Functional Communication Training to Increase Communication Skills for Young Children with Autism Spectrum Disorder

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FUNCTIONAL COMMUNICATION TRAINING TO INCREASE COMMUNICATION SKILLS FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Curriculum & Instruction

by
Terri Lane Sutherland Collins
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Accepted by:
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ABSTRACT

The prevalence rates of children being diagnosed with autism spectrum disorder (ASD) continue to rise at alarming rates. Recent figures suggest that approximately 1 in 90 children have an ASD. Children with ASD have significant deficits that affect communication skills and social interaction. Children with ASD may also engage in high levels of aberrant behavior toward others or themselves such as screaming, hitting, or biting that interfere with learning. The current study examined the effects of functional communication training on young children with ASD when implemented by a paraprofessional in a special education classroom. Data were collected on the rates of and communicative responses and aberrant behaviors. Generalization data were also collected. Findings indicated that when functionally relevant consequences were delivered following an appropriate communicative response, a reduction in aberrant behaviors and an increase in appropriate communicative responses were noted.
ACKNOWLEDGMENTS

I would like to thank my family for their support throughout this experience. My husband, Tim, always encouraged me to keep going through the tough times. I would also like to thank my children, Molly, Mary Brian, and Timothy, for understanding why I had to be away from home so much. I hope my journey shows that they can accomplish their goals in life.

I would like to thank my committee members for their support and encouragement. To my chair, Dr. K, thanks for making sure I had things “rolling”! Your guidance has been instrumental throughout this process. I would not be here now had it now been for you pushing me to always do my best. To Dr. Ryan, the “Captain”, thanks for your guidance and support. Your humor helped me to keep my balance during the tough times! To Dr. Yell, thank you for allowing me to be involved with your work. Finally, to Dr. Barrett, thank you for keeping me straight on the stats!

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CHAPTER ONE

INTRODUCTION

The purpose of this chapter is to provide an overview of autism spectrum disorder (ASD). Prevalence rates and characteristics of ASD are provided. Second, an overview of functional communication training, an intervention that may be used to address the communication and behavioral needs of children with ASD is discussed. Third, the statement of the problem is given. Finally, the chapter concludes with the significance of the study and research questions addressed.

Overview of Autism Spectrum Disorders

Over the past several decades, the prevalence rate of children classified as having an autism spectrum disorder (ASD) has continued to rise. According to the Center for Disease Control (CDC) an average of 1 in 150 children in multiple areas of the United States were found to have an ASD (CDC, 2006). Researchers with the Health Resources and Services Administration (HRSA), Centers for Disease Control (CDC) and Massachusetts General Hospital recently published a new estimate of the prevalence of autism indicating approximately 1 in 90 children have an ASD (Kogan et al., 2009). Today, children with ASD represent the second most common serious developmental disability after mental retardation (CDC, 2006). Between the years of 1998 and 2007, the number of 6 – 21 year-old students with ASD receiving special education services in public schools increased nearly four fold, from 53,644 to 256,863 (Office of Special Education Programs, 2010).
Children with ASD provide challenges for teachers who must provide these children with appropriate interventions in the classroom. Complicating matters is the diversity of deficits associated with this population because ASD is a spectrum of disorders that encompasses five different subtypes, including autistic disorder, Asperger syndrome, Rett syndrome, childhood disintegrative disorder, and pervasive developmental disorder – not otherwise specified (PDD-NOS). Students who receive special education services under the IDEA disability category of autism may have a diagnosis of any one of the five subtypes. Regardless, ASD is typically characterized by impairments in social interaction, communication, and restricted repertoires of behaviors and interests that occur on a continuum of impairment from mild to severe (American Psychiatric Association, 2000). Because ASD can significantly affect communication skills and social interaction, these children generally have difficulty responding appropriately in their daily lives and may be described as withdrawn or even detached (Agosta, Graetz, Mastropieri, & Scruggs, 2004).

One of the primary features, and perhaps the most defining characteristic of ASD, is a deficit in social skills (Rogers, 2000). Children with ASD may be unresponsive to others or focus intently on an item to the extent that they exclude others for extended periods of times. They may also fail to respond to their names and avoid eye contact with others (National Institutes of Health, 2009). Preschoolers with ASD who socially avoid peers tend to continue to avoid peers and in turn use less language as they age (Ingersoll, Schreibman, & Stahmer, 2001).
Children with ASD also have communication skills deficits and may have difficulty in the acquisition of speech and language, but they may also have difficulty understanding and using nonverbal behavior in interactions involving communication. Deficits in communication may include the presence of echolalia (e.g., repetitive speech), pronoun reversals, unusual intonations, or the delay or absence of spoken language. Students with ASD who are unable to communicate their wants and needs in an appropriate manner may also become disruptive (Machalicek, O’Reilly, Beretvas, Sigafoos, & Lancioni, 2007). This type of behavior may in turn lead to the student being rejected by their peers (Rubin & Clark, 1983). Without the appropriate interventions, deficits in classroom behavior and functional communication skills may limit a child’s social and educational progress.

Children with ASD exhibiting stereotyped patterns of behavior may engage in high levels of aberrant behavior toward others or themselves that interfere with learning (Sigafoos, 2000). Aberrant behaviors such as aggression, self-injury, and tantrums create major obstacles to those responsible for their education and wreak havoc in the daily lives of the families (Durand & Merges, 2001). Parents of children with ASD may experience difficulty in determining the reason for the aberrant behaviors because of the child’s limited language skills.

A body of research has focused on examining the relationship between aberrant behaviors and communication deficits. Researchers have also examined increasing communication and decreasing aberrant behaviors (e.g., Ahearn, Clark, MacDonald, & Chung, 2007 Bott, Farmer, & Rhode, 1997; Chiang, 2008; Chung, Jenner, Chamberlain,
& Corbett, 1995; Peterson, Peck, Caniglia, & Royster, 2005). It is hypothesized that impaired communication deficits in children with ASD and other developmental disabilities may contribute to an increase in aberrant behaviors. Further, when children lack the appropriate skills to communicate, the aberrant behaviors are used for communicative purposes (Sigafoos, 2000). One of the most efficacious intervention strategies used to address the behavior and communication needs of children with ASD is functional communication training (FCT). An overview of the intervention follows.

**Functional Communication Training**

To address the communication and behavioral deficits of children with ASD, Carr and Durand (1985) introduced FCT. Researchers demonstrated that when functionally relevant consequences were delivered following an appropriate communicative response, a reduction in aberrant behaviors and an increase in appropriate communication (i.e., mands) were noted. Researchers in numerous follow-up studies have shown similar findings (e.g., Durand & Carr, 1987; Durand & Carr, 1992; Wacker et al., 1990).

FCT is the second phase of a two-phase approach to address the communicative and behavioral deficits of children with ASD (Ringdahl et al., 2009). The process begins by assessing the function of the behavior and then teaching the child to use an appropriate communicative response to request those things previously obtained by the aberrant behavior (Durand, Berotti, & Weiner, 1993). By teaching individual a functionally equivalent and more socially acceptable response to obtain desired outcomes, a reduction in aberrant behaviors and an increase in communicative behaviors may be observed (Casey & Merical, 2006).
A multiphase prompting and prompt-fading procedure is used to teach the new communicative response (Durand, 1990). Prompts are introduced as needed and then faded as quickly as possible. Discrete trial training procedures may be used to teach the communicative response by providing direct and repeated trials (Mancil, 2006). Children may be taught to request assistance during tasks, request breaks from tasks, request social attention, or request a tangible item. Finally, response-independent consequences are used where the aberrant behavior is placed on extinction with the goal of making the aberrant behavior “nonfunctional” (Durand).

Researchers have demonstrated increases in communicative responses and a reduction of aberrant behaviors when using FCT. For example, Langdon et al. (2006) and Mancil et al. (2009) both reported increases in communication concurrent with decreases in aberrant behavior. Researchers also demonstrated that a variety of communicative responses were trained. Olive and colleagues (2009) successfully trained a participant to use a voice output communication (VOCA) to gain attention whereas Schindler & Horne (2005) successfully trained the participant to use a picture card to gain access to a tangible.

**Statement of the Problem**

The prevalence rates of children being diagnosed with an ASD continue to rise at alarming rates. Recent figures suggest that approximately 1 in 90 children have an ASD (Kogan et al., 2009) and represent the second most common serious developmental disability after mental retardation (CDC, 2006). Children with ASD have significant deficits that affect verbal and nonverbal communication and social interaction. These
children generally have difficulty responding appropriately in their daily lives and may be described as withdrawn or even detached (Agosta, Graetz, Mastropieri, & Scruggs, 2004). They may also may engage in high levels of aberrant behavior toward others or themselves such as screaming, hitting, or biting that interfere with learning (Sigafoos, 2000). This behavior in turn may cause great distress for families when trying to determine the cause of the behavior, especially if the child has limited language (Durand & Merges, 2001).

**Significance of the Study**

This study examined the effectiveness of FCT implemented by a paraprofessional in the educational setting of the child to reduce aberrant behaviors and increase communication. Educational services for students with severe autism are typically provided in a one-on-one format due to the nature of intensive individualized services provided to this population of students (Bolton & Mayer, 2008). As a result, there has been an increasing reliance on paraprofessionals to deliver this one-on-one instruction (Simpson, 2004). Whereas many positive effects of FCT have been noted, only recently has there been an increase of studies conducted in the educational environments with FCT begin implemented by teachers or paraprofessionals.

The literature regarding the use of paraprofessionals in special education suggests that the number of paraprofessionals used to support students with disabilities continues to increase and that their roles have become more instructional in nature (Ashbaker & Morgan, 2001; Giangreco, Edelman, Broer, & Doyle, 2001; Pickett & Gerlach, 2003). As more students with autism, mental retardation, and other developmental disabilities...
are being placed in general education settings, there has been an increase in the practice of assigning one-on-one paraprofessionals as the primary support mechanism for these students (Giangreco, 2009). The Study of Personnel Needs in Special Education (SPeNSE, 2001) also found that the majority of special education paraprofessionals spend at least 10% of their time implementing behavior management plans, modifying materials, providing small group instructional support, and providing one-on-one instruction.

Even with the extensive use of paraprofessionals in critical roles in both special education and general education, their effectiveness has essentially gone unstudied (e.g., Causton-Theoharis & Malmgren, 2005; Giangreco, Broer, & Edelman, 2001; Giangreco, Edelman, Luiselli, & MacFarland, 1997; Young, Simpson, Myles, & Kamps, 1997). Evidence suggests that many one-on-one paraprofessionals are simply left to “fend for themselves” and make curricular and instructional decisions without adequate training or proper supervision (Downing, Ryndak, & Clark, 2000; French, 2001; Giangreco & Broer, 2005). Further, as paraprofessionals are becoming more responsible for providing instruction for students with ASD, the majority of researchers have not used persons directly involved in the care and education of children with ASD, such as the paraprofessional. Rather, researchers have been responsible for implementing FCT.

Researchers also examined generalization of newly acquired skills to other settings and persons. This component of the study is critical because many children with ASD are taught skills in isolation and may have difficulty generalizing these skills (Fein, Tinder, & Waterhouse, 1979). Also, without continued adult prompts, students with
ASD may not display target skills and spontaneous responses over time (MacDuff, Krantz, & McClannahan, 1993).

**Purpose of the Study**

The purpose of the study was to examine the effects of FCT as an intervention to teach functional communication skills to young children with ASD. The following research questions were addressed:

1. Does the implementation of FCT by the paraprofessional increase communication skills in young children with ASD in a school setting?

2. Does the implementation of FCT by the paraprofessional decrease aberrant behaviors in young children with ASD in a school setting?

3. Does the newly acquired communicative response of children with ASD generalize to other settings and individuals?
CHAPTER TWO

LITERATURE REVIEW

The purpose of this chapter is to examine the literature regarding the effectiveness of functional communication training (FCT), specifically with young children with autism spectrum disorder (ASD). First, an introduction of ASD is given with descriptions of the incidence and characteristics associated with ASD. Second, a description of FCT and how it is used to address aberrant behaviors and communicative behaviors of children with ASD will be provided. Finally, selected studies related to the use of FCT with children with ASD will be reviewed with emphasis placed on the environments and persons responsible for the implementation on the intervention. Elements of the studies analyzed include: (a) characteristics of the participants; (b) settings; (c) persons responsible for implementation of the intervention; (d) aberrant behaviors addressed, and (e) components of the intervention. Also, (a) research designs, (b) major findings, (c) reliability, (d) treatment fidelity, and (e) social validity were analyzed.

**Autism Spectrum Disorder**

According to the National Institutes of Health (NIH), autism spectrum disorder (ASD) is a range of complex neurodevelopment disorders with onset typically prior to age 3 (NIH, 2009). ASD encompasses five subtypes that include: (a) autistic disorder; (b) Asperger syndrome; (c) Rett syndrome; (d) childhood disintegrative disorder; and (e) pervasive developmental disorder – not otherwise specified (PDD-NOS) (Heward, 2009, p. 258). ASD is often characterized by impairments in social interaction, communication,
and restricted repertoires of behaviors and interests that occur on a continuum of impairment from mild to severe (American Psychiatric Association, 2000).

