55%) emitted aberrant behaviors to escape a task or situation, while eight participants (8/22, 36%) displayed aberrant behaviors to gain attention. Only three participants (3/22, 14%) engaged in aberrant behaviors to gain a tangible item. Also, of the 12 participants whose behavioral function was escape, four of them (18%) also engaged in the behavior to gain attention. Similarly, one participant (1/22, 5%) who engaged in aberrant behaviors did so to gain attention and to gain access to a tangible item.

Communicative responses. With the knowledge of the behavioral function(s), trainers taught an array of communicative responses to replace the aberrant behaviors, with equal success regardless of the response category. Responses taught aligned with the identified function and fit into one of the following categories: (a) verbal language, (b) sign language, (c) picture icon based language, or (d) augmentative devices. As shown in Table 2.3, trainers in six studies taught participants to verbally mand. For example, Durand and Carr (1987) taught participants to verbally mand, "Help me" to replace body rocking and hand flapping that served to escape aversive tasks and situations. Durand and Carr (1992) taught participants in another study to verbally mand, "Am I doing good work?" to replace tantrums that served to gain attention. Researchers in two studies taught children to use sign language for manding (Wacker et al., 2005; Wacker et al., 1990). For example, to gain access to a tangible, Wacker and colleagues (1990) taught participants to mand the sign, "please". In two studies, research teams taught children to use icons to serve as the mand (Martin, Drasgow, Halle, & Brucker, 2005; Wacker et al., 2005). For example, Martin et al. taught their participant to present an icon card with the

words “No Thank You” written upon it to replace tantrums, which served as an escape function. Wacker et al. (2005) used an augmentative device to teach a participant to press a micro switch that said, “Please”. This response replaced self-injurious behavior, which was attention maintained.

Across all studies, communication responses were taught in a similar fashion. For example, when Durand and Carr (1992) taught participants to verbally mand, “Am I doing good work?” the training sessions as described previously continued until the participants were able to perform the task correctly 10 consecutive times. During the training sessions, the trainer sat across the table from the participant and waited for the participant to respond to the mand. Similarly, in the study conducted by Martin and colleagues (2005), participants were trained to emit the communicative response without error. In summary, all participants in each of the studies were taught one mand until they were able to respond correctly 10 consecutive times.

FCT research designs. After the communicative responses were taught, researchers used one of the following two single subject research designs for evaluating the effectiveness of FCT: (a) reversal, or (b) multiple baseline. As shown in Table 2.3, researchers used a reversal design in four studies. For example, Carr and Durand (1985) alternated relevant and irrelevant response phases with baseline. First, baseline data were collected on aberrant behaviors. Then, participants were reinforced for relevant communicative responses by the trainer giving them assistance. Following this phase, reinforcement was removed, thus, returning to baseline. Next, participants were reinforced for irrelevant responses. These responses, however, were irrelevant to the task at hand or the function. The sequence was then repeated; however, the phases (i.e., relevant and irrelevant) were counterbalanced. Also as shown in Table 2.3, four studies used a multiple baseline design. For example, Durand and Carr (1992) implemented the procedures

with one participant as they continued to collect baseline data on the remaining participants. After a few sessions, they implemented the procedures with the next participant as they continued to implement the procedure with the first participant. This continued until the procedure was implemented with every participant. Further, they conducted sessions with a naïve trainer (i.e., graduate psychology major) to test for generalization to other people. This was the only study to check for generalization across persons or settings.

Reported Reliability

Reported research results would be compromised unless the aforementioned observations were reliable and procedures were implemented with fidelity. Researchers all reported high inter-rater reliability (i.e., agreement of observed phenomenon) ranging from 79% to 100%. For example, Carr and Durand (1985) reported reliability of 80% or greater for all categories. Similarly, Wacker et al. (1990) had an average reliability of 92%, with 80% or more for each category. Martin and colleagues (2005) reported greater reliability ranging from 97% to 99%.

Reported Treatment Fidelity

In addition to reliability, all research teams reported high treatment fidelity (i.e., consistence of implementation of the methods and procedures of treatment) within their prospective studies. They suggested treatment fidelity was high based on direct observations, but research teams seldom reported a percentage of steps completed correctly. The researchers simply stated that the treatments were implemented with high fidelity without providing the treatment data.

Major FCT Findings

For each of these studies, research teams reported similar findings, in that all participants learned functional communication responses matched to the functions of their aberrant

behaviors, with the exception of the one participant whose behavioral function was undetermined. As shown in Table 2.4, the success of the intervention was demonstrated by a decrease of aberrant behaviors with a corresponding increase in the trained communication response. After implementation of FCT, research teams found a decrease in aberrant behavior across all studies. For example, Wacker and colleagues (2005) found that FCT combined with time-out resulted in hand biting decreasing to zero percent. Similarly, Carr and Durand (1985) found aberrant behaviors to decrease to 0.5% upon the successful implementation of FCT. Also, Wacker and colleagues found significant decreases in aberrant behavior for all but one participant, whose behavior's function was undifferentiated. Consequently, Wacker and colleagues noted that the communication response must match the aberrant behavior's function, since no function was identified, no FCT could occur.

Akin to decreases in aberrant behavior results across studies, participants increased their use of communication mands. However, these mands were limited in range. Only one mand was taught to the participants. For example, Carr and Durand (1985) noted sustained rates of relevant responses in the final phases of the study, but only one response was taught and measured. In a later study, Durand and Carr (1992) also found an increase in unprompted communication, the communication, however, was again limited to one type of mand. More recently, the participant in Martin et al.'s (2005) study independently used his icon card to request an item 100% of the time following training; similar to previous studies, they focused on one mand with no expansion of communication.

Only one research team reported generalization to other people or settings (Durand and Carr, 1992). Durand and Carr examined for generalization with another person or setting for children with ASD. They conducted final sessions with a naïve trainer (i.e., graduate psychology

major) to test for generalization to other people. The children who had received FCT training maintained their appropriate replacement communicative response and low levels of aberrant behavior.

Summary of FCT Literature

In summary, FCT is one approach researchers have employed to address the communication and behavioral needs of children with ASD. The effectiveness of FCT was demonstrated in each study. Researchers demonstrated that FCT resulted in aberrant behavior decreasing and the trained communicative response increasing. Although the results are promising, the FCT literature also presents a number of limitations, which are described below.

FCT has been demonstrated to be a successful strategy for decreasing problem behaviors and increasing functional communicative responses, however, the majority of the research has been conducted in clinical settings, rather than children's natural environments (e.g., children's classrooms and homes). When implementing the procedures during initial development stages, researchers produced positive behavioral and communication results. For example, Durand and Carr (1987) indicated an increase in communication and a decrease in aberrant behaviors, but this study occurred within a separate 5 x 10 meter classroom that excluded the child's teacher and did not design the environment to look like the child's regular classroom.

Similarly, parents and teachers very seldom have been used as change agents. In the majority of the studies, research assistants have served as therapists. Wacker and colleagues (2005) were the only researchers to use parents as natural change agents. None of the research studies have used a target child's teacher as the change agent.

In addition to training in clinical settings, researchers focused on only a single communication mand. Researchers taught one communication response to each child and did

not attempt to expand the vocabulary, vocal or non-vocal, of any child. Finally, research studies have failed to evaluate the generalization and maintenance of acquired communicative responses. Only one study analyzed generalization across individuals (Durand & Carr, 1992). No study evaluated generalization across settings or maintenance of acquired skills.

Clearly, the FCT has made a significant impact on children with ASD; however, there are a number of areas within the literature that need further research and expansion. These will be described in the final section of this chapter.

Milieu Therapy Literature Review

The literature review of research conducted in the area of milieu therapy began with searches of ERIC, Education, PsycINFO, and Academic Search Premier electronic data bases using various combinations of the following terms: milieu therapy, incidental teaching, time delay, embedded instruction, autism, autism spectrum disorder, and communication. Following the electronic data base search, a hand search was conducted of the following journals, covering the span of 1968 to the present: *Education and Training in Developmental Disabilities, Focus on Autism and Other Developmental Disabilities*, *Journal of Applied Behavior Analysis, Journal of Early Intervention, Journal of Positive Behavior Intervention,* and *Topics in Early Childhood Special Education*. Finally, after reviewing the retrieved articles, an archival search was conducted. These searches produced 28 articles in which components of milieu therapy were the primary intervention for increasing communication in children, of which eight included children with autism spectrum disorders. The following criteria were used for inclusion in this review: (a) at least one participant of the study was a child with an autism spectrum disorder diagnosis, (b) the training occurred in environments that mirrored the natural environment (e.g., clinic arranged like a typical classroom), (c) the primary intervention involved at least one of the identified

milieu therapy techniques, and (d) the primary intervention was to increase communication in children.

The eight articles that met the criteria were reviewed to determine the effectiveness of milieu therapy with children with ASD. Particularly, the studies were analyzed to determine the characteristics of the study participants, research setting, behavior, interventions, research designs, reliability, treatment fidelity, and major findings across studies are provided.

Characteristics of Study Participants

The majority of researchers reported gender along with chronological and mental ages, with only two research teams reporting language age. Twenty-five out of 34 (74%) of the participants were male; four (12%) were female, and the gender of five participants (14%) (Ross & Greer, 2003) were not reported. As shown in Table 2.5, participants ranged in age from 2.9 to 15.8 years, with the average age being 7.3 years. Mental age was not reported consistently across studies. The authors of one study reported IQ scores with a range of <50 to 95, with an average of 61 (Hancock & Kaiser, 2002). The authors of five other studies reported a mental age score with a range of 2.7 to 6.2 years, with an average of 3.9 years. Language/communication age was reported for two studies with a range of 1.6 to 5.7, with an average of 2.8 years. Participants differed in their language levels prior to the studies, with all participants reported to have diagnoses of ASD. Of the prior speech levels reported for 20 participants, nine participants (9/20, 45%) demonstrated echolalia (i.e., repeated phrase over and over), four participants (4,20, 20%) were nonverbal, and six participants (6/20, 30%) had limited speech (i.e., one to two word phrases requesting basic needs such as food), one individual (1/20, 5%) had extensive speech and spoke spontaneously.

Characteristics of Research Setting

The type of settings the studies were conducted in was similar across the majority of the studies. Most studies were conducted in the child's natural environment (i.e., home and community setting) and the change agents included individuals who naturally interact with the target child (e.g., parents, teachers).

Trainers. As shown in Table 2.6, teachers, paraprofessionals, and parents implemented the majority of milieu therapy training. Only one study (12.5%) involved a researcher as the sole implementer, which was one of the earlier investigations with milieu therapy techniques (Charlop, Schriebman, & Thibodeau, 1985).

Training sessions. The majority of trainers conducted training sessions in the natural environment. For example, 75% (i.e., 6/8 studies) of the studies occurred in the target child's natural environment, that is, two studies were conducted in homes and four in classroom settings. However, two studies (2/8, 25%) were conducted in settings that were not the child's natural environment. For example, Charlop et al. conducted their study in clinic rooms arranged like classrooms and partitioned areas of classrooms while Hancock and Kaiser (2002) conducted sessions in a playroom in a university setting. However, Hancock and Kaiser then measured generalization in the home and demonstrated that three out of four children generalized training from the university's playroom to the children's respective homes.

Characteristics of Target Behavior, Interventions, and Research Designs

Researchers implemented various milieu therapy techniques to address the varied communication skill deficits demonstrated by participants. Differences identified across the studies can be organized in the following categories: (a) targeted communication skills taught (i.e., behavior), (b) interventions (i.e., milieu procedures used), and (c) research designs.

Target behaviors. Since communication levels of participants varied, researchers taught different communication responses (i.e., behavior) to various participants and focused on a variety of communication skills across studies (see Table 2.7). These included basic need phrases (e.g., "I want snack"); emotional phrases (e.g., "I like you"); descriptive phrases (e.g., "Block is big"); pairs of prepositions (e.g., "on, under"); questions (e.g., "What do you want?"); receptive labeling (e.g., handing correct food item to teacher); and increases in the mean length of utterance (i.e., number of words spoken together in one phrase). As shown in Table 2.7, basic need phrases were taught to a higher percentage of participants (62%, 21 participants), while receptive labeling was taught to only two participants (6%). For example, Charlop et al. (1985) taught seven participants to say, "I want cookie". Also, Ross and Greer (2003) taught five participants to say, "cookie".

Interventions. Researchers used various milieu therapy techniques to address the communication difficulties of the participants in their respective studies. Typically, one or more of the following milieu techniques were used: (a) model/correct, (b) mand/model/correct, (c) time delay, or (d) incidental teaching. The strategies varied across studies. However, the majority of researchers used time delay and/or the mand/model/correct technique (i.e., 6/8, 75%). As shown in Table 2.7, time delay was used to teach twenty-one participants (62%) communication skills. For example, Charlop et al. (1985) used a 2s to 10s time delay and Johnson, McDonnell, Holzwarth, and Hunter (2004) used a 4s time delay to teach communication skills. Similarly, twenty-one participants (62%) were taught using the mand/model/correct technique. Laski et al. (1988) used mand/model/correct to teach basic need phrases, description phrases, and questions. Also, Charlop and Walsh (1986) used mand/model/correct to teach emotional phrases. Further, time delay and mand/model/correct

were used simultaneously for 13 participants (38%). For example, Hancock and Kaiser (2002) and Ross and Greer (2003 used both techniques to teach communication skills. In contrast, only one participant (3%) was taught using the model/correct technique, which was done by Johnson et al. (2004) simultaneously with a 4s time delay.

Research designs. In the studies reviewed, all researchers used a multiple baseline single subject methodology to evaluate the effectiveness of the milieu therapy intervention. The baseline phases in the studies were across participants, communication skills, and/or sets of objects. As shown in Table 2.7, five of eight (62.5%) research teams analyzed the intervention using a multiple baseline across only participants, one (12.5%) research team analyzed the intervention using a multiple baseline across only communication skills, one (12.5%) research team analyzed the intervention using a multiple baseline across participants and communication skills, and one (12.5) research team analyzed the interventions using a multiple baseline across sets of objects (i.e., receptive language where children chose the correct object).

Reported Reliability

Research results would be compromised unless observations were reliable. Fortunately, all research teams reported high inter-rater reliability. For example, Charlop et al. (1985) reported reliability of 98% or greater for all behavioral categories. Similarly, Johnson et al. (2004) had an average reliability of 99%, with a range of 97 to 100%. The other studies had similar findings.

Reported Treatment Fidelity

In addition to reliability, all research teams with the exception of Laski, Charlop, and Schreibman (1988) reported high treatment fidelity (i.e., consistence of implementation of the methods and procedures of treatment) within their prospective studies. The research teams reported that treatment fidelity was high based on direct observations. Similar to the FCT

literature reviewed, research teams for milieu therapy seldom reported a percentage of steps completed correctly and simply stated that the treatments were implemented with high fidelity without providing the treatment data.

Major Milieu Therapy Findings

Regardless of the milieu strategies used, research teams reported similar findings, in that they were all successful in teaching children with ASD communication skills regardless of the combination of techniques used or the communication skills targeted. Further, the majority of the children with ASD participating in these studies generalized their communication skills across people and/or settings.

As shown in Table 2.8, the success of milieu therapy was demonstrated by an increase in targeted communication skills for all 34 participants. For example, Charlop et al. (1985) noted that all 7 participants in their study achieved the targeted communication skills at 90% accuracy or higher. In another study, Hancock and Kaiser (2002) noted that all 4 participants mean length utterance (MLU) and diversity of words (i.e., nouns and verbs) increased following training. Similarly, McGee, Krantz, and McClannahan (1985) noted that all three participants achieved targeted communication skills. In addition to increasing targeted communication skills in the training setting, several researchers noted that these skills generalized. For example, Charlop et al. noted that 6 participants (86%) generalized communication skills to untrained objects and 2 participants (29%) generalized the communication skills to unfamiliar settings. Similar to the Charlop et al. study, generalization to another setting occurred in a study conducted by Hancock and Kaiser (2002). However, 3 participants (75%) generalized communication skills to another setting as compared to only 29% for the Charlop et al. study. One explanation could be because Hancock and Kaiser included the mand/model/correct technique in their study. Additionally, the

parent conducted the trainings (see Table 2.8). In addition, McGee, Krantz, and McClannahan (1985) noted that all three participants achieved generalization to another classroom after acquisition was achieved during teaching sessions.

Similarly, several researchers noted maintenance of targeted communication skills. For example, Hancock and Kaiser (2002) demonstrated that increases in target language were maintained for the four children in their study as indicated through follow-up observations conducted six months after the study ended. Similarly, Ross and Greer (2003) demonstrated that all participants in their study showed maintenance of vocalization skills during a follow-up probe three months after the study was completed.

Summary of Milieu Therapy Literature

In summary, milieu therapy is one approach researchers have used to address the communication needs of children with ASD. As researchers investigated the use of milieu therapy with children with ASD, they provided interventions in natural environments where teachers and parents conducted the majority of training. When implementing various milieu therapy procedures across research studies, researchers demonstrated that children with ASD improved their communication skills. Although Sigafoos (2000) has noted that poor communication skills and aberrant behaviors in children with ASD are highly linked, this review found no mention of aberrant behaviors in the milieu therapy literature. Thus, readers may acknowledge that milieu therapy increases communication skills and for many individuals, generalizes to other people and settings when training is conducted in the natural environment. However, the effect milieu therapy has on aberrant behaviors has not been investigated in the literature. Clearly, this is a logical extension of the literature and needs further investigation.

Discussion

Children with ASD have significant impairments that influence their daily functioning. Two interrelated impairments typically exhibited are deficits in appropriate communication and behavior. Children with ASD typically have deficits in appropriate use of functional communication skills and often engage in aberrant behaviors that serve a communicative function (Sigafoos, 2000). In an attempt to address communication and behavioral needs, researchers independently have addressed one or both of these problems. Functional communication training (FCT) is one area of research that has investigated the effectiveness of teaching children with ASD functional communication skills to replace their aberrant behaviors. Milieu therapy is another area of research that has focused on the development of communication skills, without attention to behavioral challenges. Although both areas of research have produced positive child outcomes, each area also has a number of limitations. The strengths and limitations of each area of research will be discussed next.

Functional Communication Training

FCT is one-approach researchers have employed to primarily address the behavioral needs of children with ASD (e.g., see Mancil, 2006). Researchers have investigated the effects of teaching a replacement communicative response, which matches the function of the aberrant behavior, has on the associated aberrant behavior. FCT interventions have been successfully implemented primarily in clinical settings, rather than in natural communicative environments. The FCT literature indicates a decrease in aberrant behavior and an increase in the replacement communicative response for the participants with ASD, which is a strength of this intervention.

Strengths. As discussed in previous sections, FCT researchers have demonstrated several strengths of this intervention. First, researchers have provided a plethora of evidence

demonstrating that FCT has a significant impact on aberrant behavior (Durand & Carr, 1992; Wacker et al., 2005). Second, evidence provided by researchers consistently demonstrates that children who receive FCT use the replacement communicative behavior in place of the aberrant behavior during intervention sessions. Finally, the discrete trial procedures typically used by FCT researchers have been shown to be most effective at initial acquisition of communication skills when compared to such techniques as incidental teaching (Miranda-Linne & Melin, 1992).

Limitations. Despite the strengths demonstrated by FCT researchers, a few limitations should be addressed. First, limited FCT research has been conducted in natural environments. Only two studies (2 of 8, 25%) were identified that have conducted training in natural environments (e.g., home). For example, O'Neill and Sweetland-Baker (2001) conducted their study in various locations of the participant's classroom, while Wacker et al. (2005) conducted training in designated rooms of the participant's home. Second, parents and teachers seldom were included as the change agent. Only two studies used a teacher (Wacker et al., 1990) or a parent (Wacker et al., 2005) as a change agent. Third, although researchers have demonstrated that FCT results in an increase in communication, this has been limited to only one trained communication mand. No studies have taught more than one communication mand to a child. Finally, there has been a lack of emphasis on generalization and maintenance in the research. Durand and Carr (1992) conducted the only study that evaluated and demonstrated generalization of communication to another person. No studies have been conducted that examined the generalization to other settings or maintenance across time.

Milieu Therapy

Milieu therapy is another approach researchers have used to improve communicative functioning of children with ASD. Researchers in this area have focused primarily on increasing

targeted communication skills. They have investigated the effects that techniques such as time delay and incidental teaching have on the communication of children with ASD. As researchers examined milieu therapy, they successfully implemented the milieu intervention strategies in the natural environment, which resulted in an increase in communication skills.

Strengths. Several strengths of milieu therapy are evident. First, various techniques such as time delay (Johnson et al., 2004) and mand/model/correct (Ross & Greer, 2003) have produced positive results such as increasing the response variation of children's communicative skills (Warren & Gazdag, 1990; Yoder & Warren, 2002). For example, Hancock and Kaiser (2002) showed an increase in the MLU (complexity) and vocabulary (diversity) of children with ASD. Second, the majority of the milieu therapy research has been conducted in the children's natural environment. Six out of 8 (75%) studies were conducted in a natural environment. Third, parents and teachers have demonstrated the ability to be effective natural change agents using milieu therapy (7 out of 8, 88%, research studies reviewed). For example, a mother implemented milieu therapy interventions in a study conducted by Hancock and Kaiser (2002). In a study conducted by Ross and Greer (2003), a teacher implemented the milieu therapy interventions. Finally, researchers consistently have demonstrated that communication skills taught to children with ASD using milieu therapy procedures generalize to other people and settings (McGee et al., 1985) and have greater maintenance than discrete trial procedures (Miranda-Linne & Melin, 1992).

Limitations. Although milieu therapy researchers have demonstrated numerous strengths of this intervention, a few limitations should be addressed. First, researchers have not evaluated milieu therapy's effects on aberrant behavior. Research consumers do not know if improvements in aberrant behavior occurred, which may effect decisions of consumers who are

looking for comprehensive interventions. Second, there is a paucity of research involving children with ASD. The few milieu therapy research studies that have included children with ASD were not designed specifically for the ASD population; instead, they were designed for any individual with communication deficits.

Future Research Directions

When considering the strengths and limitations described in the FCT and milieu therapy literature, future research should address concerns to extend the literature of both areas of research. A logical extension of the FCT research is to extend this literature by examining the following: (a) the effectiveness of FCT strategies in natural environments, (b) the generality of FCT across people (adults and peers) and settings (home, school, community), and (c) the maintenance of skills acquired through FCT across time. As discussed previously, few FCT research studies have been conducted in natural environments. Further, researchers have not investigated the generalization or maintenance of acquired skills sufficiently. In addition, researchers have not examined the use of parents and teachers as natural change agents sufficiently.

Similarly, there are logical extensions of the milieu therapy research. Analysis of the following: (a) the connection to behavioral problems, and (b) the design of studies specifically for children with ASD would extend the current research base. As described previously, milieu therapy researchers have not systematically analyzed the relation between acquisition of communication skills and aberrant behavior. For example, one question for future researchers to consider is whether aberrant behaviors continue to decrease across settings as the child's communication repertoire increases? The field cannot conclude what influence if any that milieu therapy has on children's aberrant behavior, particularly for children with ASD. Also, studies

have not been designed for children with ASD. Rather, the studies have been designed for children with language delays, which may or may not include children with ASD.

