The Effects of Functional Communication Training on the Emission of Independent Mands and Reduction of Problem Behaviors in Children Diagnosed with Autism Spectrum Disorder

THESIS

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By

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Abstract

Functional communication training (FCT), defined as a differential reinforcement (DR) procedure in which an individual is taught an alternative response that results in the same class of reinforcement identified as maintaining problem behavior, is a special type of DR procedure in which the alternative response is a recognizable form of communication. The current study examined how problem behaviors may be reduced by teaching a functionally equivalent behavior (i.e., communication) that produces the same reinforcement as the problem behavior. A multiple probe across participants design was utilized to examine the effects of functional communication training on the emission of independent manding responses and the reduction of problem behaviors with three elementary age students diagnosed with autism who also have poor interpersonal communication skills. The participants were taught to request for desired items or activities by touching an icon during times when problem behaviors were likely to occur. By learning appropriate communication, it was hypothesized that the occurrence of communication related problem behaviors would decrease. Results confirmed the hypothesis that FCT was able to increase appropriate communication skills while also decreasing unwanted problem behaviors.

*Keywords:* function communication training, problem behaviors, autism
I would like to dedicate this project to my parents, Ron and Regina Roby. It is with their unwavering love, constant support, and insightful advice that I am where I am today.

Thank you for everything you have done for me. I love you both.
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# Table of Contents

Abstract .................................................................................................................. ii

Dedication ................................................................................................................. iii

Acknowledgments .................................................................................................... iv

Vita ............................................................................................................................ v

List of Figures .......................................................................................................... ix

Chapter 1: Introduction .............................................................................................. 1

  Children with ASD ............................................................................................... 3

  ASD and Problem Behaviors ............................................................................... 4

  ASD and Communication Impairments .............................................................. 5

  Functional Communication Training with Children with ASD ....................... 6

Chapter 2: Methods .................................................................................................. 14

  Participants and Setting ...................................................................................... 14

  Experimenters .................................................................................................... 17

  Materials ............................................................................................................ 17

  Definition and Measurement of Dependent Variables ..................................... 18
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variable</td>
<td>20</td>
</tr>
<tr>
<td>Inter-observer Agreement</td>
<td>20</td>
</tr>
<tr>
<td>Procedural Fidelity</td>
<td>21</td>
</tr>
<tr>
<td>Experimental Conditions</td>
<td>21</td>
</tr>
<tr>
<td>Experimental Design</td>
<td>24</td>
</tr>
<tr>
<td>Social Validity</td>
<td>26</td>
</tr>
<tr>
<td>Chapter 3: Results</td>
<td>27</td>
</tr>
<tr>
<td>Inter-observer Agreement</td>
<td>27</td>
</tr>
<tr>
<td>Procedural Fidelity</td>
<td>27</td>
</tr>
<tr>
<td>Experimental Conditions</td>
<td>28</td>
</tr>
<tr>
<td>Social Validity</td>
<td>34</td>
</tr>
<tr>
<td>Chapter 4: Discussion</td>
<td>36</td>
</tr>
<tr>
<td>Sean</td>
<td>36</td>
</tr>
<tr>
<td>Jason</td>
<td>38</td>
</tr>
<tr>
<td>Harry</td>
<td>39</td>
</tr>
<tr>
<td>Effect FCT on Mands?</td>
<td>40</td>
</tr>
<tr>
<td>Effect FCT on Problem Behaviors?</td>
<td>42</td>
</tr>
<tr>
<td>Frequency of Mands Post-Intervention?</td>
<td>43</td>
</tr>
<tr>
<td>Frequency of Problem Behaviors Post-Intervention?</td>
<td>44</td>
</tr>
</tbody>
</table>
Maintaining over Time? ................................................................................................. 45
Limitations .................................................................................................................. 45
Future Research ......................................................................................................... 50
Overcall Conclusions ................................................................................................. 53
References ................................................................................................................. 55
 Appendix A: Multiple Stimulus without Replacement Preference Assessment .......... 58
Appendix B: Communication Matrix ......................................................................... 60
Appendix C: Data Collection Sheet ........................................................................... 62
Appendix D: Picture Icons ........................................................................................ 64
Appendix E: Procedural Fidelity Checklist ................................................................ 66
Appendix F: Social Valdity Survey ............................................................................. 69
List of Figures

Figure 1. The Effect of FCT ................................................................. 35
Chapter 1: Introduction

Autism Spectrum Disorder, more commonly known as ASD or autism, is a developmental disability that typically affects social interactions, communication, and behaviors of individuals. According to the Centers for Disease Control and Prevention [CDC] (2015), about one in 68 children are diagnosed with autism yearly, with boys five times more likely to receive an ASD diagnosis than girls. While the specific causes of autism are unknown, researchers have identified several gene mutations that may be responsible (CDC). The CDC also recognizes that environmental and biological factors play a role in autism diagnoses. A primary concern of parents with children diagnosed with autism includes the quintessential features of the disability, i.e. impairments in social interactions and communication that are significant in the life of the individual as well as the child having limited areas of activities and interests (Mancil, 2006).

Additionally, some children with ASD engage in challenging behaviors such as screaming, hitting, and biting, which creates substantial obstacles for individuals to learn appropriate language and communication (Mancil, 2006). According to Dominick and colleagues (2007), about 38% of children diagnosed with ASD engage in aggression or self-injurious behavior (SIB) and about 70% engage in temper tantrums. Problem behaviors that a child with autism exhibits may be related to communication barriers, such as an unreliable way to communicate or misunderstanding the communication attempts of others. Effective two-way communication is vital to the functioning of all
individuals. One strategy that has been used to improve communication for children with ASD, as well as reduce unwanted problem behaviors, is functional communication training (FCT) (Lambert et al., 2012).