**Autistic disorder**

Autistic disorder, sometimes referred to as “classic” autism, is the most severe form of ASD. Children with autistic disorder usually experience significant language delays, deficits in social skills, and communication challenges. These children may also engage in repetitive motions such as flapping their hands or spinning in circles. The majority of children with autistic disorder have an IQ score categorizing them with mental retardation whereas only one-third have an IQ score in the average to above average range (Heflin & Alaimo, 2007).

**Asperger syndrome**

A milder condition of autism along the spectrum, often considered a high functioning form of autism, is Asperger syndrome. Children with Asperger syndrome have difficulty interacting socially and may experience clumsiness and difficulty with fine and/or gross motor skills. These children may have difficulty understanding others’ feelings and have exhibit significant social skills deficits. Although children with Asperger syndrome have difficulty socially, many have above-average intelligence and possess extensive vocabularies (NIH, 2009). They tend to excel in fields such as science and computer programming.

**Rett syndrome**

Rett syndrome is a rare neurological disorder that affects females almost exclusively. It is characterized by a period of normal development followed by a slowing
of development, slowed brain and head growth, seizures, and intellectual disability (NIH, 2009). Children with Rett syndrome also experience severe impairments in expressive language abilities and loss of purposeful movement of the hands (National Library of Medicine, 2008).

**Childhood disintegrative disorder**

Childhood disintegrative disorder is a rare condition primarily affecting males. The condition usually occurs in 3 – and 4 - year olds who have developed normally up until the age of 2, after which the children will show deterioration in intellectual, social, and language functioning, similar to that of a child with autistic disorder (NIH, 2009).

**Pervasive developmental disorder – not otherwise specified (PDD-NOS)**

Children who meet some of the criteria for autistic disorder or Aperger syndrome, but not all, may be diagnosed with pervasive developmental disorder, not otherwise specified (PDD-NOS). Children with PDD-NOS typically have fewer and milder symptoms than children with autistic disorder (CDC, 2006). Delays in the development of socialization and communication skills are also noted NIH, 2009). Children with PDD-NOS vary widely in abilities, intelligence, and behaviors whereas repetitive play skills and limited social skills are evident.

According to the Centers for Disease Control and Prevention (CDC), it is estimated that an average of 1 in 150 children in the United States have an ASD (2006). However, data released in *Pediatrics* by the Health Resources and Services Administration on parental report of autism suggests an even higher prevalence rate (Kogan, et al., 2009). Among children ages 3 to 17, new estimates claim that 1 in 90
children have an ASD. The National Institute of Mental Health (NIMH) notes that this finding is consistent with the reports that the number of children being diagnosed with an ASD is increasing (NIMH, 2009). Also, between the years of 1998 and 2007, the number of 6 – 21 year-old students with ASD receiving special education services in public schools increased nearly four fold, from 53,644 to 256,863 (Office of Special Education Programs [OSEP], 2007).

As previously mentioned, one of the primary features, and perhaps the most defining characteristic of ASD, is a deficit in social skills (Rogers, 2000). Children with ASD may be unresponsive to others or focus intently on an item to the extent that they exclude others for extended periods of times. They may also fail to respond to their names and avoid eye contact with others (NIH, 2009). Preschoolers with ASD who socially avoid peers tend to continue to avoid peers and use less language as they age (Ingersoll, Schreibman, & Stahmer, 2001).

Children with ASD have communication skills deficits and may have difficulty in the acquisition of speech and language, but they may also have difficulty understanding and using nonverbal behavior in interactions involving communication. Deficits in communication may include the presence of echolalia (i.e., repetitive speech), pronoun reversals, unusual intonations, or the delay or absence of spoken language. Because ASD can significantly affect verbal and nonverbal communication and social interaction, these children generally have difficulty responding appropriately in their daily lives and may be described as withdrawn or even detached (Agosta, Graetz, Mastropieri, & Scruggs, 2004).
In addition to social and communication deficits, children with ASD often engage in restricted repetitive and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 2000). Also, children with ASD exhibiting stereotyped patterns of behavior may engage in high levels of aberrant behavior (e.g., screaming, hitting, biting) toward themselves or others that may interfere with learning (Sigafoos, 2000). These behaviors impact the communication and social skills of students with ASD and wreak havoc in the daily lives of the families and create major obstacles to those responsible for their education (Durand & Merges, 2001).

Because social and communication skills are important for achieving positive outcomes (Gest, Graham-Berman, & Hartup, 2001), the National Research Council (NRC, 2001) recommends direct and intensive intervention for children with ASD. The NRC also recommends that this intensive instruction be provided utilizing low student to teacher ratios. In many cases, the paraprofessional has assumed the primary teaching responsibilities for students with ASD (Giangreco, 2009). The next section focuses on the role of the paraprofessional in the education of students with ASD.

The Role of the Paraprofessional

In the United States, there are approximately, 1.3 million paraprofessionals employed in public/private schools and early childhood daycare settings (Bureau of Labor Statistics, 2008). This number has increased dramatically since they were first introduced to classrooms back in the 1950’s (French & Pickett, 1997; Stanovich, 1996) due to the post World War II shortages of licensed teachers and the efforts of parents to develop community based services for children with disabilities (Pickett, Likins, &
Wallace, 2003). In the 1960’s and 1970’s, programs such as Title I and Head Start provided funding for schools and community organizations to hire paraprofessionals. With the passage of PL 94-142 in 1975, teachers required support to provide the individualized services for students with disabilities as mandated by the new federal law. During this time, an increase in the employment of paraprofessionals was observed along with significant changes in their roles and responsibilities (Pickett et al., 2003). Even though paraprofessionals still perform clerical tasks, housekeeping and caretaking duties, their role has expanded to include the review and reinforcement of learning activities initiated by teachers (Pickett, 1989).

Since their introduction, the roles and duties of paraprofessionals have become ever more complex and demanding (Katsiyannis, Hodge, & Lanford, 2000). Under the supervision of teachers, and in some cases related services professionals (e.g., occupational therapists), paraprofessionals may perform the following duties: (a) assist individuals and small groups with instructional activities; (b) carry out behavior management plans; (c) assist teachers with functional assessment activities; and (d) assist teachers with the involvement of parents in the child’s education (Pickett et al., 2003). As more students with autism and other severe disabilities are placed in inclusive settings, paraprofessionals are often assigned as the primary support mechanism for many of these students (Giangreco, 2009). As increasing numbers of paraprofessionals take on those expanded roles, paraprofessionals are often assigned to work with students who have the most complex learning or behavioral challenges without adequate training or supervision (Giangreco, Edelman, Broer, & Doyle, 2001).
The need for well-trained paraprofessionals has not only been addressed in the literature but also in legislation. The No Child Left Behind Act (NCLB, 2001) required that paraprofessionals who provide instructional support and work in schools supported by Title I funds must meet certain federal requirements to be considered “highly qualified”. NCLB required that all paraprofessionals must have a high school diploma or its equivalent. In addition, paraprofessionals must have completed at least two years of study at an institution of higher education or obtained at least an associate’s degree. If the paraprofessional did not have two years of study or an associate’s degree, NCLB allowed the paraprofessional to meet the standard of quality through a formal state or local assessment.

Children with ASD are a more diverse group than those identified with the disability 30 years ago (Simpson, 2004). Not only do these students require well-trained paraprofessionals but also require a high degree of structure and consistency within their programs. This necessitates a coordinated, well-informed educational team where the teacher has to assume the role of classroom manager. The teacher needs to have knowledge about communication, consultation, and organization of the members of the educational team, including the paraprofessional (Scheuermann, Webber, Boutot, & Goodwin, 2003). This manager role is critical because many students with ASD rely on the one-on-one assistance provided by the paraprofessional (Pickett, 1996).

In some cases, children spend more instructional time with paraprofessionals than they do with the teacher (Scheuermann et al., 2003). Also, one paraprofessional may work with several children in different locations during the course of a single day,
providing individualized services (Bolton & Mayer, 2008). This instruction may include using the discrete trial, or *learning trial* (Heward 1994), the basic unit of instruction in education. For the classroom teacher as the supervisor or manager, it is important to know that the paraprofessional can implement procedures, such as the discrete trial, in a one-on-one setting with children in the classroom. This knowledge of procedures also ensures that as new children as referred to the classroom, instructional services can begin immediately (Bolton & Mayer, 2008).

In summary, schools should emphasize the training of paraprofessionals to work with children with ASD (Simpson, deBoer-Ott, & Simith-Myles, 2003). Not only does the research literature emphasize the need for highly qualified paraprofessionals, this need is also emphasized in NCLB. Direct service providers of students with disabilities need to have the necessary knowledge and skills to be effective (Katsiyannis et al., 2000).

**Functional Communication Training**

A body of research has focused on examining the relationship between aberrant behaviors and communication deficits and methods of increasing communication and decreasing aberrant behaviors (e.g., Ahearn, Clark, MacDonald, & Chung, 2007; Bott, Farmer, & Rhode, 1997; Chiang, 2008; Chung, Jenner, Chamberlain, & Corbett, 1995; Peterson, et al., 2005). It is hypothesized that impaired communication deficits in children with ASD and other developmental disabilities may contribute to an increase in aberrant behaviors. Further, when children lack the appropriate skills to communicate, the aberrant behaviors are used for communicative purposes (Sigafoos, 2000).

To address the communication and behavioral deficits of children with ASD, Carr
and Durand (1985) introduced FCT. This study demonstrated that when functionally relevant consequences were delivered following an appropriate communicative response, a reduction in aberrant behaviors and an increase in appropriate communication (i.e., mands) were noted. Researchers in numerous follow-up studies have shown similar findings (e.g., Durand & Carr, 1987; Durand & Carr, 1992; Wacker et al., 1990).

FCT can be described as the second phase of a two-phase approach to address the communicative and behavioral deficits of children with ASD (Ringdahl et al., 2009). The process begins by assessing the function of the behavior and then teaching the child to use an appropriate communicative response to request those things previously obtained by the aberrant behavior (Durand, Berotti, & Weiner, 1993). By teaching a child with autism a functionally equivalent and more socially acceptable response to obtain desired outcomes, a reduction in aberrant behaviors and an increase in communicative behaviors may be observed (Casey & Merical, 2006).

**First Phase: Functional Behavior Assessment and Functional Analysis**

In most educational settings, information for functional behavior assessments (FBA) is gathered through a combination of both indirect and direct descriptive assessments (Johnston & O’Neill, 2001). Indirect assessments are those assessments that do not require direct observation of the child and may include interviews, questionnaires, rating scales, and reviews of school records (Alter, Conroy, Mancil, & Haydon. 2008). Several rating scales have been developed that attempt to address the function of a problem behavior (e.g., Donellan et al., 1984; Durand & Crimmins, 1983, 1988; Lewis, Scott, & Sugai, 1994). These ratings scales have been developed for completion by the
child’s caregivers and ask questions regarding the variables maintaining the challenging behavior (Durand, 1990). A scale that has been shown to have reliability and validity is the Motivation Assessment Scale (MAS) (Durand & Crimmins, 1996). This checklist utilizes a Likert scale ranging from 0 to 6, with 0 representing the behavior “never occurs” and 6 being it “always occurs”. The MAS has 16 questions related to possible functions and are randomly grouped. After totaling points, the function with the greatest number of points and highest relative ranking is hypothesized to be the function of the behavior. Other methods of indirect assessments include interviews where open-ended questions may be asked of parents or teachers regarding the challenging behavior. Also, reviews of records such as behavior incident reports, behavior logs, and evaluation reports may provide additional information regarding the problem behavior.

Direct observations provide a means of describing behavior that can be directly observed (Alberto & Troutman, 2006). Three methods of direct observation include anecdotal reports, scatter plot analysis, and ABC descriptive analysis. Anecdotal reports are written to try to provide a complete description of the behavior and the events surrounding it. Scatter plot analysis (Touchette, MacDonald, & Langer, 1985) involves the categorization of the number of events during a unit of time (e.g., half-hour) rather than a count and documentation of each incident. The scatter plot allows analysis of the times of days during which behaviors are most likely to occur and potential variables maintaining the behavior. The direct observation of antecedents, behaviors, and consequences (i.e., ABC) is another means of collecting information about the variables maintaining challenging behavior (Bijou, Peterson, & Ault, 1968). Various data sheets
and charts are available (e.g., Evans & Meyer, 1985; O’Neill et al., 1997) and generally include blanks to record a running narrative of antecedents, behaviors, and consequences.

Additionally, a functional analysis that requires the manipulation of variables to systematically identify antecedents and consequences as they relate to the function of the behavior may be completed (Sugai et al., 1999). The variables manipulated typically include access to attention, access to tangible items, escape from a non-preferred task, an alone or ignore condition, and a free play condition that serves as a control (Alter et al., 2008). The condition where the aberrant behavior occurs at the highest rate, or as maintaining the behavior, is considered to be the function of the behavior. Even though FA may be complex and time-consuming, it is considered to be more valid for identifying a behavior function (Sasso, Conroy, Stichter, & Fox, 2000).