One logical extension of the literature is to combine the strengths in FCT and milieu therapy. Each approach has strengths that would support the future research directions for the other approach (e.g., milieu therapy is in natural environments and FCT decreases aberrant behavior). Combining both areas of research may (a) increase the response variation (i.e., more words and more complex words) of children's communicative skills, (b) provide an analysis of the relation between aberrant behaviors and communication, (c) facilitate generalization and maintenance of communicative skills in natural environments that also replace aberrant behavior, and (d) demonstrate that these skills can be taught by natural change agents.

As previously mentioned, researchers investigating milieu therapy consistently have demonstrated that using procedures such as time delay and mand/model/correct in the natural environment greatly increases the response variation of children's communicative skills (Warren & Gazdag, 1990; Yoder & Warren, 2002). Thus, combining both areas of research and following the same milieu therapy procedures while implementing FCT should result in similar findings.

In addition to increasing response variation, simultaneously analyzing communication and aberrant behaviors is particularly important because many researchers (Carr &Durand, 1985; Sigafoos, 2000) have hypothesized a direct relationship between aberrant behaviors and communication skills in children with ASD. Despite this hypothesis, the relationship beyond one behavior and communication mand using FCT has not been investigated adequately. The findings of FCT research have shown that teaching a communicative response will decrease one behavior; however, these studies have not investigated whether aberrant behaviors in various settings continue to decrease as more communication mands are taught to children with ASD

(Mancil, 2006). In contrast, research in milieu therapy with children with ASD has not addressed this relationship, because this research focuses primarily on the communication of children with ASD. Combining both areas of research should address the relationship between the two variables.

Another benefit of combining both research areas is that milieu therapy researchers have an extensive history demonstrating the effectiveness of research in the natural environment (Alpert & Kaiser, 1992; Halle, Baer, & Spradlin, 1981; Hart & Risley, 1975; Warren & Gazdag, 1990). As aforementioned, these methods have demonstrated generalization and maintenance of communication skills in children with ASD and other disabilities such as speech disorders (Miranda-Linne & Melin, 1992). By using milieu therapy procedures in the natural environment, results may indicate similar generalization and maintenance of targeted communication skills that replace the aberrant behavior.

In addition to training in natural environments, milieu therapy researchers have demonstrated the success of training parents and teachers to implement the intervention. The parents and teachers used the procedures with high fidelity and results indicated an increase in communication skills for all children. Combining milieu therapy with FCT may show similar results for an increase in communication skills and a decrease in aberrant behavior with parents as natural change agents.

Another reason to simultaneously analyze the diversity of communication mands and aberrant behaviors is efficiency. As noted by Koegel and LaZebnik (2004), the key to any treatment program is to start intervention at an early age. Koegel and LaZebnik further noted that each moment deficits in children with ASD are not addressed; the chance the children will function independently in society decreases significantly. However, children with ASD and their

families have a limited amount of time available for therapy, as do many individuals; thus, combining two forms of intervention (i.e., FCT and milieu therapy) optimizes the use of time by concurrently addressing more than one deficit area.

In summary, both FCT and milieu therapy have been used successfully to address the needs of children with ASD. Functional communication training (FCT) has focused on teaching children with ASD functional communication skills to replace aberrant behaviors. In contrast, milieu therapy has focused on the development of communication skills, without attention to behavioral challenges. Although both areas of research have produced positive child outcomes, each area also has a number of limitations.

In conclusion, the combination of milieu therapy and FCT will extend current research by addressing maintenance and generalization. Maintenance and generalization will be addressed by using milieu therapy procedures embedded in the natural environment and by training parents in homes and teachers in classrooms (i.e., natural environment) while collecting data across time, settings, and people. This will help determine if the training of a child with ASD by his or her parent in the home setting will maintain over time and/or generalize to a classroom setting.

Therefore, the purpose of this study was to determine the effectiveness of combining the strengths of two effective strategies [i.e., milieu therapy and functional communication training (FCT)] to replace aberrant behavior with functional communicative skills in the individual's natural environments with parents as change agents. The following research questions will be addressed:

(a) Does the implementation of a modified milieu therapy intervention increase communication responses and decrease dependence on prompts in children with ASD in a natural setting?

(b) Do newly acquired communication skills in children with ASD generalize to an untrained setting?

(c) Do newly acquired communication skills in children with ASD maintain over time?

(d) Does the implementation of a modified milieu therapy intervention result in a decrease of aberrant behaviors in children with ASD in a natural setting?

Table 2-1. Characteristics of the study participants of FCT

Study	N	CA*	LA*	MA*	M	F	Diagnosis	Prior speech level
Carr & Durand (1985)	1	13	N/A	3	1		Autism	Verbal (complete sentences)
Durand & Carr (1987)	4	7-13	3.3-7.7	3-7.9	4		2- Autism; 2- PDD	Verbal (echolalia, complex sentences, bizarre speech)
Durand & Carr (1992)	3	3.8-4.9	1.8-3.8	2.4-4.4	2	1	Autism	N/A
Martin et al. (2005)	1	10	N/A	N/A	1		Autism	Nonverbal
O'Neill & Sweetland-Baker (2001)	2	6-15	N/A	N/A	2		Autism, MR	Verbal (non-functional)
Ross (2002)	3	9-14.8	7-13.3	N/A	1	2	Autism	Verbal
Wacker et al. (1990)	1	7	N/A	N/A	1		Autism, MR, Seizure disorder	None
Wacker et al. (2005)	7	2.7-6.5	N/A	N/A	6	1	3- Autism, 4- PDD, 1- Seizure disorder 2- CD	N/A
Total	22	m=8	m=5.7	m=4.1	18	4		
Range		(2.7-15)	(1.8-13.3)	(2.4-7.9)				

Note. CA = chronological age; LA = language age; MA = mental age; N/A = not available; MR = mental retardation; func. = functional; M = male; F = female; m = mean; CD = communication disorder
*Age in years/months

Table 2-2. Characteristics of the environment of FCT

Study	FCT implementer	FCT training location	Description of location
Carr & Durand (1985)	Researcher	Separate class	5 x 10-m classroom next door
Durand & Carr (1987)	Researcher/ Assistants	Separate class	Contained table, two chairs
Durand & Carr (1992)	Research Assistants	Separate class	Table, chairs for trainer, children
Martin et al. (2005)	Researcher	Separate class	N/A
O'Neill & Sweetland-Baker (2001)	Researcher	Various class locations	N/A
Ross (2002)	Researcher	Separate class	Table, bookshelf, 3 chairs
Wacker et al. (1990)	Therapist, graduate students, 1 teacher	Standard classroom/ therapy room	Therapy room had table, chairs
Wacker et al. (2005)	Children's parents	Room at home	N/A

Note. N/A = not available.

Table 2-3. Research Designs and Interventions

Study	FCT design	FBA procedures	Dependent measures	Function	Response
Carr & Durand (1985)	Reversal	I, FA Alt. Tx	AG, TAN, SIB, DP	E	Verbal
Durand & Carr (1987)	Multiple Baseline	I, FA Alt. Tx	2-BR; 2-HF	E	Verbal
Durand & Carr (1992)	Multiple Baseline	I, FA Alt. Tx	2-DP; 2-OP; TAN	A	Verbal
Martin et al. (2005)	Alt. Tx	FA Alt. Tx	TAN, AG, W	E	Picture card
O'Neill & Sweetland-Baker (2001)	Multiple Baseline	FA Alt. Tx	2-W; 1-DP; 1-SIB	E	Verbal
Ross (2002)	Reversal	FA Alt. Tx	no or poor initiation	1-A, 1-E, 1-T	Verbal
Wacker et al. (1990)	Reversal	FA Alt. Tx	SIB	T	Sign language
Wacker et al. (2005)	Multiple Baseline	FA multiple Element design	6-AG; 4-SIB; 3-DP	4-A & E; 1-A & T; 1- U	Signs, Pictures, Verbal, Assistive technology

Note. AG = aggressive behavior; SIB = self-injurious behavior; DP = destroying property; OP = oppositional; TAN = tantrum; W = walk away; FCT = functional communication training; FA = functional analysis; FBA = functional behavioral assessment; HF = hand flapping; BR = body rocking; N/A = not available; I = interview; Alt. Tx = alternating treatment; A = attention; E = escape; T = tangible; U = undifferentiated

Table 2-4. Major findings of FCT

Study	Tx F	IR reliability	Behavioral results	Communication results	Gen.	Maint.
Carr & Durand (1985)	High	80% or higher	DB decreased to 0.5%	Relevant responses maintained	N	N
Durand & Carr (1987)	High	80% or higher	Reduction in HF, BR exhibited following training	Communication increased	N	N
Durand & Carr (1992)	High	N/A	Decreased, maintained best in FCT/time-out	Unprompted communication	Y	N
Martin et al. (2005)	High	97-99%	Bear hugging decreased	Independently after A phase	N	N
O'Neill & Sweetland-Baker (2001)	High	87-99%	Disruptive behavior decreased	Stimulus generalization occurred across some tasks	N	N
Ross (2002)	High	88-100%	N/A	Faulty responses decreased	N	N
Wacker et al. (1990)	High	92% average	FCT w/time-out resulted in hand biting decreasing to 0%	Signing was maintained	N	N
Wacker et al. (2005)	High	90-100%	Behaviors decreased for all participants ranging from 66.25% to 100% reduction	Manding increased	Y	N

Note. Tx = treatment; HF = hand flapping; BR = body rocking; N/A = not available; FCT = functional communication training; Db = disruptive behavior; Tx F= treatment fidelity; Gen. = generalization; Maint. = maintenance; IR = inter rater; N = no; Y = yes

Table 2-5. Characteristics of the study participants of milieu therapy

Study	N	CA*	LA*	MA*	M	F	Diagnosis	Prior Speech Level
Charlop, Schriebman, & Thibodeau (1985)	7	5.1-10.9	N/A	U- 6.1	7		Autism	2- Nonverbal; 5- Echolalic
Charlop & Walsh (1986)	4	6-8.8	N/A	3.6-6.2	4		Autism	2- Echolalic 1- Limited speech 1- Extensive speech
Hancock & Kaiser (2002)	4	2.9-4.5	1.7-2.2	N/A	3	1	Autism	Limited speech
Johnson, McDonnell, Holzwarth, & Hunter (2004)	1	8	N/A	N/A		1	Autism	Limited speech
Laski, Charlop, & Schriebman (1988)	8	5-9.6	N/A	1.7-3.1	7	1	Autism	4- Nonverbal 4- Echolalic
McGee, Krantz, Mason & McClannahan (1985)	2	12.6-15.8	N/A	5-5.7	1	1	Autism	Limited speech
McGee, Krantz, & McClannahan (1985)	3	6-9	3.0-5.7	2.2-5.3	3		Autism	Limited speech, often echolalic
Ross & Greer (2003)	5	5.5-6.9	N/A	N/A	N/A		Autism	Limited speech
Total	34	m=7.3	m=2.8	m=3.9	25	4		
Range		(2.9-15.8)	(1.6-5.7)	(2.7-6.2)				

Note. CA = chronological age; LA = language age; MA = mental age; N/A = not available; U= untestable; func. = functional; M = male; F = female; m= mean
*age in years

Table 2-6. Characteristics of the environment of milieu therapy

Study	Therapy implementer	Therapy training location	Description of location
Charlop et al. (1985)	Researcher	Separate class	Partitioned area of classroom and clinic room
Charlop & Walsh (1986)	Researcher/ Parent	Typical play area	Play room w/toys, outside in grass area
Hancock & Kaiser (2002)	Parent	Separate class	Clinic room
Johnson et al. (2004)	Paraprofessional	Classroom	N/A
Laski et al. (1988)	Primary caretaker*	Home	Various rooms of typical home
McGee et al. (1983)	Teacher	Group Home	Various rooms of typical home
McGee et al. (1985)	Teacher	Classroom	Typical classroom
Ross & Greer (2003)	Teacher	Classroom	Typical classroom

Note. N/A = not available.
* Primary caretaker is a resident home parent

Table 2-7. Research Designs and Interventions of Milieu Therapy

Study	Research design	Milieu procedures	Dependent measures	Communication skill
Charlop et al. (1985)	Multiple baseline Across participants	Time delay (2s-10s)	CS	Basic needs (e.g., "I want ___")
Charlop & Walsh (1986)	Multiple baseline Across participants	Time delay (2s-10s), Model/Correct, and Mand/Model/Correct	CS	Emotion phrase (i.e., "I like you")
Hancock & Kaiser (2002)	Multiple baseline Across participants	Time delay (N/A), Mand/Model/Correct	CS	MLU
Johnson et al. (2004)	Multiple baseline Across CS	Time delay (4s), Model/Correct	CS	Basic needs (Use of device to request help, break, and snack)
Laski et al. (1988)	Multiple baseline Across participants	Mand/Model/Correct	CS	Basic needs (i.e., "I want car"); Description (i.e., "Block is big"); and Questions (i.e., "What do you want?")
McGee et al. (1983)	Multiple baseline Across sets of objects	Incidental teaching	CS	Receptive labeling of objects
McGee et al. (1985)	Multiple baseline Across participants and pairs of prepositions	Incidental teaching	CS	Pairs of prepositions (on/under, inside/next to, and in front of/ in back of)
Ross & Greer (2003)	Multiple baseline Across participants	Time delay (5s), Mand/Model/Correct	CS	Basic needs/ Vocal imitations

Note. MLU= mean length of utterance; N/A = not available; CS= communication skill

Table 2-8. Major findings of milieu therapy

Study	Tx F	IR reliability	How reported	Results	Gen.	Main.
Charlop et al. (1985)	High	98%	By trial and blocks of 10	All acquired CS within 60 trials	Y	Y
Charlop & Walsh (1986)	High	100%	# of correct responses per day	2- CS quickly increased to criteria level 2-met criteria after time delay procedure	Y	Y
Hancock & Kaiser (2002)	High	N/A	% of opportunities, MLU diversity, and PPVT-R	% of opportunities w/ correct response increased, MLU increased	Y	Y
Johnson et al. (2004)	High	97-100%	% of correct responses	Help (100%), break and snack (80-100%)	Y	Y
Laski et al. (1988)	Low	79-98%	% of intervals	All children increased % of intervals in which vocalized	Y	Y
McGee et al. (1983)	High	94-100%	% of correct responses	75-100% for all sets of objects for both participants	Y	Y
McGee et al. (1985)	High	87-100%	% of correct responses	90-100%	Y	Y
Ross & Greer (2003)	High	89-100%	% of correct responses	20-100% range, all increased dramatically from baseline	Y	Y

Note. Tx = treatment; CS= communication skills; TxF = treatment fidelity; IR = interrater; Gen. = generalization; Main, = maintenance; Y = yes; N = no

CHAPTER 3
METHODS

The purpose of this chapter is to describe the methods that were used to conduct the study. First, criteria for selecting the participants, the setting in which the study was conducted, and the change agents and materials needed to carry out the study are reviewed. Second, the dependent measures, coding definitions, experimental procedures, study design, and data analysis methods are described. Finally, strategies to ensure interobserver agreement, treatment integrity, and social validity are summarized.

Participants

The purpose of this study was to determine the effectiveness of modified milieu therapy intervention [i.e., combined functional communication training (FCT) and milieu therapy] implemented in the natural environment of children with ASD by their parents or other guardian. The participants for the study included three preschool or elementary aged children with ASD who were between the ages of four and eight. They were recruited with the help of a local agency for individuals with ASD.

Prior to participating in the study, Institutional Review Board (IRB) approval was obtained from the University of Florida. Upon IRB approval, parents and teachers of the target children signed consent forms for their children to participate in the study, and for the study to occur in the homes and classrooms of the target children. The target children had a diagnosis of ASD obtained independently from a physician, licensed psychologist, or diagnostic center. In addition, the Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003) and the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, DiLavore, & Risi, 1999) were administered to obtain additional standardized scores indicating a diagnosis of autism.

The selection criteria for the targeted children included (a) enrolled in a pre-school or elementary school, (b) nonverbal or limited language, (c) a mental age of at least 28 months (McFee, McCrimmon, & Bebko, 2006), (d) autism diagnosis according to the ADI-R, and (e) display of aberrant behavior used for communication to obtain a tangible item. Initially, parent and teacher interviews determined if the target children met the aforementioned criteria. After the interviews were concluded, direct observations and formal testing were conducted to confirm that each child met the latter three inclusion and exclusion criteria. The third and fourth criteria (i.e., diagnosis of autism and mental age of at least 28 months) were confirmed based on data obtained from the ADI-R (LeCouteur, Lord, & Rutter, 2003), SCQ (Rutter, et al., 2003), and Mullen Scales of Early Learning (Mullen, 1992). These were given by the primary experimenter who was clinically trained to administer the ADI-R and other instruments. In addition, the final criterion (i.e., tangible function of behavior) was confirmed by conducting a functional analysis (see Appendix A for the functional analysis protocol).

Scott

Scott, a Caucasian male, was 7 years and 11 months at the start of the study (see Table 3.1). He participated in a private school for children with autism and related disabilities. Scott was diagnosed with Autism at the age of three by a psychiatrist (no specific diagnostic measure was reported). According to teacher and parent interviews, his socio-communicative skills included the ability to initiate and respond through gestures and verbal language (2-3 word utterances). However, they noted he had to be prompted to communicate the majority of time. He demonstrated a low rate of social initiations to peers and adults. Scott's overall mental age was 49 months as indicated by the Mullen Scales of Early Learning. His SCQ score was 25, well above the cut off score of 15; thus, indicating autism and a need for further testing. Further,

Scott's ADI-R scores for the three domains were 26 for reciprocal social interaction (cutoff = 10), 22 for communication (cutoff = 8), and 10 for repetitive behavior (cutoff = 3), which were all well above their respective cutoff scores; indicating a diagnosis of autism. In addition, tangible function for aberrant behavior was determined by a functional analysis to maintain his aberrant behavior (i.e., hitting and pinching others).

Scott's mother, the natural change agent for this study, has two children of which Scott is the youngest (see Table 3.2). She has a Bachelor's degree and has participated in several research studies prior to this study. In addition, she indicated having received training in Applied Behavior Analysis and the Picture Exchange Communication System (PECS) from a workshop hosted by the Center for Autism and Related Disabilities.

Scott's teacher had a Bachelors degree in education (see Table 3.3). She had six years teaching experience and was ABA trained. In addition to Scott, she had 4 other students in her classroom (i.e., a total of 5 students).

David

David, a Caucasian male, was 4 years and 1 month at the start of the study (see Table 3.1). He participated in a public school special education classroom for children with varying disabilities. David was diagnosed with Autism at the age of two by a neurologist (no specific diagnostic measure was reported). According to teacher and parent interviews, his socio-communicative skills included the ability to initiate and respond through gestures and verbal language (2-3 word utterances). However, they noted he had to be prompted to communicate the majority of time. He demonstrated low rates of social initiations to peers and adults. David's overall mental age was 29 months as indicated by the Mullen Scales of Early Learning. His SCQ score was 24, well above the cut off score of 15; thus, indicating autism and a need for additional

testing. Further, David's ADI-R scores for the three domains were 26 for reciprocal social interaction (cutoff = 10), 14 for communication (cutoff = 7), and 10 for repetitive behavior (cutoff = 3), which were all well above their respective cutoff scores; indicating a diagnosis of autism. In addition, tangible function for aberrant behavior was determined by a functional analysis to maintain his aberrant behavior (i.e., hitting and biting self).

David's mother, the natural change agent for this study, has two children of which David is the oldest (see Table 3.2). She has a Bachelor's degree in Nursing and has not participated in research studies prior to this study. In addition, she did not indicate having received training in such techniques as Applied Behavior Analysis.

David's teacher had a Masters degree in education (see Table 3.3). She had twelve years teaching experience and was not ABA trained. In addition to David, she had eight other students in her classroom (i.e., a total of 9 students).

Zeb

Zeb, a Caucasian male, was 4 years and 10 months at the start of the study (see Table 3.1). He participated in a public school special education classroom for children with varying disabilities. Zeb was diagnosed with autism at the age of two by a neurologist (no specific diagnostic measure was reported). According to teacher and parent interviews, his socio-communicative skills included the ability to initiate and respond through gestures and verbal language (2-3 word utterances). However, they noted he had to be prompted to communicate the majority of time. He demonstrated low rates of social initiations to peers and adults. Zeb's overall mental age was 32 months as indicated by the Mullen Scales of Early Learning. His SCQ score was 27, well above the cut off score of 15; thus, indicating autism and a need for further testing. Further, Zeb's ADI-R scores for the three domains were 26 for reciprocal social

interaction (cutoff = 10), 16 for communication (cutoff = 7), and 10 for repetitive behavior (cutoff = 3), which were all well above their respective cutoff scores; indicating a diagnosis of autism. In addition, tangible function for aberrant behavior was determined by a functional analysis to maintain his aberrant behavior (i.e., tantrums- screaming).

Zeb's mother, the natural change agent for this study, has two children of which Zeb is the oldest (see Table 3.2). She has a high school diploma and has not participated in research studies prior to this study. In addition, she did not indicate having ever received training in such techniques as Applied Behavior Analysis.

Zeb's teacher had a Masters degree in education (see Table 3.3). She had fifteen years teaching experience and was not ABA trained. In addition to Zeb, she had five other students in her classroom (i.e., a total of 6 students).

Settings, Change Agents, and Materials

This section describes the settings in which each phase of the study was conducted, the change agents who conducted the experimental procedures and collected data during each phase, and the materials used to conduct the study.

Settings

All four phases of the study were conducted in the natural environments of the participants (i.e., home and school). The phases included: (a) pre-intervention/assessment, (b) baseline, (c) intervention, and (d) maintenance. Additionally, generalization was examined throughout the study. For the pre-intervention phase, baseline phase, and intervention phase, data were collected in the home of each participant (e.g., living room or other area where communication typically occurred). Training of the child participants and parents occurred in the home of each respective participant. Additionally, generalization data were collected in the

participants' classrooms during the baseline, intervention, and maintenance phases in the home setting. The location of the study within the home and classroom were selected by the parents and teachers and represented locations where the communication skills typically occurred (e.g., playground, snack time). In addition, the maintenance phase occurred in the home and classroom in the same location as the previous phases.

Change agents

The primary experimenter, who conducted the pre-intervention/assessment phases, has several years experience working with children with ASD. The primary experimenter has several publications related to ASD and his research currently focuses on communication and social behaviors of children with ASD. Parents served as the change agents for the baseline, intervention, and maintenance phases. All parents spoke English and were literate. In addition, information on their education, expertise, and experience was obtained to account for any potential differences based on implementer characteristics (see Appendix B for data sheet). For example, one parent participated in previous communication studies. Teachers also spoke English. Similar to the parent characteristics, data was collected on the teachers' education, expertise, and experience (see Table 3.3).

Materials

During each of the phases, materials were used to provide interventions and to collect, code, and analyze data. These included picture cards, preferred items, training videos, a digital video camera, a laptop computer, and data collection sheets. The picture cards (created using the computer program Board Maker) were used during intervention, generalization, and maintenance sessions (see Appendix C for sample cards). In addition, along with the training videos, the cards

were used to train parents. Preferred items (e.g., toys) identified during preference assessments were used during all three phases. A digital camera was used to video all phases of the study.

Dependent Measures

This section outlines the primary and secondary dependent measures. Definitions of the primary dependent measures that were collected on the participants' aberrant and communication behaviors during the study's four phases are provided. In addition, definitions of the secondary dependent measures that were collected on the participants' play behaviors and adults' prompting behaviors are provided. The specific definitions used to operationally define each behavior are described (see Appendix D for coding manual) and have been adapted from previous researchers (Lalli, Casey, & Kates, 1995; Wacker et al., 2005).