According to Tiger et al. (2008), functional communication training is defined as a “differential reinforcement (DR) procedure in which an individual is taught an alternative response that results in the same class of reinforcement identified as the maintaining problem behavior” (p.16). Specifically, FCT is a special type of DR procedure in which the alternative response is a recognizable form of communication (Tiger et al., 2008). Researchers and practitioners have employed functional communication training to address both the communication and behavioral needs of children with autism. Most research regarding FCT with children diagnosed with autism involves one of the basic verbal operants (i.e., mand) giving rise to additional verbal operants without explicit training - specifically tacts, in typically developing children (Finn et al., 2012). Children diagnosed with a developmental disability, however, should have explicit training on additional verbal operants. A tact is defined as a verbal operant controlled by a nonverbal stimulus (such as an object, event, or property of an object) and is maintained by nonspecific social reinforcement (Cooper, Heron, and Heward, 2007). For example, when a child is shown a picture of an ocean and says “ocean”, the child’s behavior is then reinforced by nonspecific social reinforcement such as an adult saying “nice work, that is an ocean!” A mand, however, is defined as a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation (Cooper et al., 2007). For example, when a child
requests “water” and is immediately given a drink of water, the child’s mand is reinforced by the characteristic consequence of getting a drink.

Once a child with autism learns to appropriately mand for desired items, overall communicative responses will increase as the child learns a more functional way to acquire desired items. It is important to note here that verbal operants do not automatically generalize so additional training may be required to increase responses (Cooper et al., 2007). Researchers believe that children with autism who have communication difficulties benefit from intensive, early intervention that focuses on increasing the frequency, form, and function of communicative acts (Paul, 2008). There are a variety of different strategies designed to increase the communication of a child with autism: a picture exchange communication system (PECS), an augmentative and alternative communication (AAC) device, or FCT, if appropriate.

**Children with ASD**

Autism spectrum disorder (ASD) is a range of complex neurodevelopment disorders, characterized by social impairments, communication difficulties, and restricted, repetitive, and stereotyped patterns of behavior (NIH, 2015). While there are many symptoms of autism, the defining aspect of this disorder is impaired social interactions. Children with autism may not respond to their name and often avoid eye contact with peers and adults. Additionally, children diagnosed with ASD may have difficulty interpreting what others are thinking or feeling as they are unable to understand social cues, such as tone of voice or facial expressions. It is also common for those diagnosed with autism to have comorbid disabilities, such as Fragile X syndrome (which causes intellectual disability), tuberous sclerosis, epileptic seizures, Tourette syndrome, learning
disabilities, and attention deficit disorder (NIH, 2015). Further, it is not uncommon for
children with autism to engage in repetitive movements or self-injurious behaviors.

According to the National Institute of Health (2015), early indicators of ASD include:
failure to babble or point by one year old, failure to use single words by 16 months or
two-word phases by two years old, failure to respond to their name, loss of language or
social skills, poor eye contact, excessive lining up of toys or objects, and failure to
engage in smiling or social responsiveness. Later indicators of the disability include an
impaired ability to develop friendships with peers, or to initiate or sustain a conversation
with others, the absence or impairment of imaginative or social play, preoccupation with
certain objects or subjects, stereotypic or self-injurious behaviors, unusual language or a
lack of communication skills, and an inflexible adherence to specific routines and rituals
(CDC, 2015). While there is no cure for autism, there are treatments available to help
reduce symptoms. Treatments that are supported by empirical data include educational
or behavioral interventions, such as Applied Behavior Analysis (ABA), and medications.
Other treatments such as gluten/casein free diets or sensory integration therapy have yet
to be validated in empirical research. With appropriate treatments, the symptoms of
autism can be reduced over time, but, as previously stated, may never be fully cured.

**ASD and Problem Behaviors**

Most individuals with autism will display some sort of challenging behaviors at some
point in their lives, though the diagnosis of autism is not the sole cause of such behaviors
(CDC, 2015). Some believe it is likely that some of the underlying biological processes
that result in autism might also result in behaviors that are outside of a person’s control,
such as stereotypic behaviors and self-injurious behaviors (SIB) (CDC, 2015). Common
challenging behaviors include aggression, tantrums, SIB, elopement, and property destruction. Such behaviors put young children at risk for exclusion and isolation from social, educational, family, and community activities (NRC, 2001). Further, it was noted that most behavior problems displayed by children with ASD are “normal” behaviors in that they may be observed, although at lower frequency, in typically developing children. However, in autism spectrum disorders, the intensity, frequency, duration, or persistence of the behaviors distinguish them from similar behaviors of typically developing children (NCR). Research conducted by Symons and Thompson (1997) studied the occurrence of problem behaviors and body site preference, meaning that children who engage in SIB may target the part of the body that produces the greatest neurochemical release and receptor binding. This research links the prevalence of problems behaviors to neurobiology.

**ASD and Communication Impairments**

It is common for children diagnosed with autism to have impaired language and communication skills, though not every child is affected (NIH, 2015). Typically developing children begin using verbal communication, in the form of babbling, around nine months to one year of age. Language for children diagnosed with autism, on the other hand, develops differently and often slower. Children with ASD may have difficulty developing language skills and understanding what others say to them. They also may have difficulty communicating nonverbally, such as through hand gestures, eye contact, and facial expressions.

There are four common patterns of language use that are often found in children with ASD: repetitive or rigid language, narrow interests and exceptional abilities, uneven
language development, and poor nonverbal conservation skills (NIH, 2015). Repetitive or rigid language means that some children with ASD may repeat words or phrases that they hear but they may use the words inappropriately or in meaningless ways. For example, a child may repeat phrases they heard on the television or may repeat a phrase immediately back to an adult such as “do you want something to eat?” Narrow interests or exceptional abilities are defined as children with ASD being able to talk one-sided about a topic of interest but not being able to hold a two-way conservation about that topic. Further, a child with autism may have a very high ability to perform in specific areas, commonly known as a “savant” skill. Uneven language development can be described as some developed speech and language skills, but not to a normal level of ability, and uneven progress. Children with ASD may learn quickly if the topic is of interest but may fall behind in other aspects of learning (NIH, 2015). Finally, the last common pattern is poor nonverbal communication skills. Children diagnosed with ASD may be unable to use gestures to effectively communicate wants or needs and this may lead to inappropriate behaviors to gain access to reinforcers (NIH, 2015).