**Second Phase: Functional Communication Training**

Upon completion of FBA procedures, the child is taught to use an appropriate communicative response that is functionally equivalent to the problem behavior (Durand & Merges, 2001). Communicative responses may be in the form of manual signing, picture card, assistive technology (AT) device, or verbal response. For example, a child may be taught to say, “Am I doing good work?” to gain teacher attention in an appropriate manner rather than an inappropriate manner, such as banging his/her head on the desk. In addition, there is an attempt to make the problem behavior nonfunctional (Durand, 1990). In other words, reinforcement is withheld for the challenging behavior to place the behavior on extinction while prompting and reinforcing the child’s functional communicative response (Lalli, Casey, & Kates, 1995).
There are considerations when identifying the communicative response that will replace the aberrant behavior. First, the form or topography of the communicative response must be determined (e.g., verbal response, picture card) (Brady & Halle, 1997; Ringdahl, et al., 2009). The selection of the response should be based on the child’s ability to produce the response; otherwise outcomes of FCT may be impacted (Horner & Day, 1991). For example, a child who is nonverbal may be taught to use a picture symbol or other AT device to gain attention. Further, others should be able to understand the communicative response (Franco et al., 2009). For example, if American Sign Language (ASL) is taught as the communicative response, those signs may not be recognized by those untrained in ASL.

Upon identifying the communicative response, a multiphase prompting and prompt-fading procedure is used to teach the new communicative response (Durand, 1990). Prompts are introduced as needed and then faded as quickly as possible. Discrete trial training procedures, which involve repeated and frequent instructional opportunities during more structured teaching sessions (Sigafoos et al., 2006), have typically been used to teach the child an appropriate communicative response. The teacher presents the instruction and then waits for, or prompts, a correct response before providing reinforcement. Trials are repeated with the communicative response until a mastery criterion has been met. Children may be taught to request assistance during tasks, breaks from tasks, social attention, or a tangible item. Finally, response-independent consequences are used where the aberrant behavior is placed on extinction. The goal is to make the aberrant behavior “nonfunctional” (Durand).
In summary, FCT is an effective intervention to reduce aberrant behaviors and increase communicative responses in children with ASD. Researchers have demonstrated the efficacy of FCT to address aberrant behaviors of ASD and by using various forms of mand topographies. In the next section, the FCT literature is reviewed.

**Functional Communication Training Literature Review**

Studies in the literature regarding the effectiveness of FCT with children identified with ASD were identified through a systematic process. First, a thorough electronic search of Educational Resources Information Center (ERIC), Academic Search Premier, and PsycINFO databases using the keywords functional communication or equivalence training, combined with autism or autism spectrum disorder was completed. Next, a hand search was conducted of the following journals, covering the span of 1995 to the present: *Journal of Applied Behavior Analysis, Journal of Autism and Developmental Disorders, Focus on Autism and Other Developmental Disabilities, Journal of Positive Behavior Interventions, Journal of Early Intervention, and Research in Autism Spectrum Disorders*. Finally, an ancestral search of the reference sections of identified articles was conducted. These searches produced 59 articles in which FCT was used as intervention to address aberrant behaviors and increase communicative responses in children with ASD. To be included in the review, studies met the following criteria:

1. Participants in the study were children ages 3 – 21,
2. At least one of the participants in the study was diagnosed with autism spectrum disorder,
3. Function of the aberrant behavior was determined through functional behavior assessment procedures, and

4. Primary intervention used in the study was functional communication training.

Ten studies met the criteria for inclusion in this review. Studies were eliminated if they did not meet the above criteria. Studies were also eliminated if there was no clear indication of a diagnosis of ASD of the participants. In studies with participants with ASD and participants with other diagnoses, only results regarding the participant with ASD were included in the review. The included studies were examined with respect to the characteristics of the participants in the study, settings, persons responsible for implementation of the intervention (i.e., trainers), aberrant behaviors addressed, components of the intervention, research designs, reliability, and treatment fidelity, and social validity. Major findings across the included studies are also discussed.

**Characteristics of the Participants**

Across the studies, a total number of nine participants were included. In all of the studies researchers reported chronological ages of the participants. As shown in Table 2.1, participants’ ages ranged from 3 years of age to 18 years of age (M = 6.7 years). Eighteen (86%) of the participants were male and three (14%) participants were female. The representation of males in the studies is consistent with findings that autism occurs more frequently in males than in females (Centers for Disease Control, 2007). For five (24%) of the participants, additional information regarding the participant’s diagnosis of autism was gathered by the researcher through the Childhood Autism Rating Scale (CARS) or the Autism Diagnostic Interview-Revised (ADI-R). Level of cognitive
functioning for eight (38%) of the participants was reported with five (24%) of the participants reported to be functioning within the severe range of mental retardation. Sixteen (76%) of the participants were diagnosed as having autism, four (19%) participants diagnosed with Pervasive Developmental Disorder (PDD), and one (5%) diagnosed with Rett syndrome.

The participants differed in their levels of language capabilities prior to the implementation of the intervention. Five (33%) of the participants were described as having some type of verbal language, however, only one (7%) of the participants was able to communicate with a complete sentence. Communication was not necessarily described as functional. For example, one (7%) participant engaged in echolalia (i.e., repetitive language) and perseverated on topics such as favorite color or stuffed animals. Of the participants with some form of verbal language, all had to be prompted to communicate. Six (66%) of the participants communicated mainly through picture symbols. One (7%) participant described as being nonverbal, demonstrated inappropriate vocalizations. The Wacker et. al (2005) study included no information on the language capabilities of the participants.

**Characteristics of the Research Settings**

**Settings.** As shown in Table 2.2, the research settings varied across the ten studies. Researchers conducted one (10%) of the studies in a clinical setting (i.e., the therapy room in an inpatient clinic) (Winborn-Kemmerer et al., 2009). In the remaining nine (90%) studies, research activities took place in the participants’ natural setting, either the home or school of the participant. Researchers in three (30%) of the studies
used both school and home as research settings (Langdon, Carr, & Owen-DeSchryver, 2008; Mancil, Conroy, & Haydon, 2009; Schindler & Horner, 2005). Researchers conducted one (10%) of the studies in multiple classrooms, as the participant was fully included in the general education setting (Casey & Merical, 2006). These results are in stark contrast to results of the Mancil (2006) literature review that revealed most research activities took place in therapeutic environments.

Trainers. In five (50%) of the studies, the researcher(s) implemented the intervention. In four of the ten (40%) studies, parents were used as trainers (Mancil et al., 2009; Olive et al., 2008; Schindler & Horner, 2005; Wacker et al., 2009). Researchers in two (20%) of the studies used instructional assistants as trainers (Casey & Merical, 2006; Schindler & Horner, 2005). In the Casey & Merical (2006) study, the instructional assistant accompanied the student into his general education classrooms; in the Schindler & Horner (2005) study, the instructional assistants in the preschool setting conducted the training procedures.

Characteristics of Behaviors

Aberrant behaviors. As shown in Table 2.3, the aberrant behaviors displayed were varied among the participants. The categories of aberrant behaviors reported were inappropriate vocalizations (i.e., the “ee” sound sustained for longer than two seconds, screaming), aggression (e.g., hair pulling, hitting), self-injurious behaviors (e.g. biting, head banging), elopement or walking away, property destruction, and tantrums. Five (24%) of the participants engaged in self-injurious behaviors. Also, seven (33%) of the participants exhibited multiple categories of aberrant behaviors. For example, a four-year
old girl engaged in elopement, screaming, hitting, biting, and mouthing materials (Olive et al., 2008).

**Functions of the behaviors.** All of the studies reported the functions of the behaviors exhibited by the participants. Five (24%) of the participants engaged in aberrant behaviors to gain access to a tangible item, and eight (38%) did so to escape a demand. Only two (10%) of the participants exhibited an aberrant behavior to gain attention. Also, one (5%) of the participants engaged in high rates of aberrant behavior to escape a demand and gain access to a tangible (Franco et al., 2009).

**Descriptions of Functional Behavior Assessment Procedures**

Across the studies, researchers employed similar procedures to analyze and determine the function of the aberrant behaviors. In six of the ten (60%) studies, indirect assessments were used to gather preliminary information regarding the participant’s behavior. In two (20%) studies (Martin, Drasgow, Halle, & Brucker, 2005; Schindler & Horner, 2005) researchers did not utilize a functional analysis (FA) to confirm the function of the behaviors.

As stated previously, researchers in six (60%) studies collected behavioral information through indirect assessments conducted with teachers or parents. One study (10%) (Casey & Merical, 2006) included the parent and teacher and other members of the IEP team (i.e., instructional assistant, school principal, school psychologist). The method of indirect assessments varied across the studies. For example, researchers in one (10%) study reported completing phone interviews (Casey & Merical, 2006), whereas other (30%) researchers reported using structured interview forms and procedures as outlined
by O’Neill et al., 1997. (Langdon et al., 2008; Olive et al., 2008; Schindler & Horner, 2005). In addition to the indirect assessments described, the researchers in the aforementioned studies also completed direct observations of the aberrant behaviors.

In eight (80%) of the ten studies, a FA was conducted to verify the function of the behavior. In six (60%) of the studies researchers implemented procedures adapted from the work of Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) using a multielement design incorporating tangible, attention, demand, and play (control) conditions.

**Elements of the Intervention**

**Communicative responses.** Upon completion of the functional behavior assessment procedures, an appropriate communicative response was taught as an alternative to the aberrant behavior as the means of gaining reinforcement (Carr & Durand, 1985). As seen in Table 2.4, response categories in the studies included verbal responses, gestural responses, picture symbols, and voice output devices which are typical classes of responses and alternative/augmentative communication devices reported in the FCT literature (Ringdahl et al., 2009).

The proficiency associated with the use of a particular response is a topography related variable that may impact the outcomes of functional communication training (Ringdahl et al., 2009). The alternative communication behavior must be as easy to produce and as effective as the behavior it is meant to replace (Mirenda, 1997). Researchers, therefore, used a communicative response associated with the participant’s level of language ability. For example, Franco et al. (2009) used a speech-generating
device because the participant was nonverbal. Furthermore, the participant had used signs adapted from American Sign Language, but the signs were not easily understandable by others. The participant was taught to use the speech-generating device to select a message to indicate whether a break was needed or access to a tangible was desired. In Winborn-Kemmerer and colleagues (2009) study, preference between two different mand topographies was evaluated after the participant was taught to activate a microswitch and touch a picture card to gain attention.

In two (20%) of the studies, the researchers taught verbal responses to the participants (Casey & Merical, 2006; Wacker at al., 2005). For example, the participant in the Casey & Merical (2006) study was successfully trained to say “I would like a break, please” to replace the self-injury that served as an escape from the demands of an academic task. During the second phase of this study, the participant was also taught a gestural response to indicate that a break from the task was needed when it was determined that the participant preferred the gestural response. The participant, however, received a break when either of the responses was emitted.

Researchers in eight (80%) of the studies reported procedures used to train communicative responses. In these studies, a three-prompt sequence was used to train the communicative response. For example, Mancil, Conroy, & Haydon (2009) used a verbal, verbal/gestural, and physical prompt sequence to train the participant to mand for a tangible item. Franco et al. (2009) used a most to least restrictive type prompt-fade procedure by initially using a physical prompt, then gestural, and ultimately fading to a verbal prompt. Studies completed by Casey and Merical (2006) and Langdon et al.
(2008) did not provide the specific sequence or procedures used to train the communicative responses.

Research Designs. As shown in Table 2.4, most (70%) researchers used multiple baseline to evaluate the effectiveness of functional communication training. Researchers in one (10%) of the ten studies (Langdon et al., 2008) implemented a reversal design (i.e., BAB), and in two (20%) studies researchers implemented alternating treatment designs (Martin et al., 2005; Winborn-Kemmerer et al., 2009).

Reported Reliability and Treatment Fidelity

Reliability of observations and fidelity of treatment are critical to ensure the integrity of the reported results. Interrater reliability can be calculated by dividing the number of agreements between the two observers by the number of agreements plus disagreements multiplied by 100. As seen in Table 2.4, researchers in all studies reported high percentages of interrater reliability ranging from 81 - 100%. For example, Olive et al. (2008) reported inter-rater reliability of 88% or greater on all behavioral codes. Wacker et al. (2005) also reported high rates of reliability with averages of 90-100% across the participants.

Reports of treatment fidelity, which is the consistency of the implementation of the components of an intervention, were limited. These findings are consistent with many studies in special education and other disciplines (Smith, Daunic, & Taylor, 2007). Researchers in three (30%) of the ten studies reported percentages for treatment fidelity with averages ranging from 88 – 100% (Olive et al., 2008; Winborn-Kemmerer et al., 2009). Martin et al. (2005) reported prompting the trainers in the study in order to
maintain treatment fidelity. In two (20%) of the ten studies, treatment fidelity was
determined by viewing videotapes from all of the sessions of the intervention (Mancil et
al., 2009; Wacker et al., 2005).

**Reported Social Validity (Consumer Satisfaction)**

Social validity, or consumer satisfaction, refers to the social importance and the
acceptability of the treatment goals, procedures, and outcomes. In four (40%) of the ten
studies researchers reported collecting social validity data. Olive et al. (2008) used the
Behavioral Intervention Rating Scale (BIRS) to measure social validity before and after
the intervention. Results indicated an acceptable rating with an increase in ratings post
intervention. Mancil et al. (2009) and Wacker et al. (2005) used Likert-type ratings
scales addressing social validity. Parents and teachers all indicated they would complete
the intervention in the future. Parents and teachers noted decreases in aberrant behavior
and increases in the participants’ levels of appropriate communication.