Pre-Intervention Measures

Two experimental pre-assessments were conducted. First, an evaluation of target individual's preference for tangible items were assessed through a preference assessment (Roane et al., 1998). Data were collected in vivo on the duration of play with tangible items during the preference assessment. Play consisted of the participant engaged with an item for a period of two or more seconds in which the participant also made eye contact with the item. For example, if a child picked up a toy car (i.e., tangible item), briefly looked at the item, and held it for at least two seconds, *play* was coded. In contrast, if a child picked up a toy car, never looked at it, and walked around the room with the car in his hand for four seconds, *play* was not coded.

Duration of play with tangible items was recorded with a stopwatch using a paper and pencil recording system while viewing the video (see Appendix E for data sheets). The observer used a stopwatch to record the duration of time the target child was engaged with the tangible and then recorded the time on a data collection sheet.

Second, identification of the function (or communicative outcome) of aberrant behavior was determined through a functional analysis. Aberrant behavior was defined broadly as behavior that negatively impacted target child learning and independence and ranged from mild (e.g., throws a toy on the floor once) to severe behavior (e.g., tantrums for an hour or bangs head on the wall) (Bailey and Burch, 2002). Individual definitions of aberrant behavior varied and were adjusted based on each target child's form of the behavior. These behaviors were operationally defined in observable and measurable terms (Bailey and Burch, 2002).

For each participant, the targeted aberrant behavior was identified from data obtained through parent and teacher interviews (i.e., informal interview questions) and direct observations. The parents and teachers first identified the most prevalent aberrant behavior for each child. The parent and teacher agreed on the same target behavior of each respective target child. The primary experimenter then observed the child for one hour (Kazdin, 1982) in the home and classroom to confirm that the target behavior occurred. The primary experimenter recorded each occurrence of the target behavior using paper and pencil (see Appendix E for data sheets). After the aberrant behavior was defined, an FA was conducted. To evaluate the relative differences of various FA conditions, data were collected on responses per minute of aberrant behavior in each condition (see Appendix A for protocol).

Intervention, Generalization, and Maintenance Measures

During the intervention, generalization, and maintenance phases of the study, data were taken in vivo on five dependent measures: (a) frequency of aberrant behavior, (b) frequency of unprompted and prompted communication responses, (c) latency of unprompted communication responses in the training setting, (d) frequency of adult verbal, verbal/gestural, and physical prompts (which also serves as a treatment integrity measure), and (e) number and diversity (i.e.,

verbs, nouns) of unprompted verbalizations. Each of these behaviors was recorded using a paper and pencil data collection system while viewing the video (see Appendix E for data sheets). The primary experimenter viewed the videotapes and recorded the first four measures initially. Following this observation period, the videotape was viewed a second time. During this time, the number and diversity of words was recorded. The definitions for these measures follow (see Appendix D for detailed coding manual).

Aberrant behavior. Aberrant behavior definitions varied and were adjusted based on each target child's form of the behavior. Some participants engaged in tantrums and others engaged in property destruction or aggression toward others.

Unprompted communication response. Unprompted communication responses were defined as handing picture communication cards to the trainer involved in the session without any prompts.

Prompted communication response. Prompted communication responses were defined as handing picture communication cards to the trainer involved in the session following a prompt. This consisted of one of the following prompts: (a) physical, verbal, or verbal/gestural.

Prompts. Prompts, a secondary dependent measure, consisted of adults providing verbal, verbal/gestural, or physical prompts, from least to most intrusive, respectively. Verbal prompts consisted of verbal cue (e.g., “Tell me what you want.”). Verbal/ gestural prompts consisted of a combined verbal and visual cue (e.g., parent holds hand out with palm up in anticipation of receiving a card while saying “Tell me what you want.”). Physical prompts consisted of hand over hand exchanges (e.g., parent leading a child’s hand to a card).

Spontaneous verbalizations. Spontaneous verbalizations, a secondary dependent measure, were defined as verbal words emitted by participants that were not echolalic in nature or imitative of adult words. These varied in number and diversity (e.g., nouns, verbs).

Experimental Procedures and Study Design

The experimental procedures section outlines the steps that were followed to conduct each phase of the study, and the study design section describes the single subject design used to evaluate treatment effects. Four phases were conducted (a) pre-intervention/assessment (functional analysis and preference assessment), (b) baseline, (c) intervention, and (d) maintenance. Additionally, generalization was collected throughout the study.

Pre-intervention/Assessment Phase

Two assessments were conducted: (1) preference assessment, and (2) functional analysis.

Preference assessment. A preference assessment was conducted based on procedures described by Roane and colleagues (1998). First, parent interviews were conducted to provide insight into target children's interests and behavioral functions. Item interests obtained in the caregiver interview were used for the preference assessment. From this list of items, the top seven were chosen for the preference assessment. This set of seven items was arranged in a circle in the specified location, chosen by the parent, at the home. The primary experimenter walked the child to the center of the circle, which was equidistance from all items. The child was told to choose a toy. Each target child was allowed to choose any item he wanted to interact with, including multiple items. For a period of five minutes, the observer recorded the duration the target child played with each item. The item the target child played with for the longest duration was used as the first item of interest in the intervention phase.

After the first preference assessment was conducted, the item the target child engaged with for the longest time period was removed. Following this, another preference assessment was conducted minus the original preferred item. This was repeated until three items were identified, which were chosen as the items used to teach each communication mand to the target child. The first assessment determined the first item to use for the mand and the next two preference assessments determined the subsequent items to use for mand training.

Functional analysis. The functional analysis was conducted to determine the function of the aberrant behavior. As stated, only children who displayed a tangible function were chosen for inclusion in this study. Tangible functions were chosen because of the inherent design of the intervention techniques, such as incidental teaching (i.e., to request items), and to avoid exposing a child to aversive stimuli that elicits escape behavior. A functional analysis was conducted in the participants' home settings using the procedures outlined by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) with the addition of a tangible condition.

The functional analysis (FA) was conducted by manipulating consequences such as escape from demands, contingent attention, and contingent tangible items to determine the function of the behavior. To identify a primary function, the relative effects of contingent reinforcement were compared to the other conditions (i.e., tangible, free play, escape) (see Appendix A for FA protocol). After completing the FA, a tangible function was identified for each participant.

Baseline and Intervention Phases

The baseline and intervention phases consisted of baseline, training, and the intervention.

Baseline. Prior to beginning baseline, the primary experimenter interviewed parents and teachers and conducted direct observations in the home and classroom in locations training

occurred. During the interviews, the primary experimenter asked the parents and teachers to identify routines during which the target children typically had access to the preferred items. After obtaining the aforementioned data, baseline observations occurred during typical home and classroom routines, which were identified and held constant for each target child. Baseline consisted of direct observation of all dependent measures. During baseline, the target child was given access to the first preferred item for 30s. The parent then removed the item and interacted with the first preferred item for 30s. After interacting with the preferred item, the parent returned the item to the target child for another 30s access period. This interaction cycle continued for the 5min session. During this time, the target child had access (i.e., card was on the floor next to the target child) to the picture card of the first preferred item. These procedures were repeated throughout each 5min session.

Training. Before initiating the intervention, parents were taught the procedures for teaching their child to communicate using the modified milieu therapy intervention. This skill was taught through viewing videos of the experimenter conducting an intervention with a child with autism and through role-play training sessions. As outlined in Appendix F, parents first read the training manual. The primary experimenter clarified any questions about coding definitions. Then, the primary experimenter and parents viewed videos and identified and recorded intervention procedures. They used paper and pencil to record and classify (e.g., verbal, physical) each prompt given to the child in the video. In addition, the primary experimenter and parents wrote each response from the child and recorded whether the response was prompted or unprompted, classifying the prompt. This was done until the parents achieved 90% interobserver agreement (IOA) with the primary experimenter. Finally, parents role-played the intervention procedures with the primary experimenter. The parent practiced taking an item and playing with

the item, and giving verbal, verbal/gestural, and physical prompts with the primary experimenter until they were able to perform the skills correctly 10 consecutive trials (see Appendix F for detailed training manual).

For purposes of generalization, in contrast, teachers were taught a single skill. They were taught to place highly preferred items in view, but out of reach of the child. Additionally, the teachers were instructed to give the highly preferred items to the child when the child gave them a picture card. The teachers practiced these skills through role-play with the primary experimenter until they were able to complete this skill successfully as evaluated and defined by parents and teachers performing the procedures correctly 10 consecutive trials (see Appendix F for training manual and worksheets).

Intervention. Following baseline and completion of adult training, the intervention began (see Figure 3.11 for visual of the intervention procedures). The intervention phase consisted of three conditions (i.e., each tangible item was a new condition). The intervention sessions initially occurred in an area of the home predetermined in the interviews during the pre-intervention/assessment phase. However, if the child initiated communication and then began to play in other locations (e.g., bedroom floor, kitchen table), the parent followed the child and conducted the intervention in the new location.

During the intervention, a time delay of 5 seconds was used prior to prompting the child for the tangible items. If the child asked for the item at any time, the child was allowed access to the preferred item for 30 seconds and then the primary experimenter prompted the parent to take the item and play with the item. An access time of 30 seconds was used because this time period has been identified as enough time to keep a child's interest but not satiate (O'Neill & Sweetland-Baker, 2001).

The intervention began by allowing the child access to the preferred item for 30 seconds and then performing a two-step modeling procedure. The first step of the modeling procedure consisted of the primary experimenter giving the parent a visual prompt (i.e., index card with "Provide Model" written on it), the parent then said, "I want the ___", gave the picture card to the child, and then took the preferred item. The parent then played with the item of interest in the home for 30 seconds without immediately providing another prompt . If the child did not use the picture card, the second step of the modeling procedure consisted of the primary experimenter providing a visual prompt (i.e., index card with the words "Physical prompt" written on it) for the parent to provide a physical prompt (i.e., hand over hand assistance) and then allow access to the preferred item for 30 seconds. This two-step model procedure was done with each target child and was not recorded as communication responses.

After the two-step modeling procedure, the primary experimenter provided a visual prompt (i.e., index card with "Take Toy" written on it), the parent took the item and played with the item of interest in the home without immediately providing a verbal mand. If the child did not ask for the item within the defined time delay for the tangible item, the primary experimenter provided a visual prompt (i.e., index card with the words "Verbal prompt" written on it) indicating to the parent to provide a verbal prompt. The parent would then say, "Tell me what you want." If the child did not initiate communication within the 5s time delay for the tangible item, the primary experimenter provided a visual prompt (i.e., index card with the words "Verbal/gestural" written on it) for the parent to provide a combined verbal/gestural prompt. If the child still did not respond within the 5s time delay, the primary experimenter provided a visual prompt (i.e., index card with the words "Physical prompt" written on it) for the parent to

provide a physical prompt (i.e., hand over hand assistance) and then allow access to the preferred item for 30 seconds.

This condition for the intervention phase was continued two to three times a week until the latency of the child's response occurred consistently within the allotted 5s time delay for the tangible item and decreased levels of aberrant behaviors were indicated. When the child displayed the communicative response following the mand for the first item consistently within 5 seconds, for at least 75% of the prompts, and at least 20% of the communication responses in the last three sessions were unprompted, the same procedures were followed to teach two additional mands for preferred items. In each new condition of the intervention phase (i.e., condition two and three), the child had access to the new card indicating a new item and the card(s) from the previous condition(s) of the intervention phase.

Maintenance Phase

The purpose of the maintenance phase was to determine if unprompted communication trained in the home maintained over time. Two weeks following the conclusion of the intervention phase, the primary experimenter and graduate assistant videotaped sessions in the home until a stable trend in data was observed. During these sessions, the primary experimenter did not provide any prompts to the parents. Parents continued to provide the intervention as previously implemented during the last condition of the intervention phase without any assistance from the primary experimenter. During this phase, the target child had access to all three picture cards. In addition, the parent randomly interacted with each preferred item across sessions. Each preferred item was interacted with for at least one entire session (see Table 3.4).

Generalization

The purpose of the generalization probes was to determine if and when communication trained in the home environment generalized to the classroom environment. Generalization data were collected simultaneously while the intervention phase of the study was being implemented. The data were collected during typical classroom routines and activities as identified through the pre-assessment interviews (e.g., snack, playtime, center time). The routines targeted depended on the item of interest and when the item was typically available to the target child. For example, if the preferred item was a toy car that the target child would play with during playtime and center time, then data were collected during those periods. During these routines, the target child had access to the picture cards. When data stabilized in each phase at home, at least three generalization probes were conducted in the classroom (Kennedy, 2005).

The primary experimenter videotaped generalization sessions in the classroom that corresponded to sessions in each child's home. After a few sessions in the home setting, generalization data were collected in the classroom for at least a four to one ratio. That is, for every four sessions in the home, at least one generalization data session was conducted.

During the generalization sessions, the teachers did not provide any prompts. Each target child's respective preferred items were in view, but not accessible without requesting the item. As aforementioned, each target child had access to the picture cards that indicated his respective preferred items. The picture cards accessible to each target child mirrored those accessible in the corresponding condition of the intervention phase. If the target child requested the preferred item using the picture card, he was given 30s access to the item.

Experimental Design

A concurrent multiple baseline design across participants was used to evaluate the effectiveness of the modified milieu therapy intervention on decreasing aberrant behaviors and increasing communication behavior. While parents implemented the intervention in the home, the primary experimenter videotaped the child in the classroom to determine if skills generalized to the classroom and teacher. Effects of multiple baseline designs are demonstrated by introducing the intervention to different participants at different times (Kazdin, 1982). Using visual analysis, if changes in the dependent variables occur following the introduction of the intervention, then this change can be attributed to the intervention.

Data Analysis

The data analysis section outlines the procedures used to analyze and evaluate the coded data. The interobserver agreement section will describe the steps taken to ensure the reliability of the data collected.

Data Collection, Coding, and Analysis

Sessions across all phases were videotaped using a Panasonic mini-DV digital camcorder and subsequently coded using real time data collection sheets (see Appendix E). The data were transferred to an ibook G4 laptop computer for data analysis using imovie and Quicktime Pro software. Each session was conducted for 5 minutes.

During each session, the primary experimenter recorded the frequency of aberrant behaviors, frequency of prompted and unprompted communication responses, latency to respond to prompts, frequency of types of prompts, and diversity and number of unprompted verbalizations. The frequency of the aberrant behavior was recorded in real time (i.e., every

aberrant behavior was recorded). Responses per minute were calculated by taking the frequency of aberrant behaviors during the session and dividing by the total amount of time of the session (five minutes).

Latency data were collected on the time between the adult taking the preferred item from the target child and the target child requesting the item spontaneously. The average latency to respond per session was calculated by adding the latency to respond with unprompted communication during the five-minute session and dividing by the total number of unprompted communication responses.

Concurrently, the number and types of prompts provided by parents were counted. Further, the primary experimenter viewed the videotapes a second time to collect the diversity and number of unprompted verbalizations by recording the occurrence of each verbalization on a data collection sheet (see Appendix E for data sheet). Every verbal word spoken during each five-minute session was recorded.

Each of the dependent measures were graphed and analyzed visually following procedures outlined by Kennedy (2005) to determine the effects of the intervention on the dependent variables. All phases were conducted until visual inspection of the graphed data revealed at least three consecutive and stable data points. The primary experimenter used the Microsoft Excel software program to graph the data. Line graphs were drawn for the frequency data (converted to responses per minute or percentage of session data). Bar graphs were drawn for the latency data (converted to mean latency) and verbalizations data (mean rate per condition).

Kennedy (2005) recommended the examination of three aspects of line graphs, which were used for the primary dependent measures in this study, to determine the influence of the

intervention (a) level of the dependent variable, (b) trend of the data (slope and magnitude), and (c) variability. He further recommends two aspects of line graphs to determine the influence of the independent variable across conditions (a) immediacy of effect, that is, how quickly change occurs between phases, and (b) overlap of data between phases. These procedures were followed to visually analyze the data for determining phase changes.

Interobserver Agreement

Interobserver agreement (IOA) is the extent to which two or more observers agree that a behavior occurred, and more specifically, when and how long a behavior occurred (Kazdin, 1982). It provides a measure of the reliability (consistency of scores overtime) of the observers. Interobserver agreement should be assessed for three reasons: (a) to minimize observer biases that may develop, (b) to control for inconsistency of observers as one source of variation in data collection, and (c) to determine if the target behaviors are well defined (Kazdin, 1982).

Kazdin (1982) recommends that IOA be collected during at least 25% of all observations across the different phases of the investigation. This research project adhered to Kazdin's criterion. IOA was calculated on at least 25% of the sessions during each phase of the study.

For frequency measures (e.g., communication responses, prompts), total agreement was calculated (Kennedy, 2005). To calculate IOA for frequency measures, the number of responses recorded by the primary observer was totaled. Similarly, the number of responses recorded by the secondary observer was totaled. Finally, the smaller total was divided by the larger total and multiplied by 100. This gave the IOA total agreement for each frequency measure.

For latency (e.g., communication response) and duration (e.g., play) measures, the total agreement approach was used (Kennedy, 2005). To calculate IOA for latency measures, the latency recorded by the primary observer was totaled. Similarly, the latency recorded by the

secondary observer was totaled. Finally, the smaller total was divided by the larger total and multiplied by 100. This gave the IOA total agreement for latency. To calculate IOA for duration measures, the duration recorded by the primary observer was totaled. Similarly, the duration recorded by the secondary observer was totaled. Finally, the smaller total was divided by the larger total and multiplied by 100. This gave the IOA total agreement for duration.

The primary experimenter was the primary data collector during each phase of the study and a trained graduate student assisted with IOA. Agreement on at least 80% of all observations must occur for observers to achieve acceptable interrater agreement. For this to occur the observers must be well trained and the behaviors must be clearly defined. Prior to the collection of data, all data collectors were at least 80% reliable across three consecutive sessions on the coding system used for each phase of the study by coding videotapes of children with ASD whom have similar characteristics as the actual participants. The primary experimenter and graduate student independently watched videotapes of the intervention being performed with a child with ASD. Both data collectors used the coding system to code frequency and latency measures. IOA then was calculated between the measures recorded by the primary experimenter and the graduate student. The IOA obtained was an average of 92% (range of 80% to 100%).

The aforementioned IOA procedures were used for the preference assessments, functional analyses, baseline, intervention, and generalization sessions for each dependent measure. First, IOA for the preference assessments will be provided. Second, IOA for the functional analyses will be reported. Finally, IOA for baseline, intervention, maintenance, and generalization sessions will be reported for each participant on the dependent measures that include communication responses, prompts, aberrant behavior, latency to respond, and verbalizations.

Preference Assessment

For the preference assessments, agreement on the duration of time each participant physically touched an item was 100%. Reliability was calculated for 100% of the sessions for each child.

Functional Analysis

For the functional analysis sessions, agreement on the frequency of aberrant behavior during sessions for Scott averaged 95% (90%-100%), David averaged 96% (92%-100%), and Zeb averaged 92% (89%-95%). Reliability was calculated for 40% of the sessions for each child.

Communication Responses

Agreement on Scott's communication responses averaged 96% with a range of 88% to 100%. As for David, agreement on his communication responses average 95% with a range of 87% to 100%. IOA on Zeb's communication responses averaged 97% with a range of 87% to 100%. Reliability was calculated for approximately 50% to 100% of all baseline, intervention, maintenance, and generalization sessions for each child on communication responses.

Prompts

Scott. Agreement on total prompts for Scott averaged 93% (86%-100%). Of the total prompts for Scott, agreement on verbal prompts averaged 91% (80%-100%), verbal/ gestural prompts averaged 94% (84%-100%), and physical prompts averaged 100%.

David. Agreement on total prompts for David averaged 96% (86%-100%). Of the total prompts for David, agreement on verbal prompts averaged 94% (87%-100%), verbal/ gestural prompts averaged 95% (88%-100%), and physical prompts averaged 100%.

Zeb. Agreement on total prompts for Zeb averaged 91% (84%-100%). Of the total prompts for Zeb, agreement on verbal prompts averaged 88% (80%-97%), verbal/ gestural

prompts averaged 92% (87%-100%), and physical prompts averaged 100%. Reliability was calculated for approximately 50% to 100% of all baseline, intervention, maintenance, and generalization sessions for each child on prompts.

Aberrant Behavior

Agreement on Scott's aberrant behavior averaged 96% with a range of 85% to 100%. As for David, agreement on his aberrant behavior average 97% with a range of 89% to 100%. IOA on Zeb's aberrant behavior averaged 95% with a range of 87% to 100%. Reliability was calculated for approximately 50% to 100% of all baseline, intervention, maintenance, and generalization sessions for each child on aberrant behavior.

Latency

Agreement on Scott's latency to respond averaged 91% with a range of 83% to 100%. As for David, agreement on his latency to respond average 92% with a range of 88% to 100%. IOA on Zeb's latency to respond averaged 92% with a range of 85% to 100%. Reliability was calculated for approximately 50% to 100% of all baseline, intervention, maintenance, and generalization sessions for each child on latency to respond.

Verbalizations

Agreement on Scott's verbalizations averaged 94% with a range of 80% to 100%. As for David, agreement on his verbalizations averaged 99% with a range of 97% to 100%. IOA on Zeb's verbalizations averaged 97% with a range of 84% to 100%. Reliability was calculated for approximately 50% to 100% of all baseline, intervention, maintenance, and generalization sessions for each child on verbalizations.

Treatment Integrity and Social Validity

Despite the importance of treatment integrity and social validity, seldom is either collected in single subject studies targeting young children with ASD (Odom et al., 2003). This section will describe how treatment integrity and social validity were collected for the current study.

Treatment Integrity

Data on treatment integrity were gathered by viewing the videotapes from the baseline, intervention, maintenance, and generalization sessions. Data were gathered during baseline to ensure that the intervention was not being implemented. Data collectors viewed the videos and recorded any adult prompts provided by the parents and teachers (i.e., recorded any prompts because the parents and teachers were instructed to make no prompts). In addition, data were gathered on the intervention in the home setting to ensure that the intervention procedures were implemented consistently across participants. Data also were gathered during the maintenance phase to ensure that the intervention procedures were implemented consistently across participants. Finally, data were gathered during generalization sessions to ensure that the teachers were following instructions and the modified milieu therapy intervention was not being implemented in the classroom.

A data collector viewed the videos and compared the procedures viewed with those outlined in the experimental procedures section. For example, treatment integrity data were collected on the percentage of times the caregivers and teachers provided the highly preferred item to the child when the item was requested. For each procedure implemented, the data collector and expert marked a “yes” if this step was done correctly and a “no” if this step was

done incorrectly (see Appendix G for treatment integrity data sheet). The total correct procedures were divided by the total number of procedures to be implemented.

Although there is not a consensus on a particular criterion level (Kazdin, 1982), a criteria level of 80% was used to determine if high treatment integrity existed. The 80% criterion level enabled the primary experimenter to make more precise conclusions about the interrelation between the intervention and the dependent variables.

In addition, data were gathered during the generalization phase within the classroom to ensure the teacher implemented the generalization procedures correctly and did not provide unintentional prompts. Data collectors viewed the videos and recorded the number of unintentional prompts provided by the teacher (i.e., recorded any prompts because the teacher will be instructed to make no prompts).

