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Evaluating the effects of functional communication training for preschool children with autism

Jane Bambrick
California State University, Monterey Bay

EVALUATING THE EFFECTS OF FUNCTIONAL COMMUNICATION TRAINING FOR PRESCHOOL CHILDREN WITH AUTISM

By

Jane Bambrick

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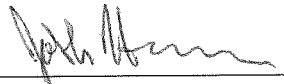
APPROVED BY THE GRADUATE ADVISORY COMMITTEE



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GRADUATE ADVISOR

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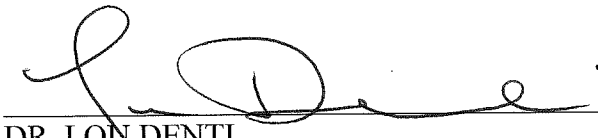

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DR. LOU DENTI
CULMINATING MAE PROJECT INSTRUCTOR

DATE

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Abstract

Evaluating the Effects of Functional Communication Training for Preschool Children with Autism

By

Jane Bambrick

Dr. Josh Harrower, Thesis Chair

Associate Professor of Special Education

California State University, Monterey Bay

This study investigated the effects of Functional Communication Training (FCT) on the communicative responses of young children with autism in a self-contained public preschool classroom. The study utilized a picture symbol as the mode of communication to teach appropriate communicative responses to three participants. The research was conducted during Circle Time in ten minute sessions. Appropriate communicative responses were taught as a replacement to problem behavior. A Functional Behavioral Assessment (FBA) was used to determine the function of the behavior and to develop an appropriate communicative response. Overall, results indicated that FCT was an effective intervention strategy for teachers to use in a self-contained public preschool classroom to teach appropriate communicative responses as a replacement for problem behavior for preschool children with autism.

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CHAPTER 1

Introduction

The Problem Statement

Teaching children with severe problem behaviors is the most challenging part of my profession. I teach young children with moderate to severe disabilities who have limited communicative ability in a self-contained public preschool classroom. Some of the children exhibit severe problem behaviors such as aggression, self-injury, or tantrums that disrupt the learning environment and impede their ability to learn. Children that continue to exhibit severe problem behaviors may limit their opportunities for less restrictive settings (Eyman & Borthwick, 1980; Eyman & Call, 1977) and may significantly restrict their lives (Durand & Carr, 1989). Also, children with severe behaviors have met with unfavorable long-term outcomes, and in some cases this has led to institutionalization (Quay, 1979).

The communicative skills of students with autism are often compromised due to their disability. Using picture symbols to encourage communication with preschool students with compromised language ability has proven to be successful in decreasing stereotypical and negative behaviors such as hand flapping, yelling, screaming, crying, biting, and hitting (Frost & Bondy, 2002). These methods have a strong empirical base and are used by special educators to develop appropriate communication skills, but there is still a need to know more about the specific picture exchange method and how it relates to problem behavior and appropriate communicative responses. This will lead to a better understanding of how to develop language and positive social interactions in students.

Purpose of the Study

The purpose of this study was to test the efficacy of Functional Communication Training (FCT), utilizing a picture symbol as the mode of communication, in the classroom setting and to show that FCT can be an intervention choice for teachers that are faced with teaching young children with problem behaviors. FCT research was first published in the literature in 1985 (FCT; Carr & Durand, 1985). This intervention studied the effects of teaching a functionally equivalent verbal response as a replacement for severe problem behavior; this study has received significant empirical support since that time (Brown et al., 2000). Problem behaviors in children have been linked to the presence of adverse stimuli or as a means to receive attention (Carr & Durand, 1985). FCT teaches a replacement behavior which results in the same reinforcement that is responsible for maintaining the problem behavior (Fisher, Kuhn, & Thompson, 1998). Durand (1999) successfully utilized Functional Communication Training to reduce disruptive behaviors in children with severe disabilities with the use of assistive devices. The training was conducted across home and community settings with significant outcomes. The results were socially significant because the skills that were taught in the school setting recruited reinforcement in the natural setting, which promoted generalization and maintenance of intervention effects (Cooper, Heron, & Heward, 2007).

The young children that I teach are diverse. They are of different races and ethnicities. Some have spoken different languages, including Spanish and Middle Eastern dialects. Their families have been single, extended, and nuclear family units, but some have a commonality; they have a child with problem behavior which impedes their ability to communicate and learn. Implementing a strategy that will develop communicative abilities, decrease problem behaviors, and encourage appropriate behavior that may transfer across settings and maintain over time has

the potential to greatly benefit the young children both socially and academically. FCT can benefit the children socially by providing an appropriate way of interaction with their peers and teachers and academically by encouraging positive social interactions that are needed during instructional times. Without appropriate communicative and behavioral skills children may limit their learning potential as well as in their opportunities for mainstreaming and inclusion (Eyman & Borthwick, 1980; Eyman & Call, 1977).

Under the Individual with Disabilities Education Act (IDEA), individuals are entitled to receive appropriate educational services that will improve their quality of life. A Free Appropriate Public Education (FAPE) must include teaching strategies that functionally benefit the children. FCT will functionally improve quality of life for children by decreasing problem behaviors and increasing appropriate communicative responses. The results of this study show that Functional Communication Training, using a picture symbol as the alternative communicative response, is an effective intervention choice for educators of young preschool children with problem behavior. This research study can guide educators in the process of implementing this intervention strategy in the classroom setting.

Personal Experience

I am a Special Education Teacher who has been teaching children with moderate to severe disabilities for the past nine years. Seven of those years have been at the Early Childhood Education Center, with children on the autism spectrum or with related disabilities. Problem behavior usually accompanies the characteristics and symptoms of autism which impede their ability to learn. Therefore, intervention strategies to extinguish problem behavior have been of the greatest priority. My Education Specialist and Early Childhood Special Education teacher credentials combined with board certification as a Board Certified assistant Behavior Analyst

(BCaBA), which documents my training in the field of applied behavior analysis, has led me to the decision to implement this study.

Theoretical Model

Applied Behavior Analysis (ABA) is a science dedicated to applying behavioral principles to address important social issues (Cooper, Heron, & Heward, 2007). ABA is the result of more than three-quarters of a century of research on the science of behavior. The field scientifically studies human behavior, explores the relationship between humans and the environment, and has given us an understanding of why we behave as we do. ABA strategies have been used successfully since the 1960s, to teach individuals with intellectual disabilities. It has become one of the recommended evidence based practices for teaching individuals on the autism spectrum (National Research Council, 2010) while remaining an effective intervention choice for any individual with special needs.

Positive Behavior Support (PBS) is an applied science that emerged from the field of ABA (Carr, 2002). PBS uses ABA strategies to analyze and treat behavior, but focuses on the selection of meaningful skills for intervention to promote the individual's overall quality of life. A functional behavior assessment (FBA) is a strategy used to determine behavior function and antecedent strategies are used for intervention treatment. FBAs' study antecedent-behavior-consequence relationships to understand function, which determine behavior purpose (i.e., escape or attention) and motivation. Knowing behavior function facilitates intervention planning to change behavior. Antecedent interventions based on motivation or motivating operations (MOs) are utilized to change behavior. Interventions using MOs manipulate the environment, stimulus, object, or event to produce behavior change (Cooper, Heron, & Heward, 2007).