**Functional Communication Training for Children with ASD**

Research to date regarding functional communication training suggest that children who participate in functional communication training show an increase in appropriate communicative acts and a decrease in communication related problem behaviors (Doughty and Anderson, 2006; Lambert et al., 2012; Sigafoos and Meikle, 1996). Most studies incorporated a functional analysis to determine the function of a behavior prior to the start of functional communication training. There are four functions of behavior: attention, escape/avoidance, access to tangibles, and automatic (Cooper et al., 2007). If
the function of a behavior is attention, the child typically engages in a challenging behavior with the hopes of acquiring attention from another individual. If the function is escape/avoidance, the child engages in a behavior with the intent to get out of a task demand. If the function is access to tangibles, the child engages in a behavior to have access to the desired item. Finally, if the function is automatic, the child engages in the behavior because the behavior itself is reinforcing. FCT traditionally takes place in short sessions multiple times a week in which requesting for a desired item is taught using prompting (typically least-to-most) to achieve appropriate communication skills. After the completion of the interventions, hypotheses were confirmed about the effectiveness of FCT.

Sigafoos and Meikle (1996) completed a study involving FCT as a treatment for multiply-determined challenging behavior in two 8 year old boys with autism. Both boys engaged in numerous problem behaviors such as aggression (i.e., hitting, pushing, biting, pinching, and throwing objects at others), self-injury (i.e., hitting, scratching, and biting self), property destruction, stereotyped movements, and other disruptive acts such as inappropriate noises. After the completion of Experiment 1 involving a functional analysis to determine the functions of the participants’ problem behaviors, the experimenters began Experiment 2 that consisted of FCT. Baseline and intervention data were conducted twice per day, 3-5 days per week. Intervention consisted of two phases. During the first phase, the communicative alternative was prompted after a brief pause (i.e., 1s delay) and during the second phase, a 3s pause before prompting was implemented. During each phase, the participant was presented with their desired item. The item was then taken away and the teacher waited either 1s or 3s, depending on the
phase, and then prompted the alternative requesting response (i.e., PECS or verbal communication depending on the participant). After the requesting response, the item was returned to the child for 60s before the next trial. Results indicated that with FCT, challenging behavior remained infrequent as correct responding increased. Sigafoos and Meikle concluded that “challenging behaviors can be reduced by teaching functionally equivalent alternatives” (p. 76).

In 2000, a study conducted by Kahng and colleagues examined single and multiple functional communication training responses for the treatment of problem behavior of one learner age 7 years with ASD. Prior to conducting the intervention, a functional analysis was completed to determine the function of the problem behavior that the participant engaged in (i.e., self-injury, aggression, and property destruction), similarly to Sigafoos and Meikle (1996). Following the functional analysis, a comparison of two FCT conditions was conducted. Prior to each FCT condition, the participant was taught to emit the alternative mand using an errorless learning procedure until he independently emitted the mand with 90% accuracy. In the FCT-single condition, reinforcement (i.e., a highly preferred item as identified via a preference assessment) was delivered contingent on the alternative mand, which was a general statement (i.e., “I want treats”). In the FCT-multiple condition, the participant was required to form a sentence using PECS to request a specific item that was delivered contingent on the mand (i.e., “I want chips”). Results indicated that a treatment involving multiple FCT responses rather than a single, general FCT response was most effective, even without a reductive procedure for a problem behavior.
In Doughty and Anderson’s (2006) study, functional communication training involving mands was utilized to reduce problem behaviors for two children ages two and thirteen with ASD. The current study extended the work of Sigafoos and Meikle (1996) by continuing to examine manding responses and FCT. Doughty and Anderson designed the study to determine whether “the noncontingent delivery of an alternative preferred stimulus and reinforcement of mands increased the rate of mands, and suppressed problem behavior prior to and during the schedule thinning of noncontingent reinforcement” (p. 23). Prior to functional communication training, a functional analysis (FA) was completed for each participant to determine the function of the target behaviors. The functional communication training for the study was completed by initially teaching the participants to hand the therapist a picture card to indicate “play” and the exchange was followed by attention delivery as determined by the FA. It was noted that the attention delivery was intended to be as similar as possible to the attention delivered for inappropriate behaviors. However, attention delivered for manding was more “laudatory”, or admiring (p. 30). The study concluded that rates of problem behavior decreased “almost immediately with both participants following FCT, with differential reinforcement of manding…” (p. 38).

Mancil and colleagues (2006) also completed a study regarding functional communication training. This study focused exclusively on FCT in the natural environment with a single participant. The purpose of the study, similarly to Doughty and Anderson (2006), was “to determine the effectiveness and efficiency of FCT on decreasing problem behaviors, increasing communication mands, and increasing spontaneous communication with a child with ASD” (p. 615). The design of this study
was different than Doughty and Anderson (2006) in that FCT took place in the participant’s natural environment. The study included first a functional analysis to determine the function of the participants problem behaviors followed by FCT with four mands (mand A was for toy horses, B for toy helicopters, C for a blanket, and D for a movie shown in 30s portions). Results demonstrated that the participant’s appropriate communication increased and problem behavior significantly decreased in the home setting. Mancil and colleagues stated that the results of the study indicate that embedding FCT in the natural environment can increase spontaneous communication and decrease aberrant behavior, thus supporting the theory of a reciprocal relationship between communication skills and challenging behaviors in children with ASD.