**Summary of the Findings of the Studies and Conclusions**

Across all of the studies, researchers reported similar findings. As shown in
Table 2.4, increases in communicative responses and a reduction of aberrant behaviors
were noted in the selected studies. Participants were successfully taught to use an
appropriate functional communication response in place of the challenging behavior. For
example, Langdon et al. (2006) reported a decrease in aberrant behaviors of the
participants and an increase in communication upon implementation of FCT. Similarly,
results from Mancil and colleagues (2009) confirmed a decrease in aberrant behavior
concurrent with an increase in the total percentage of communication responses.
Additionally, the percentage of unprompted communication responses increased. Generalization data collected indicated that communication generalized from the home to the classroom.

As reported previously, a variety of communicative responses were trained. For example, Olive et al. (2008) reported the implementation of FCT with a voice output communication aid (VOCA) successfully decreased challenging behaviors to 0% across settings. Further, an increase in correct pronoun use was observed. Franco and colleagues (2009) successfully used VOCA to reduce inappropriate vocalizations and increase engagement of the participant on the playground and gymnasium.

Researchers reported success in teaching participants two communicative responses to replace aberrant behavior. For example, Casey & Merical (2006) trained the participant to verbally request a break. After determining the participant preferred to use a gestural response, aberrant behavior decreased to 0% in the general education setting. Similarly, Winborn-Kemmerer and colleagues (2009) trained the participant to use two novel means of communicating. Results indicated that FCT was effective in reducing aberrant behaviors, regardless of the means used. Further findings indicated that the participant may demonstrate a preference for a communicative response when provided a choice.

**Summary**

Overall, findings of the studies indicated that FCT has been used successfully to decrease aberrant behaviors while increasing the rates of communication of children with ASD. While the results of these studies are promising, it is disconcerting that a small
number of studies were located where FCT was used as the primary intervention with participants with ASD. In the literature review on FCT completed by Mancil (2006), covering a span of twenty years, the author was able to locate only eight studies where FCT was used as the primary intervention for participants with ASD. Because children with ASD typically have deficits in the appropriate use of functional communication skills and often engage in aberrant behaviors that serve a communicative function (Sigafoos, 2000), it is critical that interventions that focus on these deficits are implemented with this population of children.

Nine (90%) of the studies included in this review were conducted in the natural environments of the participants. However, in the majority of those studies, researchers implemented the FCT. Only two (20%) of the studies used the special education paraprofessional, even though the literature suggests that the number of paraprofessionals used to support students with disabilities continues to increase. Also, the role of the paraprofessional has become more instructional in nature (Ashbaker & Morgan, 2001; Giangreco, Edelman, Broer, & Doyle, 2001; Pickett & Gerlach, 2003). Even with the extensive use of paraprofessionals in critical roles in both special education and general education, their effectiveness has essentially gone unstudied (e.g., Causton-Theoharis & Malmgren, 2005; Giangreco, Broer, & Edelman, 2001; Giangreco, Edelman, Luiselli, & MacFarland, 1997; Young, Simpson, Myles, & Kamps, 1997). If the paraprofessional role has become more instructional and critical in nature, they must be provided the appropriate training required to address the needs of students with disabilities. This review of the literature verifies the importance of investigating an intervention to address
the behavioral and communication needs of students with ASD that can be implemented by the paraprofessional in the special education classroom.
Table 2.1

*Characteristics of Study Participants*

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age(s)</th>
<th>Gender (M/F)</th>
<th>Diagnosis</th>
<th>Speech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casey &amp; Merical</td>
<td>1</td>
<td>11</td>
<td>M = 1</td>
<td>Autism</td>
<td>Verbal (complete sentences)</td>
</tr>
<tr>
<td>(2006)</td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Langdon et al.</td>
<td>2</td>
<td>6, 18</td>
<td>M = 2</td>
<td>Autism</td>
<td>Non-verbal (pictures and gestures)</td>
</tr>
<tr>
<td>(2008)</td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Franco et al.</td>
<td>1</td>
<td>7</td>
<td>M = 1</td>
<td>Autism</td>
<td>Non-verbal (inappropriate vocalizations)</td>
</tr>
<tr>
<td>(2009)</td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mancil et al. (2009)</td>
<td>3</td>
<td>4, 4, &amp; 7</td>
<td>M = 3</td>
<td>Autism</td>
<td>Non-verbal (pictures and gestures)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Martin et al. (2005)</td>
<td>1</td>
<td>10</td>
<td>M = 1</td>
<td>Autism</td>
<td>Non-verbal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olive et al. (2008)</td>
<td>1</td>
<td>4</td>
<td>M = 0</td>
<td>Autism</td>
<td>Verbal (echolalia)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2.1 (Continued)

*Characteristics of Study Participants*

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age(s)</th>
<th>Gender (M/F)</th>
<th>Diagnosis</th>
<th>Speech</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’Neill &amp; Sweetland-Baker</td>
<td>2</td>
<td>6, 15</td>
<td>M = 2</td>
<td>Autism &amp; severe mental retardation</td>
<td>No functional speech</td>
</tr>
<tr>
<td>(2001)</td>
<td></td>
<td></td>
<td>F = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schindler &amp; Horner (2005)</td>
<td>3</td>
<td>4, 4, 5</td>
<td>M = 2</td>
<td>Autism</td>
<td>Verbal (2 – 5 word utterances) &amp; gestures</td>
</tr>
<tr>
<td>Wacker et al. (2005)</td>
<td>6</td>
<td>3, 4, 6, 6, 6, 6</td>
<td>M = 5</td>
<td>2 - Autism, 1 - Rett syndrome, &amp; 3 - PDD</td>
<td>Not available</td>
</tr>
<tr>
<td>Winborn-Kemmerer et al. (2009)</td>
<td>1</td>
<td>7</td>
<td>M = 1</td>
<td>PDD</td>
<td>Non-verbal (pictures and gestures)</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td></td>
<td>M = 6.7</td>
<td>M = 18; F = 3</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.2

*Characteristics of Research Settings*

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Person Responsible for FCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casey &amp; Merical (2006)</td>
<td>Multiple classrooms in school</td>
<td>Instructional Assistant</td>
</tr>
<tr>
<td>Langdon et al. (2008)</td>
<td>Home and school</td>
<td>Researchers</td>
</tr>
<tr>
<td>Franco et al. (2009)</td>
<td>School</td>
<td>Researchers</td>
</tr>
<tr>
<td>Mancil et al. (2009)</td>
<td>Home/school</td>
<td>Parents</td>
</tr>
<tr>
<td>Martin et al. (2005)</td>
<td>School</td>
<td>Researcher</td>
</tr>
<tr>
<td>Olive et al. (2008)</td>
<td>Home</td>
<td>Parent</td>
</tr>
<tr>
<td>Schindler &amp; Horner (2005)</td>
<td>Home/school</td>
<td>Instructional Assistants/Parents</td>
</tr>
<tr>
<td>Wacker et al. (2005)</td>
<td>Home</td>
<td>Parent</td>
</tr>
<tr>
<td>Winborn-Kemmerer et al. (2009)</td>
<td>Therapy room in an inpatient clinic</td>
<td>Researchers</td>
</tr>
</tbody>
</table>
Table 2.3

*Characteristics of Behaviors and Functional Behavioral Assessment (FBA) Procedures*

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent Measures</th>
<th>Function of the Behavior</th>
<th>FBA Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casey &amp; Merical (2006)</td>
<td>SIB (gouging/scratching eyes), property destruction</td>
<td>Escape</td>
<td>Indirect measures, Direct measures, functional analysis</td>
</tr>
<tr>
<td>Langdon et al. (2008)</td>
<td>SIB (head banging)</td>
<td>Escape</td>
<td>Indirect, direct measures, functional analysis</td>
</tr>
<tr>
<td>Franco et al. (2009)</td>
<td>Inappropriate vocalizations (“ee” sound)</td>
<td>Tangible &amp; escape</td>
<td>Functional analysis</td>
</tr>
<tr>
<td>Mancil et al. (2009)</td>
<td>1 – hitting, pinching, 1 – hitting, SIB (biting self), 1 – tantrums</td>
<td>Tangible</td>
<td>Indirect, direct measures, functional analysis</td>
</tr>
<tr>
<td>Martin et al. (2005)</td>
<td>Tantrums, aggression, walking away</td>
<td>Escape</td>
<td>Indirect, direct measures</td>
</tr>
<tr>
<td>Olive et al. (2008)</td>
<td>Elopement, hitting, biting</td>
<td>Attention</td>
<td>Indirect, direct measures, functional analysis</td>
</tr>
</tbody>
</table>

*Note.* SIB = self-injurious behavior; NA = not available
Table 2.3 (Continued)

*Characteristics of Behaviors and Functional Behavioral Assessment (FBA) Procedures*

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent Measures</th>
<th>Function of the Behavior</th>
<th>FBA Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schindler &amp; Horner (2005)</td>
<td>1 – Aggression</td>
<td>1 – Tangible</td>
<td>Indirect, direct measures</td>
</tr>
<tr>
<td></td>
<td>1 – Screaming &amp; tantrums</td>
<td>2 – Escape</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 – Noncompliance; biting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wacker et al. (2005)</td>
<td>4 – Aggression</td>
<td>5 – Escape</td>
<td>Functional analysis</td>
</tr>
<tr>
<td></td>
<td>2 – SIB</td>
<td>1 - NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aggression (hair pulling, hand</td>
<td>Attention</td>
<td>Functional analysis</td>
</tr>
<tr>
<td></td>
<td>biting)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SIB = self-injurious behavior; NA = not available
Table 2.4

*Elements of the Intervention*

<table>
<thead>
<tr>
<th>Study</th>
<th>Trained Response</th>
<th>Research Design</th>
<th>Interrater Reliability</th>
<th>Social Validity</th>
<th>Major Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casey &amp; Merical (2006)</td>
<td>Verbal, gestural</td>
<td>Multiple baseline</td>
<td>96 – 100%</td>
<td>NR</td>
<td>Decrease in SIB</td>
</tr>
<tr>
<td>Langdon et al. (2008)</td>
<td>Picture Card</td>
<td>Reversal</td>
<td>85-100%</td>
<td>NR</td>
<td>Communication increased; aberrant behavior decreased</td>
</tr>
<tr>
<td>Franco et al. (2009)</td>
<td>VOCA</td>
<td>Multiple baseline</td>
<td>97-100%</td>
<td>NR</td>
<td>Inappropriate vocalizations decreased</td>
</tr>
<tr>
<td>Mancil et al. (2009)</td>
<td>Picture Card</td>
<td>Multiple baseline</td>
<td>94-96%</td>
<td>Parents “satisfied” with intervention</td>
<td>Communication increased; aberrant behavior decreased</td>
</tr>
<tr>
<td>Martin et al. (2005)</td>
<td>Picture Card</td>
<td>Alternating treatment</td>
<td>97-99%</td>
<td>NR</td>
<td>Communication increased; aberrant behavior decreased after A phase</td>
</tr>
</tbody>
</table>

*Note.* SIB = self-injurious behavior; NR = not reported; VOCA = Voice Output Communication Aid
<table>
<thead>
<tr>
<th>Study</th>
<th>Trained Response</th>
<th>Research Design</th>
<th>Interrater Reliability</th>
<th>Social Validity</th>
<th>Major Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olive et al. (2008)</td>
<td>VOCA</td>
<td>Multiple baseline</td>
<td>88-100%</td>
<td>Parent reported intervention as “acceptable”</td>
<td>Increased use of VOCA; aberrant behavior decreased</td>
</tr>
<tr>
<td>O’ Neill &amp; Sweetland-Baker (2001)</td>
<td>Picture card</td>
<td>Multiple baseline</td>
<td>87-99%</td>
<td>NR</td>
<td>Requests increased; disruptive behavior decreased</td>
</tr>
<tr>
<td>Schindler &amp; Horner (2005)</td>
<td>Picture card</td>
<td>Multiple baseline</td>
<td>94 – 95%</td>
<td>Procedures were “in the best interests of the students”</td>
<td>Communication increased; problem behavior decreased</td>
</tr>
<tr>
<td>Wacker et al. (2005)</td>
<td>Verbal, manual signing, picture card, assistive technology</td>
<td>Multiple baseline</td>
<td>90 – 100%</td>
<td>Parents reported intervention as “acceptable”</td>
<td>Increase in requests; problem behavior decreased</td>
</tr>
<tr>
<td>Winborn-Kemmerer et al. (2009)</td>
<td>Picture Card, microwitch</td>
<td>Alternating treatment</td>
<td>81-100%</td>
<td>90-100%</td>
<td>Preference for mands demonstrated</td>
</tr>
</tbody>
</table>

*Note. SIB = self-injurious behavior; NR = not reported; VOCA = Voice Output Communication Aid*
CHAPTER THREE

METHOD

This purpose of this chapter is to describe the methods used to conduct the single-subject research design study. First, the research questions addressed are stated. Second, characteristics of the setting, participants and persons selected as trainers. Also, materials needed for the study are reviewed. Third, dependent measures, experimental procedures, study design, and data analysis methods are described. Finally, descriptions of inter-observer agreement, treatment fidelity, and social validity are included. This investigation addressed the following questions:

1. Does the implementation of FCT by the paraprofessional increase communication skills in young children with ASD in a school setting?

2. Does the implementation of FCT by the paraprofessional decrease aberrant behaviors in young children with ASD in a school setting?