Social Validity

Social validity data were collected on the intervention and outcomes. Caregivers and teachers were asked to complete rating scales concerning the invasiveness and friendliness of the procedures (see Appendix G) to determine the social validity of the process. In addition, videotape analyses by one expert in the field of ASD were used to determine therapeutic outcomes of the participants' social-communicative behaviors. The expert was chosen from the University of Florida and had several years experience working with children with ASD and their parents and teachers. The expert was asked to view 10-minute video clips of randomly selected footage of the participants during the baseline and intervention sessions. The expert completed a Likert scale to indicate the degree of appropriate social-communicative behavior displayed by the participant on the video clips (see Appendix G).

Table 3-1. Participant characteristics

Participant	Age	Diagnosis	ADI-R S-C-R	SCQ	Participant MA	Topography of Behavior	Function of Behavior
Scott	7-11	Autism	26-22-10	25	49 months	Hit, pinch	Tangible
David	4-1	Autism	26-14-10	24	29 months	Hit, bite self	Tangible
Zeb	4-10	Autism	26-16-10	27	32 months	Tantrum	Tangible

Note. Age in years-months; MA = mental age; S-C-R = Reciprocal social interaction, communication, repetitive behaviors.

Table 3-2. Mother's survey results

Participant	# of children	Birth order	Other studies	Education	ABA trained
Scott	2	Youngest	Yes	Bachelors	Yes
David	2	Oldest	No	Bachelors	No
Zeb	2	Oldest	No	High school	No

Table 3-3. Teachers' survey results

Participant	# of students	Other studies	Education	ABA trained	Experience
Scott's teacher	5	No	Bachelors	Yes	6 yrs
David's teacher	9	Yes	Masters	No	12 yrs
Zeb's teacher	6	No	Masters	No	15 yrs

Table 3-4. Maintenance session items

Participant	Session 1	Session 2	Session 3	Session 4	Session 5
Scott	Ball	Computer	Toy story	Computer	Ball
David	Swing	Train	Toy story	Toy story	Swing
Zeb	Swing	Computer	Toy story	Computer	Swing

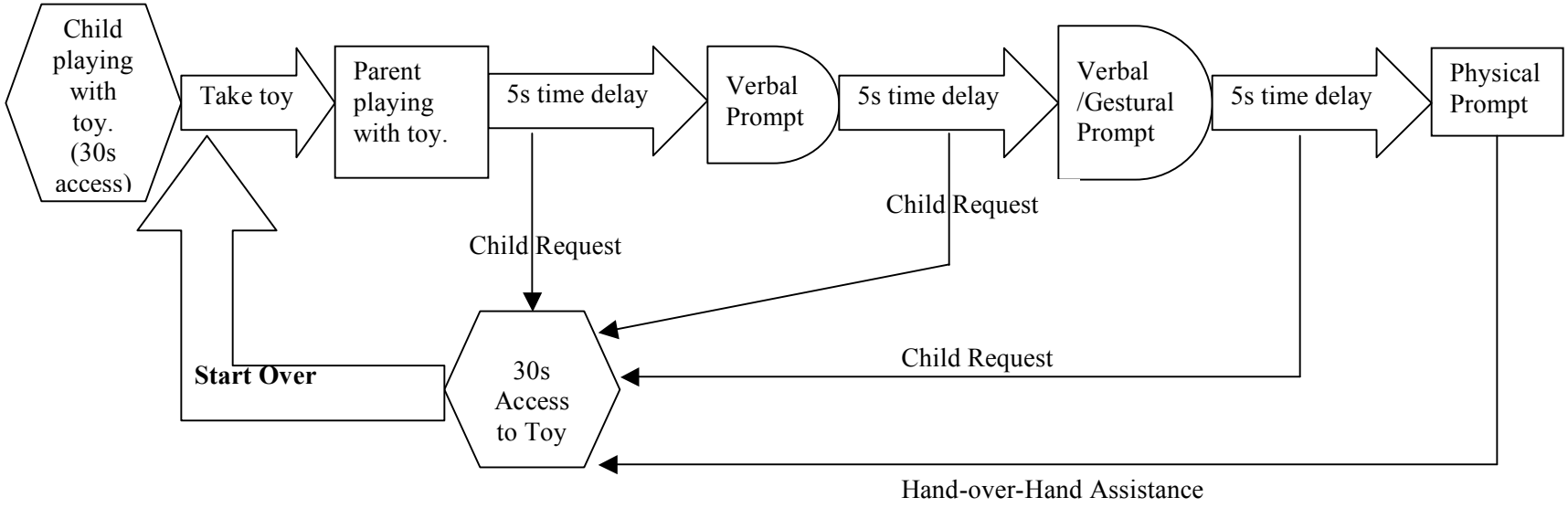


Figure 3-1. Intervention procedures

CHAPTER 4
RESULTS

The purpose of this study was to examine the effects of a modified milieu therapy intervention on the communicative behaviors of young children with autism spectrum disorders. The study was conducted across 4 phases: (a) pre-intervention/ assessment phase, (b) baseline, (c) intervention, and (d) maintenance. The intervention phase consisted of three conditions, each teaching a new communicative behavior. Additionally, generalization of communicative behaviors across settings was examined throughout the study. Interobserver agreement was conducted to assess the reliability of behavioral observations and the findings. Finally, treatment integrity and social validity data were conducted.

Pre-Intervention/ Assessment Phase

Preference Assessment

As described in Chapter 3, the preference assessments were conducted according to procedures outlined by Roane, Vollmer, Ringdahl, & Marcus (1998). The results of the preference assessments for all three participants are found in Table 4.1.

Scott. For the first preference assessment, Scott was presented with the following items: a green ball, toy dinosaur, toy truck, computer, swing, favorite book, and favorite movie (i.e., toy story). In the first session, Scott exclusively chose the green ball for the entire time of the preference assessment session (i.e., 5 min). During the second preference assessment session, he interacted with the computer for 3 min 45s and did not interact with any other item during the remainder of the session. In the final preference assessment session, Scott engaged with the Toy Story for 4 min 46s and did not interact with any other item during the session. Therefore, each of these items, individually, was determined to be the preferred item for each of the 3 communication conditions, respectively.

David. For the first preference assessment, David was presented with the following items: a toy truck, toy farm animals, swing, toy train, favorite movie (i.e., toy story), favorite book, and toy jack in the box. In the first preference assessment session, David interacted with the toy train for 4 min 3s and with the toy truck for 20s. During the second preference assessment session, he chose Toy Story for 3 min 48s and interacted again with the toy truck for 35s. In the final preference assessment session, David engaged with the swing for 3 min 11s and once again chose the toy truck for 1 min 2s. Therefore, each of these items, individually, was determined to be the preferred item for each of the 3 communication conditions, respectively.

Zeb. For the first preference assessment, Zeb was presented with the following items: a swing, toy dinosaur, toy truck, computer, puzzle, favorite book, and favorite movie (i.e., Toy Story). In the first preference assessment session, Zeb exclusively chose the computer. During the second preference assessment session, he interacted with the swing for 3 min 4 s and did not interact with any other item. In the final preference assessment session, Zeb engaged with Toy Story for 5 min and did not interact with any other item. Therefore, each of these items, individually, was determined to be the preferred item for each of the 3 communication conditions, respectively.

Functional Analysis

Functional analyses were conducted for all three participants to determine functions of their aberrant behaviors (see Figures 4.1 – 4.3).

Scott. Scott's results of the functional analysis are depicted in figure 4.1. The rate of Scott's aggressive behavior (i.e., pinching and hitting others) was higher in the tangible condition (M = 0.6/min, range 0.4-0.8/min), in contrast to the attention condition (M = 0/min), escape condition (M = 0.05, range 0-0.2/min), and free play condition (M = 0). There was no overlap in

data between conditions, although the data during the tangible condition varied. Further, Scott engaged in aggressive behavior in only one session outside of the tangible condition. These results indicate that Scott's aggressive behavior was maintained by access to tangible items of interest.

David. David's results of the functional analysis are depicted in figure 4.2. The rate of David's self-injurious behavior (SIB; i.e., hitting and biting self) was the higher in the tangible condition (*M* = 2.0/min, range 1.6-2.6/min), in contrast to the attention condition (*M* = 1.1/min, range 0.8-1.6/min), escape condition (*M* = 0.3, range 0.2-0.6/min), and free play condition (*M* = 0). There was no overlap in the data between conditions. In addition, his data during the tangible condition was mostly stable until the final session, which ended on an increasing trend. These results indicate that David's SIB was maintained by access to tangible items of interest.

Zeb. Zeb's results of the functional analysis are depicted in figure 4.3. The rate of Zeb's tantrums (i.e., screaming and whining) was higher in the tangible condition (*M* = 1.9/min, range 1.6-2.2/min), in contrast to the attention condition (*M* = 0/min), escape condition (*M* = 0.35/min, range 0.2-0.6/min), and free play condition (*M* = 0/min). There was no overlap in data between conditions. In addition, data during the tangible condition was stable and produced an increasing trend. Further, Scott engaged in aggressive behavior in only one other condition (i.e., escape), but response rates were much lower compared to the tangible condition. These results indicate that Zeb's tantrum behavior was maintained by access to tangible items of interest.

Intervention Results

Following the pre-intervention phase of the study, baseline, intervention, and maintenance phases were implemented for each participant (see Figures 4.4 and 4.5). Based on each participant's responses, the number of opportunities for communication differed across each

session (see Table 4.2). In addition, an assessment of generalization of skills across settings during each of these phases was conducted. Data were collected across all phases of the study on target children's communicative and aberrant behaviors. The results for each target behavior follow.

Communication

Scott's baseline. Baseline data were collected on Scott's total percentage of communication responses (PCR). During baseline, no prompts were given to Scott. After the data were stable during baseline in the primary training setting (i.e., the home) for all participants, which stabilized at 0% with no celeration (see Figure 4.4), the first intervention condition was implemented with Scott.

Scott's condition 1. Following the implementation of the first intervention condition (condition 1), Scott's total PCR changed in level from the baseline phase to intervention phase from 0% to 37%. During condition 1, his total PCR initially stabilized across six sessions and then was elevated in session 12 and again stabilized with a slight acceleration trend. Across condition 1, his total PCR ranged from 40% to 86%, with an average of 64%. A breakdown shows that his prompted PCR averaged 56% (37% to 78%), while his unprompted PCR averaged 8% (0% to 29%). In addition, there was no overlap in the data between the baseline and intervention phases. Further, during condition 1, his mean latency to respond with unprompted communication responses was 2.87s (2.00s-4.50s; see Figure 4.6), which is consistent with the latency to respond in typically developing children (Hart & Risley, 1999). Scott required prompts for the majority of sessions during this condition, but at least 20% (M= 27%, range 20% – 33%) of each of the last three sessions was unprompted communication responses (see Figure 4.4).

Scott's condition 2. After Scott's total PCR stabilized above 75% for at least 3 consecutive sessions in the first condition and at least 20% of each of the last three sessions did not require prompts, the new communicative response card was introduced. During intervention condition 2, his responses stabilized above 75% for the last three sessions with an acceleration trend. Across condition 2, his total PCR ranged from 56% to 100%, with an average of 82%. A breakdown shows that his prompted PCR averaged 64% (32% to 100%), while his unprompted PCR averaged 18% (0% to 55%). Similar to condition 1, his mean latency to respond with unprompted communication responses was consistent with typically developing children with an average of 3.10s (2.40s – 4.20s). Similar to condition 1, Scott continued to need prompts for the majority of sessions. He used unprompted communication responses for his last three sessions of condition 2 (M= 44%, range 28% – 63%).

Scott's condition 3. After Scott's total PCR stabilized above 75% for at least 3 consecutive sessions in the second condition and at least 20% of each of the last three sessions did not require prompts, a new communicative response card for condition 3 was introduced. During this condition, Scott's total PCR was constant throughout the condition at 100%. A breakdown shows that his prompted PCR averaged 9% (0% to 33%), while his unprompted PCR averaged 91% (67% to 100%). Similar to the other two conditions, his mean latency to respond with unprompted communication responses remained consistent with that of typically developing children at an average of 2.94s (2.71s – 3.03s). In contrast to the other conditions, Scott no longer required any prompts to communicate for the majority of the sessions.

Scott's maintenance. Following the last session of condition 3 in the intervention phase, no observations were conducted for 2 weeks. At the end of the two-week period, the experimenter returned and collected maintenance data. During the maintenance phase, Scott's

total PCR stabilized at 100% for three consecutive sessions (M= 80%, range 50% – 100%). A breakdown shows that his prompted PCR averaged 20% (0% to 50%), while his unprompted PCR averaged 60% (0% to 100%). In addition, his communicative responses maintained and did not return to baseline levels. Similar to the three conditions in the intervention phase, his mean latency to respond with unprompted communication responses remained consistent with that of typically developing children at an average of 2.12s (2.00s – 2.40s). He also did not require prompts for the final three sessions.

David's baseline. After the intervention was implemented with Scott, the experimenter continued to collect baseline data on David. As with Scott, no prompts were given during these sessions. PCR remained at zero percent during the baseline phase.

David's condition 1. When data were at a stable trend in baseline for David and a predictable accelerating trend in condition 1 for Scott, the first intervention condition was implemented with David. Similar to Scott's change of level from baseline to intervention, David's total PCR changed in level from the baseline phase to intervention phase from 0% to 36%. During condition 1, David's total PCR had an accelerating trend, with his last four sessions above 75% and zero celeration. Across condition 1, his total PCR ranged from 43% to 88% with an average of 68%. A breakdown shows that his prompted PCR averaged 50% (28% to 73%), while his unprompted PCR averaged 15% (0% to 32%). In addition, there was no overlap in the data between the baseline and intervention phases. Further, during condition 1, David's mean latency to respond with unprompted communication responses was 2.15s (2.00s – 2.33s; see Figure 4.7), which is consistent with typically developing children (Hart & Risley, 1999). However, he required prompts for the majority of session time during this condition (see Figure

4.4). David's used unprompted communication for part of his last three sessions of condition 1 (M= 27%, range 25% – 28%).

David's condition 2. When data were at a stable and predictable accelerating trend in condition 2 for Scott, David's total PCR stabilized above 75% for at least 3 consecutive sessions during condition 1, and at least 20% of each of the last three sessions did not require prompts, the new card for condition 2 was implemented with David. During condition 2, David's total PCR had an acceleration trend and stabilized with zero celeration at 100% for 3 consecutive sessions. Across condition 2, his total PCR ranged from 71% to 100%, with an average of 89%. A breakdown shows that his prompted PCR averaged 11% (0% to 60%), while his unprompted PCR averaged 78% (11% to 100%). Similar to condition 1, his mean latency to respond with unprompted communication responses was consistent with typically developing children with an average of 3.08s (2.25s – 4.42s). In contrast to condition 1, David did not require prompts for the majority of sessions. He used unprompted communication for 100% of his last three sessions during condition 2.

David's condition 3. When data were at a stable and predictable trend in condition 3 for Scott, David's total PCR stabilized above 75% for at least 3 consecutive sessions during condition 2, and at least 20% of each of the last three sessions did not require prompts, the new card for condition 3 was implemented with David. During this condition, his total PCR averaged 98% (range 78% – 100%), which was 100% for all but the first session. A breakdown shows that his prompted PCR averaged 3% (0% to 25%), while his unprompted PCR averaged 95% (53% to 100%). Similar to the other two conditions, his mean latency to respond with unprompted communication responses remained consistent with that of typically developing children at an average of 3.53s (2.33s – 4.88s). David also no longer required prompts to communicate for the

majority of the sessions. Similar to condition 2, he used unprompted communication for 100% of his last three sessions during condition 3.

David's maintenance. Following the last session of condition 3, no data were collected for 2 weeks. At the end of the two-week period, the experimenter returned and collected maintenance data. During this phase, David's total PCR stabilized at 100% for five consecutive sessions (M = 100%). A breakdown shows that his prompted PCR averaged 0%, while his unprompted PCR averaged 100%. In addition, his communicative responses maintained and did not return to baseline levels. Similar to the other three conditions, his mean latency to respond with unprompted communication responses remained consistent with that of typically developing children at an average of 3.4s (2.50s – 4.20s). He also did not require any prompts during maintenance sessions.

Zeb's baseline. After the intervention was implemented with Scott and David, the experimenter continued to collect baseline data on Zeb. As with Scott and David, no prompts were given during these sessions. PCR remained zero during the baseline phase.

Zeb's condition 1. When data were at a stable and predictable accelerating trend in condition 1 for David, the intervention was implemented with Zeb. Similar to Scott and David's change of level from baseline to intervention, David's total PCR changed in level from 0% to 37%. During condition 1, Zeb's total PCR had an accelerating trend, with his last three sessions constant at 100%. Across condition 1, his total PCR ranged from 31% to 100%, with an average of 70%. A breakdown shows that his prompted PCR averaged 30% (0% to 59%), while his unprompted PCR averaged 44% (0% to 100%). In addition, there was no overlap in the data between the baseline and intervention phases. Further, during condition 1, Zeb's mean latency to respond with unprompted communication responses was 2.12s (2.00s – 2.20s; see Figure 4.8),

which is consistent with typically developing children (Hart & Risley, 1999). Similar to David, he required prompts for the majority of sessions during this condition (see Figure 4.4). However, Zeb used unprompted communication for the majority of his last three sessions of condition 1 (M= 90%, range 83% – 100%).

Zeb's condition 2. When data were at a stable and predictable accelerating trend in condition 2 for David, Zeb's total PCR stabilized above 75% for at least 3 consecutive sessions during condition 1, and at least 20% of each of the last three sessions did not require prompts, the new communication response for condition 2 was implemented with Zeb. During condition 2, Zeb's total PCR had an acceleration trend and stabilized with zero celeration at 100% for six consecutive sessions. Across condition 2, his total PCR ranged from 63% to 100%, with an average of 93%. A breakdown shows that his prompted PCR averaged 47% (0% to 80%), while his unprompted PCR averaged 45% (0% to 100%). Similar to condition 1, his mean latency to respond with unprompted communication responses was consistent with typically developing children with an average of 2.10s (1.29s – 2.33s). In contrast to condition 2, Zeb did not require prompts for the majority of sessions. A portion of his last three sessions of condition 2 was unprompted communication responses (M= 38%, range 20% – 66%).

Zeb's condition 3. When data were at a stable and predictable trend in condition 3 for David, Zeb's total PCR stabilized above 75% for at least 3 consecutive sessions during condition 2, and at least 20% of each of the last three sessions did not require prompts, the new communication response for condition 3 was implemented with Zeb. During this condition, his total PCR averaged 94% (range 67% – 100%), which was 100% for the final three sessions. A breakdown shows that his prompted PCR averaged 28% (0% to 83%), while his unprompted PCR averaged 72% (17% to 100%). Similar to the other two conditions, his mean latency to

respond with unprompted communication responses remained consistent with that of typically developing children at an average of 3.18s (1.57s – 4.80s). Zeb also did not require prompts to communicate for the majority of the sessions. Similar to condition 2, his last three sessions of condition 3 each had removal prompts (M= 94%, range 83% – 100%).

Zeb's maintenance. Following the last session of condition 3, no data were collected for 2 weeks. At the end of the two-week period, the experimenter returned and collected maintenance data. During this phase, Zeb's total PCR stabilized at 100% for five consecutive sessions (M= 100%). A breakdown shows that his prompted PCR averaged 11% (0% to 42%), while his unprompted PCR averaged 89% (58% to 100%). In addition, his communicative responses maintained and did not return to baseline levels. Similar to the other three conditions, his mean latency to respond with unprompted communication responses remained consistent with that of typically developing children at an average of 2.10s (2.00s – 2.20s). He also did not require prompts during the majority of maintenance session time. A large percentage of Zeb's communication during maintenance was unprompted (M= 89%, range 57% – 100%).

Aberrant Behavior

Scott. During baseline, Scott's aberrant behavior (hitting, pinching parent) rate averaged 1.44 responses per minute (RPM) with a range of 1.00 to 1.80 RPM (see Figure 4.5). During condition 1, his aberrant behavior rate decreased and stabilized at zero (M = 0.45 RPM, range 0-1.20 RPM), which corresponded with his increase in communication responses. His aberrant behavior rate remained low and decreased to zero (M = 0.20 RPM, range 0-0.40 RPM) during condition 2. During condition 3, his aberrant behavior rate was stable at zero (M = 0 RPM) for the entire condition. Scott maintained low rates of aberrant behavior (M = 0.20 RPM, range 0-0.80) during maintenance sessions, with the last three sessions at 0 RPM.

David. During baseline, his aberrant behavior (hitting, biting self) rate averaged 1.86 RPM with a range of 0.80 to 2.60 RPM (see Figure 4.5). During condition 1, his aberrant behavior rate decreased to zero (M = 0.56 RPM, range 0-1.60 RPM), which corresponded with his increase in communication responses. His aberrant behavior rate remained at zero (M = 0.04 RPM, range 0-0.40 RPM) for eight of 9 sessions during condition 2. During condition 3, his aberrant behavior rate remained at zero (M = 0 RPM) for all sessions. In contrast to Scott, David's aberrant behavior rate stabilized around 0.8 RPM (M = 0.72 RPM, range 0.60-0.80) during maintenance even though his communication remained high. However, he did not return to pre-intervention rates of aberrant behavior.

Zeb. During baseline, Zeb's aberrant behavior (tantrum) rate averaged 2.11 RPM with a range of 1.40 to 2.60 RPM. His aberrant behavior rate decreased to near zero (M = 0.56 RPM, range 0-1.60 RPM) during condition 1, which corresponded with his increase in communication. During condition 2, his aberrant behavior rate remained at zero (M = 0 RPM) for all sessions. Similar to the prior condition, Zeb's aberrant behavior rate remained at zero (M = 0 RPM) for all sessions. In contrast to David, Zeb maintained an aberrant behavior rate of 0 RPM (M = 0 RPM) during all maintenance sessions.

Spontaneous Verbalizations

Scott. During baseline sessions Scott had a spontaneous verbalization rate of 1.24 responses per minute (RPM; see Table 4.3 for more detail). In condition 1 of the intervention phase, Scott's spontaneous verbalization rate increased to 3.38 RPM. Scott's spontaneous verbalization rate increased to 4.91 RPM during condition 2. His spontaneous verbalization rate continued to increase during condition 3 to 6.7 RPM. Scott's spontaneous verbalizations maintained during follow-up at a rate of 5.76 RPM.

David. In contrast to Scott, David did not produce spontaneous verbalizations as defined in this study during any sessions.

Zeb. Similar to David, Zeb did not produce spontaneous verbalizations during baseline, condition 1 or condition 2. However, he did produce spontaneous verbalizations during condition 3. It was noted that Zeb had a spontaneous verbalization rate of 0.05 RPM during condition 3. During maintenance sessions, his spontaneous verbalizations maintained at a rate of 0.84 RPM.

Generalization Results

Communication

Scott. During baseline, Scott did not engage in unprompted communication. Scott's communication responses did not generalize to the classroom during condition 1 either. During condition 2, his communication responses generalized from the training setting to the generalization setting (i.e., classroom setting). For two sessions in the classroom, Scott had a response rate of 0.40. Also, he demonstrated a generalized use of the new communication response (i.e., the new picture card) for 3 sessions in the classroom during condition 3 where he had an average response rate of 0.20 (range of 0 – 0.40). In addition, generalization of his communication responses maintained with an average of 0.20 RPM (range 0.20 – 0.20).