Volkert et al. (2009), analyzed the resurgence during treatment with functional communication training. The study sought to determine whether resurgence of problem behavior would reliably occur with participants who received treatment with FCT. This was previously not investigated but with the completion of this study, important information regarding resurgence and FCT was discovered. Prior to testing for resurgence, a functional analysis was conducted to determine the function of problem behaviors for each participant. Each participant was taught to request the functional reinforcer using an alternative communicative behavior. Resurgence was defined as an increase in the occurrence of problem behavior exceeding the rate during the FCT maintenance, the functional reinforcer was no longer provided for either problem behavior or the alternative communicative response. Results obtained from this study concluded that extinction-induced resurgence may account for some instances of response recovery of problem behavior during tests for resurgence, often above baseline
rates. These findings suggest the need for further research involving resurgence and the eventual prevention of this phenomenon.

Schmidt et al. (2014) conducted a study examining the effects of discrete-trail functional analysis and functional communication training with three individuals with autism and severe problem behaviors. This study systematically replicated a similar study conducted by Sigafoos and Meikle (1996) to determine if similar results with FCT and a time delay component could be obtained. Before functional communication training, a functional assessment and analysis were completed to determine functions of behavior. The purpose of the FCT was to teach each participant a new communication form that served the same function as the problem behavior (i.e., food stealing, aggression, or attention). To begin FCT, the therapist initially used a 0s constant time delay physical prompting procedure to have the participant request (i.e., requests included signing “eat” or “talk to me”). After consistent responding with a 0s delay, the time increased to 2s to provide the participant the opportunity to produce the response independently. Results indicated that with the FCT intervention, all participants eventually acquired the new form of communication with a corresponding decline in problem behavior.

Wacker et al. (2012) completed a study that incorporated conducting FCT via telehealth consultation to reduce the problem behavior of young children with autism. Telehealth is the delivery of health-related services and information via telecommunication services. In this study, FCT was conducted by parents of young children with ASD. The purpose of this study, similarly to Volkert et al. (2009), was to further expand upon knowledge regarding FCT and to obtain more information regarding
this topic for future research. The parents received coaching via telehealth consultation from behavioral consultants regarding how to properly implement FCT. With coaching, the parents first conducted a functional analysis to determine functions of behavior. With this information, FCT was matched to the identified function of problem behaviors. Parental assistants located at regional clinics received a brief training on procedures to provide support to parents during clinic visits. Results indicated that FCT reduced problem behavior by an average of 93.5%. Further, results suggest that FCT can be conducted by parents via telehealth when experienced applied behavior analysts provide consultation.

Lambert et al. (2012) conducted a study with two girls and one boy ages ranging from 3 to 4 years, each with a diagnosis of a developmental delay. They were instructed in functional communication training to reduce problem behaviors such as aggression and property destruction. Lambert and colleagues first conducted a trial-based FA for each participant to identify the function of each participant’s problem behaviors. Using this information, an intervention was developed based on the results of the FA. The intervention consisted of extinction of the problem behavior and differential reinforcement of appropriate communication. At the start of each session, the experimenter placed a picture card within reach of the participant and stated that they could ask for the functional reinforcer. Prompting was used if the participant did not emit an independent response. Prompting initially consisted of manual guidance to touch the teacher with the picture card while a vocal request was modeled and was faded until only a vocal request was used. Results showed that, for all three participants, functional communication training increased the amount of appropriate communicative acts and also
decreased problem behaviors. These results demonstrated that interventions based on the outcomes of FAs could reduce problem behavior and increase appropriate communication in an early childhood setting.

The purpose of this study was to examine the effects of functional communication training on the emission of age-appropriate mands and reduction of problem behaviors exhibited in elementary aged children diagnosed with autism. The present study systematically replicated portions of the Lambert et al. (2012) study specifically regarding functional communication training.

The study addresses the following questions:

1. What effect does functional communication training have on the emission of mands for elementary age children with autism who have both poor communication and frequent problem behaviors?

2. What effect does functional communication training have on decreasing the problem behaviors of children with autism who have both poor communication and frequent problem behaviors?

3. What is the frequency of mands after the intervention concludes?

4. What is the frequency of problem behaviors after the intervention concludes?

5. Will increases in mands maintain over time?
Participants and Setting

The study was conducted in a private school for children with ASD and/or cognitive disabilities. The researcher informed the school director that she wanted participants who had both poor interpersonal communication skills and engaged in frequent problem behaviors. There were a total of three participants selected for this study. The participants, Sean\(^1\), Jason, and Harry, were 11 years old at the start of the study (Sean turned 12 during intervention). All participants selected for the study had been diagnosed with autism, displayed frequent and discrete problem behaviors, and demonstrated a limited or poor manding repertoire. The participants were selected after informal classroom observations were completed to determine which students fit the established criteria and after an IRB-approved parental consent form and cover letter were sent home and returned to the school with parental consent. The school director facilitated this process.

**Sean.** Sean was diagnosed with autism, Lennox-Gastaut Syndrome (LGS), and significant developmental delays. According to his Evaluation Team Report (ETR), Sean had significant delays in cognition, communication, adaptive behavior, social-emotional, and physical development. Sean was dependent on adults for many physical, communication, and self-care needs. Though Sean had significant delays in all

\(^{1}\) Participant names are pseudonyms
developmental domains, he demonstrated the capacity for increases in independence in the classroom and improvement with fine motor tasks. Sean was described as enjoying interacting with adults and as being a very affectionate boy as he seemed to enjoy 1:1 attention with teachers. Sean mainly communicated with gestures or prompted picture cards and had a history of non-compliance (i.e., not following directions with one prompt) and hand biting around the thumb area of his left hand during demanding situations. An indirect functional behavior assessment (FBA), consisting of teacher interviews and classroom observations, indicated the function of his behavior to be escape/avoidance. To incorporate FCT into Sean’s schedule and to address his behaviors, he was taught to request for a break by pointing to a break card to replace his non-compliant and hand biting behaviors.