3. Does the newly acquired communicative response of children with ASD generalize to other settings and individuals?

This study was designed to determine the effectiveness of functional communication training (FCT) conducted by paraprofessionals in the school setting. The study was implemented in the natural environment (i.e., school setting) of three young children with ASD. The participants were recruited with the assistance of a local school district administrator who serves as the behavior specialist for the district. Prior to participating in the study, Institutional Review Board (IRB #2009-361) approval was
obtained from the university. Upon IRB approval, teachers and parents were contacted to obtain consent for participation in the study.

Setting, Participants, Training, and Materials

Setting

The study was conducted in a rural school district in the southeastern United States. The school district serves almost 11,000 students (80% White, 11% African-American, 6.7% Latino, and 1.8% American Indian/Multi Racial) from pre-kindergarten through twelfth grade. Approximately 54% of the district’s students qualified for free/reduced lunch. Students from one of the 11 elementary schools in the district participated in the study. This elementary school recently opened and served 650 students in pre-kindergarten through fifth grade. The school received funds through Title I of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6301 et seq.) to help at-risk students. The school housed four self-contained classrooms for children with disabilities. Students who participated in the study were served in a self-contained classroom specifically for children with Autism Spectrum Disorder (ASD). Students in this special education classroom received services from the classroom special education teacher, behavior specialist, and a one-on-one instructional assistant (i.e., paraprofessional). At the time of the study, eight students were receiving special education services in this classroom.

Participants

The selection criteria for participants in this study required they: (a) be enrolled in an elementary school in a special class for children with ASD, (b) be nonverbal or have
limited language abilities, (c) have a diagnosis of autism confirmed by physician or school psychologist, and (d) display aberrant behavior. Initially, the school district behavior specialist recommended children for participation in the study. The researcher then interviewed the special education teacher to confirm criteria for inclusion in the study. After interviews were completed, the researcher conducted direct observations of the aberrant behaviors well as communicative behaviors. The teacher completed the Childhood Autism Rating Scale (CARS, Schopler, Reichler, & Renner, 1998) with each participant. CARS is a brief, 15-item behavior rating scale used to identify and classify children with autism and determine level of autistic behaviors. In a standardization sample of approximately 1,600 children with autism, percent agreement between the CARS and clinical diagnoses of autism was 87%.

The function of the aberrant behavior was obtained through the administration of the Motivation Assessment Scale (MAS, Durand & Crimmins, 1996). Original reports of MAS items indicate good test-retest (.89-.92) and interrater reliability (.66-.92). Also, MAS scores demonstrated good predictive validity when compared with analog conditions (Durand & Crimmins, 1988). The experimenter and classroom special education teacher conducted functional analyses conditions to confirm functions of the aberrant behaviors.

**Keith.** Keith, a Caucasian male, was 5 years, 4 months of age when the study began (See Table 3.1). He was diagnosed as having autism at the age of 4 by the family physician. According to teacher interviews, Keith experienced developmental delays in general knowledge, motor skills, self-help skills, and socialization. Keith’s
communication consisted of 1 – 4 word utterances and required verbal and visual prompts to communicate. During circle time, the teacher noted that Keith had difficulty answering simple questions and would scream and tantrum (i.e., lie in the floor and kick his feet). Keith obtained a total score of 47 on the CARS indicating a severe level of autism. Results from the MAS indicated that Keith’s behaviors were maintained by the tangible condition (See Figure 3.1). The functional analysis condition confirmed the tangible function as maintaining the aberrant behavior. Keith received two and one-half hours of service daily in the special education classroom and received services in the preschool intervention program for two and one-half hours.

**Chris.** Chris, an African-American male, was 3 years, 7 months of age when the study began (See Table 3.1). His pediatrician diagnosed Chris with autism at the age of 3. According to teacher interviews, Chris experienced deficits in cognitive and personal-social skills. Chris’s communication skills consisted primarily of single word utterances and severely impacted his ability to make his needs and wants known. During group and individual work times, Chris easily became frustrated and exhibited high-pitched vocalizations. Chris received a total score of 34 on the CARS indicating a moderate level of autism. Results from the MAS indicated that Chris’s behaviors were maintained by the escape from demand condition (See Figure 3.2). However, the functional analysis conditions indicated a tangible function for the aberrant behavior. Chris received two and one-half hours of service daily in the special education classroom and also received services in the preschool intervention program for two and one-half hours.
Mike. Mike, an Asian male, was 3 years, 4 months of age when the study began (See Table 3.1). Mike received a diagnosis of autism by a pediatrician at age 3. According to teacher interviews, Mike experienced severe deficits in cognitive, motor, and self-help skills. Mike’s language skills consisted of only a few vocalizations, none of which appeared to serve any particular function. Mike had been diagnosed with cortical visual impairment by a physician and also suffered myclonic seizures. During the seizures, the muscles in his arms would contract and jerk, but he did not suffer a loss of consciousness. When requested to attend to a task, Mike would become frustrated, and his vocalizations escalated in pitch (i.e., infantile squeal). Mike received a total score of 56 on the CARS indicating a severe level of autism. Results from the MAS indicated that Mike’s behavior was maintained by escape from a demand (See Figure 3.3) and further confirmed through the functional analysis conditions. Mike received two and one-half hours of service daily in the special education classroom.

Paraprofessionals

As noted previously, all students in the self-contained classroom received assistance from a one-on-one aide or paraprofessional. The paraprofessionals implemented the FCT in the single-subject research study. Both of the paraprofessionals who participated in the study spoke English and were literate. Whereas the paraprofessionals had previous experience working in a self-contained classroom for students with ASD, neither had previously implemented FCT nor participated in any research studies.
**Kam.** As seen in Table 3.2, Kam received a high school diploma and had five years of experience working in classrooms for students with ASD. She participated in general staff trainings on the basics of applied behavior analysis and intensive teaching procedures for students with ASD. Kam was assigned to work with Keith and Mike in the self-contained classroom and also assisted Keith in the preschool intervention classroom.

**Marsha.** As seen in Table 3.2, Marsha received a high school diploma and was working towards a bachelor’s degree in education. This was Marsha’s first year working in a class for children with ASD and had not completed any training in applied behavior analysis or intensive teaching procedures. Marsha had been assigned to work with Chris in the self-contained classroom and accompanied him into the preschool intervention classroom.

**Training**

The researcher introduced FCT to the paraprofessionals in a required district professional development session. The first part of the session consisted of 1.5 hours of lecture. During this time, the researcher used a training package that included a PowerPoint presentation explaining FCT and handouts for the participants. At the end of the lecture, the participants completed a quiz to check their understanding of the concepts presented.

The second part of the professional development session included 1.5 hours of modeling, coaching, and feedback. The researcher modeled the procedures for implementing FCT. The paraprofessionals then practiced the procedures and were
coached by the researcher and the classroom teacher. The researcher and classroom
teacher provided follow-up coaching during the initial sessions of FCT with each child.

**Materials**

Picture cards and verbal responses were used to train the replacement
communicative responses and were used during the intervention and generalization
phases of the study. Data collection sheets and laptop computer were used to record and
analyze data.

**Dependent Measures, Experimental Procedures, Study Design, and Data Analysis**

**Dependent Measures**

In this section, the definitions of dependent measures are provided. Definitions of
the dependent measures collected on the participants’ aberrant and communicative
behaviors are given. The specific definitions used are adapted from previous researchers
(Mancil, 2009; Wacker et al., 2005).

**Pre-intervention assessment.** Prior to implementation of the intervention, the
aberrant behavior of each participant was identified. Aberrant behavior was defined as a
behavior that interrupted the learning of the child and interfered with or replaced
communication. Aberrant behaviors may be grouped as destructive behaviors (e.g., self-
injury, aggression, property destruction) and disruptive behaviors (e.g., screaming,
elopement, non-compliance, tantrums, task refusal, inappropriate vocalizations) (Wacker
et al., 2005). Individual definitions of aberrant behavior varied among the participants
(See Table 3.1).
The researcher interviewed the classroom teacher to determine the disruptive behaviors to be targeted during the study. Teacher interviews were completed to determine the high preference items that served as reinforcers for each child along with tasks considered to be demanding for each child. Through the interview and classroom observations, Keith was noted to scream and tantrum to gain access to a preferred tangible item. Chris engaged in high-pitched vocalizations to gain access to a preferred item. Mike engaged in high-pitched vocalizations when presented with a demanding task.

Prior to the implementation of the intervention, a functional analysis (FA) was conducted to confirm the function of the aberrant behavior (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). During FA conditions, the percentage of intervals in which the identified aberrant behaviors occurred was displayed graphically. Assessment continued until a stable pattern of behavior was identified.

**Baseline, Intervention and Generalization Phases.** During the baseline, intervention and generalization phases, data were collected on the following measures: (a) frequency of aberrant behavior; (b) frequency of unprompted requests/communicative responses.

**Aberrant behavior.** Aberrant behaviors were maladaptive behaviors displayed by the participants in place of the communicative response. The behaviors varied among the participants. For Keith, the aberrant behavior was defined as screaming and tantrums in which he would lie on the floor and kick his feet. For Chris and Mike, the aberrant behavior was defined as a high-pitched vocalization (i.e., the “ee” sound).
**Unprompted communicative response.** An unprompted communicative response was defined as an appropriate request for reinforcement without a specific prompt from the paraprofessional. Requesting consisted of either a verbal response for Keith and Chris. Touching a picture card was the communicative response taught to Mike. The communicative responses were selected by the classroom teacher and were based upon the language abilities of the participants.

**Prompted communicative response.** A prompted response was defined as an appropriate request for reinforcement immediately following the prompt by the paraprofessional. Prompts included physical, gestural, and verbal.

**Prompts.** Prompts were defined as assistance provided to the participant to perform the communicative response. A series of echoic prompts were used to train a verbal response (Skinner, 1957). For example, the paraprofessional may say, “tell me ‘car’, if you want the car” when training the verbal response with an echoic. This prompt would then be faded to a partial echoic where the paraprofessional may supply only the first sound of the word, “car”. A physical prompt, the most intrusive, consisted of a hand over hand assistance to perform the communicative response, such as when guiding the child to hand a picture card to the paraprofessional. The physical prompt would then be faded to a combined verbal/gestural prompt to use the picture card. Finally, the verbal/gestural would be faded to a gestural prompt.

**Experimental Procedures**

The single-subject research study was conducted in four phases. In Phase 1, a functional analysis was conducted to identify the events maintaining the aberrant
behaviors. During Phase 2, baseline data were collected on the occurrences of aberrant behaviors and any unprompted communicative responses. In Phase 3, the intervention, FCT was implemented. During Phase 4, generalization data were collected.

**Phase 1: Functional Analysis.** The functional analysis (FA) was conducted to determine the function of the specific aberrant behavior of the participant and to confirm the information obtained through the *Motivational Assessment Scale*. A multielement design was used to compare five-minute assessment conditions utilizing the procedures outlined by Iwata et al., (1982, 1994). During FA, the environmental variables, such as the room used and people present, were held constant for each session. The conditions were counterbalanced to control for order effects and consisted of the following:

(a) Free play, where the child had access to preferred items and neutral activities. No demands were placed on the child. The teachers provided non-contingent attention to the child approximately three to five times per minute;

(b) Tangible, where the child was allowed access to a preferred item and then interrupted after an interval of approximately 30 seconds. Upon demonstration of the disruptive behavior, the item was returned to the child for approximately 30 seconds;

(c) Attention, where the teacher maintained a distance of three – six feet from the child and ignored the child. The child was provided access to a neutral activity with no other demands being presented. Upon the occurrence of disruptive behavior, the teacher provided a mild reprimand (e.g., “Please don’t do that.”); and
(d) Escape, where the teacher presented a demanding task to the child. If there was no response after approximately five seconds, the demand is repeated until he child completed the task or engaged in disruptive behavior. Upon the occurrence of the behavior, the task was removed for approximately 30 seconds and then presented again.

To identify the primary function of the behavior, the percentage of intervals in which disruptive behaviors occurred for each condition was displayed graphically and compared. The assessment conditions continued until a stable pattern of behavior was demonstrated, and the function of the behavior could be identified for each participant. If at any time the conditions posed a safety risk to the child or teacher, the conditions were halted (See Appendix A for FA procedures).

**Phase 2: Baseline.** Direct observations were conducted in the classroom to determine the frequency of aberrant behaviors identified for each child. The selection of specific stimulus conditions was based on information obtained from indirect assessments, direct descriptive assessments, and the FA. For example, in the escape from demand stimulus conditions used with Mike, the paraprofessional would provide instructions for the task with no contingent escape allowed for aberrant behavior that was displayed. The paraprofessional continued to repeat the instructions until the task was completed or five minutes had elapsed. Praise was provided upon completion of the task. The percentage of intervals in which the behaviors occurred was calculated. During this time, Mike had access to the picture card that served as his communicative response. Any unprompted communicative responses were recorded.
In the tangible condition for Keith and Chris, access to a preferred item was provided for 30 seconds. The paraprofessional then removed the item and interacted with the item for 30 seconds. This interaction sequence continued for the duration of the five-minute session. The percentage of intervals in which the aberrant behaviors occurred was calculated. Any unprompted communicative responses were also recorded.