David. David did not generalize his communication responses (unprompted) during baseline or condition 1. Similar to Scott, his communication responses generalized from the training setting to the generalization setting (i.e., classroom setting) during condition 2. However, rather than the communication response taught in condition 2, David used the communication response with the card from condition 1 during generalization. For three sessions in the classroom, David had an average response rate of 0.23 (range 0 – 0.60). Also, he generalized the use of the new communication response for seven of 8 sessions in the classroom

during condition 3 where he had an average response rate of 0.48 (range 0 – 0.60). In addition, generalization of his communication responses maintained with an average of 0.30 RPM (range 0 – 0.80).

Zeb. Similar to Scott and David, Zeb initially did not generalize his communication responses (unprompted) during baseline. Further, he only used the communication response once during generalization sessions in condition 1. Similar to Scott and David, Zeb's communication responses generalized from the training setting to the generalization setting (i.e., classroom setting) for three consecutive sessions during condition 2. During generalization sessions in condition 2 in the classroom, Zeb had an average response rate of 0.29 (range 0 – 0.6). Also, he generalized the use of the new communication response for every session of condition 3 in the classroom where he had an average response rate of 0.63 (range of 0.4 – 0.8). In addition, generalization of his unprompted communication responses maintained with an average of 0.6 RPM (M= 0.6).

Aberrant Behavior

Scott. Scott's aberrant behavior rate averaged 0.3 RPM with a range of 0.2 to 0.6 RPM (see Figure 4.5) during baseline. His aberrant behavior rate decreased to 0.2 RPM (M = 0.05 RPM, range 0-0.2 RPM) during condition 1. During condition 2, his aberrant behavior rate remained at 0 RPM (M = 0 RPM). His aberrant behavior rate remained low during condition 3 (M = 0.16 RPM, range 0-0.6). His aberrant behavior rate remained low during maintenance (M = 0.13 RPM, range 0-0.4).

David. During baseline, David's aberrant behavior rate averaged 1.73 RPM with a range of 1.5 to 2.0 RPM (see Figure 4.5). David's aberrant behavior rate remained high during condition 1 generalization sessions (M = 1.95 RPM, range 1.8-2.2 RPM; see Figure 4.5). His

aberrant behavior rate decreased to 0 RPM (M = 0.1 RPM, range 0-0.2 RPM) during condition 2. His aberrant behavior rate remained at 0 RPM (M = 0 RPM) during condition 3. His aberrant behavior rate remained at 0 RPM (M = 0 RPM) also during maintenance.

Zeb. Zeb's aberrant behavior rate averaged 0.55 RPM with a range of 0.4 to 0.8 RPM (see Figure 4.5) during baseline. His aberrant behavior rate decreased during condition 1 (M = 0.18 RPM, range 0-0.4 RPM). His aberrant behavior rate decreased to 0 RPM (M = 0.1 RPM, range 0-0.2 RPM) during condition 2. Similar to David, Zeb's aberrant behavior rate remained at 0 RPM (M = 0 RPM) during condition 3. His aberrant behavior rate also remained at 0 RPM (M = 0 RPM) during maintenance.

Spontaneous Verbalizations

Scott. During baseline generalization sessions, Scott did not produce spontaneous verbalizations (see Table 4.3). Scott did produce spontaneous verbalizations during condition 1-generalization sessions, with a spontaneous verbalization rate of 0.95 RPM. It also was noted that Scott had a spontaneous verbalization rate of 0.3 RPM during condition 2 generalization sessions. His spontaneous verbalizations increased in condition 3 generalization sessions to a rate of 1.56 RPM. During maintenance sessions, his spontaneous verbalizations maintained at a rate of 2.73 RPM.

David. In contrast to Scott, David did not produce spontaneous verbalizations as defined in this study during any generalization sessions.

Zeb. Similar to David, Zeb did not produce spontaneous verbalizations during baseline, condition 1, or condition 2 generalization sessions (see Table 4.3). However, he did produce spontaneous verbalizations during condition 3 generalization sessions. It was noted that Zeb had

a spontaneous verbalization rate of 0.27 RPM during condition 3. During maintenance sessions, his spontaneous verbalizations increased and maintained at a rate of 2.07 RPM.

Treatment Integrity

Treatment integrity is reported for training and treatment sessions (i.e., baseline, intervention, maintenance, and generalization sessions).

Training

Parent training. As aforementioned in Chapter 3, parents were trained to criterion. First, they viewed videos of the intervention with the primary experimenter and identified procedures until they achieved a 90% IOA. This step took an average of two hours and 30 minutes (see Table 4.4). Second, the parents' role played procedures with the primary experimenter until they performed each procedure correctly (i.e., 100% accuracy) ten consecutive times. Parents required an average 51 trials that took an average of 1 hour and 25 minutes of role-play to reach criteria (see Table 4.4).

Teacher training. As aforementioned in Chapter 3, teachers were trained to criterion on giving the requested item to the target child upon display of unprompted communication. The teachers role-played with the primary experimenter until they performed the procedure correctly (i.e., 100% accuracy) ten consecutive times. Teachers required an average of 23 trials that took an average of 15 minutes of role-play to reach criteria (see Table 4.5).

Treatment Sessions

Treatment integrity data for baseline, intervention, maintenance, and generalization sessions include: (a) percentage of correct procedural prompts (i.e., verbal, verbal/gestural/, or removal), (b) correct implementation of the time delay procedure, and (c) the percentage of times the requested item was given to participant for the correct time (i.e., 30s access contingent on

communication response) when item was requested. As mentioned in Chapter 3, treatment integrity for each aforementioned procedure was calculated by marking a "yes" if it was done correctly and a "no" if it was done incorrectly. The total correct procedures were divided by the total number of procedures. Mean percentages and ranges are reported for each treatment integrity measure (see Table 4.6).

Procedural prompts. Across phases, treatment integrity for procedural prompts was high for each participant in the intervention setting. The average integrity was 81.4% with a range of 63% to 100%. Treatment integrity in the generalization setting for procedural prompts averaged higher. The average integrity across participants was 98.7% with a range of 75% to 100%.

Time delay. Across phases, treatment integrity for the use of time delay was high for each participant in the training setting. The average integrity was 87.1% with a range of 73% to 100%. Treatment integrity in the generalization setting for time delay averaged higher. The average integrity across participants was 100%.

Requested item procedures. Across phases, treatment integrity for requested item procedures was high for each participant in the training setting. The average integrity was 87.7 % with a range of 73% to 100%. Treatment integrity in the generalization setting for requested item procedures averaged higher. The average integrity across participants was 100%.

Social Validity

The participants' parents, teachers, and an expert in the field of ASD completed Likert-type rating scales to determine the social validity of the intervention process and outcomes, respectively. For the expert rating scales, Likert values ranged from 1, typically indicating the process and outcomes were *not at all* useful to 5, typically indicating the process and outcomes

were *very* useful to the teacher and or child. The likert values for the parent and teacher rating scales were similar, except for question 1, for which a five indicated that the training was too time consuming.

Parent Social Validity

Across participants, parent's responded to questions in a similar manner. Parent responses to question one, which inquired about *how time consuming* the interventions' procedures were averaged 2.7 (range: 2-3). The mean response for question two concerning the *improvement* of everyday routines in the home was 4.7 (range: 4-5). Responses to question three averaged 4.3 (range: 3-5). This question addressed the *how much increase* did the parent observe in the child's communication. The mean response for question four dealing with *how much increase in appropriate behavior* did the parent observe in the child averaged 4.7 (range: 4-5). Responses to question five averaged 5 (range: 5), the highest possible value. This question addressed the *willingness of the parent to use the intervention in the future*.

Teacher Social Validity

Similar to parent social validity questionnaires, teachers responded similar across participants. Teachers' responses to question one, which inquired about how time consuming the intervention procedures were, averaged 1 (range: 1). The mean response for question two concerning the *improvement* of everyday routines in the home was 3.3 (range: 3-4). Responses to question three averaged 4.3 (range: 4-5). This question addressed the *how much increase* did the teacher observe in the child's communication. The mean response for question four dealing with *how much increase in appropriate behavior* did the teacher observe in the child averaged 4 (range: 4). Responses to question five averaged 4.7 (range: 4-5). This question addressed the *willingness of the teacher to use the intervention in the future*.

Expert Social Validity

When the expert viewed the video of the children in the home and classroom setting for the baseline, intervention, and maintenance phases, the expert's response to question one that inquired about the *appropriateness of the target child's communication* averaged 4 (range: 3-5) when the expert viewed video of the children in the home and classroom setting for the baseline, intervention, and maintenance phases. The average response to question two concerning the *level of aberrant behavior* of the child averaged 2.6 (range: 2-4) when the expert viewed video of the children in the home and classroom setting for baseline, intervention, and maintenance phases. The expert's mean response to question three that addressed the *frequency* of the child's communication averaged 4.6 (range: 4-6). The final question dealt with the target child's *overall improvement* concerning communication and aberrant behavior. The expert's mean response to question four was 5 (range: 4-6).

Summary

Based on the data reported, conclusions can be drawn within and across the three participants. Overall, target children's percentage of communication response increased, leveled, and remained stable at or above 75% across the intervention conditions. In addition, this was maintained at follow-up sessions conducted two weeks after the conclusion of the last intervention condition. Further, communication skills generalized to the classroom setting (i.e., generalization setting) in conditions 2 and 3 for Scott and David and conditions 1, 2, and 3 for Zeb. However, the communication response rates for generalization were the highest in condition 3 and maintenance sessions for each participant.

The participants' dependence on prompts decreased across all three intervention conditions, with less prompts being required for condition 3 or maintenance sessions. During

condition 3 and maintenance sessions, 80% or greater of the participants communication responses did not require a physical, verbal/gestural, or verbal prompt. Each participant responded on average between 3 and 4s across all three intervention conditions; however, this measure was slightly variable.

Similar to the percentage of communication response levels, aberrant behavior rate decreased, leveled, and remained low across conditions and maintained at 0 RPM by condition 3. In addition, aberrant behavior rate remained at zero during maintenance sessions for each participant except David, whose rate remained well below baseline levels. Further, aberrant behavior rates for each participant during generalization probes leveled and stabilized at zero.

Treatment integrity data revealed that the intervention was conducted with a high level of integrity within and across participants. Finally, social validity data demonstrated that the teachers, parents, and an expert in the filed of ASD found the study to be beneficial to the participants.

Table 4-1. Preference assessment choices

Participant	Condition 1 Item	Condition 2 Item	Condition 3 Item
Scott	Ball (5 min)	Computer (3 min 45s)	Toy Story (4 min 46s)
David	Train (4 min 3s)	Toy Story (3 min 48s)	Swing (3 min 11s)
Zeb	Computer (5 min)	Swing (3 min 4s)	Toy Story (5 min)

Table 4-2. Average (range) number of trials

Participant	Baseline	Condition 1	Condition 2	Condition 3	Maintenance
Scott	5	15 (12-21)	13 (10-16)	9 (8-10)	10 (8-12)
David	5	14 (8-19)	10 (7-15)	9 (7-11)	9 (8-10)
Zeb	5	14 (8-21)	11 (8-13)	10 (8-13)	8 (8-9)

Table 4-3. Spontaneous verbalizations

	Baseline	C1	C2	C3	Maintenance
Scott's Tx Setting	1.24	3.38	4.91	6.7	5.76
Scott's Gen. Setting	0	0.95	0.3	1.56	2.73
David Tx Setting	0	0	0	0	0
David Gen. Setting	0	0	0	0	0
Zeb Tx Setting	0	0	0	0.05	0.84
Zeb Gen. Setting	0	0	0	0.27	2.07

Note. C1 = condition 1; C2 = condition 2; C3 = condition 3; Tx = Treatment; Gen. = generalization.

Table 4-4. Parent training

Parent	Video viewing	Role-play
Scott's mother	2 hours 45minutes	2 hours (72 trials)
David's mother	1 hour 15 minutes	1 hour (36 trials)
Zeb's mother	3 hours 30 minutes	1 hour 15 minutes (45 trials)

Table 4-5. Teacher training

Teacher	Role-play
Scott's teacher	11 minutes (20 trials)
David's teacher	23 minutes (32 trials)
Zeb's teacher	10 minutes (18 trials)

Table 4-6. Treatment Integrity Data

		Baseline		Condition 1		Condition 2		Condition 3		Maintenance	
Procedure	Child	Training	Gen.	Training	Gen.	Training	Gen.	Training	Gen.	Training	Gen.
Procedural Prompts	Scott	M = 100%	M = 100%	M = 82% (80% – 100%)	M = 100%	M = 86% (82% - 100%)	M = 100%	M = 100%	M = 100%	M = 80% (75% - 100%)	M = 80% (75% - 100%)
	David	M = 100%	M = 100%	M = 80% (75% - 100%)	M = 100%	M = 1.0	M = 100%	M = 90% (82% - 100%)	M = 100%	M = 100%	M = 100%
	Zeb	M = 100%	M = 100%	M = 83% (73% - 100%)	M = 100%	M = 90% (85% - 100%)	M = 100%	M = 80% (63% - 100%)	M = 100%	M = 100%	M = 80% (75% - 100%)
Time Delay	Scott	M = 100%	M = 100%	M = 82% (80% - 95%)	M = 100%	M = 86% (82% - 100%)	M = 100%	M = 100%	M = 100%	M = 80% (73% - 100%)	M = 100%
	David	M = 100%	M = 100%	M = 83% (73% - 100%)	M = 100%	M = 100%	M = 100%	M = 90% (86% - 100%)	M = 100%	M = 100%	M = 100%
	Zeb	M = 100%	M = 100%	M = 85% (80% - 100%)	M = 100%	M = 90% (86% - 100%)	M = 100%	M = 85% (80% - 100%)	M = 100%	M = 100%	M = 100%
Requested Item Time	Scott	M = 100%	M = 100%	M = 95% (92% - 100%)	M = 100%	M = 100%	M = 100%	M = 100%	M = 100%	M = 100%	M = 100%
	David	M = 100%	M = 100%	M = 90% (86% - 100%)	M = 100%	M = 100%	M = 100%	M = 100%	M = 100%	M = 95% (92% - 100%)	M = 100%
	Zeb	M = 100%	M = 100%	M = 95% (92% - 100%)	M = 100%	M = 100%	M = 100%	M = 100%	M = 100%	M = 90% (73% - 100%)	M = 100%

Note. M = mean; Gen. = generalization

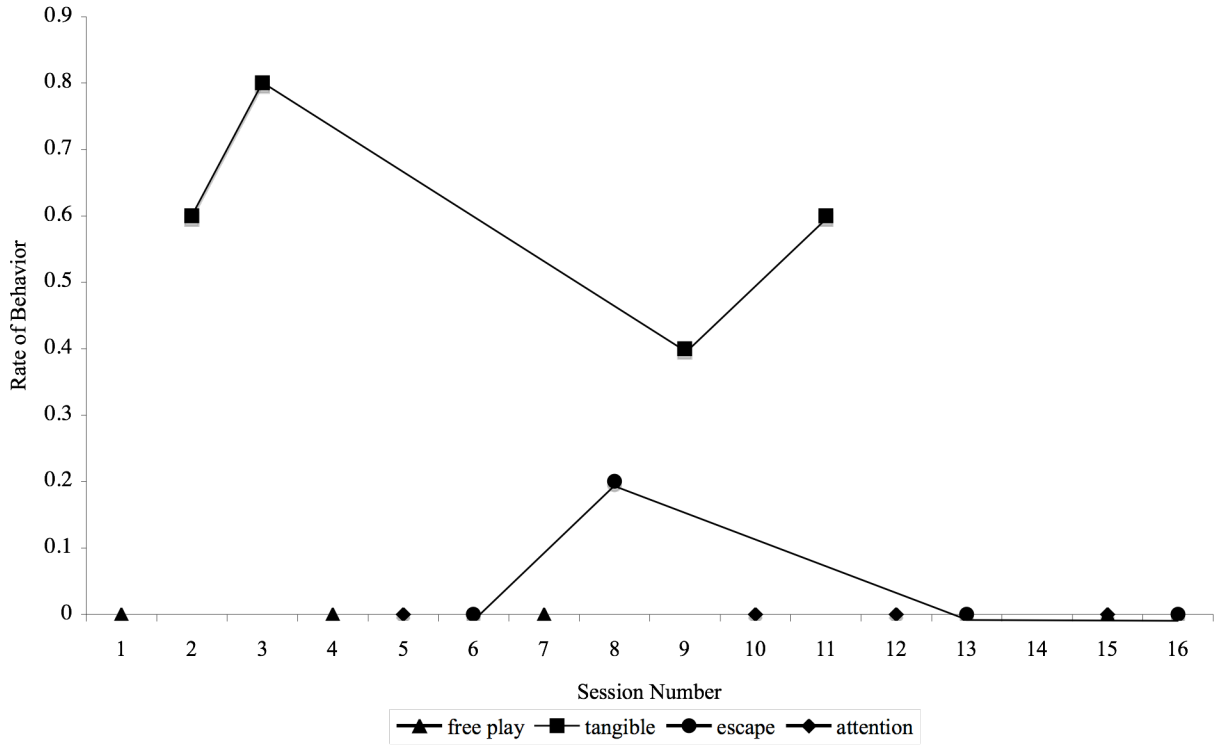


Figure 4-1. Scott's rate of aberrant behavior per min during the functional analysis.

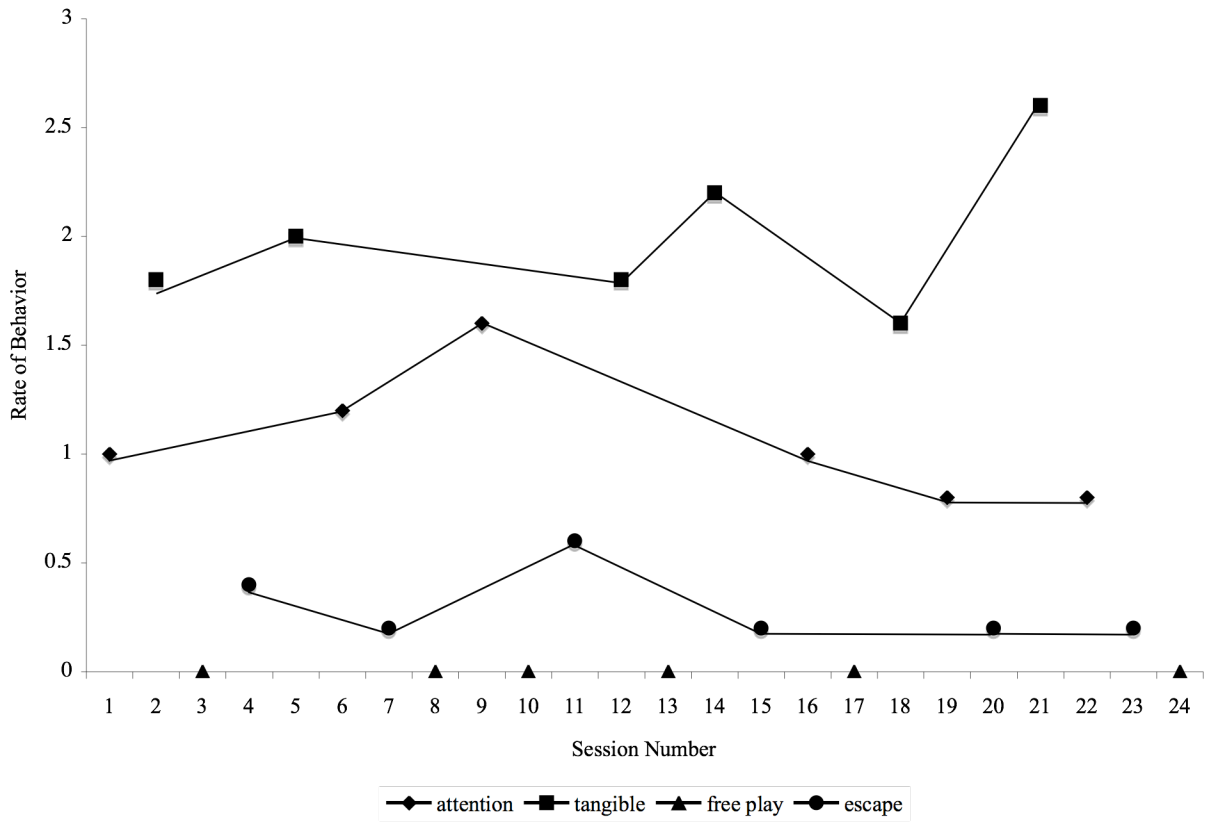


Figure 4-2. David's rate of aberrant behavior per min during the functional analysis.

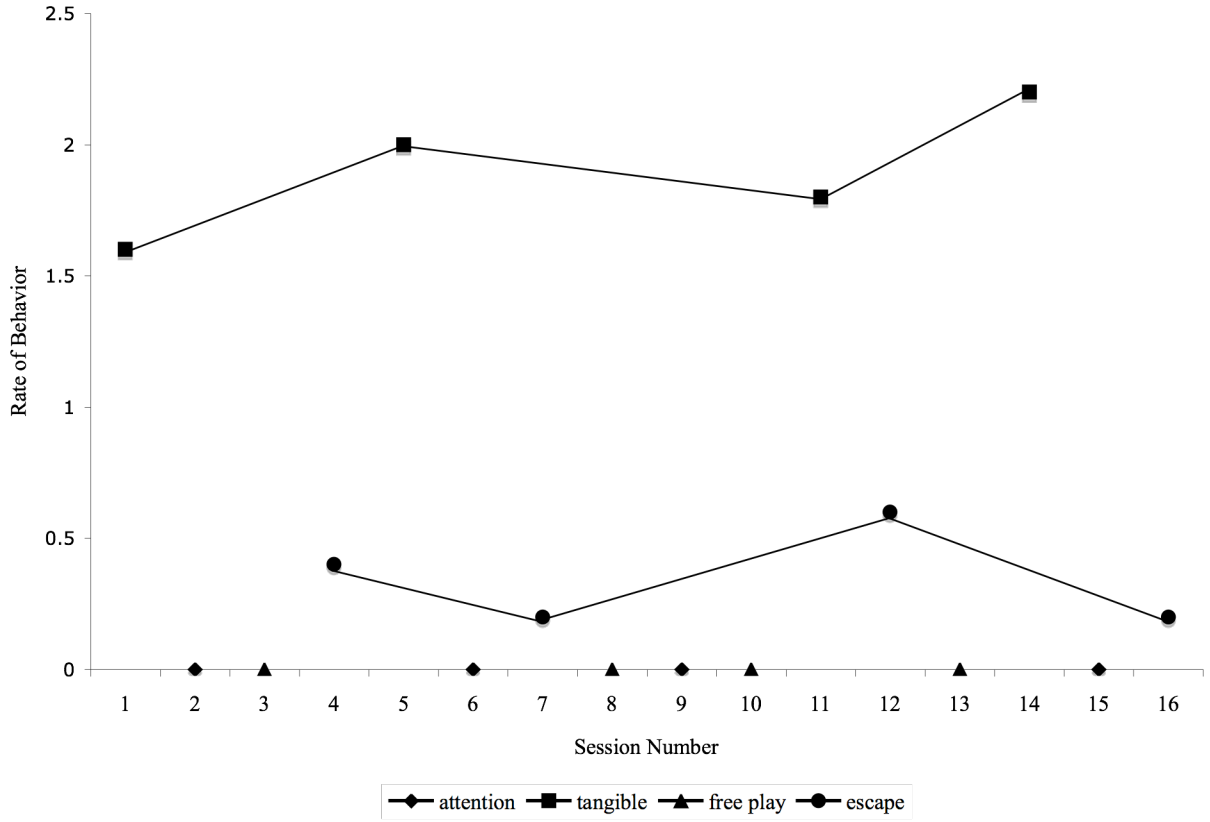


Figure 4-3. Zeb's rate of aberrant behavior per min during the functional analysis.