**Jason.** Like Sean, Jason has a diagnosis of autism and was also diagnosed with motor dyspraxia, generalized anxiety disorder, and emotional disturbance. Jason demonstrated strengths in math with matching and sorting numbers as well as in color and shape sorting. Jason also demonstrated strengths in fine motor tasks such as holding a pencil with a functional grasp and tracing lines. Jason was described as a very easy-going student and a good listener; usually following directions within one prompt. Jason communicated most commonly with gestures or prompted picture cards though he could initiate words with prompting. Further, Jason engaged in rigid and repetitive behaviors (i.e., self-stimulatory behaviors such as rocking, standing and sitting down repetitively, and exiting and re-entering the classroom) that inhibited his working abilities. An indirect functional behavior assessment (FBA), consisting of teacher interviews and classroom observations, determined the function of his behavior to be automatic. To
incorporate FCT into Jason’s schedule and to address his behaviors, he was taught to request for a break by pointing to a break icon. During the break, Jason was allowed to engage in his rigid and repetitive behaviors as an appropriate outlet if he chose. After discussing this option with his classroom teacher, it was determined that this was a good use of FCT to address Jason’s appropriate working abilities and his automatically reinforced behaviors. By allowing Jason specific times to engage in automatically reinforced behaviors, his teacher hoped to increase Jason’s appropriate on task behaviors throughout the school day. Although Jason was allowed to engage in his behaviors during the break if he chose, he often engaged with functional play items identified from his preference assessment.

**Harry.** Harry was also diagnosed with autism and had a history of recurring nosebleeds. Harry demonstrated strengths in language arts by matching identical objects and pictures as well as upper to lower case letters. In math, he matched identical colors, shapes, and numbers. Despite these strengths, his independent communication skills were low. Harry also communicated with gestures or prompted picture cards and engaged in spitting behaviors (i.e., saliva leaving his mouth and landing on objects in front of him such as the floor, desks, or his shirt). An indirect functional behavior assessment (FBA), consisting of teacher interviews and classroom observations, determined the function of his behavior to be automatic. To incorporate FCT into Harry’s schedule and to address his spitting behavior, a differential reinforcement of incompatible behavior (DRI) procedure was embedded within the FCT. Harry was taught to request a snack by pointing to a “snack” icon; when eating, spitting became an incompatible behavior for Harry.
School. All three participants attended an autism learning center five days a week that was founded in 2004 and served over 300 students with ASD and other developmental disabilities in the Midwestern region of the United States. The center operated both classroom-based and home-based programs and accepted students from preschool through twelfth grade. The study took place in a classroom with one certified teacher and one paraprofessional always present. The classroom was furnished with five student desks, two separate work tables along the back and side walls with two chairs each, a leisure area with a beanbag and bookcase, and a teacher desk with a computer. FCT was conducted at the work table along the back wall of the classroom.

Experimenters

The experimenter was a graduate student attending a large university studying for her master’s degree in Educational Studies with a specialization in Applied Behavior Analysis (ABA). She has a Bachelor of Science degree in psychology earned in 2014. At the time of the study, she had four years of experience working with children with autism and other developmental disabilities. The inter-observer agreement (IOA) data collector was also a graduate student attending the same university as the experimenter and working towards her master’s degree in Educational Studies specializing in ABA. She earned her Bachelor of Arts degree in psychology with a neuroscience concentration in 2014. She had seven years’ experience working with children with disabilities.

Materials

Materials used for completion of this study were the multiple stimulus without replacement (MSWO) preference assessment (see Appendix A), the Communication Matrix (see Appendix B), data collection sheets (see Appendix C), picture icons (see
Appendix D), a procedural fidelity checklist (see Appendix E) to ensure the experiment was conducted accurately throughout, and the social validity survey (see Appendix F) completed by each participants’ teacher to see how valuable the intervention was in the classroom. Additional materials included a pencil and three timers, i.e. one timer to keep track of the ten minute session, one to keep track of 30s reinforcement periods, and one to keep track of two minute approximations. Further, each participant’s desired items to encourage manding responses were used as identified in the MSWO preference assessment.

**Definition and Measurement of Dependent Variables**

There were five dependent variables in this study. The first and second dependent variables were the effectiveness of FCT on the emission of independent mands and the effectiveness of FCT on decreasing problem behaviors throughout the study. It was hypothesized that FCT would increase the emission of manding responses and decrease the challenging behaviors of each participant. The third dependent variable was the number of unprompted, independent mands exhibited by each participant during intervention sessions. Independent mands were defined as requests made via picture icons (see Appendix D) identified for each participant to acquire a desired item or activity without prompting from the experimenter. The response was reinforced by the characteristic consequence and was therefore under the functional control of relevant conditions of deprivation. Specific mands were identified for each participant based on the environmental conditions in which the problem behaviors are most likely to occur. For example, Sean was most likely to engage in non-compliance and hand biting during demand situations, therefore the desired manding response was asking for a break from
the task. The number of prompted and unprompted mands exhibited per participant was measured via frequency recording (see Appendix C). The number of prompted and unprompted mands was also measured after the intervention concluded to probe for maintenance; probes took place 11 and 18 days after the intervention concluded.