**Phase 3: Functional Communication Training.** Prior to the intervention, paraprofessionals were taught the procedures for training the communicative response. Paraprofessionals first participated in the training and role-playing sessions conducted during a three-hour professional development training. Upon completion of the training, the intervention was implemented with the participants. The researcher and classroom teacher provided coaching during the initial sessions of FCT, if needed.

The participants were taught to hand the picture card to request a break (Mike) or provide a verbal response (Keith & Chris) to gain access to a preferred item. After presentation of the stimuli, a five-second delay was provided before prompting the participant. The stimulus was presented again with another five-second delay with prompting used again as necessary. This process continued during the five-minute intervention sessions.

For Mike, the demand was presented followed by a five-second delay. If he used the picture card to request a break, he was allowed a 30 second break from the demanding task. After the break, the task was presented again with the same cycle of procedures during the five-minute session (See Figure 3.4). Keith and Chris were both provided 30 seconds of access to the preferred item. The item was then removed from
the child. If the child asked for a turn with the item, 30-second access was provided. This cycle of procedures continued for the five-minute session (See Figure 3.5).

A multiphase prompting and prompt-fading procedure was used to teach the communicative response to the child. Prompts were introduced as necessary and faded as quickly as possible. For Keith and Chris, a verbal response of “my turn” was trained to access the preferred item. After a five second delay and no response noted, the paraprofessional used the echoic prompt, “Say ‘my turn’”. If the child used the communicative response, 30-second access to the item was provided. The paraprofessional removed the item again. The echoic prompt was faded to a partial echoic by using only the first sounds of the phrase “my turn”. Prompts were only used if the child emitted no response after the five-second delay.

Specifically for Mike, a picture card with the word “up” and a picture of an arrow was used to request a break from the demanding task. The paraprofessional led Mike to the area where he was asked to sit on the floor and remain for instruction. If he used the picture card to request a break from the demand, Mike was allowed to leave the area for 30 seconds. After the break, the paraprofessional would then lead Mike back the instructional setting. If Mike refused to work or began to display the disruptive behavior, the paraprofessional would then physically prompt Mike to hand over the picture card to receive a break. After a 30 second break, the demand was reinstated. If Mike did not respond with the picture card, he was prompted again by the paraprofessional. The physical prompt was then faded to verbal/gestural prompt, and finally to a gestural prompt to use the picture card.
During FCT, reinforcement for aberrant behaviors was withheld through extinction. The paraprofessional continued as if the aberrant behavior had not occurred (unless the behavior was self-injurious). The goal is to attempt to make the aberrant behavior “nonfunctional” in the environment (Durand, 1990). Consequences such as reprimands or withdrawing reinforcers were avoided to try to make the aberrant behavior less efficient at obtaining reinforcement.

Data were collected on the frequency of unprompted communicative responses used during the five-minute sessions. Also, data were collected on the percentage of intervals in which the aberrant behaviors occurred. When the child displayed the unprompted communicative response for at least 75% in three consecutive five-minute sessions, the intervention was implemented with the next participant.

**Phase 4: Generalization.** Generalization probes were conducted to determine if communicative responses generalized to other environments and other people. Generalization data were collected in other classrooms, such as the preschool intervention class attended by Keith and Chris. These sessions were implemented by the paraprofessional who had not conducted the FCT with the child during the intervention phase. Generalization probes were conducted with each participant once the child displayed the unprompted communicative response for least 80% in three consecutive five-minute sessions in the self-contained classroom. During the generalization probes, the stimulus conditions were presented (i.e., tangible or demanding task) to the child. As in baseline, no prompts to communicate were given. The percentage of unprompted communicative responses was calculated during the five-minute generalization sessions.
that were conducted in the preschool intervention classroom.

**Study Design**

A concurrent multiple baseline design across participants was used to evaluate the effectiveness of FCT on decreasing aberrant behaviors and increasing communicative responses. In multiple baseline designs, the effects of the intervention are demonstrated by introducing the intervention to different participants at different times (Kazdin, 1982). When data for the first participant demonstrates a stable pattern, the intervention is introduced to the next participant and continues until the intervention is implemented across all participants. Through visual examination of the data, a functional relationship between the independent variable and dependent variable can be determined if changes in the dependent variable are noted following the introduction of the intervention (Alberto & Troutman, 2008).

**Data Analysis**

During each session, data were collected and recorded by the primary experimenter. Data on the percentage of intervals of aberrant behaviors and unprompted communicative were collected. In order to obtain the percentage, the number of intervals in which the aberrant behavior occurred was divided by the number of intervals in a five-minute session. The same procedures were also used to determine the percentage of intervals in which communicative responses occurred. Data were converted to line graphs utilizing Microsoft Excel software.

In procedures outlined by Kennedy (2005), line graphs were examined for three different dimensions. First, the level of the dependent variable was examined. Level
refers to the average of the data and calculated as the mean or median. Examining the level of the data allows for comparison of patterns between phases. Second, trend of the data (slope and magnitude) was examined. Slope refers to the upward or downward slant of the data, and magnitude describes the extent of the slope. The third dimension used to examine within-phase data patterns was variability. Variability is the degree to which the data points are dispersed relative to the best-fit straight line.

Kennedy further recommended visually inspecting data for patterns occurring between phases by examining immediacy of effect and overlap of data between phases. The immediacy of effect how quickly a change in the data pattern occurs between phases. Overlap of data is the percentage or degree to which data in adjacent phases share similar quantitative values. The percentage of nonoverlapping data (PND) determines the proportion of data points in a treatment condition that exceeds the extreme value in the baseline condition (Scruggs, Mastropieri, & Casto, 1987a). For example, when using FCT to increase unprompted communication, the proportion of intervention points that exceeds the highest baseline value is calculated. Scores above 90% represent very effective treatments, scores from 70 to 90% represent effective treatments, scores from 50 to 70% are questionable, and scores below 50% describe ineffective treatments (Scruggs & Mastropieri, 1998). Using the described dimensions for visual inspection, data was used to form a judgment regarding whether a functional relation had been established.

**Interobserver Agreement, Treatment Integrity, and Social Validity**

**Interobserver Agreement**
Interobserver agreement (IOA) is the extent to which two observers agree that a behavior occurred (Kazdin, 1982). IOA provides a means of measuring reliability of the observations of behavior. IOA also serves to (a) minimize observer bias, (b) controls for inconsistency of observers as one source of variation in data collections, and (c) help to determine if the target behaviors are well defined.

During the study, IOA was calculated on at least 30% of all observations across all phases. Agreement on at least 80% of the observations is considered acceptable (Kazdin). For frequency measures, the percentage of interobserver agreement is calculated by dividing the number of agreements by the total number of agreements plus disagreements and then multiplying by 100. The behavior specialist in the self-contained classroom was trained to collect and record data. IOA was calculated using the data collected by the primary researcher and the behavior specialist. In the following sections, IOA will be provided for the functional analyses along with baseline, intervention, and generalization phases of the study.

**Functional Analysis.** Reliability was calculated for 42% of the functional analysis sessions for each child. Agreement on the frequency of aberrant behavior for Keith averaged ranged from 94% - 100% ($M = 97\%$). For Chris, agreement ranged from 90% - 100% ($M = 96\%$), and for Mike, agreement ranged from 94% - 100% ($M = 97\%$).

**Communication.** Reliability was calculated on approximately 50% - 60% of baseline, intervention, and generalization sessions across all children. Agreement on
unprompted communication for Keith ranged from 95% - 100% ($M = 98\%$). Agreement for Chris ranged from 94% - 100% ($M = 97\%$), and for Mike, agreement was 100%.

**Aberrant behavior.** Reliability was calculated on approximately 50% - 60% of baseline, intervention, and generalization sessions across all children. Agreement on aberrant behaviors for Keith ranged from 90% - 100% ($M = 96\%$). Agreement for Chris ranged from 88% - 100% ($M = 95\%$), and for Mike, agreement ranged from 94% - 100% ($M = 97\%$).

**Treatment Integrity**

During all phases, the primary experimenter collected treatment integrity data. In baseline, observational data were collected to ensure that the intervention was not being implemented. The experimenter, the behavior specialist, and classroom teacher observed treatment sessions implemented with the participants. A checklist was used to record whether the procedures were implemented with fidelity according the experimental procedures of the study (See Appendix B for Treatment Integrity Collection Sheet). Treatment integrity was calculated by dividing the number of times the intervention was implemented correctly by the number of sessions (trials) of implementation. This number was multiplied by 100 and expressed as percentages across the study. Although there is not a consensus on what constitutes a criterion level for treatment integrity (Kazdin, 1982), a criterion level of 80% was used to determine if a high level of treatment integrity existed during the study.

**Social Validity**
The Intervention Rating Profile (IRP-15) was used to assess levels of satisfaction (Martens, Witt, Elliott, & Darveaux, 1985). The IRP-15 consists of 15 items and utilizes a Likert Scale ratings system. The scores on the IRP-15 can range from 15 to 90, higher scores indicating a greater acceptance level of the intervention. Reliability of the instrument is .98 (Martens et al., 1985). Scores above 52.50 are considered to be acceptable (Von Brock & Elliott, 1987). The paraprofessionals and the classroom teacher completed the IRP 15 (See Appendix C for IRP-15).
Table 3.1

*Characteristics of the Participants*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Race</th>
<th>Diagnosis</th>
<th>CARS Score</th>
<th>Aberrant Behavior</th>
<th>MAS Results</th>
<th>Functional Analysis Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keith</td>
<td>5 – 4</td>
<td>C</td>
<td>Autism</td>
<td>47</td>
<td>Scream/tantrum</td>
<td>Tangible</td>
<td>Tangible</td>
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<tr>
<td>Chris</td>
<td>3 – 7</td>
<td>AA</td>
<td>Autism</td>
<td>34</td>
<td>High-pitched vocalizations</td>
<td>Escape</td>
<td>Tangible</td>
</tr>
<tr>
<td>Mike</td>
<td>3 – 4</td>
<td>A</td>
<td>Autism</td>
<td>56</td>
<td>High-pitched vocalizations</td>
<td>Escape</td>
<td>Escape</td>
</tr>
</tbody>
</table>

*Note.* Age in years-months; C = Caucasian; AA = African-American; A = Asian; CARS – Childhood Autism Rating Scale
Table 3.2

*Characteristics of the Paraprofessionals*

<table>
<thead>
<tr>
<th>Paraprofessional</th>
<th>Age</th>
<th>Years Experience</th>
<th>Education</th>
<th>ABA Training</th>
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<td>Kam</td>
<td>40</td>
<td>5</td>
<td>High School Diploma</td>
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</tr>
<tr>
<td>Marsha</td>
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<td>1</td>
<td>High School Diploma (Completing requirements for Bachelors degree in Education)</td>
<td>No</td>
</tr>
</tbody>
</table>
Figure 3.1. Motivation Assessment Scale Sub-totals for Keith.
Figure 3.2. Motivation Assessment Scale Sub-totals for Chris.
Figure 3.3. Motivation Assessment Scale Sub-totals for Mike.
Figure 3.4. Procedures used when training communicative response for break from demanding task.
Figure 3.5. Procedures used when training communicative response for tangible item.
CHAPTER FOUR

RESULTS

The purpose of the single-subject research study was to examine the effects of functional communication training on the communication and aberrant behaviors of young children with autism spectrum disorder (ASD). The study was conducted in four phases: (a) pre-intervention assessment (functional analysis), (b) baseline, (c) intervention, and (d) generalization. The intervention phase consisted of training the child to use a new communicative response. Also, generalization probes were conducted in new settings with new persons. Interobserver agreement was conducted across the study to determine reliability of the observations. Finally, treatment fidelity and social validity measures were conducted.

Pre-intervention (Functional Analysis)

As mentioned previously in Chapter 3, the classroom teacher completed the Motivation Assessment Scale (MAS) (Durand & Crimmins, 1996) on each child to determine the function of the aberrant behavior displayed. The functional analysis was then conducted to confirm the information received through the MAS.

Functional Analysis

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

Keith. The results of the FA conditions conducted with Keith are shown in Figure 4.1. The percentage of intervals of Keith’s aberrant behavior (i.e., screaming and tantrums) was higher in the tangible condition ($M = 53\%$, range = $20\% – 75\%$) in
contrast to the escape condition \(M = 7\%, \text{ range } = 0\% - 20\%\), attention condition \(M = 0\), and free play condition \(M = 0\). Keith engaged in aberrant behavior in one other condition (i.e., the escape condition), but this occurred during only one session. These results confirmed the information from the MAS that Keith’s aberrant behaviors were maintained by access to a tangible item.

Chris. The results of the FA conditions conducted with Chris are shown in Figure 4.2. The percentage of intervals of Chris’s aberrant behavior (i.e., high-pitched vocalizations) was higher in the tangible condition \(M = 65\%, \text{ range } = 55\% - 75\%\) in contrast to the escape condition \(M = 17\%, \text{ range } = 10\% - 20\%\), attention condition \(M = 0\), and free play condition \(M = 0\). There was no overlap in the data among the conditions. Additionally, the percentage of intervals of aberrant behavior continued to increase until the final session. These results differed from the information received from the MAS that indicated Chris’s behavior was maintained by the escape condition.

Because FA involves the experimental manipulation of variables (O’Neill et al., 1997), this procedure may provide a more accurate picture of the functional relationship between target behaviors and predictor variables (Alter, Conroy, Mancil, & Haydon, 2008). As a result, access to a tangible item was determined to be the function of Chris’s aberrant behavior.