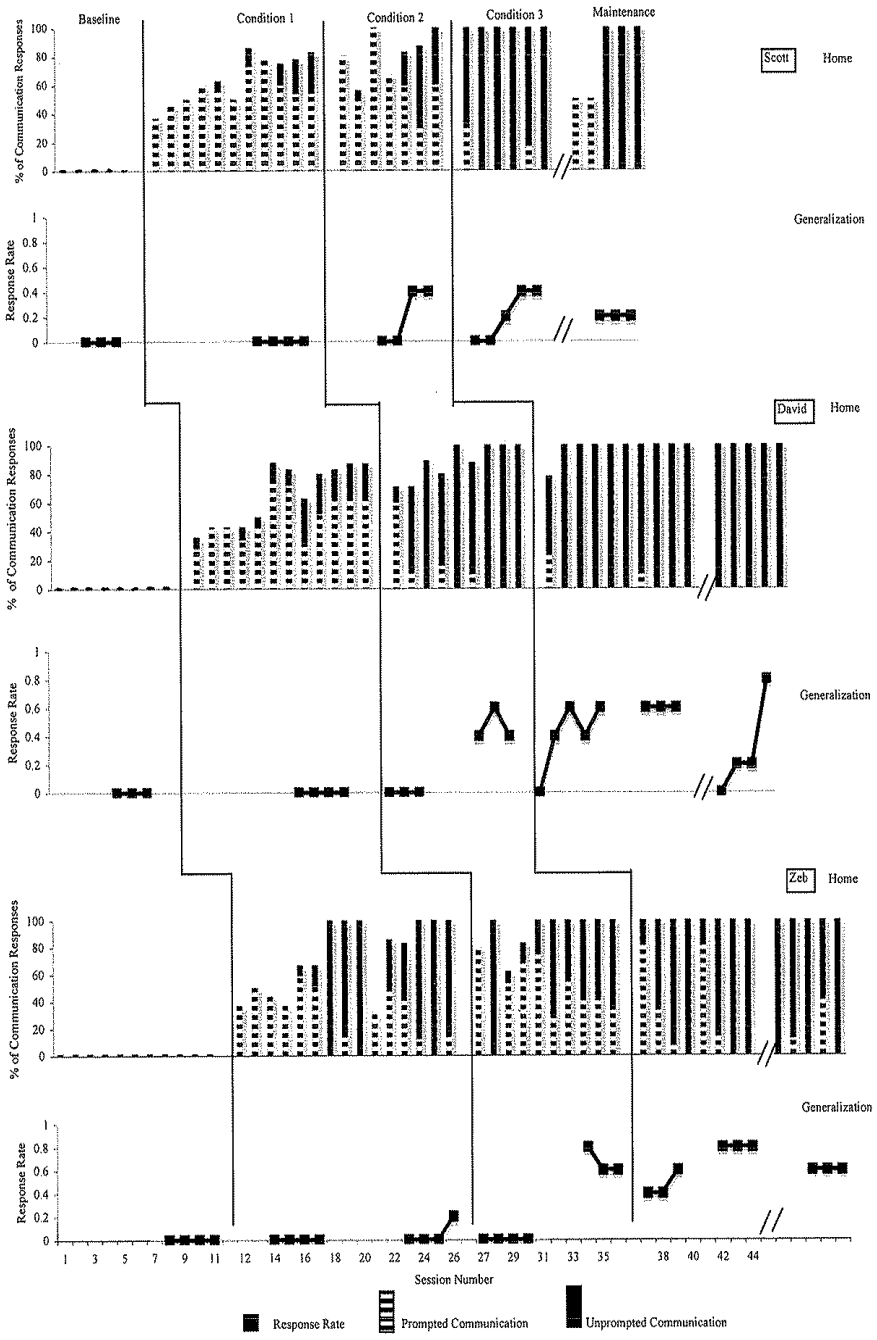


Figure 4-4. Communication response percentages and rates.

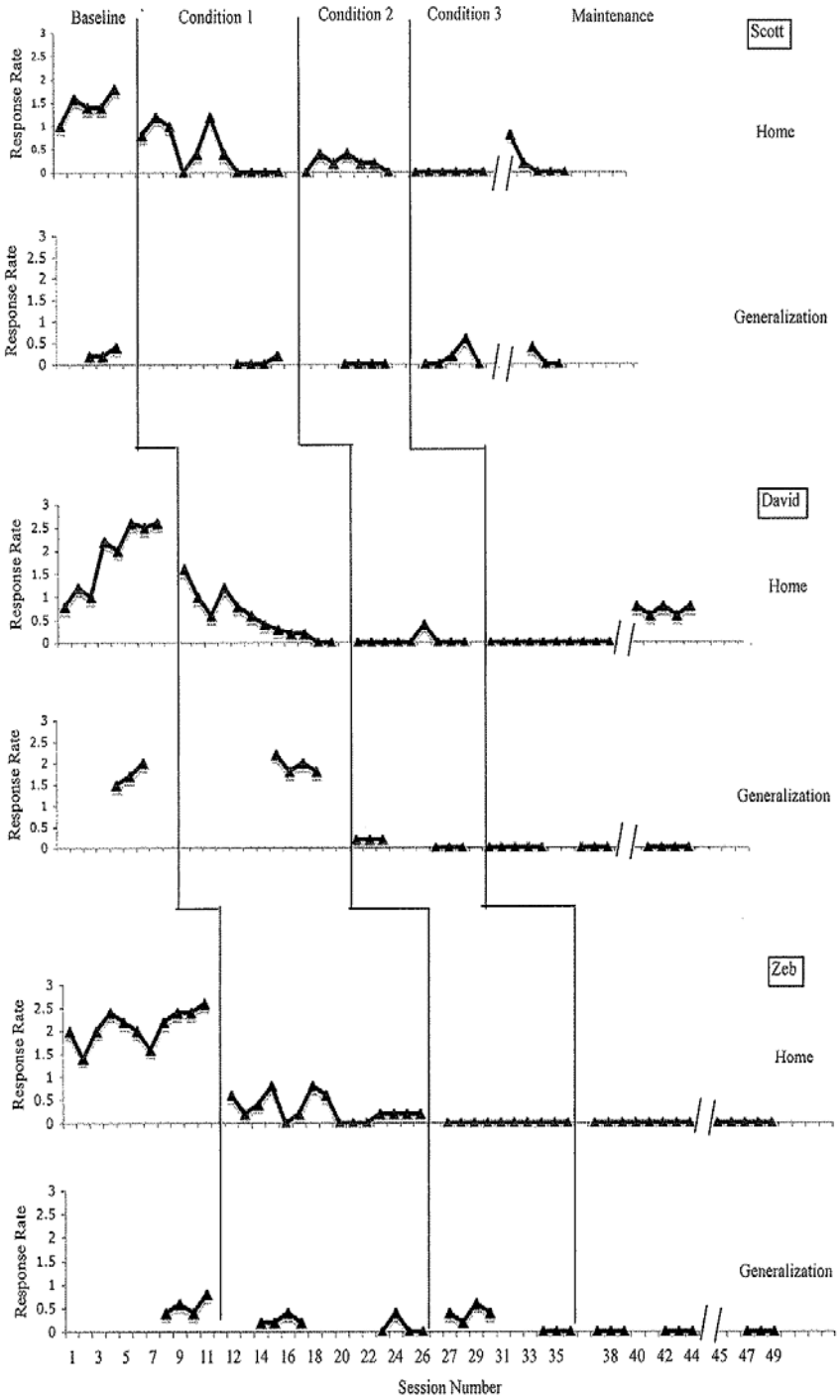


Figure 4-5. Aberrant behavior rate.

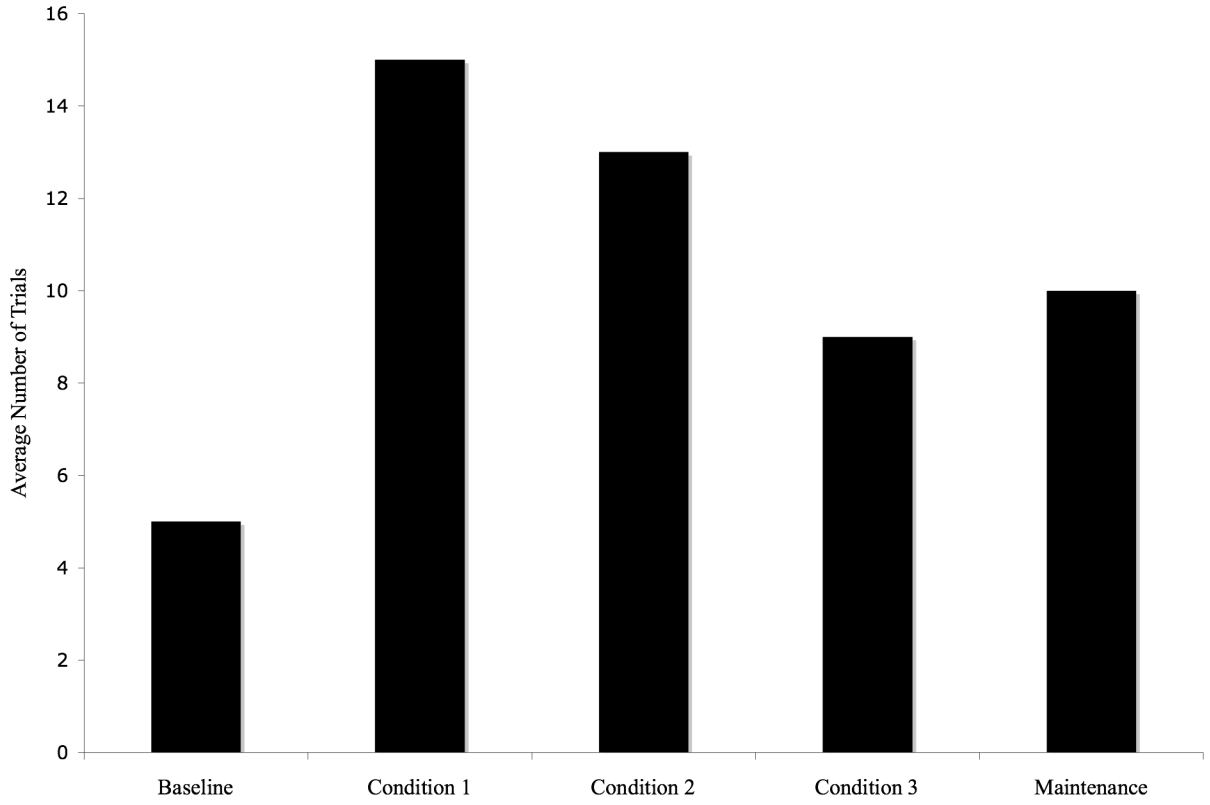


Figure 4-6. Scott's mean latency to respond unprompted.

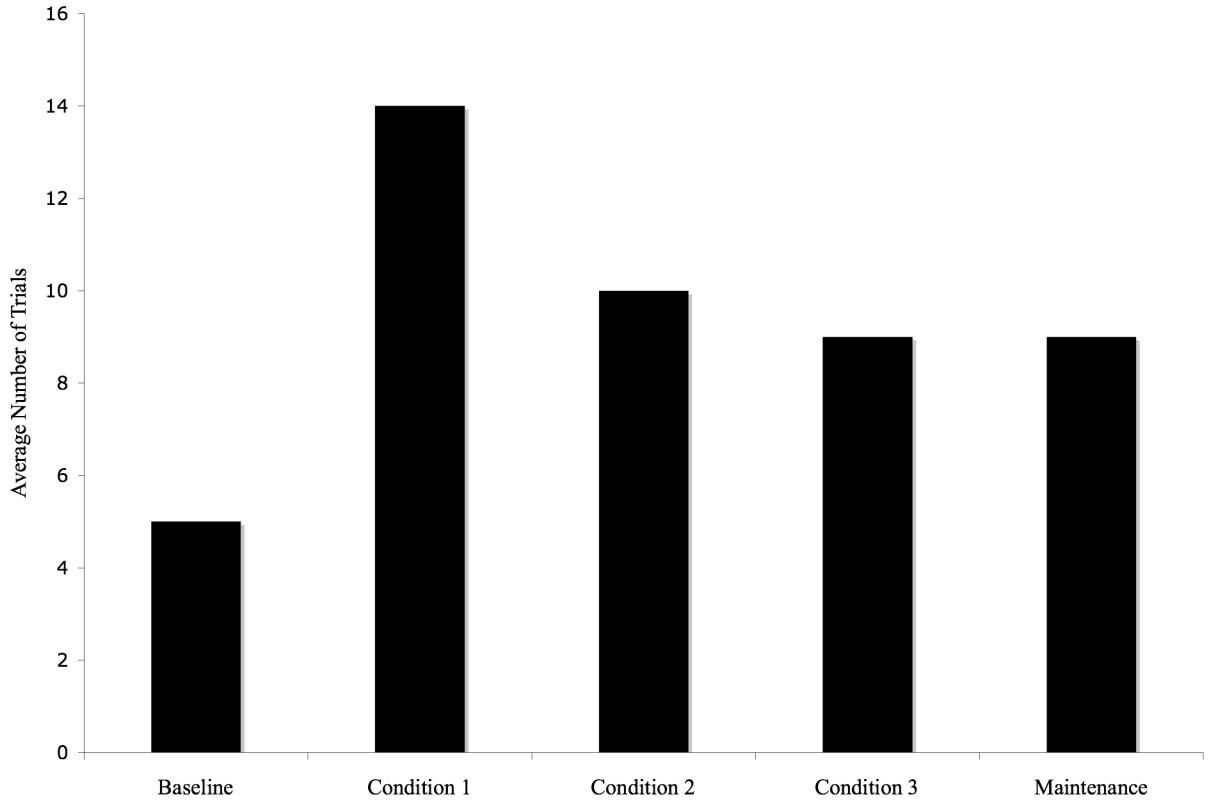


Figure 4-7. David's mean latency to respond with unprompted.

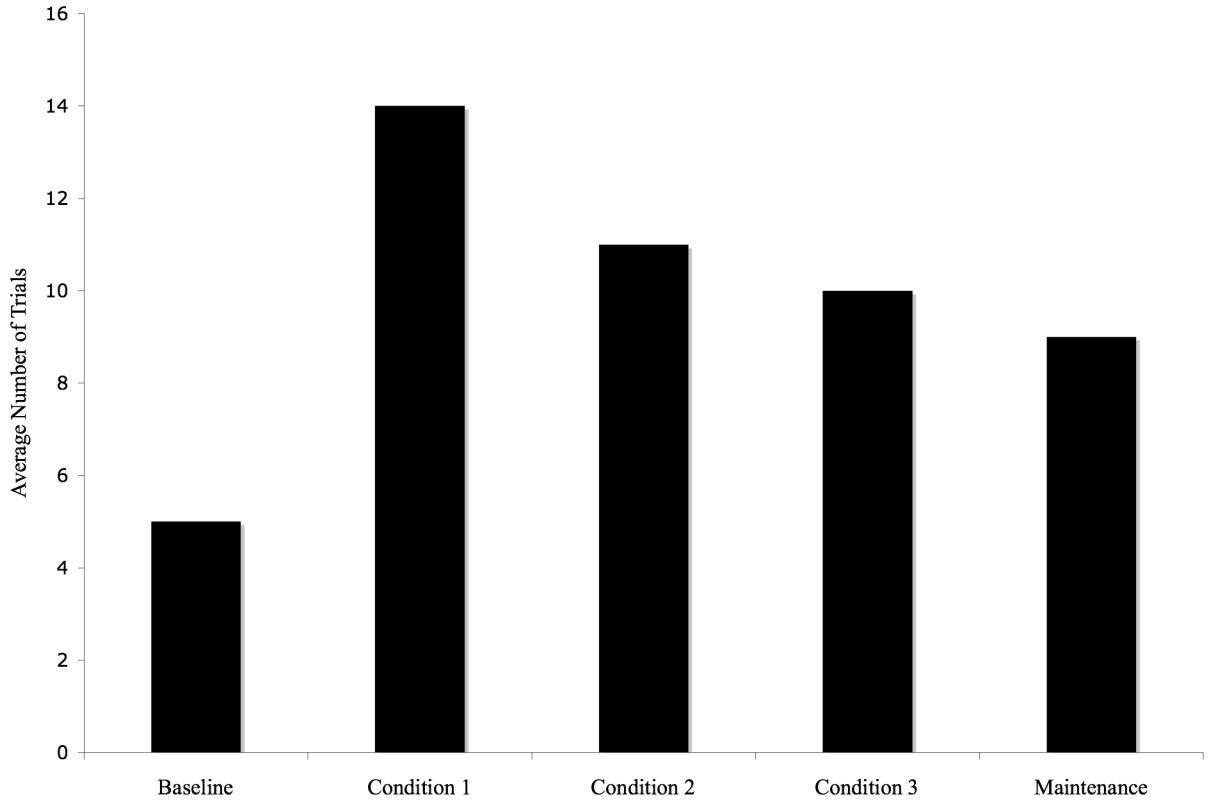


Figure 4-7. Zeb's mean latency to respond unprompted.

CHAPTER 5
DISCUSSION

The purpose of this chapter is to expound upon the results of the current study. First, the chapter begins with a discussion of the limitations of the current study. Next, both an overview and interpretation of the findings is provided. In addition, this chapter addresses the contribution of those findings to theory. Finally, the chapter concludes with a discussion of the implications for future research and practice.

Limitations

Although the intervention was functionally related to an increase in communication responses and a decrease in aberrant behaviors across all participants, a few limitations may limit the outcomes. First, as with many single subject research studies, the small sample size limits the external validity of this study (Kazdin, 1982). The three participants had a diagnosis of autism; thus, it is unknown whether the study's findings could be replicated with children who have differential diagnoses of ASD (i.e., PDDD-NOS or Asperger's syndrome) or if the findings could extend to a larger sample of children with autism. In addition, since the study only included young children whose aberrant behavior was maintained by a tangible function, one cannot be certain that the findings would extend to older children with other behavioral functions (e.g., attention or escape).

Second, the participants only had access to the first picture card during baseline. One cannot determine conclusively whether the participants could use the other picture cards prior to training. However, parents and teachers reported that the participants had never been trained to use any of the picture cards and had not used these picture cards spontaneously in the past. In

addition, the participants initially did not use any of the picture cards as they were introduced during generalization.

Third, due to the nature of the intervention, the number and type of prompts varied across phases. Particularly, no prompts were given during the baseline phase of the study. However, by the end of each condition of the intervention phase, the use of unprompted communication for at least 20% of sessions were required for each participant to move to the next condition. Further, the providing of prompts to elicit communicative responses was chosen as a part of the intervention to prevent the escalation of aberrant behaviors and increase the ethical treatment of the intervention for the children. In addition, the procedures for the system of prompts were consistent across conditions within the intervention phase and resulted in completely fading the use of prompts by the end of condition 3.

Fourth, the parents may have used the intervention when the primary experimenter was not in the home, which could have affected the outcome of the study. A parent using the intervention everyday for three hours would have a different result than a parent who never used the intervention outside the intervention sessions.

Finally, the utility of the preferences may not have been constant for all participants (Hanley, Iwata, & Roscoe, 2006). Preferences may change based on states of deprivation and satiation. If an individual has access to an item for an extended time prior to treatment sessions, the strength of the preference may decrease (Hanley, et al., 2006). However, the experimenter attempted to control this by requesting parents and teachers to withhold access to the preferred items on the day of the intervention, but not on other days. It is unknown if this may have influenced the outcomes. In addition, participants may have had a longer access history to some preference items in the school setting. The history of interaction with items may explain why

some items generalized more quickly at school in comparison to the intervention condition (Ono, 2004). For example, the swing was an item participants had used everyday at school and was a part of their respective schedules, whereas playing with the train was not. This may partially explain why the swing generalized at a higher rate, despite that it was not the first preferred item. However, the experimenter interviewed the teachers to ensure that each item included in the preference assessments had been available and used several times by the participants in the school setting.

Overview of Findings

The target children all acquired the communication responses during each condition of the intervention phase and responded at least 75% of the time for at least the last three sessions of each condition. By the third condition, the majority of communication responses were unprompted, while communication responses were maintained and generalized to the classroom setting.

Corresponding with the increase in communication responses, the target children's aberrant behaviors decreased and were stable at 0 RPM by the end of the intervention phase. Aberrant behavior remained low during maintenance and the generalization settings (i.e., classroom setting) by the end of the intervention phases (i.e., condition 3).

Two of the three participants increased their use of spontaneous verbalizations from the baseline to intervention phases, while the third target child (David) never exhibited spontaneous verbalization during sessions. The two participants who used spontaneous verbalization maintained these verbalizations and used them in the generalization setting (i.e., classroom setting).

Explanation of Findings

Although the study's findings relatively are straight forward, a few of the findings deserve further explanation. These include: (a) generalization of preferred items, and (b) David's maintenance data.

Generalization of Preferred Items

One of the purposes of this study was to examine the relationship between communicative responses learned in one setting (i.e., home) and the generalization of these responses to a second setting (i.e., school). As discussed in the results section, for the majority of the participants, generalization of communicative responses began to occur in condition 2, with the exception of Zeb, who requested the item only once during condition 1. Although generalization of communication responses did occur, it is not clear why generalization did not begin to occur until the second response was acquired. One plausible explanation may be because during condition 2, unprompted communication responses increased for all participants. Researchers have suggested that generalization that does not occur immediately may increase over time when more exemplars have been presented. For example, Griffiths and Craighead (1972) and Stokes and Baer (1977) referred to this phenomenon as *training sufficient exemplars* (i.e., training multiple examples of a new skill). In addition, Stokes and Baer purported that introducing individuals to natural contingencies may increase the chance of generalization. For instance, a child asking for a preferred tangible item that he or she would have access to in the natural setting and then receiving the item requested would be a natural contingency. Therefore, the generalization occurring in this study may be attributed to all three, which include: (a) the increase in the participants' unprompted communication, (b) training sufficient exemplars, and (c) introducing to natural contingencies. Each of these will be further discussed.

Unprompted communication. One possible explanation for the delayed generalization of the communication responses is the emergence of unprompted communication in the training setting. As aforementioned, for the most part, communication did not generalize to the untrained setting (i.e., classroom) until each child began to use more unprompted communication in the training setting (i.e., home), respectively. Dyches, Davis, Lucido, and Young (2002) found similar results in a case study of an adolescent girl and her use of a voice output communication aid (VOCA). In this study, the researchers found that the individual generalized her unprompted use of the VOCA only after unprompted communication was achieved during training.