The fourth dependent variable identified was the number of problem behaviors exhibited by each participant during training sessions. Problem behaviors were defined as any behavior that inhibits the participant’s ability to learn, such as elopement, call-outs, self-stimulatory behavior, etc. Sean engaged in non-compliance and hand biting during demand situations, Jason engaged in rigidity and repetitive behaviors as automatically reinforced behaviors, and Harry engaged in spitting as automatically reinforced behavior. All training sessions took place during the time when problem behaviors are likely to occur for each participant. The sessions were conducted in the participants’ classroom with one certified teacher and one paraprofessional always present. The number of problem behaviors per participant was measured via frequency recording (see Appendix C). In instances of participants’ intense problem behaviors (i.e., behavior can cause harm to self or others or property destruction), the experimenter ceased the session and allowed the school personnel to follow school protocol for problem behavior.

The fifth dependent variable was the increasing of manding responses maintaining over time. Maintenance probes occurred 11 and 18 days after the intervention concluded to test if the skills learned during the intervention maintained and were still functionally used.
Independent Variable

The independent variable identified in this study was the prompting of manding responses during intervention sessions by the experimenter. Manding responses were prompted when the participant engaged in a problem behavior and when neither an independent mand nor problem behavior was observed for approximately 2 min. Mands were prompted after 10s elapsed from the cessation of the problem behavior to ensure the participant was not engaging in unwanted behavior and earning their desired item or activity as a result of that behavior. Mands were also prompted if neither an independent mand nor problem behavior was observed for approximately 2 min to ensure the participant was still exposed to the skill with the hopes of independent responding in the future. There was no training of the independent variable prior to intervention sessions.

During pre-baseline, the Communication Matrix was used to assess the level of student learning of language and the skill level of the participants in relation to manding. The need to assess each student’s level of communication through the use of the Matrix was necessary in determining participants’ eligibility; if communication skills were too high or too low, the student would not fit the criteria for study inclusion. The Communication Matrix indicates areas of communication that are surpassed, not used, emerging, and mastered on seven levels: pre-intentional behavior, intentional behavior, unconventional communication, conventional communication, concrete symbols, abstract symbols, and language.

Inter-observer Agreement (IOA)

A second trained observer collected data for at least 33% of all training sessions (see Appendix C). IOA observers were trained by the experimenter on the procedures used in
this study and were given the opportunity to ask questions to clarify understanding. IOA
was calculated by Interval/Type Two agreement during baseline and intervention sessions
for participant responses and problem behaviors. An agreement was counted if the
experimenter and observer both mark a manding response or problem behavior as
occurring. A disagreement was counted if one observer marked a response or behavior as
occurring and the other marked it as not occurring. The total number of agreements were
divided by the number of agreements plus disagreements and then multiplied by 100 to
convert it to a percentage (Cooper et al., 2007).

**Procedural Fidelity**

Procedural fidelity was determined by using a task analysis of the intervention. A
correct response was recorded each time the experimenter accurately implemented the
 corresponding steps prescribed on the task analysis. Both the experimenter and the
second observer recorded the steps implemented by the experimenter. Procedural fidelity
was assessed for at least 33% of all training sessions. It was calculated by dividing the
number of steps completed accurately by the total number of steps and then multiplying
by 100. The experimenter used the procedural fidelity checklist as a guide to implement
each session (see Appendix E).

**Experimental Conditions**

**Pre-baseline.** Prior to collecting baseline data for each participant, the experimenter
completed observations of each participant to determine target problem behaviors and
when these behaviors were likely to occur. Each participant was observed four times and
each observation lasted approximately 30 minutes. Once this information was obtained,
the experimenter conducted the multiple stimulus without replacement (MSWO)
preference assessment to identify reinforcers for each participant to be used during intervention sessions. The MSWO was completed in approximately 20 minutes for each participant. For example, Sean’s preference assessment included popcorn, almonds, gluten free pretzels, musical toys, an iPad, and keys. All materials were placed in front of Sean and he was instructed to “pick one”. Once he chose an item, he had access to the item for 30s before prompted “it’s my turn” from the experimenter. The item was not replaced in the assessment. Sean was again instructed to “pick one” from the remaining items. This process continued until all items were chosen and multiple trials were conducted. Each item was given the number it was chosen (i.e., the first item chosen was given 1, the second a 2, and so on) and these numbers were added across each trial. The item with the smallest number was the most preferred and the item with the largest number was least preferred. Finally, the experimenter conducted the Communication Matrix language assessment (see Appendix B) to determine the level of student learning of language and the skill levels of the participants in relation to manding. The Matrix was completed online in approximately 30-40 minutes per participant.

**Baseline.** During baseline data collection, the experimenter began by observing each participant for 10 min sessions in three consecutive sessions. This was done to establish a true baseline with a steady state (Horner et al., 1978). Steady state responding was defined as stability in data (i.e., steady level) or an increase in the opposite direction of desired results. The experimenter continued to probe baseline data for 10 min sessions with participants 2 and 3 for a multiple probe design. During the observation times, the experimenter recorded the number of independent communicative responses (mands) for
each participant. The experimenter also recorded the number of problem behavior that occurred during sessions.

**Intervention.** The intervention procedure was similar to the baseline condition except the experimenter prompted for participants to mand (during baseline the experimenter only observed). Participants were prompted to mand by a least-to-most prompt hierarchy (i.e., verbal, gestural, physical). Further, the participants were not trained prior to intervention sessions on how to receive reinforcement. During intervention, functional communication training was used to teach each participant an alternative behavior, specifically a type of communicative response, which resulted in the same class of reinforcement as the problem behavior. Each occurrence of prompted or unprompted manding responses, as well as problem behaviors, was measured via frequency count and was recorded in the appropriate data collection sheet (see Appendix C).