Mike. The results of the FA conditions conducted with Mike are shown in Figure 4.3. The percentage of intervals of Mike’s aberrant behavior (i.e., high-pitched vocalizations) was the highest in the escape condition \(M = 65\%, \text{ range } = 60\% - 75\%\). In the tangible, attention, and free play conditions, no aberrant behaviors were noted \(M = \)}
These results, along with results from the MAS, confirmed that Mike’s aberrant behavior was maintained by escape from a demanding task.

**Increase in Communication Skills**

The first question addressed whether the implementation of FCT by a paraprofessional would increase the communication skills of young children with ASD. Upon completion of the pre-intervention assessment phase of the study, baseline and intervention data were collected on the percentages of unprompted communicative responses for each participant. Based on the participant’s response to the intervention, the number of data points varied across the participants. The results of FCT on the communicative responses for each participant are provided.

**Communication Skills**

**Keith (baseline).** Baseline data on Keith’s percentage of unprompted communication responses (PUCR) were collected prior to the implementation of the intervention (See Figure 4.4). During baseline, no prompts to communicate were provided to Keith. PUCR was stable throughout baseline at 0% with no increase in value of the data points.

**Keith (intervention).** Following the implementation of the intervention, Keith’s PUCR changed in level from 0% to 78.3%. From the first session to the second session, his PUCR increased from 18% to 90% and remained fairly stable until the seventh session. This was the only session in which PUCR dropped below 75% for the intervention phase. After the seventh session an acceleration trend where PUCR continued to increase to 100% in the final session was noted. Keith’s PUCR ranged from
18% - 100% during the intervention phase. The percentage of nonoverlapping data (PND) was calculated to be 100% as all data points (10/10) in the intervention exceeded 0%.

**Chris (baseline).** Baseline data continued to be collected on Chris after the intervention was implemented with Keith (See Figure 4.4). During the baseline, no prompts to communicate were provided. The PUCR in session one was 0% but showed acceleration in trend, increasing to 20% by session three. The last data points in baseline showed a downward slope in trend with PUCR eventually decreasing to 0%. The mean of data in baseline for Chris was 8% with a range of 0% - 20%.

**Chris (intervention).** When the last three data points showed a decelerating trend for Chris and an accelerating trend for Keith, the intervention was implemented with Chris. Chris’s PUCR changed in level from 8% in baseline to 92% during the intervention phase. In the last session of the baseline phase, Chris’s PUCR was noted to be 0%, but increased to 50% in the first session of the intervention. Chris’s PUCR showed an accelerating trend, immediately escalating to 100% in the second session of the intervention with the remaining sessions all at 100%. PND was calculated to be 100% as all data points in the intervention (6/6) exceeded the highest point (i.e., 20%) in baseline. The data during intervention for Chris ranged from 50% - 100%.

**Mike (baseline).** After the intervention was implemented with Chris, baseline data continued to be collected on Mike (See Figure 4.4). As with the previous two participants, no prompts to communicate were provided. PUCR remained at 0% throughout the baseline phase.
Mike (intervention). When three consecutive data points were above 75% for Chris, the intervention was implemented with Mike. As with the baseline phase, PUCR for Mike remained stable at 0% throughout the intervention phase. PND was calculated to be 0%.

Decrease in Aberrant Behavior

The second research question addressed whether the implementation of FCT by a paraprofessional would decrease the aberrant behaviors of young children with ASD. Baseline and intervention data were collected on the percentages of aberrant behaviors for each participant and are presented in the following section.

Aberrant Behavior

Keith (baseline). Keith’s percentage of intervals of aberrant behavior (i.e., screaming and tantrums) averaged 72% during baseline with a range of 35% - 100% (See Figure 4.5). The data showed an accelerating trend, eventually reaching 100% for the remaining two sessions of baseline. The last session of baseline was terminated early due to an escalation in Keith’s behavior. During this session, Keith became physically aggressive toward the adults in the room.

Keith (intervention). During the intervention, Keith’s percentage of aberrant behavior decreased immediately and stabilized at 0% for the remainder of the intervention phase. These results corresponded with an increase in his communication. PND was calculated to be 100% as all data points (10/10) were below the lowest data point in baseline.
Chris (baseline). Chris’s percentage of intervals of aberrant behavior (i.e., high-pitched vocalizations) averaged 63% during baseline with a range of 50% - 100% (See Figure 4.5). Whereas the data showed a decreasing trend and dropped to a low of 50% in the third session, an accelerating trend was noted in the final data points with the percentage increasing to 100% in the final session of baseline.

Chris (intervention). During the intervention, Chris’s percentage of aberrant behavior decreased to 20% in the first session and then stabilized at 0% for the remainder of the phase (\(M = 3.7\%\), range = 0% – 22%). This decrease in aberrant behavior corresponded with an increase in Chris’s communication. PND was calculated to be 100% as all of the data points (6/6) in the intervention phase were below the lowest data point of the baseline phase.

Mike (baseline). Mike’s percentage of intervals of aberrant behavior varied during baseline (i.e., high-pitched vocalizations) and averaged 52% with a range of 33% - 72% (See Figure 4.5).

Mike (intervention). Even though variability in the data was also noted during the intervention, percentage of intervals of aberrant averaged 38%, a decrease from baseline (range = 28% - 42%). The decrease in aberrant behavior, however, did not correspond to an increase in communication. PND was 20% as only one data point (1/5) in the intervention phase was below the lowest point of the baseline phase.

Generalization to Other Settings

The third research question addressed whether the newly acquired communication skills of children with ASD would generalize to other settings and individuals. When
unprompted communication was observed to be at 80% in at least three consecutive sessions, generalization probes were implemented in another setting. A different paraprofessional (i.e., did not implement the intervention with the child) conducted the generalization sessions. The results for each participant are provided.

**Keith**

Generalization data on Keith were collected in the preschool intervention program. Generalization sessions were implemented by a different paraprofessional. Keith’s PUCR averaged 88% (range = 50% - 100%) during the generalization phase and stabilized at 100% at the end of the phase. The percentage of aberrant behavior remained constant at 0% throughout generalization.

**Chris**

Generalization data on Chris were collected in the preschool intervention program. Generalization sessions were implemented by a different paraprofessional. Chris’s PUCR remained constant at 100%. The percentage of aberrant behavior remained at 0% throughout generalization.

**Mike**

Generalization data were not collected on Mike because PUCR remained stable at 0% throughout the intervention phase.

**Treatment Integrity**

Treatment integrity data were collected on 39% of baseline, intervention, and generalization sessions. The results are reported for the implementation of the
procedures with each child.

**Keith**

Treatment integrity on functional communication procedures implemented with Keith during baseline and intervention phases ranged from 78% - 100% ($M = 92\%$). In the generalization phase, treatment integrity ranged from 92% - 100% ($M = 94\%$).

**Chris**

Treatment integrity on functional communication procedures implemented with Chris during baseline and intervention phases ranged from 84% - 100% ($M = 93\%$). In the generalization phase, treatment integrity ranged from 90% - 100% ($M = 96\%$).

**Mike**

Treatment integrity on functional communication procedures implemented with Chris during baseline and intervention phases ranged from 82% - 100% ($M = 91\%$). No generalization sessions were conducted with Mike.

**Social Validity**

The classroom teacher and paraprofessionals completed the IRP-15. The classroom teacher’s total score on the IRP-15 was 74. The paraprofessional total scores were 78 and 79. Scores above 52.50 are considered to be acceptable; therefore, the scores indicated a high level of acceptability of the intervention.

**Summary of Findings**

Findings from this study indicated that for two of the three children (Keith & Chris), unprompted communication increased during the intervention. For both students, communication averaged 75% or better during the intervention phase. Further,
communication remained at high levels (i.e., greater than 80%) during generalization sessions conducted in the preschool intervention classroom. However, communication for Mike failed to improve during the intervention phase.

The rates of aberrant behavior decreased significantly for Keith and Chris during the intervention phase and remained at low levels throughout the study. For Keith, aberrant behavior was non-existent during the intervention phase. For Chris, aberrant behavior stabilized at zero after one session in the intervention phase. For both children, no aberrant behaviors were noted during generalization sessions. For Mike, aberrant behaviors did decrease in the intervention phase but remained variable.

Treatment integrity data revealed that the intervention was implemented with a high level of fidelity across the participants in the study. Social validity data indicated the intervention was considered to be a highly acceptable intervention to address the disruptive behaviors of the participants.
Figure 4.1. Percentage of intervals of aberrant behavior displayed by Keith.
Figure 4.2. Percentage of intervals of aberrant behavior displayed by Chris.
Figure 4.3. Percentage of intervals of aberrant behavior displayed by Mike.
Figure 4.4. Percentage of intervals of communication.
Figure 4.5. Percentage of intervals of aberrant behavior.
CHAPTER FIVE

DISCUSSION

The primary purpose of this research study was to examine the effects of functional communication training (FCT) on the communication and aberrant behaviors of young children with autism spectrum disorder (ASD). Specifically, the study sought to determine if FCT would result in an increase in unprompted communication responses, concurrent with a decrease in aberrant behavior. Sessions were conducted to determine if treatment results generalized to other settings. Further, the paraprofessional implemented the intervention with Keith, Chris, and Mike. The study was conducted in the following phases:

1. Functional analysis sessions were conducted to confirm the function (i.e., tangible, attention, escape) of the aberrant behavior of each child.

2. Baseline data were collected through direct observations conducted in the classroom to determine the frequency of aberrant behaviors identified for each child. Also, data on any unprompted communication responses were recorded.

3. FCT was implemented by utilizing a multiphase prompting and prompt-fading procedure is used to teach the communicative response to the child. Prompts were introduced as necessary and faded as quickly as possible.

4. Once mastery criterion was met, generalization data were collected in another setting. Also, a different paraprofessional implemented the generalization settings.
In the following sections, the results of the study are summarized. Implications for practice along with limitations of the study are addressed. The chapter concludes with a discussion on recommendations for future research.

**Summary of Findings**

The first research question was designed to determine the effects of FCT on the communication skills of young children with ASD. Results indicated that two of the three children (i.e., Keith and Chris) did acquire the unprompted communication response during the intervention phase and used the response 75% of the time for at least three consecutive sessions. For Mike, however, no unprompted communication responses were noted during the study.

The purpose of the second research question was to determine the effects of FCT on the aberrant behaviors of young children with ASD. Significant decreases in aberrant behavior were noted for both Keith and Chris. In fact, notable decreases in aberrant behavior for these children occurred after only one session and stabilized at 0% for the remainder of the intervention phase. Rates of aberrant behavior for Mike were variable; however, the mean percentage of aberrant behavior decreased from 52% in baseline to 38% in intervention. These findings are consistent with previous researchers (e.g., Franco et al., 2009; O’Neill & Sweetland-Baker, 2001) who demonstrated that a function-based intervention could be successfully implemented in a school setting.

The third research question was designed to determine if the communicative response trained would generalize to other settings and other persons. Keith and Chris were able to use the communicative response for at least 80% of the time during three
consecutive sessions. Therefore, generalization sessions were conducted in the preschool intervention classroom with a different paraprofessional. Both Keith and Chris were successfully in generalizing the response to a different environment. Because Mike did not use the unprompted communicative response during intervention, no generalization data could be collected.

**Interpretation of Findings**

Several factors have been identified that may influence the success of outcomes of FCT. Such elements may be necessary to see initial reductions in rates of aberrant behaviors, increases in communicative responses, and generalization across people and settings (Durand & Merges, 2001). One factor that influences the initial success of FCT is response match (Durand & Merges, 2001). In other words, the new communicative response must result in the same consequences as the challenging behavior. For example, Durand & Crimmins (1987) conducted a study in which the participant was taught to say, “Help me” when presented with a difficult task. In one condition, the phrase resulted in the experimenter offering praise, but not with assistance. This response resulted in an increase in challenging behavior. For all of the participants in the current study, the communicative response resulted in the immediate delivery of either access to the tangible or break from the demanding task. Even though Mike was not able to use the communicative response without a prompt, the physical and verbal prompts used by the paraprofessional assisted him with receiving a break from the demanding task. The decreases in aberrant behavior is consistent with previous research that response match is an essential component in initial reductions of challenging behavior.
Another factor that may contribute to the success of FCT is the use of *response-independent consequences* (Durand, 1990). When challenging behavior occurs, the person responsible for implementing FCT should continue to behave as if the challenging behavior did not take place. The goal is to try to make the challenging behavior “nonfunctional” for the child. When the participants engaged in disruptive behavior, the paraprofessional ignored the behaviors and did not provide any reprimands. By learning a communicative response that served the same function, the challenging behavior became less efficient at obtaining the reinforcement of access to the tangible item.

As noted previously, the decrease in aberrant behavior did not correspond to an increase in Mike’s unprompted communication responses. Researchers suggest that a number of variables may be related to differences in the development of children with ASD (Bopp, Mirenda, & Zumbo, 2009). For example, intelligence score (Gabriels, Hill, Pierce, & Rogers, 2001; Harris & Handelman, 2000) and autism severity score (DeMyer, 1973; Eaves & Ho; Liss et al., 2001) have been found to be related to cognitive, language, and adaptive behavior outcomes over time. Mike received a 56 out of a possible 60 points on the Childhood Autism Rating Scale indicating a severe level of autism. Due to Mike’s severe deficits in communication, the two weeks of intervention sessions may have been insufficient in teaching him to use the communicative response without being prompted. More favorable results for Mike may have been achieved had he received a higher number of intervention sessions.