Sufficient exemplars. Another possible explanation in this study for the delayed generalization of the communication responses is the training of sufficient exemplars, particularly since the communication responses generalized during condition 2. Stokes and Baer (1977) suggested that training multiple exemplars until generalization occurs sufficiently in an untrained setting might be one strategy for increasing generality of a newly learned skill. For example, Griffiths and Craighead (1972) provided training in two settings, and then observed generalization to a third untrained setting. They trained a 30-year old woman with mental retardation correct articulation of words in a clinical setting. However, she did not generalize this skill to the residential cottage. Finally, after she was trained in the residential cottage, she generalized to a third setting (i.e., classroom).

Stokes and Baer suggested that two to three exemplars are sufficient for increasing the generality of a newly acquired skill, such as that demonstrated in Griffiths and Craigheads' study. In addition, Stokes and Baer noted that generalization across responses might be accomplished by training a sufficient number of responses. For example, Laski, Charlop, and Schreibman (1988) trained parents to use multiple exemplars in the home during an intervention

and then observed to see if the children generalized the skills during free play in a different area of the home. Laski and colleagues noted that the trained verbalizations did generalize, but did not give the exact number of multiple exemplars required to accomplish the generalization. Similar to previous research (Laski et al., 1988), the current study also accomplished generalization to a new setting following the training of multiple exemplars, particularly, two exemplars.

Natural contingencies. One final possible explanation for the generalization of the communication responses in this study may be the introduction of natural contingencies. Natural contingencies are consequences that occur in the person's natural environment that maintain specific behaviors (Stokes & Baer, 1977). Stokes and Baer (1977) suggest choosing behaviors to teach that normally result in natural reinforcement after the teaching concludes. Individuals are taught behaviors that solicit naturally reinforcing consequences. For example, Horner (1971) taught a 5-year old boy with mental retardation to use crutches in an experimental setting. The boy then generalized the skill to a new setting to obtain desired items. In this new setting, the caretakers did not give him the items he desired. Rather, he had to use his crutches to obtain the item.

Similarly, Charlop, Schreibman, and Thibodeau (1985) taught children with autism to request an item in a training setting. After the children requested the item consistently in the training setting, Charlop and colleagues presented the item to the child in the generalization setting without providing any verbal prompts. Six of the seven children generalized the communication requesting to the new setting. In the current study, parents taught participants to request preferred items, which may have served as natural reinforcers in the generalization setting. Similar to Charlop et al. (1985) and Horner (1971), caretakers in this study required the

participants to use their new skill (i.e., use of picture card for communication) to obtain access to a desired item in the generalization setting.

Maintenance Data

Generally, participants maintained high levels of communication and low levels of aberrant behavior during maintenance sessions, with the exception of David. Similar to the other two participants, David maintained high levels of communication, but he also engaged in aberrant behavior during maintenance sessions.

There are several possible explanations that may be applied to David's occurrence of problem behaviors during the maintenance condition, all related to potential setting events. One plausible explanation may have been the occurrence of a temporally distant setting event for David just prior to the maintenance phase of the study (i.e., change of routine and out of town visit with his family). Additionally, David's parents noted that his sleep patterns were interrupted (i.e., sleep deprived during sessions) during this out of town trip and continued to pose a problem since returning home. Each of these potential setting events is related to personal contexts (McGill, Teer, Rye, and Hughes, 2005). Personal contexts refer to events such as when someone has been sleep deprived, ill, or had a change in routine. According to McGill and colleagues, setting events in personal contexts, particularly the disturbance of sleep, are more likely to contribute to the occurrence of problem behaviors than others such as physical setting or day of the week. For example, Kennedy and Itkonen (1993) experimentally demonstrated that sleep deprivation in an individual with moderate mental retardation and autistic-like symptoms was differentially associated with increased levels of problem behavior.

In summary, generalization occurred for the most part beginning in condition 2 of the intervention phase. This may be attributed to when unprompted communication occurred in the

training setting, sufficient exemplars were trained, and participants were introduced to natural contingencies. In addition to generalization, participants maintained their communication responses, but David continued to engage in aberrant behavior. This may be explained by personal context setting events (e.g., sleep deprivation), which researchers have demonstrated to be differentially associated with increased levels of problem behavior (Kennedy & Itkonen, 1993).

Theoretical or Conceptual Implications of Findings

The findings of the current study have theoretical implications for FCT and milieu therapy literature research. Researchers in the field of FCT have discussed the importance of linking communication responses to behavioral function. In addition, milieu therapy researchers have noted the importance of using more naturalistic procedures to enhance generalization and maintenance of effects. This study has taken an initial step in furthering each of these lines of research and merging the two research areas together.

In regard to FCT literature, the current study demonstrates the utility of teaching multiple responses in decreasing dependence on prompts and increasing the likelihood of generalization. Previous FCT research lacked an emphasis on either of these considerations (Mancil, 2006). Carr and Durand (1985), Durand and Carr (1992), and Wacker and colleagues (1990) taught one communication response to the participants of their respective studies. Further, the majority of researchers for the FCT studies did not focus on generalization to other persons or settings. The one research team who did test for generalization of the one communication response with a graduate psychology major (Durand & Carr, 1992), not a natural change agent. This lack of focus on generalization partially may be because they did not train sufficient exemplars, which are used to promote generalization (Baer, Wolf, & Risley, 1968). In contrast, the results of the

current study demonstrate that with sufficient exemplars, prompt dependence decreased and generalization occurred in an untrained setting with an untrained person.

The current study also extends the milieu therapy literature by providing a direct, functional connection between communication and abnormal behavior. Although a few milieu therapy researchers in the past anecdotally mentioned decreases in aberrant behavior, these behaviors were not experimentally analyzed (Yoder et al., 1995). They did not systematically analyze aberrant behavior. For example, Charlop, Shriebman, and Thibodeau (1985), Hancock and Kaiser (2002), Ross and Greer (2003) did not mention aberrant behavior. Further, Yoder et al. (1995) noted that milieu procedures may decrease aberrant behavior, but did not empirically demonstrate a relation between the intervention and the decrease in aberrant behavior. The current study, however, provides a model for incorporating function of aberrant behavior and teaching replacement communication responses while employing milieu therapy prompting techniques in a natural environment.

In addition to contributing to the FCT and milieu therapy literature base, the current study also contributes to the generalization literature. The findings of this study further support the concept that training sufficient exemplars and targeting natural contingencies is needed for generalization to occur. Similar to the studies by Griffiths and Craighead (1972) and Laski, Charlop, and Schriebman (1988), participants in this study generalized after sufficient exemplars were trained. Further, the use of natural contingencies may have contributed to the generalization as it did in the study by Charlop, Thibodeau, and Schriebman (1985). In addition, the current study demonstrated that unprompted communication may need to occur in one setting before it generalizes to another setting.

In summary, the current study's findings have theoretical or conceptual implications for the FCT, milieu therapy, and generalization literatures. The current study extends the FCT literature by demonstrating the utility of having natural change agents teach multiple communication responses in a natural environment. Similarly, the findings extend the milieu therapy literature by providing a functional relationship between an intervention with milieu procedures and the decrease of aberrant behavior. Finally, the study's findings extends the generalization literature by demonstrating that using natural contingencies, training multiple exemplars, and obtaining unprompted communication in one setting increases the chance of generalization occurring.

Implications for Future Research

The primary experimenter found positive effects of the intervention on the social communicative behaviors of young children with ASD. The results along with the limitations of the current study provide implications for future research. First, the study's findings should be replicated with a larger group of individuals with ASD, systematically accounting for diverse characteristics (e.g., language level). These analyses may provide additional information for individuals along the autism continuum with different diagnoses, age, and ability level. This may assist researchers in identifying ASD subgroups that are the most responsive to the intervention. For example, children with ASD who have social characteristics that are aloof (i.e., have an absence of speech and poor social interaction, but seem to enjoy others) may respond better than children who are socially passive (i.e., avoid eye contact and other social stimuli such as touching). Further, children with ASD who have an average I.Q. and/or are considered high functioning may demonstrate better responses to the intervention.

Second, the utility of the intervention with various trainers should be explored. Researchers could examine whether similar results would occur when fathers, teachers, or peers implement the intervention in comparison to mothers who were the implementers in the current study. In addition, researchers should explore generalization with peers. Researchers may want to determine if similar results would occur following training with an adult or if training would need to occur with one peer before generalizing to another peer. Further, training may need to occur with multiple peers before the communication responses generalize to other peers.

Third, the effects of using different items should be examined. For example, researchers could examine the effectiveness of using items identified later in the sequence of preferences as the first items trained. Some researchers have found using preferences identified in subsequent preference assessments to have similar effects as the first preferences (Ciccone, Graff, & Ahearn, 2006). Further, DeLeon, Anders, Rodriguez-Catter, and Neidert (2000) found that rotating sets of toys had a better effect on outcomes than using a single set of toys.

Fourth, researchers should examine generalization further. Researchers should examine generalization to peers and siblings. For example, researchers should examine if communication skills generalize to peers after training with an adult or if training should occur first with one peer to increase the chance of generalization to another peer.

Finally, researchers should examine additional outcomes of the modified milieu therapy intervention such as possible effects on the mother's use of language. For example, the experimenter and the expert, both, observed that the mothers began to speak more with participants, similar to how they may interact with typically developing children. The mothers began using speech that focused on "richly" describing objects. They talked about the colors, shapes, and other properties of the items. This could possibly have an effect on the overall

outcomes with communication (Hart & Risley, 1999). Further, researchers should examine the effects, if any, the intervention has on the amounts of eye gaze, social smiling, and/or otherwise improve the deficits typically associated with ASD. For example, the increase in communication may result in improvement in joint attention skills. Further, the reciprocity of communication learned may transfer to other areas such as playing with peers.

In summary, future researchers should focus on five areas. First, the findings should be replicated with a larger group of children with ASD who have diverse characteristics. Second, the intervention should be examined with various change agents (i.e., teachers, peers). Third, the effects of using different items should be analyzed. Fourth, generalization should be examined further. Finally, future researchers should examine different outcomes of the modified milieu intervention such as mother's use of language.

Implications for Practice

In addition to future research implications, the current study has implications for practice. Researchers have demonstrated effectiveness of FCT (Wacker et al., 2005) and milieu therapy (Hester et al., 1995) on addressing aberrant behavior and communication, respectively. However, researchers of the FCT literature have not demonstrated effectiveness by natural change agents in natural environments, nor have they demonstrated an increase in multiple communication responses (Mancil, 2006). In addition, the researchers in the milieu therapy literature have not demonstrated an empirical connection between an increase in communication response and a decrease in aberrant behavior. This study provides some evidence that using milieu procedures in the natural environment by natural change agents is effective in increasing unprompted communication and decreasing aberrant behavior. This study also provides evidence that having natural change agents use milieu procedures (i.e., prompts and time delay) in a natural

environment increase generalization and maintenance. The study by Hancock and Kaiser (2002) provides related support that training in the natural environment increases generalization and maintenance. Therefore, the current study has practical implications because it provides additional evidence of the importance of interventions in the natural environment by natural change agents (e.g., parents).

The other practical implication of this study is that it demonstrates that the milieu procedures can have the same effect on aberrant behavior as traditional discrete trial training typically used in FCT, but may be considered a more natural intervention for a classroom or home setting (Miranda-Linne & Melin, 1992). The three participants increased their use of unprompted communication and decreased their engagement in aberrant behavior. These findings are consistent with the FCT literature in regards to the aberrant behavior (Carr & Durand, 1985; Wacker et al., 2005) and the milieu therapy literature in regards to the communication (Charlop, Schreibman, & Thibodeau, 1985; Hester, Kaiser, Alpert, & Whiteman, 1995), but with the added benefit of being one intervention.

Summary

Previous researchers have examined the effectiveness of FCT and milieu therapy with children with ASD, but FCT researchers more so. FCT researchers have demonstrated positive effects on aberrant behavior and milieu therapy researchers have demonstrated positive effects with communication. The current study extended the outcomes and addressed the limitations of the past studies. Similar to past FCT studies, the current study's results demonstrate that aberrant behavior decreases when a communication skill is taught that serves the same function as the aberrant behavior. This study extended the research by teaching multiple exemplars and demonstrating generalization to an untrained setting with an untrained person. In contrast to the

majority of previous FCT studies, the experimenter of this study trained natural change agents in the natural environment and achieved similar results as previous studies conducted in clinical settings.

In addition to extending the FCT literature, the current study also extended the milieu therapy literature. Similar to past milieu therapy studies, this study demonstrated the effectiveness of milieu procedures on increasing communication. In contrast, the current study demonstrated the utility of milieu therapy on decreasing aberrant behavior and provided a functional relationship between milieu therapy procedures and aberrant behavior. The current study also added to the milieu literature base by focusing on children with autism.

The current study contributes to research and practice because it adds to the FCT and milieu therapy literature by demonstrating that a combined intervention decreases aberrant behavior, increases unprompted communication, and promotes generalization to untrained settings and persons. This contributes to practice because the study demonstrates the utility of the intervention with individuals who have limited training (e.g., parents). In conclusion, the implementation of the modified milieu therapy intervention by parents in the natural setting led to an increase in unprompted communication, clinically significant decreases in aberrant behavior, generalization to untrained settings and persons, and maintenance of these effects.

LIST OF REFERENCES

Alpert, C. L., & Kaiser, A. P. (1992). Training parents as milieu language teachers. *Journal of Early Intervention, 16*(1), 31-52.

American Psychiatric Association. (2000). *Diagnostic and statistical manual for mental disorders* (4th ed., Rev. ed.). Washington, D.C.: American Psychiatric Association.

Autism Society of America. (2006). *All about autism.* Retrieved June 6, 2006, from http://www.autism-society.org/site/PageServer?pagename=allaboutAutism

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1,* 91-97.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 20,* 313-327.

Bailey, J. S., & Burch, M. R. (2002). *Research methods in applied behavior analysis.* London, England: Sage Publications.

Bott, C., Farmer, R., & Rhode, J. (1997). Behavior problems associated with lack of speech in people with learning disabilities. *Journal of Intellectual Disability Research, 41,* 3-7.

Bourret, J., Vollmer, T. R., & Rapp, J. T. (2004). Evaluation of a vocal mand assessment and vocal mand training procedures. *Journal of Applied Behavior Analysis, 37,* 129-144.

Brady, N. C., & Halle, J. W. (1997). Functional analysis of communicative behaviors. *Focus on Autism and Other Developmental Disabilities, 12,* 95-104.

Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18,* 111-126.

Centers for Disease Control and Prevention (2005, October 29). *How common is autism spectrum disorder (ASD)?* Retrieved March 2, 2006, from http://www.cdc.gov/ncbdd/autism/asd-common.htm

Charlop, M. H., Schreibman, L., & Thibodeau, M. G. (1985). Increasing spontaneous verbal responding in autistic children using a time delay procedure. *Journal of Applied Behavior Analysis, 18*(2), 155-166.

Charlop, M. H., & Walsh, M. E. (1986). Increasing autistic children's spontaneous verbalizations of affection: An assessment of time delay and peer modeling procedures. *Journal of Applied Behavior Analysis, 19*(3), 307-314.

Chung, M. C., Jenner, L., Chamberlain, L., & Corbett, J. (1995). One year follow-up pilot study on communication skill and challenging behavior. *European Journal of Psychiatry, 9,* 83-95.

Ciccone, F. J., Graff, R. B., & Ahearn, W. H. (2006). Stimulus preference assessments and the utility of a moderate category. *Behavioral Interventions, 21,* 59-63.

Dale, P. S. (1976). *Language development: Structure and function* (2nd ed.). New York: Holt, Rinehart, and Winston.

DeLeon, I. G., Anders, B. M., Rodriguez-Catter, V., & Neidert, P. L. (2000). The effects of noncontingent access to single- versus multiple-stimulus sets on self-injurious behavior. *Journal of Applied Behavior Analysis, 4,* 623-626.

Dunlap, G., & Duda, M. (2005). Using functional communication training to replace challenging behavior. *What Works Brief.* Retrieved March 10, 2005, from http://www.csefel.uiuc.edu/whatworks.html

Durand, V. M., & Carr, E. G. (1987). Social influences on "self-stimulatory" behavior: Analysis and treatment application. *Journal of Applied Behavior Analysis, 20*, 119-132.

Durand, V. M., & Carr, E. G. (1992). An analysis of maintenance following functional communication training. *Journal of Applied Behavior Analysis, 25*, 777-794.

Durand, V. M., & Crimmons, D. B. (1996). *The motivation assessment scale administration guide.* Kansas City, KS: Monaco & Associates Incorporated.

Durand, V. M., & Merges, E. (2001). Functional communication training: A contemporary behavior analytic intervention for problem behaviors. *Focus on Autism and Other Developmental Disabilities, 16*, 110-119.

Dyches, T. T. Davis, A., Lucido, B. R., & Young, J. R. (2002). Generalization of skills using pictographic and voice output communication devices. *Augmentative and Alternative Communication, 18,* 124-131.

Griffiths, H., & Craighead, W. E. (1972). Generalization in operant speech therapy for misarticulation. *Journal of Speech and Hearing Disorders, 37,* 485-494.

Halle, J. W., Baer, D. M., & Spradlin, J. E. (1981). Teachers' generalized use of delay as a stimulus control procedure to increase language use in handicapped children. *Journal of Applied Behavior Analysis, 14*(4), 389-409.

Hancock, T. B., & Kaiser, A. P. (2002). The effects of trainer-implemented enhanced milieu teaching on the social communication of children with autism. *Topics in Early Childhood Special Education, 22*(1), 39-54.

Hanley, G. P., Iwata, B. A., & Roscoe, E. M. (2006). Some determinants of changes in preference over time. *Journal of Applied Behavior Analysis, 39,* 189-202.

Harding, J. W., Wacker, D. P., Berg, W. K., Barretto, A., Winborn, L., & Gardner, A. (2001). Analysis of response class hierarchies with attention-maintained problem behaviors. *Journal of Applied Behavior Analysis, 34,* 61-64.

Hart, B. M., & Risley, T. R. (1968). Establishing use of descriptive adjectives in the spontaneous speech of disadvantaged preschool children. *Journal of Applied Behavior Analysis, 1(*2), 109-120.

Hart, B., & Risley, T. R. (1975). Incidental teaching of language in the preschool. *Journal of Applied Behavior Analysis, 8*(4), 411-420.

Hart, B., & Risley, T. R. (1999). *The social world of children learning to talk.* Baltimore, MD: Brookes Publishing.

Heflin, L. J., & Alaimo, D. F. (2006). *Students with autism spectrum disorders: Effective instructional practices.* Upper Saddle River, NJ: Merrill/Prentice Hall.

Hemmeter, M. L., & Kaiser, A. P. (1990). Environmental influences on children's language: A model and case study. *Education and Treatment of Children, 13*(4), 331-346.

Hester, P. P., Kaiser, A. P., Alpert, C. L., & Whiteman, B. (1995). The generalized effects of training trainers to teach parents to implement milieu teaching. *Journal of Early Intervention, 20*(1), 30-51.

Horner, R. H. (1971). Establishing use of crutches by a mentally retarded spina bifida child. *Journal of Applied Behavior Analysis, 4,* 183-189.

Horner, R. H., & Day, H. M. (1991). The effects of response efficiency on functionally equivalent competing behaviors. *Journal of Applied Behavior Analysis, 24*, 719-732.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27,* 197-209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2,* 3-20, 1982)

Johnson, J. W., McDonnell, J., Holzwarth, V. N., & Hunter, K. (2004). The efficacy of embedded instruction for students with developmental disabilities enrolled in general education classes. *Journal of Positive Behavior Interventions, 6*(4), 214-227.

Kaiser, A. P. (1993). Parent-implemented language intervention: An environmental system perspective. In A. P. Kaiser & D. B. Gray (Eds.), *Enhancing children's communication: Research foundations for intervention* (pp. 63-84). Baltimore: Paul H. Brookes Publishing Co.

Kaiser, A. P. (1993). Functional language. In M. E. Snell (Ed.), *Instruction of students with severe disabilities.* New York: Macmillan.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Kennedy, C. H. (2005). *Single-case designs for educational research.* New York: Allyn and Bacon.

Kennedy, C. H., & Itkonen, T. (1993). Effects of setting events on the problem behavior of students with severe disabilities. *Journal of Applied Behavior Analysis, 26,* 321-327.

Koegel, L. K., & LaZebnik, C. (2004). *Overcoming autism: Finding the answers, strategies, and hope that can transform a child's life.* New York: Penguin Books.

Lalli, J. S., Casey, S., & Kates, K. (1995). Reducing escape behavior and increasing task completion with functional communication training, extinction, and response chaining. *Journal of Applied Behavior Analysis, 28*, 261-268.

Laski, K. E., Charlop, M. H., & Schreibman, L. (1988). Training parents to use the natural language paradigm to increase their autistic children's speech. *Journal of Applied Behavior Analysis, 21*(4), 391-400.

LeCouteur, A., Lord, C., & Rutter, M. (2003). *Autism diagnostic interview-revised (ADI-R).* Los Angeles: Western Psychological Services.

Lord, C., Rutter, M., DiLavore, P., & Risi, S. (1999). *Autism Diagnostic Observation Schedule (ADOS).* Los Angeles: Western Psychological Services.

Lotter, V. (1966). Epidemiology of autistic conditions in young children. *Social Psychiatry, 1,* 124-137.

MacDuff, G. S., Krantz, P. J., MacDuff, M. A., & McClannahan, L. E. (1988). Providing incidental teaching for autistic children: A rapid training procedure for therapists. *Education and Treatment of Children, 11*(3), 205-217.

Mancil, G. R. (2006). Functional communication training: A review of the literature related to children with autism. *Education and Training in Developmental Disabilities, 41,* 213-224.

Martin, C. A., Drasgow, E., Halle, J. W., & Brucker, J. M. (2005). Teaching a child with autism and severe language delays to reject: Direct and indirect effects of functional communication training. *Educational Psychology, 25*, 287-304.

McFee, K., McCrimmon, A., & Bebko, J. (2006). Understanding the symbolic nature of pictures in children with autism. *Paper presented at 5th International Meeting for Autism Research.* Montreal, Canada.

McDonnell, J., Johnson, J. W., Polychronis, S., & Risen, T. (2002). Effects of embedded instruction on students with moderate disabilities enrolled in general education classes. *Education and Training in Mental Retardation and Developmental Disabilities. 37*(4), 363-377.

McGee, G. G., Krantz, P. J., Mason, D., & McClannahan, L. E. (1983). A modified incidental teaching procedure for autistic youth: Acquisition and generalization of receptive object labels. *Journal of Applied Behavior Analysis, 16*(3), 329-338.

McGee, G. G., Krantz, P. J., & McClannahan, L. E. (1985). The facilitative effects of incidental teaching on preposition use by autistic children. *Journal of Applied Behavior Analysis, 18*(1), 17-31.

McGill, P., Teer, K., Rye, L., & Hughes, D. (2005). Staff reports of setting events associated with challenging behavior. *Behavior Modification, 29,* 599-615.

Miranda-Linne, F., & Melin, L. (1992). Acquisition, generalization, and spontaneous use of color adjectives: A comparison of incidental teaching and traditional discrete-trial procedures for children with autism. *Research in Developmental Disabilities, 13*, 191-210.

Mullen, E. M. (1992). Mullen scales of early learning. Cranston, RI: T.O.T.A.L. Child.

Nelson, K. (1973). Structure and strategy in learning to talk. *Monographs of the Society for Research in Child Development, 38,* 1-135.