These important theoretical methods served as catalysts for research centers to study the effectiveness of ABA and PBS fostering a new paradigm known as Positive Behavioral Interventions and Supports (PBIS). PBIS was developed by behavior analysts Horner, Sugai, Carr, and Dunlap (Cooper, Heron, & Heward, 2007). The U.S. Department of Education, Office of Special Education program's Technical Assistance Center on PBIS also advocates the use of the functional analysis and pro-active antecedent interventions to effectively treat students with problem behavior. FCT is a positive behavior support strategy that utilizes ABA ideology by conducting an FBA to determine behavior function and an antecedent intervention to teach a pro-social skill to replace the problem behavior. FCT is a procedure with a rich ABA background that can be used effectively in the classroom setting to support students. The center for Positive Behavioral Interventions and Supports promotes evidence based education practices to encourage inclusion of students with moderate to severe disabilities in general education and community settings.

Research Questions

Based on my interest in this subject, the questions are:

- In what ways will Functional Communication Training using a picture symbol as the communicative response impact the rates of problem behavior and frequency of appropriate communicative responses among preschool children with autism?
- How will any documented gains be maintained over time?

Definition of Terms

- **Functional Communication Training (FCT):** An intervention that focuses on eliminating severe behaviors such as tantrums, aggression, and self-injury, behaviors that

could disrupt the educational process and jeopardize the safety of the child or their peers (Carr & Durand, 1985).

- **Generalization:** When the newly trained behavior is seen in situations or with people that are different than those in the trained scenario (Baer, Wolf, & Risely, 1968).
- **Maintenance:** When the child continues to perform the newly trained behavior after the intervention has been terminated (Stokes & Baer, 1977).
- **Severe Problem Behaviors:** Behaviors that significantly interfere with learning, cause physical or emotional harm to self or others, such as tantrums, aggression, or self-injurious behavior (Meyer & Evans, 1989).
- **Picture Exchange Communication System (PECS):** The use of picture cards or icons that are used to facilitate communication in individuals with limited communicative ability (Frost & Bondy, 2002).

CHAPTER 2

Literature Review

Introduction

The purpose of this research was to study the impact of Functional Communication Training (FCT) using a picture symbol as the communicative response on a young child's severe problem behaviors in a self-contained public preschool classroom. This literature review forms the basis of this study and investigates the specific research questions that concern: 1) the impact of Functional Communication Training on the frequency of a young child's use of appropriate communicative responses; and 2) if the skills are maintained over time. Following is a review of the literature as it relates to the research questions. The organization is as follows: Research on Functional Communication Training, Generalization and Maintenance, and a Chapter Summary.

Functional Communication Training

It is hypothesized that problem behaviors may be a means of nonverbal communication (Carr & Durand, 1985). Carr & Durand tested this hypothesis in their research study that was published in the literature in 1985. The study used FCT to eliminate severe problem behaviors such as tantrums, aggression, and self-injury, behaviors that could disrupt the educational process and jeopardize the safety of the child or their peers (Carr & Durand, 1985). FCT has been effective with the reduction of severe problem behaviors (Carr & Durand, 1985) because behavior function is matched to the consequence and density schedule of reinforcement and the children were placed in an active role by being taught to make appropriate requests which control their access to reinforcement (Wacker et al., 1990). FCT is an antecedent intervention that uses differential reinforcement of the alternative behavior or new communicative response to develop the new communicative skill. This reinforcement competes with the problem behavior making it obsolete (Copper, Heron, & Heward, 2007).

FCT is a two-step process consisting of: 1) completing a functional behavioral assessment to determine the behavior function, and 2) developing an appropriate alternative response that will provide the same result. Matching behavior function to the consequence is obtained through a functional behavioral assessment (FBA; Iwata et al., 1994). FBA is an empirically based assessment procedure that is designed and used to find the function or purpose of a behavior. It specifically investigates the relationship between the behavior and the types of environmental effects (Cooper, Heron, & Heward, 2007). When combining the use of FBA to identify behavior contingencies with FCT to replace the behavior, the results were a powerful intervention approach that produced positive communicative skills within relatively few treatment trials (Wacker, et al., 1990).

A FBA will determine if the behaviors under investigation are maintained by positive or negative reinforcement (Cooper, Heron, & Heward, 2007). A behavior that is maintained by positive social reinforcement is a behavior that results in immediate attention from others. A behavior that is maintained by negative social reinforcement is a behavior that results in escape, withdrawal, termination, or postponing of aversive events, requests, or demands from others (Cooper, Heron, & Heward, 2007). Identifying the type of reinforcement will determine the appropriate communicative replacement response. For example, a problem behavior that serves the function of positive social reinforcement or attention may be replaced with a communicative card that requests a response from another person. A problem behavior that serves the function of negative social reinforcement or escape may be replaced with a communicative card that requests a "break". Regardless of the function of the behavior, a FBA will indicate the cause and a replacement behavior can then be introduced that matches the same function (Cooper, Heron, & Heward, 2007).

In addition to utilizing FBA to identify matching behavior functions, FCT is most effective when combined with other behavior-reducing intervention strategies such as extinction (Shirley, Iwata, Kahng, Mazaleski, & Lerman, 1997). Extinction involves immediately withholding reinforcement in the presence of a behavior that was previously reinforced (Cooper, Heron, & Heward, 2007). When implementing FCT, extinction involves withholding reinforcement for problem behaviors and providing reinforcement only for the communicative replacement response (Wacker et al., 1990). However, extinction may not be necessary, if the alternative communicative response receives the same rate of reinforcement as the severe behavior (e.g., a fixed-ratio schedule 1 or FR 1; Worsdell, Iwata, Hanley, Thompson, & Kahang, 2000).

The density schedule of reinforcement refers to the rate in which the reinforcers (i.e., attention or positive social reinforcement and escape or negative social reinforcement) are delivered to the child. Research guidelines suggest that the replacement behavior should generate a continuous or dense rate of reinforcement during the acquisition phases of the training (Cooper, Heron, & Heward, 2007). The child should immediately receive either attention or escape every time they display the appropriate communicative response, especially during the early intervention or acquisition stage (Cooper, Heron, & Heward, 2007).

During FCT, the child plays an active role that controls the frequency of the reinforcement. This is an important aspect of FCT and contributes to its success. Teaching the child an appropriate communicative response that produces a high rate of reinforcement will place the child in control over the delivery or frequency of reinforcement making the severe behavior unnecessary (Wacker et al., 1990).