Researchers have also indicated that FCT outcomes may vary as function of the response effort (Bailey, McComas, Benavidis, & Lovasc, 2002; Buckley & Newchok,
Horner & Day, 1991). For example, Horner & Day found that FCT was more efficient with a lower effort response. It is plausible that the effort required by Mike to exchange the picture card to receive a break required too much physical effort on his part. Perhaps if Mike had been taught to touch the card to request a break, this may have produced different results. Favorable outcomes for Keith and Chris may have been a result of choosing a low effort communicative response for them. In this study, Mike was not provided with an opportunity to use a different communicative response. It may have been beneficial to consult with a speech language pathologist to determine if an alternative communicative response (e.g., assistive technology communication device) would have resulted in Mike showing preference for one response over another.

The relative novelty of a communication response has been shown to impact the effectiveness of FCT (Ringdahl, et al., 2009). Mike had not been taught to use a picture card prior to this study. Also, due to Mike’s physical limitations and size of the picture card, it is difficult to determine if he was able to visualize the card on the floor next to him.

**Implications for Practice**

The results of the study have implications for practice. Researchers in numerous studies have documented the effectiveness of FCT, but very few studies have included the paraprofessional as the person responsible for implementation. In fact, researchers in only two of the studies included in the literature review used a paraprofessional or instructional assistant. Even as disagreement continues over the appropriate roles for paraprofessionals, there continues to be documentation that paraprofessionals are
operating with high levels of autonomy, making instructional decisions, and are providing the majority of instruction to some students (Giangreco, Suter, & Doyle, 2010). In order to meet the demand for paraprofessional training, many school districts have come to rely on pre-service and in-service workshops. Unfortunately, these models appear to have limited success (Lang & Fox, 2003). Researchers have called for training models that include not only didactic instruction but other components such as modeling and feedback (Arco & duToit, 2006; LeBlanc et al., 2005.) In the present study, the paraprofessionals were provided in-service training as well as modeling and feedback by the researcher and classroom teacher. The findings of the study add to the research demonstrating paraprofessionals can be effectively trained to implement instructional tasks in the classroom that result in positive student outcomes.

Children with ASD require a high degree of structure necessitating a coordinated, well-informed educational team with the classroom teacher as manager (Scheuermann, Webber, Boutot, & Goodwin, 2003). As previously mentioned, the classroom teacher provided support by modeling FCT and giving feedback to the paraprofessionals as they implemented the intervention with the students. This study provides support for the critical role that the classroom teacher plays when communicating and organizing the educational team that will provide services to students with ASD.

Results of the study also indicate that it may be necessary to carefully consider the selection of a communicative response when implementing FCT in the classroom. By allowing the child to choose the communicative response through use of a preference assessment, stronger FCT results may result. In fact, researchers have determined that a
child’s communicative responses may be improved by switching to the preferred response (Casey & Merical, 2006). Winborn-Kemerrer and colleagues also demonstrated that individuals with disabilities might show a preference for one communicative response over another. When utilizing FCT in the classroom, practitioners may wish to use a preference assessment to determine the feasibility of using a communicative response prior to the implementation of treatment. It may also be necessary for practitioners to consult with another expert (i.e., speech-language therapist) to determine the most appropriate communicative response(s) for the child.

**Limitations of the Study**

Although the intervention was successful in increasing the communication and decreasing aberrant behaviors of two of the three participants, there are a few limitations that may limit the findings of the study. First, the small sample size limits generality across subjects (Kazdin, 1982). All three participants were diagnosed with autism, but each participant displayed different characteristics. It is difficult to determine if similar results would be achieved with other students on the autism spectrum because the diagnosis of autism is not necessarily related to likelihood success of a specific intervention (Horner et al., 2002).

Second, the study was conducted using a multiple baseline design. Whereas multiple baseline designs do not require the withdrawal of treatment, one participant may receive limited treatment sessions. In this study, Mike was the third participant to receive treatment. Due to school schedules, this also meant that the number of treatment sessions for Mike was limited.
Third, only a small number of generalization sessions were conducted, due to school schedules. The extent to which these results can be extended to other settings in the school (i.e., cafeteria, gym) is limited. Researchers have suggested that generalization may increase over time when more exemplars have been presented. Stokes and Baer (1977) referred to the training of multiple examples of a new skill as training sufficient exemplars. In this study, only one example of a new skill was trained. Training multiple examples may require the allocation of more time on the part of the trainer, in this case, the paraprofessional.

Finally, approximately two and a half weeks was needed to implement the functional analysis conditions. Whereas the results are necessary to determine the function of the aberrant behavior, this required disruption of the classroom environment. This disruption of schedules could have affected the results of the functional analyses. Also, for classroom teachers, the implementation of a functional analysis may not be a feasible step in the FCT process (Mancil, 2010).

**Recommendations for Future Research**

The single subject research study found positive effects of FCT on the unprompted communication of two of the children with ASD. Also, the intervention successfully decreased the aberrant behaviors of the participants. The results of the study do provide possible implications for future research.

First, researchers in future studies should focus on implementation of the interventions by the paraprofessional with children with ASD. Research indicates that availability and adequacy of training for paraprofessionals remains a persistent need
(Giangreco, Broer, & Edelman, 2002). School districts need to ensure that the professionals working with students with ASD have the training and expertise necessary to provide instructional support (Yell, Katsiyannis, Drasgow, & Herbst, 2003). As more of these services are being provided by paraprofessionals, researchers should address the ability of paraprofessionals to implement function-based interventions with students with ASD.

Second, the use of preference assessments to determine the communicative response used during FCT should be explored. Researchers have consistently demonstrated the success of FCT (e.g., Wacker et al., 2005), but few researchers have addressed participant preference for a specific communicative response when describing how the response was chosen (Winborn-Kemmerer et al., 2009). Environments that encourage choice making improve the outcomes of FCT (Durand & Merges, 2001). Future research should also address whether participant preference of the communicative response is related to the maintenance of the response.

Third, researchers should further examine generalization of the communicative response. There is insufficient information in the literature about generalization and maintenance effects of problem behavior interventions for young children with ASD (Horner et al., 2002). Researchers in future studies should investigate the factors that support the generalization of outcomes of FCT in naturally occurring environments of children with ASD. Activities such as lunchtime and playground activities provide opportunities for students to communicate and interact socially with other students.
Finally, studies should be conducted to determine if indirect functional behavioral assessments could be successfully used to identify the function of the aberrant behavior. Because the functional analysis conditions for each child require a substantial amount of time for implementation, some classroom teachers may be hesitant to implement an intervention such as FCT.

**Summary**

Researchers have documented the success of FCT with students with ASD. This single-subject study extends the research on FCT by documenting the outcomes of an intervention implemented by the paraprofessional. Because paraprofessionals are often assigned as the primary support mechanism for students with ASD (Giangreco, 2009), adequate training is essential. In this study, the paraprofessionals were successfully trained to implement FCT with young students with ASD. FCT resulted in increased unprompted communication in two of the participants and decreased aberrant behavior for all of the participants.

Based on the results, the study provides directions for future studies in FCT. Researchers should focus on participant preference as one of the factors in determining the communicative response trained. This is one of the factors that researchers need to consider to help ensure that FCT is an effective intervention.

Functional, spontaneous communication should be the primary focus of early education for children with autism spectrum disorder. Classrooms should employ teaching techniques that emphasize both verbal and alternative forms of functional communication (National Research Council, 2001). Even though there is no “one size
fits all” approach for interventions for children for ASD, this study provides support for FCT as function based intervention that may be implemented in classrooms to improve communication skills. The study also provides documentation that paraprofessionals, when provided adequate training, can effectively implement FCT to produce positive student outcomes.
APPENDICES
Appendix A

Functional Analysis Procedures

Free Play (Control):

1. Child is allowed access to preferred toys and neutral activities
2. Researcher/teacher provides non-contingent attention to the child (approximately 3 – 5 times/min)
3. No instructional demands are placed on the child
4. Assumption is problem behavior should not occur in this condition

Tangible:

1. Child is allowed access to preferred item (determined by preference assessment)
2. Researcher/teacher removes item after a set interval of 30s
3. Upon demonstration of a disruptive behavior, researcher/teacher presents the child with the item and says, “Now it is your turn with the ______”
4. After 30 s, the item is removed again and the researcher/teacher says, “Now it is my turn with the ______”
5. Demonstration of the behavior results in the item being returned to the child
6. No other demands are presented to the child
7. All other behaviors which do not meet the response criteria are ignored
8. Researcher/teacher provides non-contingent attention to the child on a fixed 30s interval

Attention:
1. Researcher/teacher maintains a distance of three – six feet from the child and pretend to be occupied with paperwork

2. Child is provided access to a neutral activity – no other demands are presented

3. When the disruptive behavior occurs, researcher/teacher will approach the student and give a verbal reprimand (e.g., “Please don’t do that”, “That is against the rules”) and place a hand on the child’s shoulder

4. When no disruptive behavior occurs, the researcher/teacher does not engage in social attention

**Escape**

1. A demanding task is presented to the child (Verbal modeling and instructions are provided at the beginning of the session)

2. If there is no response by the child after 5 s, the demand is repeated until the child completes the task or engages in the disruptive behavior

3. When the disruptive behavior occurs, the task is removed for 30 s (Researcher/teacher states, “Time for a break”)

4. Following the break, the demand is presented again

5. Researcher/teacher provided non-contingent attention to the child on a fixed 30 s interval

**Note:** In all conditions, environmental variables (e.g., location, people) are held constant. If the child poses harm to himself/herself or others in the room, immediately end the session.
Appendix B

Treatment Integrity

Record a “+” if the specific procedure is followed, “ – “ if the procedure is not followed. Record “NA” if the procedure is not needed.

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<th>Stimulus Presented</th>
<th>Reinforcement Provided</th>
<th>Prompts Used Correctly</th>
<th>Extinction Procedures</th>
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</table>

1. **Materials Ready** - Are the materials needed for the session ready?

2. **Stimulus Presented** - Is the stimulus presented correctly to the child?

3. **Reinforcement Provided** - Is reinforcement provided for the correct communication response?
4. **Prompts Used Correctly** – Are prompts used correctly? (i.e., correct levels of prompts used)

5. **Extinction Procedures** - Are behaviors ignored?
Appendix C

Social Validity

Intervention Rating Profile – 15 (IRP-15)

The purpose of this questionnaire is to obtain information that will aid in the selection of classroom interventions. These interventions will be used by teachers of children with behavior problems. Please circle the number that best describes your agreement or disagreement with each statement using the scale below.

1 = strongly disagree  2 = disagree  3 = slightly disagree  4 = slightly disagree  5 = agree  6 = strongly agree

1. This would be an acceptable intervention for the child’s problem behavior.  1 2 3 4 5 6

2. Most teachers would find this intervention appropriate for behavior problems in addition to the one described.  1 2 3 4 5 6

3. This intervention should prove effective in changing the child’s problem behavior.  1 2 3 4 5 6

4. I would suggest the use of this intervention to other teachers.  1 2 3 4 5 6

5. The child’s problem behavior is severe enough to warrant use of this intervention.  1 2 3 4 5 6

6. Most teachers would find this intervention suitable for the behavior problem described.  1 2 3 4 5 6

7. I would be willing to use this intervention in the classroom setting.  1 2 3 4 5 6

8. This intervention would not result in negative side effects for the child.  1 2 3 4 5 6

9. This intervention would be appropriate for a variety of children.  1 2 3 4 5 6

10. This intervention is consistent with those I have used in classroom settings.  1 2 3 4 5 6

11. The intervention was a fair way to handle the child’s behavior problem.  1 2 3 4 5 6
12. This intervention is reasonable for the behavior problem described.

13. I liked the procedures used in this intervention.

14. This intervention was a good way to handle this child’s behavior problem.

15. Overall, this intervention would be beneficial for the child.
Appendix D

Paraprofessional Survey

Student:
Paraprofessional Name:

1. Age: ________

2. Education:
   Please indicate the highest degree received:
   
   □ None.
   □ High School Diploma.
   □ Technical School Degree.
   □ Bachelors Degree.
   □ Masters.
   □ Post Masters.

3. How many years’ experience do you have working in a program for children with autism? ________ years

4. Research Experience: Have you participated in any other research studies?

   □ Yes
   □ No

   If so, how many? ________

5. Trainings completed: How many trainings/in-services have you attended this year?

   □ 0 – 3
   □ 4 – 6
   □ 7 – 9
   □ 10 or more

   Please indicate the names of trainings you have completed:
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
6. What other trainings do you think would be beneficial?
Appendix E

Miscellaneous Data Collection Sheets

Interval Recording Sheet

Student: ________________________      Interval Length: ____________(seconds)

Target Behavior: ________________________________________________________________

_____Baseline              _____Intervention

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**Student:** ______________________  **Date:** ________________

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**Prompt**
REFERENCES


Giangreco, M. F., Broer, S. M. & Edelman, S. W. (2002). “That was then, this is now!” Paraprofessional supports for students with disabilities in general education classrooms. *Exceptionality, 10*, 47-64.