Noonan, M., & McCormick, L. (1993). *Early intervention in natural settings.* Pacific Grove, CA: Brookes/Cole.

Odom, S. L., Brown, W. H., Frey, T., Karasu, N., Smith-Canter, L. L., Strain, P. S. (2003). Evidence-based practices for young children with autism: Contributions for single-subject design research. *Focus on Autism and Other Developmental Disabilities, 18,* 166-175.

O'Neill, R. E., & Sweetland-Baker, M. (2001). Brief report: An assessment of stimulus generalization and contingency effects in functional communication training with two students with autism. *Journal of Autism and Developmental Disorders, 31*, 235-240.

Ono, K. (2004). Effects of experience on preference between forged and free choice. *Journal of Experimental Analysis of Behavior, 81,* 27-37.

Renty, J., & Roeyers, H. (2006). Satisfaction with formal support and education for children with autism spectrum disorder: The voices of the parents. *Child: Care, Health, & Development, 32,* 371-385.

Roane, H. S., Vollmer, T. R., Ringdahl, J. E., & Marcus, B. A. (1998). Evaluation of a brief stimulus preference assessment. *Journal of Applied Behavior Analysis, 31*, 605-620.

Ross, D. E. (2002). Replacing faulty conversational exchanges for children with autism by establishing a functionally equivalent alternative response. *Education and Treatment in Mental Retardation and Developmental Disabilities, 37*, 343-362.

Ross, D. E., & Greer, R. D. (2003). Generalized imitation and the mand: Inducing first instances of speech in young children with autism. *Research in Developmental Disabilities, 24*, 58-74.

Rutter, M., Bailey, A., & Lord, C. (2003). *The social communication questionnaire.* Los Angeles, CA:Western Psychological Services.

Schopler, E., Reichler, R., & Renner, B. (1988). *The childhood autism rating scale.* Los Angeles: Western Psychological Services.

Schroeder, S. R., Schroeder, C. S., Smith, B., & Dalldorf, J. (1978). Prevalence of self-injurious behavior in a large state facility for the retarded: A three-year follow up study. *Journal of Autism and Childhood Schizophrenia, 8,* 261-269.

Schwartz, I. S. (2003). Social validity assessment: Voting on science or acknowledging the roots of applied behavior analysis? In K. S. Budd & T. Stokes (Eds.), *A small matter of proof: The legacy of Donald M. Baer* (pp. 53-61). New York: Context Press.

Sigafoos, J. (2000). Communication development and aberrant behavior in children with developmental disabilities. *Education and Training in Mental Retardation and Developmental Disabilities, 35*, 168-176.

Sigafoos, J., Arthur-Kelly, M., & Butterfield, N. (2006). *Enhancing everyday communication for children with disabilities.* London: Brookes Publishing.

Skinner, B. F. (1953). *Science and Human Behavior.* New York: Free Press.

Skinner, B. F. (1957). *Verbal Behavior.* New York: Appleton-Century-Crofts.

Snell, M. E., & Brown, F. (2000). *Instruction of students with severe disabilities* (6th ed.). New York: Merrill.

Spradlin, J. E., & Siegel, G. M. (1982). Language training in natural and clinical environments. *Journal of Speech and Hearing Disorders, 47,* 2-6.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349-367.

Volkmar, F. R., Szatmari, P., & Sparrwo, S. S. (1993). Sex differences in pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 23,* 579-591.

Wacker, D. P., Berg, W. K., Harding, J. W., Barretto, A., Rankin, B., & Ganzer, J. (2005). Treatment effectiveness, stimulus generalization, and acceptability to parents of functional communication training. *Educational Psychology, 25*, 233-256.

Wacker, D. P., Steege, M. W., Northup, J., Sasso, G., Berg, W., Reimers, T. et. al. (1990). A component analysis of functional communication training across three topographies of severe behavior problems. *Journal of Applied Behavior Analysis, 23*, 417-429.

Warren, S. F., & Gazdag, G. (1990). Facilitating early language development with milieu intervention procedures. *Journal of Early Intervention, 14*(1), 62-86.

Yoder, P. J., et al. (1995). An exploratory comparison of milieu teaching and responsive interaction in classroom applications. *Journal of Early Intervention, 19*(3), 218-242.

Yoder, P. J., & Warren, S. F. (2002). Effects of prelinguistic milieu teaching and parent responsivity education on dyads involving children with intellectual disabilities. *Journal of Speech, Language, and Hearing Research, 45*, 1158-1174.

APPENDIX A
FUNCTIONAL ANALYSIS PROTOCOL

Functional Analysis Protocol

Four conditions: Attention, Tangible, Escape, and Free Play (control)

1. Free Play
   a. Home environment
      - Environmental variables held constant (e.g., people, rooms, furniture, noise levels)

   b. Activity
      - Child interacts with preferred items as determined by a preference assessment

   c. Researcher behavior
      - Researcher provides noncontingent attention to the child
      - No task demands are presented
      - No programmed consequences are provided for problematic behavior

   d. Assumption
      - No problem behavior should occur in this condition

2. Attention
   a. Home environment
      - Environmental variables held constant (e.g., people, rooms, furniture, noise levels)

   b. Activity
      - Child interacts with a neutral task as determined by the parent and previous observations

   c. Researcher behavior
      - Researcher attends to the child's behavior each time it occurs by giving the child attention and stating "Please don't do that"

   d. Assumption
      - If increased problem behavior occurs, conclude problem behavior is to "gain" access to adult attention

3. Tangible
   a. Home environment

- Environmental variables held constant (e.g., people, rooms, furniture, noise levels)

b. Activity
    - Child interacts with a preferred item determined previously by a preference assessment

c. Researcher behavior
    - No task demands are presented
    - Researcher provides noncontingent attention to the child
    - Researcher removes the preferred item after a short, set period of time of appropriate behavior (30 seconds)

d. Assumption
    - If increased problem behavior occurs, conclude problem behavior is to "gain" access to tangible items

4. Escape
    a. Home environment
        - Environmental variables held constant (e.g., people, rooms, furniture, noise levels)

    b. Activity
        - Child interacts with a demanding task as determined by the parent and through observation

    c. Researcher behavior
        - Researcher provides noncontingent attention to the child
        - Researcher repeatedly directs child to complete the demanding task (one minute intervals)
        - Researcher removes task each time problem behavior occurs for a set period of time (30 seconds) and then returns the task when appropriate behavior occurs

    d. Assumption
        - If increased problem behavior occurs, conclude problem behavior functions to "escape" demands

APPENDIX B
MISCELLANEOUS VARIBLES DATA SHEETS

Adult Survey

Student: Date:
Adult: *(e.g., Parent 1)*

1. **Education:**
   Please indicate your highest degree obtained.
   - ☐ None.
   - ☐ High School.
   - ☐ Bachelors.
   - ☐ Masters.
   - ☐ Post Masters.

2. **Experience:**
   Please indicate the number of research studies in which you have participated.
   ___ Number of Research Studies

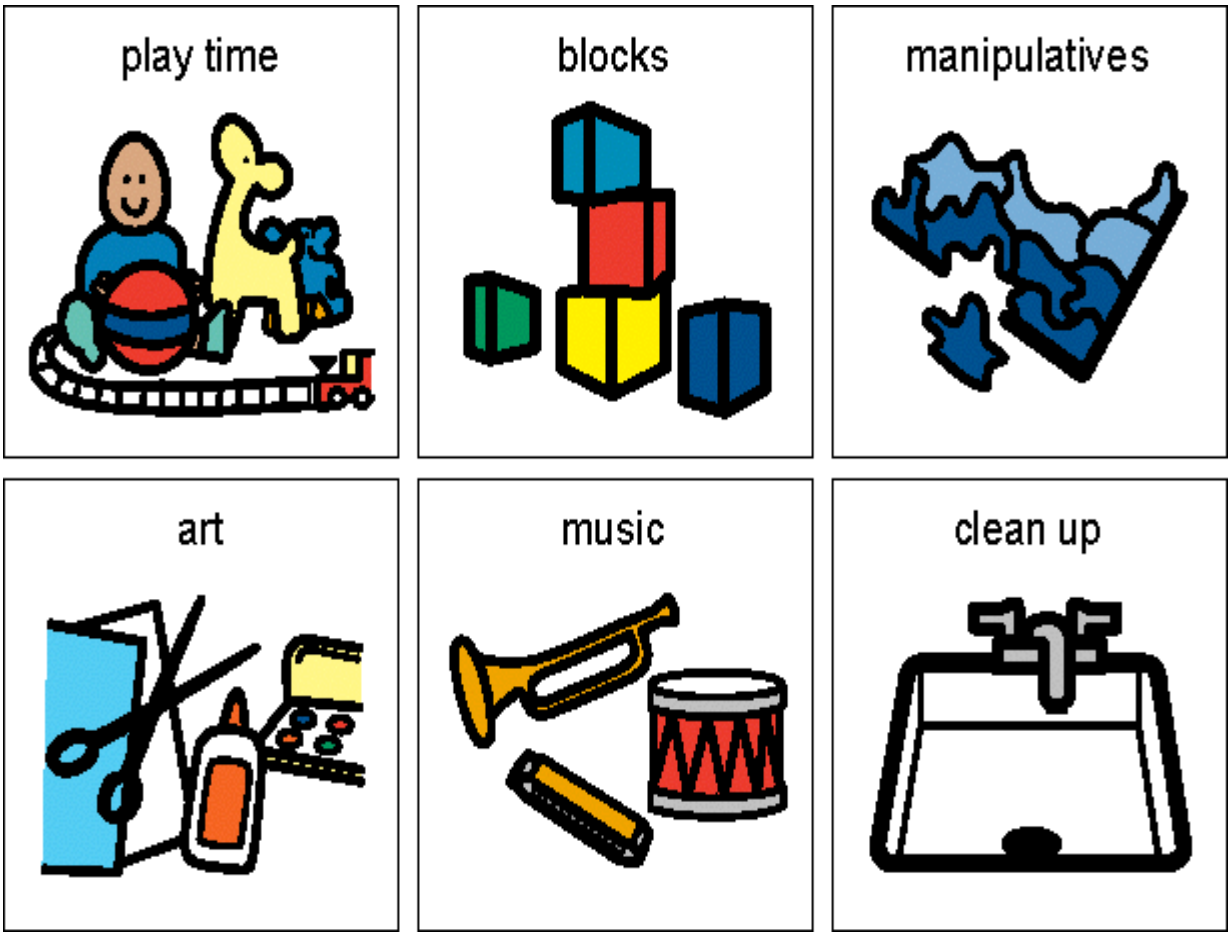
3. **Expertise:**
   Please indicate each type of training you have received. (*Check all that apply)*.
   - ☐ Applied Behavior Analysis
   - ☐ Functional Communication Training
   - ☐ Milieu Therapy.
   - ☐ Other: _____
   - ☐ None.

Session Variable Check

Date	Time	Sleep C	Sleep P	People	Meals	Weather	Health	Major Events	Behavior of previous day

Major event = like death in family, etc.; Sleep P = parent's sleep; Sleep C = child's sleep
Meals = number of meals before session; Weather = hot, humid, rain, etc.

APPENDIX C
BOARDMAKER CARDS



APPENDIX D
CODING MANUAL

Coding Manual

Aberrant behavior: Aberrant behavior is defined broadly as behavior that negatively impacts target child learning and independence and can include mild behavior and severe behavior (Bailey and Burch, 2002). The definition will vary and be adjusted based on each target child's form of the behavior. Some participants may engage in tantrums and others may engage in property destruction or aggression towards others. For example, screaming and hitting classmates would be considered aberrant behavior. The behaviors will be operationally defined in observable and measurable terms as outlined by Bailey and Burch (2002). For each participant, the aberrant behavior to target will be determined from data obtained from parent and teacher interviews and direct observations. A behavior must be over for three seconds before another aberrant behavior can be counted. If a child tantrums, stops for 1 second, and resumes to tantrum, the episode is counted as one behavior.

Aberrant behavior: Typically defined as tantrums, task refusal, self-injury, aggression, or property destruction (Harding et al., 2001).

1. Examples:
    - A child lies on the floor, kicks his feet, and screams for a period equal to or greater than 1 second (i.e., tantrum).
    - When asked to do a task, a child screams (i.e., tantrum, task refusal).
    - A child lies on the floor and begins banging his head (self-injury).
    - A child screams and hits an adult (aggression).
    - A child lies on the floor and kicks a hole in the wall (property destruction).

2. Nonexamples:

    - A child lays on the floor and no task demand has been made.
    - A child falls and hits his head on the floor.

Communication response: Communication responses are defined as handing picture communication cards to the trainer involved in the session with or without a prompt.

Prompted communication: Prompted communication response is defined as requesting an item with a physical, verbal, or gestural prompt.

1. Examples:

    - If a teacher tells a participant, "Tell me what you want" and the participant then hands the picture card to the teacher, then prompted communication has occurred.

2. Nonexamples:

    - If a child hands a picture card to a teacher or other change agent without any prompt, then unprompted communication has occurred.

Unprompted communication: Unprompted communication is defined as requesting an item without a physical, verbal, or gestural prompt (i.e., unprompted communication).

1. Examples

    - If a child hands a picture card to a teacher or other change agent without any prompt, then unprompted communication has occurred.

2. Nonexamples:

    - If a teacher tells a participant. "If you want the car, give me the card" and the participant then hands the card to the teacher, then unprompted communication has not occurred.

Prompts: Prompts consist of verbal, gestural, or physical prompts, least to most intrusive, respectively.

Verbal prompts consist of verbal language (e.g., "Tell me what you want.").

1. Examples:
    - The teacher says, “Tell me what you want.”
2. Nonexamples:
    - The teacher points to an object and then holds her hand out.

Gestural prompts consist of visual cues (e.g., teacher holds hand out with palm up in anticipation of receiving a card).

1. Examples:
    - The parent holds her hand out.
    - The parent holds her hand out and points to the object.
2. Nonexamples:
    - The parent says, “What do you want?’
    - The teacher touches the student’s hand.

Physical prompts consist of hand over hand exchanges (e.g., teacher leading a child’s hand to a card).

1. Examples:
    - The parent grasps the child’s hand and assists in picking up the card.
2. Nonexamples:
    - The teacher holds her hand out for the picture card.
    - The parent says, “Give me the card.”

Play: Play consists of the participant engaged with a preferred item for a period of two or more seconds in which the participant also makes eye contact with the preferred item.

1. Examples:
    - If a child picks up a toy car (i.e., preferred item), briefly looks at the item, and holds it for two seconds, play has occurred.

2. Nonexamples:

    - If a child picks up a toy car, never looks at it, and walks around the room with the car in his hand for four seconds, play has not occurred.

Verbalizations. Verbalizations may be imitative or unprompted.

Imitative verbalizations: Defined as imitating another's words such as the case with echolalia.

1. Examples:

    - The parent says, "Tell me what you want." The child then says, "Tell me."

    - The teacher says, "Do you want the car?" and the child says, "Car."

2. Nonexamples:

    - The child says, "Car" without an adult present saying the word.

    - The child says, "help" without an adult present saying the word.

Unprompted verbalizations: Defined as verbal words emitted by participants that are not echolalic in nature. That is, adult words are not being imitated.

1. Examples:

    - The child says, "Car" without an adult present saying the word.

    - The child says, "help" without and adult present saying the word.

2. Nonexamples:

    - The parent says, "Tell me what you want." The child then says, "Tell me."

    - The teacher says, "Do you want the car?" and the child says, "Car."

APPENDIX E
DATA COLLECTION AND CODING SHEETS

Real-time Data Collection Sheet

Date: _____ Time: _____ Name: _____
Primary Observer: _____ Secondary Observer: _____
Session Number (s): _____ Schedule: _____
Highly Preferred Stimulus: _____ Condition:

Comments

0:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

1:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

2:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

3:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

4:00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

Results:

Student: Date:
Mand Item: Session Number:

Primary Observer:

1. Mand

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Prompt: V V/G P U Latency: 1 2 3 4 5 6 7 8 9 10

Child Response: Y N Abberant Behavior: ________________

Instructions:

1. Record the adult prompt.
V= verbal prompt
V/G= verbal + gestural prompt
P= physical prompt
U= unprompted

2. Record latency to the prompt.
This will be 1 to 5 seconds. Recall that if it is more than 5 seconds, another prompt is given.

3. Record the child response.
Y= yes, the child responded
N= no, the child did not respond

4. Tally the number of aberrant behaviors
Note, there must be 3 seconds between the end of one aberrant behavior, and the beginning of a new one.

APPENDIX F
TRAINING MANUAL

Training Manual

Introduction: The training will consist of training parents to teach their children communication skills to replace aberrant behaviors.

Before initiating the intervention, parents will be taught the procedures for teaching their child this skill through viewing videos and role-play training sessions, which will occur until caregivers reach 90% accuracy. First, parents will read the coding manual. The primary experimenter will clarify any questions about coding definitions. Then, parents will view videos and must identify and record intervention procedures. Parents will use paper and pencil to record and classify (e.g., verbal, physical) each prompt given to the child. In addition, the parent will write each response from the child and record whether the response was prompted or unprompted, classifying the prompt. Finally, parents will role-play the intervention procedures with the primary experimenter. The parent will practice taking an item and playing with the item, and giving verbal, verbal/gestural, and physical prompts with the primary experimenter (see Appendix F for detailed training manual).

For purposes of generalization, in contrast, teachers will be taught a single skill. Teachers will be taught to place highly preferred items in view, but out of reach of the child. Additionally, the teachers will be instructed to give the highly preferred items to the child when given a picture card. The teachers will practice this through role-play with the experimenter until they are able to complete this skill successfully as evaluated and defined by caregivers and teachers performing the procedures correctly 10 consecutive trials (see Appendix F for training manual and worksheets).

Parents: Parents will be taught the procedures for teaching their child to communicate and initiate communication through reading the coding and experimental manuals, viewing training videos (videos of the primary experimenter performing the intervention), and role-play training sessions, which will occur until they reach criterion level.

1. Parents will read the manuals and view videos and must identify and record intervention procedures.

    a. The parents will read the coding manual and experimental procedures manual.

    b. Using paper and pencil and the attached data sheet, the parents will record and identify prompts used (verbal, gestural, and physical) in the video clips.

    c. The parents will identify play situations according to the definition in the coding manual.

    d. The parents will identify communication responses.

    e. Given video clips, the parents will code the behaviors using the data collection sheets in Appendix E. The parents' codes will be compared to the primary experimenter. The parents must obtain 90% IOA.

    f. If the parents are below 90% accuracy after viewing ten 1-minute video clips, the primary experimenter will review the coding manual.

    g. The parents will be given more video clips until the parents reach 90% accuracy, which approximately will be four hours across two days.

Video Clip	Prompts	Play Situations	Communication Responses	Implementation on Video Clip
Clip 1				Yes/No
Clip 2				Yes/No
Clip 3				Yes/No
Clip 4				Yes/No
Clip 5				Yes/No
Clip 6				Yes/No
Clip 7				Yes/No
Clip 8				Yes/No
Clip 9				Yes/No
Clip 10				Yes/No

2. During the role-play, parents must implement the intervention procedures with the primary experimenter and/ or graduate assistant.

    a. Parents will role-play the procedures with the primary experimenter.

    b. The parents will practice the session using the procedures outlined in the experimental procedures section.

    c. After completing the session, parents will view the videos with the primary experimenter and determine if the procedures were implemented correctly.

    d. This will continue until the parent performs the procedures correctly 10 consecutive times.

Teachers: Teachers will be taught to place highly preferred items in view, but out of reach of the child. Also, the teachers will be instructed to give the highly preferred items to the child when given a picture card.

1. Teachers will practice this through role-play with the experimenter.

2. This training will occur daily until parents and teachers perform the procedures correctly 10 consecutive trials (see Appendix E for training worksheet).

APPENDIX G
SOCIAL VALIDITY FORMS

INTERVENTION ACCEPTABILITY FORM

Date: _____
Caregiver: _____
School (if applicable): _____
Age of child: ____ years ____ months

SECTION I: *Please complete the items below by circling the number under the question that best fits how you feel about the intervention.*

1. How time consuming was the training?

Not at all		**Somewhat**		**Very**
1	2	3	4	5

2. Did the intervention improve your everyday routines (e.g., dinner, etc.)?

Not at all		**Somewhat**		**Very**
1	2	3	4	5

3. How much increase did you see in your child's communication?

Not at all		**Somewhat**		**Very**
1	2	3	4	5

4. Did you see an increase in your child's appropriate behavior?

Not at all		**Somewhat**		**Very**
1	2	3	4	5

5. How likely is it that you will use the intervention in the future?

Not at all		**Somewhat**		**Very**
1	2	3	4	5

SECTION II: *Please tell me about you and your family.*

1. How many children do you have?
   ___ Children

2. What is your current level of education? *Place a check next to your choice.*
   ___ High school ___some college ___bachelors ___ graduate school

3. Have you participated in research studies in the past?
   ____

SECTION III: *Thank you for completing this questionnaire. Your input is very appreciated. If there is anything else you may like to share, please do so in the space provided below.*

Expert Social Validity Form

Date: _____

Participant: _____

Name: _____

Scoring Code: _____

After viewing the 10-minute video clip please use the likert scales below to indicate the child's display of social behavior. Please remember to base your answers on the social behavior of the targeted child.

1. How appropriate was the child's communication?

Not at all		Sometimes		Very	
1	2	3	4	5	6

2. How inappropriate was the child's behavior?

Not at all		Sometimes		Very	
1	2	3	4	5	6

3. How often did the child communicate?

Not at all		Sometimes		Very	
1	2	3	4	5	6

4. Overall, do you think the child's communication and behavior improved?

Not at all		Sometimes		Very	
1	2	3	4	5	6

Comments:

BIOGRAPHICAL SKETCH

My decision to work in the field of special education was by happenstance. After providing supports for a mother and her child who had bipolar disorder, I was offered a job at a center for children with severe emotional behavior disorders and autism called the Cedarwood program, which was a part of the Georgia Psychoeducational Network. Prior to this, I taught high school mathematics, but was not satisfied with my job. I took the job and started teaching children with autism in August of 1999.

The program employed me for five years. During this time, I worked in the classroom for four years directly with the students. The program sent me to numerous workshops including a stint at Division TEACCH (treatment and education of autistic and communication-handicapped children), a statewide organization in North Carolina for individuals with autism. In addition, they sent me to visit with Temple Grandin, a famous individual with autism. From that point on, I knew working with individuals with autism was my passion and would encompass my career. My last year working for the Cedarwood Program was spend as the school liaison. I traveled to various schools to conduct functional assessments and help teachers develop behavioral programs for children with autism and behavior disorders. While working at Cedarwood, I worked on a master's degree in behavior disorders at Georgia Southern University and received the degree in 2002.

After completing my master's program, I continued working for the Cedarwood Program and started teaching undergraduate and graduate courses at Georgia Southern University. That experience coupled with those gained with the Cedarwood Program helped confirm my decision to pursue a doctoral degree. My experiences with the Cedarwood Program gave me my desire to work with children with autism, while the experiences I had at Georgia Southern University

kindled my desire to become part of academia. Keeping in mind my desire to work directly with parents and their children, and acknowledging my growing aspiration to conduct research and teach at the college level, I chose to pursue a doctoral degree in special education. With a doctoral degree from the University of Florida, I plan to continue to carry out research in the field of autism because it is my passion, and to help parents and teachers of these children better understand and meet their unique needs.