Picture cards have been used successfully as communicative responses in FCT studies to replace problem behavior (Doughty and Anderson, 2006; Mancil, Conroy, & Nakao 2006). The problem behaviors functioned as both negative and positive social reinforcement. Problem behavior topography was in the form of aggression, self-injury, and tantrums. The studies that used FCT for positive social reinforcement utilized picture cards in the following ways: participants were taught to exchange a picture card depicting individuals at play and the written word "play" to request attention (Doughty and Anderson, 2006). Picture and word cards have been used with a microswitch as a communicative response to access toys (Harding et al., 2009) and again as communicative responses for participants to access toys and objects (Mancil, Conroy, & Nakao 2006). Lalli, Casey, & Kates (1995) taught participants to use picture cards to receive escape or negative social reinforcement in the form of "breaks".

Generalization and Maintenance of Skills

Generalization and maintenance of the behavior change refers to the behavior change lasting over time, appearing in different environments or settings, and spreading to other related behaviors (Baer, Wolf, & Risely, 1968). This includes untrained scenarios such as people, settings, subjects, behaviors, and/or time, including the withdrawal of intervention supports and conditions (Stokes & Baer, 1977). Some basic strategies that have been used during teaching trials to promote generalization have been the use of functional and relevant stimuli including objects, items, and situations (Stokes & Baer, 1977).

When the child continues to use the intervention strategy, after the intervention has been withdrawn, that strategy is considered to have attained maintenance. Maintenance is one of the most important challenges of an intervention (Horner, Dunlap, & Koegel, 1988). An intervention is truly effective if it maintains outside of the treatment setting (Durand & Carr, 1991).

Fading the reinforcement schedule is an important part of maintenance. One study used a continuous rate of reinforcement during the acquisition phase before using a Fixed Interval (FI) schedule to fade reinforcement and promote maintenance (Hanley, Iwata, & Thompson, 2001). FI schedules provide reinforcement for the first response emitted after a fixed amount of time has elapsed since the previous reinforcement (Cooper, Heron, & Heward, 2007). In the Hanley et al. study (2001) a FI schedule maintained the contingency between responding and reinforcement. The Hanley et al., (2001) study also used picture cards and external clocks as a way to control a high rate of the communicative response and to signal to the child that reinforcement was available or not (Worsdell, Iwata, Hanley, Thompson, & Kahang, 2000). A microswitch and card served as visual discriminative stimuli that reinforcement was available during the Harding et al., (2009) study. The picture cards would then make fading the rate of the alternative communicative response unnecessary as their presence would indicate that reinforcement is available.

Summary

FCT is an intervention strategy that first appeared in the literature in the 1980s (Carr & Durand, 1985) and has been shown to have the potential to change the lives of young children with problem behavior. This strategy can benefit the children by improving their communicative skills (Carr & Durand, 1985). FCT has also provided an opportunity for generalization and maintenance because it recruits reinforcement in other settings including the home (Cooper, Heron, & Heward, 2007). For children with limited verbal skills, the use of an alternative mode of communication, such as a picture symbol, has the potential to enhance communication despite the difficulties in using verbal skills (Frost & Bondy, 2002). Therefore, the purpose of this study was to examine the effects of FCT using the exchange of a picture symbol as the appropriate

communicative response on the frequency of appropriate and problem behavior among preschool children with moderate to severe disabilities in a self-contained public school classroom. Anticipated results include improvement in socially appropriate communication skills, along with decreases in problem behavior.

CHAPTER 3

Methodology

]Purpose

The purpose of the study was to investigate the effects of utilizing a picture symbol as the communication mode within a Functional Communication Training (FCT) procedure on the problem behaviors of young children with moderate to severe disabilities, in a self-contained public preschool classroom. The effect was determined by changes in the child's appropriate and inappropriate communicative responses, which is derived from baseline and intervention data collection measures. The participants' problem behaviors and use of appropriate communicative responses in baseline were compared to the data taken while the Functional Communication Training (FCT) was implemented to determine the effectiveness of FCT. The methodology is discussed as follows: Participants, Setting, Research Design, Procedure, and a Chapter Summary.

Participants

There were three participants in the study. They were between three and four years of age, one male and two females. The participants have moderate to severe disabilities, limited communicative ability, and qualify for special education services under the category of Autism and/or Language and Speech impairment.

Kay. The first participant was Kay. Kay was 3 years 3 months of age at the time of the study. She qualified for special education services under the primary disability of Autism and secondary disability of Speech and Language impairment. She was 2 years 4 months of age when she qualified for special education services under an Individual Family Service Plan (IFSP). The most recent integrated assessment report was completed at 2 years 4 months of age by the school

psychologist, speech therapist, and early intervention teacher. A notation was made indicating that Kay passed a hearing test given by an audiologist. Kay's primary language is Spanish and all tests were administered in her primary language. The Hawaii Early Learning Profile (HELP), Preschool Language Scale, Spanish Version (PLS-3), and Brigance Inventory of Early Development, Revised (Brigance) were administered. The results indicated that Kay's cognition level was at 18 months of age, Auditory Comprehension at 10 months of age, Expressive Communication at 2 years 0 months of age, General Speech and Language Development at 1 year 5 months of age, and Length of sentence, less than 2 words, below 2 years of age. Kay demonstrated a 34% delay in her cognitive skills, 63% delay in receptive language, and a mild delay in expressive language. At the time of the study, Kay was receiving special education services at the Early Childhood Education Center in a special day class with Speech and Language Therapy.

Dee. The second participant was Dee. Dee was 3 years 10 months of age at the time of the study. She qualified for special education services under the primary disability of Speech and Language Impairment. Dee received a medical diagnosis of Autism through a private psychologist who completed the Pervasive Developmental Disorder Behavioral Inventory (PDD) with her parents. She was 2 years 10 months of age when she qualified for special education services under an Individual Family Service Plan (IFSP). The most recent integrated assessment report was completed at 3 years of age by the school psychologist, speech therapist, and early intervention teacher. A notation was made that results were inconclusive pending an official hearing evaluation. Dee's primary language is Spanish and all tests were administered in her primary language. The Wechsler Preschool and primary Scale of Intelligence-Third Edition (WPPSI-III), Developmental Test of Visual-Motor Integration (VMI), The Scales of

Independent behavior-Revised (SIB-R), and Gilliam Autism Rating Scale-Second Edition (GARS-2). Dee was unable to perform tasks on the cognitive evaluation during the time of testing. Her Broad Independence level was at 8 months of age, Language Comprehension at 1 year 1 month of age, and Language Expression at 6 months of age. The GARS-II was completed by parents and teacher, Parent results indicated a very likely probability of Autism with an index of 111 (85 and higher on the index scale indicates very likely probability). Teacher results indicated a very likely probability of Autism with an index of 115. At the time of the study, Dee was receiving special education services at the Early Childhood Education Center in a special day class with Speech and Language Therapy.