Each intervention session for each participant lasted for ten minutes and occurred in a section of the classroom with school personnel always present. Each session occurred during the time of day in which problem behaviors were likely to occur. Participants engaged in task demands including picture matching, number sequencing, and letter matching throughout the intervention phase. The participants did not have access to the highly reinforcing items as identified in the MSWO preference assessment for approximately 1 hr during the school day prior to starting the intervention session. Each participant was then given the opportunity to mand. If a problem behavior was exhibited during the session, the participant was prompted to mand for the desired item after 10s elapsed from the cessation of the problem behavior. If a mand was prompted and the participant continued to display the inappropriate behavior, the experimenter waited 10s
after the cessation of the behavior and physically prompted a manding response. Once an appropriate mand was demonstrated, the participant gained access to the reinforcing item or activity for 30s. If an appropriate mand was independently exhibited, the participant gained access to the item or activity for 30s. If an appropriate mand was not exhibited and a problem behavior was not exhibited for approximately two minutes, the participant was prompted to mand for the item or activity. Once an appropriate mand was performed, the participant gained access to the item or activity for 30s. Reinforcers for each participant were identified via the MSWO preference assessment completed during the pre-baseline condition. Data were collected continuously throughout baseline and intervention sessions. Data were collected on the frequency of prompted or unprompted mands and problem behaviors using frequency recording.

**Maintenance.** The experimenter continued to probe the skill with all participants 11 and 18 days after steady responding was obtained during intervention to test for maintenance of skills. The procedures were the same as intervention procedures though the independent variable was withdrawn (Cooper et al., 2007). This differs from baseline procedures as the experimenter observed regular school day activities during those sessions. During maintenance, the experimenter continued to work on task demands for 10 min with the participants (as done during intervention), but did not prompt any manding responses.

**Experimental Design**

A multiple probe design across participants was used to evaluate the effects of functional communication training on the emission of independent mands and on the reduction of problem behaviors in three elementary aged students diagnosed with autism.
spectrum disorder. All participants were observed in baseline until steady state responding was obtained so the experimenter could gather information regarding each participant’s manding (if applicable) and problem behaviors prior to intervention. When Participant 1 moved to the intervention phase, Participants 2 and 3 remained in baseline for additional sessions. Participant 2 was then moved to the intervention phase along with Participant 1 while Participants 3 remained in baseline for additional sessions. This staggering process continued until all three participants were in the intervention phase. All participants remained in the intervention phase until appropriate responses were made to demonstrate experimental control. Multiple probe designs, a variation of multiple baseline designs, show experimental control through baseline logic: prediction, replication, and verification (Cooper et al., 2007). Prediction demonstrates the difference between what would be predicted if the baseline pattern continued and what occurred when the independent variable was applied. Replication and verification demonstrate experimental control by showing similar patterns between Participant 1 and 2 immediately after moving to intervention (replication) and how baseline remains similar in Participant 2 once Participant 1 is moved to intervention (verification). All sessions were conducted in the school building with school personnel (one certified teacher and one paraprofessional) always present and were in areas of the building where the participants could not observe each other’s intervention phase. Data for each participant was graphed and visually analyzed to compare baseline data and intervention data and to determine efficacy of the study.
Social Validity

Upon completion of the study, the experimenter gave the participating students’ teachers a 5-point rating scale asking them about the goals, procedures, and outcomes of the study (see Appendix F). The teachers were asked not to include their name or any identifying information on the questionnaire. Additional space was provided for the teachers to write any other comments regarding areas not addressed within the questions. A third party collected questionnaires in order to preserve confidentiality.
Chapter 3: Results

**Inter-observer Agreement (IOA)**

The IOA data collector recorded independent and prompted mands as well as problem behaviors (if applicable) during baseline, intervention, and maintenance sessions with each participant. IOA was calculated by Interval/Type Two agreement during baseline, intervention, and maintenance sessions for participant responses and problem behaviors. The total number of agreements were divided by the number of agreements plus disagreements and then multiplied by 100 to obtain a percentage. IOA was collected during 44% of all sessions: 56% of baseline sessions, 39% of intervention sessions, and 33% of maintenance sessions. Baseline IOA averaged 80% (range, 73% to 88%) while intervention IOA averaged 99% (range, 96% to 100%). IOA was analyzed during intervention to obtain specific IOA regarding both manding responses and problem behaviors. IOA averaged 100% (range, 100%) and 98% (range, 96% to 100%), respectively. IOA for maintenance averaged 100% (range, 100%).

**Procedural Fidelity**

The IOA data collector also served as the fidelity observer and recorded correct or incorrect implementation of the method during intervention sessions. Procedural fidelity was calculated by dividing the number of steps implemented correctly by the total number of steps (see Appendix E) and multiplying by 100. Fidelity was evaluated during
35% of all intervention sessions and averaged 99% (range, 98% to 100%) of procedures correctly followed.

**Experimental Conditions**

**Pre-Baseline.** The completion of the pre-baseline portion of the study yielded results for preference assessments and the Communication Matrix for each participant in order to identify highly reinforcing items and current levels of functioning regarding communication, respectively. The Communication Matrix indicates areas of communication that are surpassed, not used, emerging, and mastered on seven levels: pre-intentional behavior, intentional behavior, unconventional communication, conventional communication, concrete symbols, abstract symbols, and language.

**Sean.** Items used in the preference assessment for Sean were popcorn, almonds, gluten free pretzels, musical toys, an iPad, and keys. All items were identified for use for the assessment through conversations with his teachers. Four sessions of the assessment were completed and results indicated that pretzels and musical toys were the most reinforcing, followed by the iPad, keys and almonds, and lastly, popcorn.

The Communication Matrix completed for Sean indicated that he had surpassed the level of pre-intentional behavior (i.e., expressing discomfort) and mastered areas such as intentional behavior (i.e., protesting, continuing an action, and obtaining more of something) and 5 of 6 areas of unconventional communication (i.e., refusing or rejecting an object or requesting more). The final area of unconventional communication (requesting a new object) was classified as emerging. Further results of the Matrix include 2 of 6 mastered areas of conventional communication while the rest were not observed and 2 of 7 areas mastered and 1 of 7 areas emerging in concrete symbols. The
final levels of the Matrix (abstract symbols and language) were classified as not observed. The Matrix also indicated Sean’s ability to use communicative actions for refusal, obtaining, social, and informational purposes. Social and informational purposes were not observed while refusing and obtaining were used up to level 5 (either mastered or emerging) in some areas.