Fred. The third participant was Fred. Fred was 3 years 4 months of age at the time of the study. He qualified for special education services under the primary disability of Autism and secondary disability of Speech and Language Impairment. He was 2 years 4 months of age when he qualified for special education services under an Individual Family Service Plan (IFSP). The most recent integrated assessment report was completed at 3 years 1 month of age by the school psychologist, speech therapist, and early intervention teacher. There is no notation regarding a hearing test. Fred's primary language is Spanish and all tests were administered in his primary language. The Batelle Developmental Inventory-2nd Edition (BDI-2) Cognitive Subtests, Vineland Adaptive scale-second Edition, Gilliam Autism Rating Scale-Second Edition GARS-2), Preschool Language Scale-4 (PLS-4), and Brigance Inventory of Early Development, Revised (Brigance) were administered. The results indicated a standard score of 60 on the cognitive index, an Adaptive Behavior composite of 83 standard score, GARS-2 scores indicating a very likely probability of Autism from teacher with a score of 112 and possible presence of Autism with a score of 82 (scores of 85 or higher indicating very likely probability), Auditory

Comprehension at 15 months of age, Expressive Communication at 13 months of age, and Receptive Language at 10 months of age. Fred demonstrated a 31% delay in Receptive Language and a 51% delay in Expressive Language. At the time of the study, Fred was receiving special education services at the Early Childhood Education Center in a special day class with Speech and Language Therapy.

Setting

All of the children were enrolled in a self-contained special day class at an Early Childhood Education Center. They were exposed to the typical conditions of a self-contained special education preschool classroom. The study was conducted during small group instruction, referred to as Circle Time. Data was collected during the first ten-minutes of Circle Time. There was one teacher and two instructional assistants present. The participants sat side by side in chairs facing the teacher. The instructional assistants were positioned behind the students.

Curriculum and activities were based on individual goals and objectives within an age appropriate theme. The basic format of the Circle routine remained the same throughout all phases of the study. It began with a welcome song, the teacher saying "Hello" to each child, reviewing their names and ages, and then reading a children's book. The four activities took approximately 10 minutes. The children were prompted to say "hello", shake hands, recognize a card with their name printed on it, point to the letters of their name using a finger puppet, point to a card with their age written on it, and listen to a children's book as it was read. During the baseline stage the Circle Time routine remained exactly the same for every session. The activities were presented in the same manner each day. Only in the intervention phase were the specific activities within the routine altered, based on the appropriate communicative responses emitted by the participants.

Research Design

The study was a quantitative, single-case design utilizing a multiple-baseline-across-participants methodology (Kennedy, 2005). This design was selected because of its ability to demonstrate whether or not an intervention influences a specific behavior and thus the existence of a functional relationship between the dependent and independent variables. Experimental control is established in multiple baseline designs when changes in behavior are reliably produced by establishing the initial frequency of the dependent variable, introducing the independent variable, and comparing the frequency rates during each condition (Kennedy, 2005). In this case, the multiple-baseline-across-participants design evaluated the effect of FCT on appropriate communicative responses and problem behavior.

A multiple-baseline-across-participants design is an A-B design used when the intervention is not removed, but rather implemented in a staggered fashion across multiple participants. A multiple baseline design is preferred in interventions when withdrawal is not ethical or when behavior is not reversible, and was therefore utilized in this study. The initial frequency of the dependent variable or problem behavior was gathered across all participants, simultaneously, during baseline and intervention phases. There is a minimum of two tiers or two participants for this design to demonstrate experimental control. There were three participants in this study. Intervention phases were initiated in a staggered fashion across participants to show functional independence. Functional independence shows that an intervention introduced on one tier does not affect behavior on another tier and that experimental control has been established

(Kennedy, 2005). This study was conducted over a 5 ½ week period of time with 1 ten-minute maintenance probe conducted at 8 weeks following the intervention phase.

Dependent Variable. The dependent variables were the children's problem behavior or appropriate communicative responses. Problem Behavior is defined under the categories of tantrums, aggression, or self-injury. Tantrums include throwing objects or materials, climbing on furniture, crawling under furniture, running away, crying, screaming, or throwing self on the floor. Aggression includes hitting, kicking, or biting another individual. Self-injury is hitting or biting self. An appropriate prompted communicative response is defined as the child making a request using a picture symbol as the communication mode within one 30-s interval of a specific prompt (e.g., "Touch the card," "Say break," or physically assisted exchange). An appropriate unprompted communicative response is defined as the child making a request using a picture symbol as the communication mode to obtain attention from another individual, access to an object, or to request escape from social demands that are made in the absence of an adult prompt.

Independent Variable. Functional Communication Training (FCT; Carr & Durand, 1985) was the antecedent intervention used to develop the new communicative skill that replaced the problem behavior. Based on the results of a Functional Behavioral Assessment (FBA) using descriptive methods and the individual skills of the child, an appropriate communicative replacement behavior was introduced in the form of a picture symbol as the mode of communication.

Procedure

Baseline. During Baseline, and all other phrases of the study, the participants were in small group instruction (i.e., 1 teacher to 3 children) during an activity referred to as Circle Time.

Instructional activities were based on the individual goals and objectives of each participant, within an age appropriate theme, modified to their ability. Direct observations were made during the ten-minute period of time and if there was an occurrence of an appropriate communicative response or problem behavior a time interval was checked on a data collection sheet (see Appendix A) that was used to establish levels of responses prior to the initiation of the training. Data was taken concurrently on all participants, using partial-interval recording at 30-second intervals. An interval was marked as an occurrence if the child exhibited problem behavior or an appropriate communicative response at least once during the specified interval.

At the start of the study there were two participants, Kay and Dee. Baseline data was taken simultaneously on both participants for 5 sessions before FCT intervention strategies were introduced for Kay. Dee's baseline data measures were taken for 4 more sessions before FCT intervention strategies were introduced for her. Fred joined the study on session 10 of the study. His Baseline data was taken for 4 sessions before FCT intervention strategies were introduced.

Functional Behavioral Assessment. A Functional Behavior Assessment (FBA) using descriptive methods was used to determine the maintaining conditions and function of the problem behavior (Cooper, Heron, & Cooper, 2007). Narrative descriptions of the participants during Circle Time activities were recorded on data collection sheets (see Appendix B) and the information was analyzed to determine the relationship between antecedent-behavior-consequence and the function of the behavior (i.e., negative or positive social reinforcement). Interviews were conducted with classroom staff to provide general information and to provide a preference assessment.

Kay's problem behavior was defined as crying, screaming, getting out of seat, throwing self on floor, grabbing at objects or taking items away from a peer or an adult. Kay's FBA

indicated that her problem behavior served both social positive and negative reinforcement. Her behavior function was access and escape motivated. Kay would exhibit the problem behaviors to access items during instructional activities or escape instructional demands. When a less preferred activity was introduced Kay would scream, cry, and/or throw self on floor in order to escape participation in the activity. She would grab, scream and/or throw self on floor if she could not gain access to a denied object.

Dee's problem behavior was kicking at an adult, screaming, throwing her body back and crying. Dee's FBA indicated that her problem behavior served both social positive and negative reinforcement. Her behavior function was access and escape motivated. Dee would exhibit the problem behaviors to access items or toys during instructional activities and to escape instructional demands. Dee would scream, throw her body back and cry if denied access to or directed to put an object or toys away. She would kick at an adult and scream if prompted to take a less preferred item or engage in an activity.

Fred's problem behavior was running away from the group, jumping up and grabbing at objects or items, and crying. Fred's FBA indicated that his behavior served both social positive and negative reinforcement. His behavior function was access and escape motivated. Fred would exhibit the problem behaviors to access objects or items and to escape instructional demands. Fred would cry and grab at an object if denied access. He would run away from the group if prompted to engage in a less preferred activity.

Intervention: Functional Communication Training. Based on the results of a Functional Behavioral Assessment (FBA) using descriptive methods and consideration for the individual skills of the child, an appropriate communicative replacement behavior was introduced to the participant and taught in context, during the Circle Time activity. The results of

the FBA indicated that both social positive and negative reinforcement maintained the problem behavior under specific environmental conditions (described in the FBA section above). During the Functional Communication Training (FCT) phase or intervention phase, an appropriate communicative response serving the same hypothesized function as the problem behavior was taught. When similar conditions were present during Circle Time activities that would elicit problem behaviors the participants were taught to use a picture symbol as the appropriate communication mode. The FCT procedure used picture symbols and methodology taken from the Picture Exchange Communication System (PECS; Frost & Bondy, 2002). Using similar guidelines outlined in PECS each participant was taught to exchange a picture symbol to gain access to activities or objects and escape from activities or demands. Most-to-Least Prompting and backward chaining (Cooper, Heron, & Heward, 2007) were used to develop initiations and increase the independent use of the picture exchange. Most-to-Least Prompting provides guidance through the entire process before withdrawing guidance. Backward chaining refers to guidance being withheld from the last step first, before the preceding steps.

Potential reinforcing activities for the participants were identified during the baseline phase through direct observation and interviews with the classroom staff. The preferred activities of the students ranged from books with an accompanying song, to objects and manipulatives. Kay's preferred books with an accompanying song were "5 Little Ducks", "This Old Man", and "Wheels on the Bus". Dee's preferred activities were to hold small plastic toy objects. Fred's preferred activity was the song "Slippery Fish" with accompanying sea animals. The books and songs could take between 5 to 8 minutes to complete. Therefore, if the preferred activity was a book with song, there were only one or two opportunities per session for the students to emit an appropriate communicative response. When problem behavior served as negative social

reinforcement or escape from instructional demands or activities, a card with "No thanks" was introduced as the appropriate communicative response. In both conditions, problem behavior was placed on extinction, a procedure of withholding reinforcers that maintain behavior. Instead, the participants were led through the picture exchange process.

The participants were physically guided by a staff member that acted like a "shadow" through the steps of making the communicative response. They guided the participants in picking up the card and delivering it to the communicative partner. Guidance was withdrawn one step at a time, starting with the last step until the participant could independently complete the communicative response independently and unassisted. The communicative steps are: pick-up card, extend arm towards partner, pass card to partner. All training sessions were conducted during Circle Time in response to the environmental stimuli. During this phase the participants received a continuous rate of reinforcement for prompted and unprompted responses. The reinforcement contingencies identified by the FBA were withheld following instances of problem behavior (i.e. extinction). Rather, in response to problem behavior, an error correction procedure was implemented to reduce the occurrence of problem behavior and to promote the participants' use of appropriate communicative response. This procedure consisted of the steps outlined above (i.e., guidance through the replacement response).

Maintenance. At 8 weeks following the final session of the FCT Intervention phase, data was collected on the frequency of the dependent variable to check for maintenance of treatment gains. All session conditions were identical to those in the Intervention phase, except that all prompts for use of the communicative exchange were absent.

Termination Criteria. During all phases of the study a session termination criteria was established in order to avoid extended periods of time engaged in problem behavior. The

termination criterion was as follows: if the child exhibited 4 consecutive minutes of disruptive behavior during any phase of the study, the session was terminated. Terminated sessions were to be indicated on the graph with an asterisk beside the data point for that session. The data point for that session would then indicate the frequency of the dependent variable obtained prior to the termination of the session. However, throughout this study it was not necessary for the Termination Criteria to be used.

Data Analysis. Two visual formats were used to display the data by percentage of intervals of problem behavior and appropriate communicative responses during all phases. The visual display of data shows the conditions for all participants under baseline conditions as FCT is sequentially implemented, and during the maintenance condition (Kennedy, 2005). Percentages of intervals of the dependent variable (i.e., problem behavior and appropriate communicative responses) are on the y-axis and sessions on the x-axis (see Figures 1 and 2).

Inter-observer Agreement. Inter-observer agreement (IOA) is a technique used to determine the reliability of the data collected. IOA refers to two or more observers recording the same events independently to evaluate the reliability of the measurement system. IOA will determine if the recorded behaviors are true representations of the behavior exhibited and if the intervention results are valid (Cooper, Heron, & Heward, 2007).

IOA was conducted by two independent trained, data collectors who individually observed and scored the occurrence of each child's behavior during a 30-s partial-interval recording system, over a ten-minute period of time. They observed 12 out of 20 or 60% of the ten-minute Baseline and Intervention sessions and recorded their findings on a 30-s cell data recording sheet with headings that indicated the three response areas (i.e., problem behaviors, appropriate prompted communicative response, and appropriate unprompted communicative

response). IOA data was taken on the 1 maintenance probe or 100% of the sessions and recorded as stated above. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100 (Cooper, Heron, & Heward, 2007). Reliability data ranged at 80% to 100% across the three response areas, during all phases.

Kay's IOA averages across all three phases for Problem Behavior were 91% with a range of 80% to 100% and for Appropriate Communicative Responses were 98% with a range of 90% to 100%. Dee's IOA averages across all three phases for Problem Behavior were 92% with a range of 85% to 100% and for Appropriate Communicative Responses were 96% with a range of 80% to 100%. Fred's IOA averages across all three phases for Problem Behavior were 91% with a range of 80% to 100% and for Appropriate Communicative Responses 99% with a range of 80% to 100%.

Summary

This research study investigated the effects of using a picture symbol as the mode of communication within a Functional Communication Training procedure for young children with Autism and related disabilities in a self-contained public preschool classroom who display high rates of problem behavior. As called for when implementing FCT, the appropriate alternative communicative response was selected based upon the results of a Functional Behavioral Assessment consisting of descriptive assessment strategies to determine the function of the problem behavior.

CHAPTER 4

Results

Introduction

This chapter answers the following research questions:

- In what ways will Functional Communication Training using a picture symbol as the communicative response impact the rates of problem behavior and frequency of appropriate communicative responses among preschool children with autism?
- How will any documented improvements be maintained over time?

The results of the data collected throughout the different phases of the research study will be reviewed for each participant in relation to the graphs. Visual representations of the data collected are presented in graphs displaying percentages of problem behavior and appropriate communicative responses (see Figures 1 and 2). The data reflects a relationship between Functional Communication Training and the participant's rate of problem behavior and appropriate communicative responses. Overall, problem behavior decreased and appropriate communicative responses increased for each participant.

Problem Behavior

The results of the data collected on the percentage of intervals of problem behavior for all three participants are depicted in Figure 1. Kay's problem behavior was crying, screaming, getting out of seat, throwing self on floor, and/or grabbing at objects or taking items away from a peer or an adult. In the baseline phase of the study she participated in five sessions. The percentage of intervals of problem behavior during this phase ranged from 40% to 75%, with an average of 54%. The intervention phase started on day six. FCT was implemented and she participated in fourteen sessions. The percentage of intervals of problem behavior during this

phase ranged from 0% to 25%, with an average of 6%. Problem behavior during the maintenance probe was at 0%.

Dee's problem behavior was kicking at an adult, screaming, throwing her body back and crying. In the baseline phase of the study she participated in nine sessions. The percentage of intervals of problem behavior during this phase ranged from 30% to 85%, with an average of 51%. The intervention phase for Dee started on day ten. FCT was then implemented for ten sessions. The percentage of intervals of problem behavior during this phase ranged from 0% to 30%, with an average of 7%. Problem behavior during the maintenance probe was at 5%.

Fred's problem behavior was running away from the group, jumping up and grabbing at objects or items, and crying. In the baseline phase of the study he participated in four sessions. The percentage of intervals of problem behavior during this phase ranged from 0% to 25%, with an average of 17%. The intervention phase for Fred started on day fourteen. FCT was implemented and continued for six sessions. The percentage of intervals of problem behavior during this phase ranged from 0% to 15%, with an average of 8%. Problem behavior during the maintenance probe was at 0%.

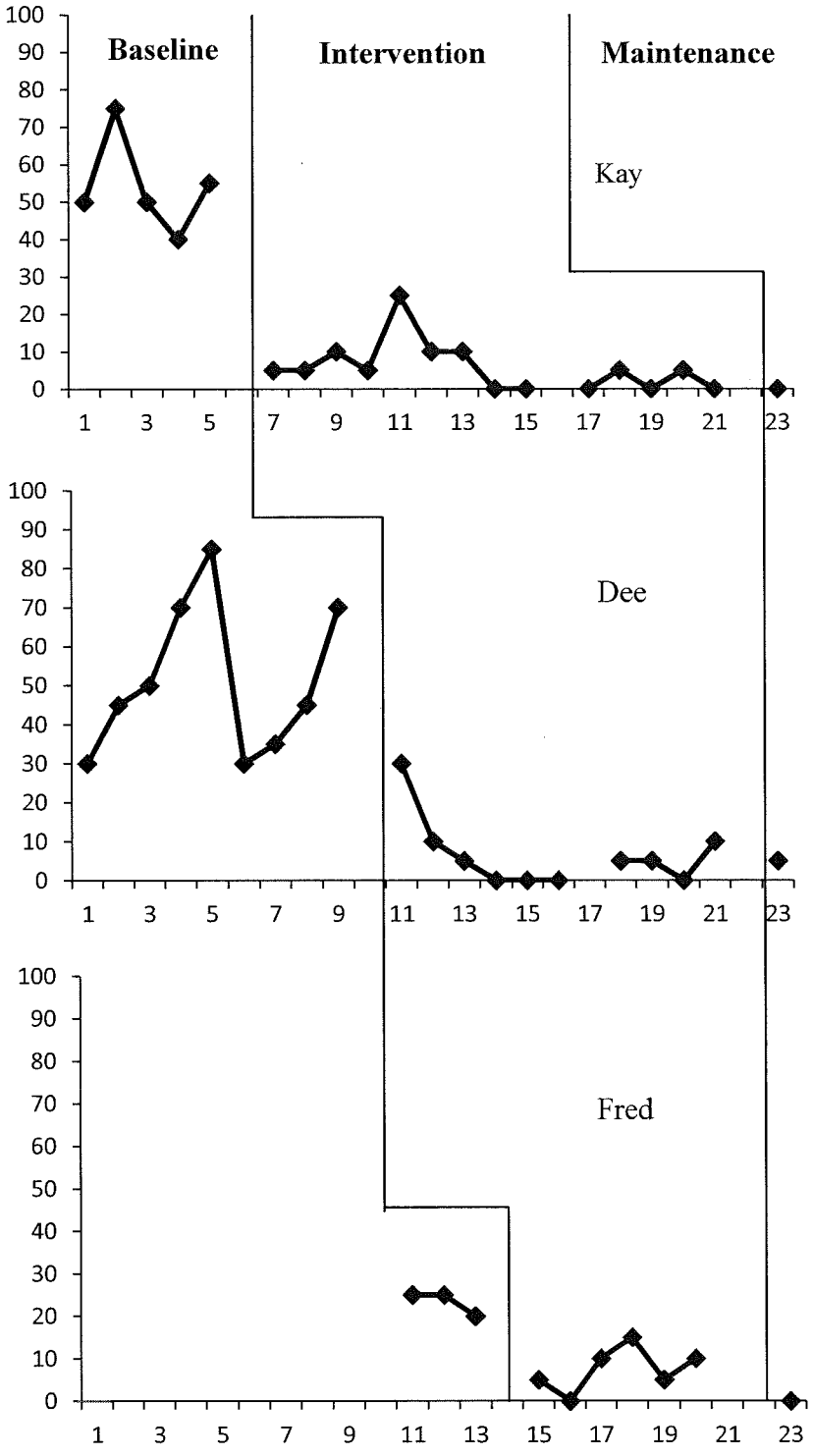

Figure 1. Percentage of intervals of problem behavior.

Appropriate Communicative Response

The results of the intervention on the appropriate communicative responses of all three participants are depicted in Figure 2. Kay's appropriate communicative response included the exchange of picture symbols to request a book with song or to escape social demands. The picture symbols were "5 Little Ducks", "This Old Man", and "Wheels on the Bus". Her escape symbol was a "No thanks". In the baseline phase of the study there were 0% of intervals of appropriate communicative responses. During the intervention phase and FCT the percentage of intervals of appropriate responses ranged from 5% to 10%, with an average of 5%. In nine out of the fourteen sessions (64%) Kay's responses were completely unprompted, as were her responses during the maintenance probe in which she used the communicative response during 5% of the intervals.

Dee's appropriate communicative response included the exchange of picture symbols to request a toy or object or to escape social demands. The picture symbols were for her preferred toys and an escape symbol saying "No thanks". In the baseline phase of the study there were 0% of intervals of appropriate communicative responses. During the intervention phase and FCT the percentage of intervals of appropriate responses ranged from 0% to 10% of intervals, with an average of 6%. All of her ten sessions consisted of prompted responses. The maintenance probe however, consisted of unprompted responses during 10% of the intervals.

Fred's appropriate communicative response included the exchange of picture symbols to request a book with song or to escape social demands. The picture symbols were for the song "Slippery Fish" with accompanies sea animals. His escape symbol was a "No thanks". In the baseline phase of the study appropriate communicative responses ranged from 0% to 5%, with an average of 2% of intervals. During the intervention phase and FCT the percentage of intervals of

appropriate responses ranged from 5% to 10%, with an average of 7%. Four out of the six sessions (67%) Fred's responses were completely unprompted as they continued to be during the maintenance probe, in which they occurred during 5% of the sessions.

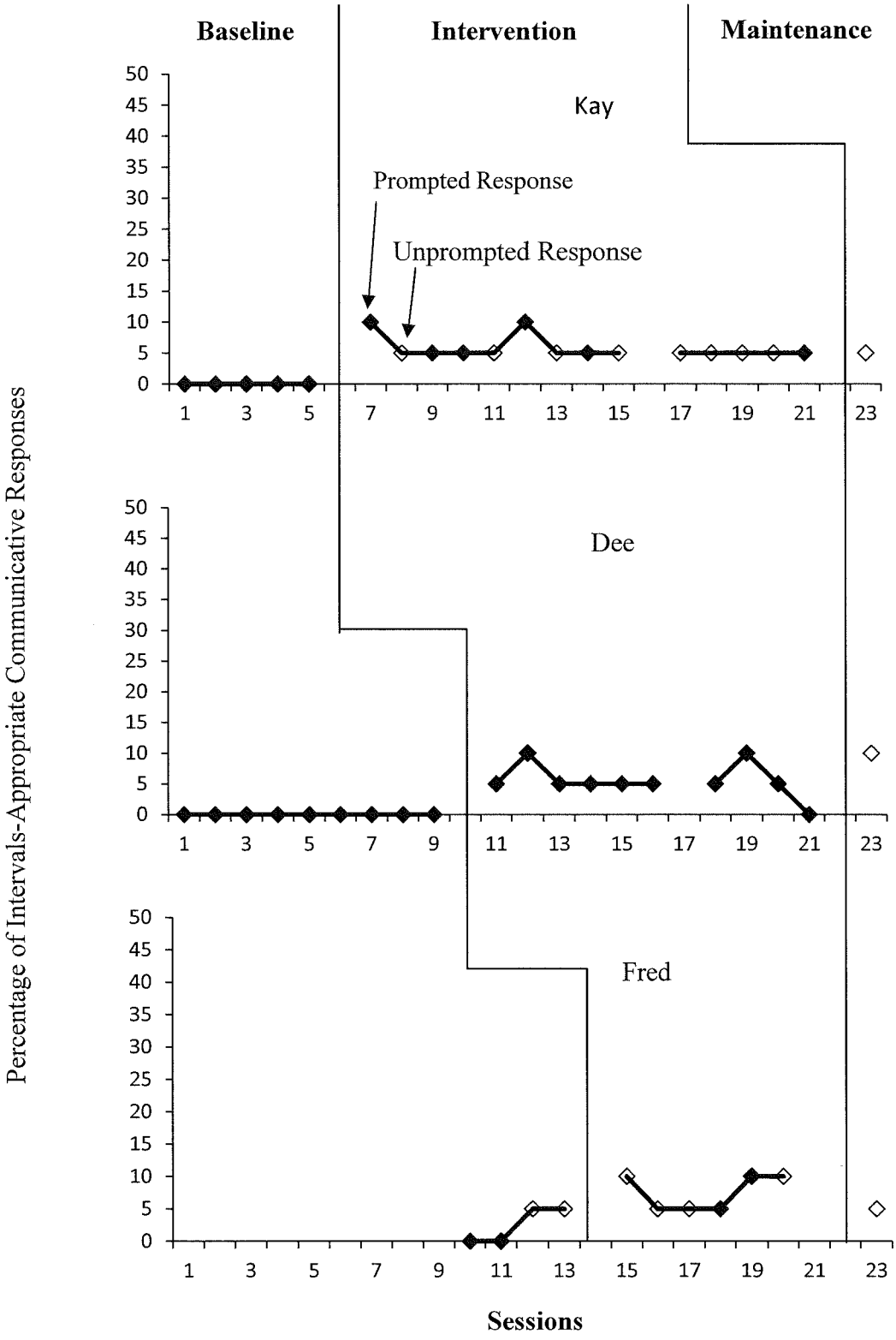

Figure 2. Percentage of intervals of appropriate communicative responses.

Summary

Data results show that FCT was an effective intervention treatment for decreasing problem behaviors and increasing appropriate communicative responses. Kay and Dee both had 0% of appropriate communicative responses during the baseline phase and high percentage of problem behavior, 54% and 51%, respectively. During the intervention phase problem behavior decreased to 6% and 7%, while appropriate communicative responses increased to 5% and 6%. Fred's data also indicated a low percentage of appropriate communicative responses during baseline at 2% and a high percentage of problem behavior at 17%. During the intervention phase problem behavior decreased to 8% and appropriate communicative responses increased to 7%. During the maintenance probe all participants' maintained low percentage of problem behavior (0% to 5%) and an increased rate of appropriate communicative responses (5% to 10%).

CHAPTER 5

Discussion

Summary of Findings

The purpose of this study was to evaluate the effects of Functional Communication Training using a picture communication response on the problem behavior and appropriate communicative responses of preschool children with autism in the classroom setting and determine if it would be an effective intervention strategy for special education teachers to use. There were three participants in the study who exhibited problem behavior, behaviors that disrupted the classroom learning environment and impeded their ability to learn. Functional Behavioral Assessments were conducted to determine behavior function and Functional Communication Training methodology using a picture symbol as the mode of communication was implemented. As a result, there was a decrease in problem behaviors and an increase in appropriate communicative responses.

Functional Behavioral Assessments indicated that problem behavior for all participants was maintained by socially mediated positive and negative reinforcement. Preference assessments were conducted to find maintaining contingencies. Picture cards were developed to represent reinforcers and for refusal. FCT was implemented.

Baseline measurements for Kay and Dee's problem behavior were high at 54% and 51%, indicating that problem behavior was present in at least half of the sessions. Yet, a single appropriate communicative response that was reflected in one interval or 5% of a session was sufficient in replacing their problem behavior. This was attributed to requests for activities that took extended amounts of time to complete, eliminating the need for multiple communicative responses. Additional communicative responses may have occurred if the activity was

interrupted however, the study was conducted within the natural occurring activities of the class and contrived situations were not introduced.

Conducting and implementing Functional Communication Training while teaching a special education preschool class was a very challenging endeavor. At times, especially in the first few intervention sessions it was quite chaotic and hard to manage, even with the help of two instructional assistants. FCT is effective when the alternative communicative response has a continuous rate of reinforcement (Cooper, Heron, & Heward, 2007), but providing this required rate of reinforcement for multiple children at the same time was very difficult. Other than Dee, who requested toys to hold, the activities that Kay and Fred requested took a long time to complete, sometimes up to six minutes. It was impossible for Kay or Fred to wait for the other's activity without exhibiting problem behavior. The participants were just learning the picture exchange process that required a continuous rate of reinforcement with reinforcers that lasted extended amounts of time. As a result, problem behaviors were placed on extinction as strategies were implemented to delay reinforcement.

First, the order in which the participants' requested was switched. Second, they were all given the opportunity at the beginning of the session to communicate their preferences. The participants communicated their preferred activity at the beginning of the session and the picture cards were placed on a board within their view to indicate the Circle Time activity schedule. Kay was then able to wait for Fred's activity without exhibiting problem behavior and this strategy was effective in delaying reinforcement and extinguishing problem behavior during the waiting time. The low rates of intervals of problem behavior during the intervention phase were a combination of the above mentioned, placing the problem behavior on extinction, manipulating

the rate of reinforcement, and teaching the appropriate communicative response or picture exchange.

During the intervention phase Dee continued to select preferred toys to hold while sitting in Circle Time, however, her choice of toys grew to include the toys and manipulatives that accompanied the songs from Kay and Fred's selections. This could be viewed as a conditioned reinforcer or learned reinforcer (Cooper, Heron, & Heward, 2007) and is the result of pairing the other toys and activities with her preferred objects. She then started to accept and interact with the new songs and manipulatives that Kay and Fred requested; eventually she displayed signs of gross motor imitation and made vocal utterances.

After the study was completed FCT was still utilized in the classroom setting and new songs were introduced to the participant's as the teacher's choice. Conditioned reinforcement could account for the expanded interests of Kay and Fred too, as the participants preferred activities changed to include each other's original choices as well as the new songs that were introduced by the teacher. At the end of the school year, Kay was requesting Fred's "Slippery Fish", arranging the fish in the same order as the song, reenacting the teacher's motions of the fish to the song, and starting to sing parts of it. Fred was also using verbal requests by saying "More" and was trying to sing and fill-in parts of the songs and books.

Limitations

A Single-subject design study has inherent limitations in that it includes only a small representation of the population that it studies. Even though this study showed gains in appropriate communicative responses and a decrease in problem behavior, the results cannot be generalized to include all preschool children with autism spectrum disorder.

During the baseline phase Fred began to use an appropriate communicative response using a picture symbol although FCT intervention was not introduced to him. Fred's appropriate communicative responses during baseline may impose a potential threat to validity as the measurements are not as stable compared to Kay and Dee's. This gives the impression that experimental control was compromised; however, all elements of the sessions remained constant throughout the sessions. Therefore, decreases in his baseline data for problem behavior cannot be attributed to changes in the variables within the sessions and the threat was considered to be very slight indicating that data measurement results were valid.

Implementing FCT in a small group setting has limitations as it can be difficult to provide the high rate of reinforcement that is needed to replace the problem behavior during the acquisition phase of the training. Extinction will have to be implemented if the rate of reinforcement does not match the rate of problem behavior. Additional training sessions can be conducted individually to help the participants' acquire the FCT skill and this may decrease the need to place the behavior on extinction. Generalization would need to occur in this scenario.

Implications for Practice and Research

Implications for practice and research are included in the following areas: generalization, fading the reinforcement, combining self-management as a tool for generalization and fading reinforcement, and the use of FCT with other modes of communication. The need for research in the generalization of intervention effects should span over classroom scenarios and settings and across home and community. Fisher et al., 1998, suggests that FCT has an excellent chance for generalization across treatment and home settings because it can be used to recruit reinforcement from family members. In the school setting FCT can be used to refuse demands and request items across settings. After the intervention phase of this study picture cards were presented to

the participants at different times during their school day in the absence of recording dependent and independent variables. Anecdotal notes recorded that Kay, Dee, and Fred were able to independently use a picture symbol to request food items during Snack Time and to request toys during Center Time indicating that generalization and stimulus control was being transferred without training. Additional research in the transfer of stimulus control across settings, in regard to generalization, will result in more efficient procedures to educators in the implementation of FCT across environments.

In the initial training sessions of FCT the frequency of reinforcement for the replacement behavior should match the rate of responding (Cooper, Heron, & Heward, 2007) making it difficult to manage in the classroom setting with multiple students. Training participants individually may remedy this, however, once the group dynamics change reinforcement schedules need to fade in order for FCT to remain effective in maintaining low rates of problem behavior. Additional research in this continuum should be explored for the school and home settings. Combining self-management as a tool may be a viable option.

Self-management can be time efficient (Fowler, 1984) and an effective procedure for decreasing inappropriate behaviors (Horner, Dunlap, & Koegel, 1988). The components for self-management include self-monitoring and self-reinforcement (Horner, Dunlap, & Koegel, 1988). The success of teaching self-management skills may be affected by reinforcement issues, such as the rate in the delay of reinforcement (Dunlap, Koegel, Johnson, & O'Neill, 1987) and the unpredictability of the reinforcers (Dunlap & Johnson, 1985; Koegel & Rincover, 1977). Effective self-management systems allow the child to be responsible for self-monitoring and reduce the constant supervision from teachers that is need in other interventions. Combining FCT

with self-management can be a viable solution to promote generalization and decrease responding. Studying the effects of this relationship as a paradigm warrants further investigation.

Augmentative devices have been used as the mode of communication in FCT studies for children with limited communicative ability. Picture and word cards have also been utilized with a microswitch (Harding et al., 2009) and assistive devices (Durand, 1999). Durand attributes the success of the study to the minimal amount of skills that are needed to operate the device, the ease of adaptation for students to use the device, and the immediate feedback by the vocal output (Durand, 1999). An area of concern was with the communicative ability of the device (i.e., how it was understood by the community, and the level of sound output) in the community setting. This is an area that could use further investigation given the gains in technological advancements in recent years. Using augmentative devices within the context of FCT is a practical alternative for children that have compromised physical movement and/or communicative ability. These devices can be used to bridge the communication gap while encouraging appropriate behavior.

Conclusion

The study demonstrates that Functional Communication Training using a picture symbol as the mode of communication is an effective intervention strategy for special education teachers to use in the classroom setting. Teaching an alternative appropriate communicative response using FCT to decrease problem behavior for preschool children with autism deserves continued research.

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Appendix A

Interval Recording Form

Date: _____

Participant: _____

Phase: _____

Intervals	Prompted Communicative Response	Unprompted Communicative Response	Problem Behavior:
0.0-0.5			
0.5-1.0			
1.0-1.5			
1.5-2.0			
2.0-2.5			
2.5-3.0			
3.0-3.5			
3.5-4.0			
4.0-4.5			
4.5.5.0			
5.0-5.5			
5.5-6.0			
6.0-6.5			
6.5-7.0			
7.0-7.5			
7.5-8.0			
8.0-8.5			
8.5-9.0			
9.0-9.5			
9.5-10.0			

Key: (+) Indicates the presence of Prompted Communicative Response, Unprompted Communicative Response, or Problem Behavior.

Appendix B

Functional Behavior Analysis

Data Collection form

Date: _____

Participant: _____

Antecedent	Behavior	Consequence