**Jason.** Items used in the preference assessment for Jason were M&Ms, bubbles, firework videos on the computer, an ocean toy, and the iPad. All items were identified for use for the assessment through conversations with his teachers. Five sessions of the assessment were completed and results demonstrated that M&Ms were the most reinforcing, followed by bubbles, firework videos, the ocean toy, and lastly, the iPad.

The Communication Matrix completed for Jason indicated that he had surpassed the level of pre-intentional behavior (i.e., expressing discomfort) and one level of intentional behavior: protesting. Other areas of intentional behavior (i.e., continuing an action and obtaining more of something) were mastered. Five of 6 areas of unconventional communication (i.e., refusing or rejecting an object or requesting more) were mastered while the final area of requesting a new action was not observed. Further results of the Matrix include 2 of 6 mastered areas of conventional communication, 2 of 6 emerging areas, and 2 of 6 areas not observed. The level of concrete symbols noted 1 of 7 areas classified as emerging while the rest were not observed. The final levels of the Matrix (abstract symbols and language) were classified as not observed. The Matrix also indicated Jason’s ability to use communicative actions for refusal, obtaining, social, and informational purposes. Social and informational purposes were not observed while
refusing and obtaining were observed to level 5 (either mastered or emerging) in some areas.

**Harry.** Items used in the preference assessment for Harry were bubbles, M&Ms, Doritos, popcorn, and sensory beads. All items were identified for use for the assessment through conversations with his teachers. Four sessions of the assessment were completed and results show that M&Ms were the most reinforcing, followed by Doritos and bubbles. Popcorn and sensory beads were removed from the assessment as Harry refused to choose either item and gestured for previously chosen items. The assessment was continued with three items.

The Communication Matrix completed for Harry indicated that he had surpassed the level of pre-intentional behavior (i.e., expressing discomfort) and mastered the level of intentional behavior (i.e., protesting, continuing an action, and obtaining more of something). Three of 6 areas of unconventional communication (i.e., refusing or rejecting, requesting more of an action/object) were mastered while one area (making choices) was classified as emerging and one area (requesting a new action) was not observed. Further results of the Matrix include 3 of 6 mastered areas of conventional communication while the remaining 3 were not observed. The level of concrete symbols had 4 of 7 classified as mastered while the rest were not observed. The final levels of the Matrix (abstract symbols and language) were classified as not observed. The Matrix also indicated Harry’s ability to use communicative actions for refusal, obtaining, social, and informational purposes. Communication for social and informational purposes was not observed while refusing and obtaining were at level 5 (either mastered or emerging) in some areas.
**Baseline.** Figure 1 displays the data recorded for appropriate manding and problem behaviors from 10 min baseline observations for each participant. The data indicates the occurrences of problem behaviors far exceed appropriate communicative responses in all three participants. Three sessions of baseline observations were done in succession with the hopes of establishing a true baseline with steady state responding (Horner et al., 1978).

**Sean.** Sean’s challenging behaviors defined as non-compliance (i.e., not follow given directions within one prompt) and hand biting around the thumb area of his left hand, were recorded at 15, 12, and 12 responses per 10 min sessions while his communicative responses were recorded consistently at 0 responses per 10 min. Baseline data for Sean showed stability in his behaviors and communicative responses as well as low variability and a steady trend.

**Jason.** Similar baseline data was recorded for Jason. His challenging behaviors were rigidity and repetitive behaviors such as self-stimulatory behaviors that included rocking, standing and sitting down repetitively, as well as exiting and re-entering the classroom. Data for these behaviors were recorded at 16, 19, and 14 responses per 10 min with his first probe recorded at 18 responses per 10 min. Like Sean, Jason’s communicative responses were consistently recorded at 0 responses per 10 min for all baseline sessions. Baseline data for Jason showed stability in his behaviors and communicative responses as well as low variability and a steady trend.

**Harry.** Harry’s baseline data showed more variability in his spitting behavior which was defined as saliva leaving his mouth and landing on objects in front of him such as the floor, desks, or his shirt. Harry’s data for challenging behaviors was recorded at 4, 10,
and 0 responses per 10 min with probe data recorded at 6, 0, 1, 1, 23, and 27 responses for each 10 min session. Similar to both Sean and Jason, Harry’s communicative responses were consistently recorded at 0 responses per 10 min throughout baseline sessions. Differently from Sean and Jason, Harry’s baseline data showed a lot of variability in his spitting behaviors though his communicative responses were stable throughout all sessions.

**Intervention.** Figure 1 displays the results of functional communication training on the emission of independent mands and reduction of problem behaviors for all participants. Data show that once the FCT intervention began, there was an immediate decrease in problem behaviors for each participant as well as an increase in appropriate communicative responses.

**Sean.** The first three intervention sessions with Sean show data recorded at 3, 1, and 1 for problem behaviors per 10 min sessions and communicative responses recorded at 5, 5, and 4 per 10 min sessions. Additional probe data show a similar increasing trend. Probe data for problem behaviors were recorded at 4, 1, 3, 1, and 0 responses per 10 min with communicative responses at 5, 12, 4, 4, and 9 responses per each 10 min session. Overall, for Sean’s problem behaviors, there was a 70% decrease once FCT was implemented. Further, Sean’s data recorded for communicative responses increased by 60% relative to baseline values.

**Jason.** Similar data was recorded for Jason. The first five intervention sessions with Jason show data recorded at 3, 0, 0, 0, and 0 responses per each 10 min session for problem behaviors with communicative responses recorded at 5, 4, 3, 3, and 3 responses per 10 min session. Further, probe data noted consistent responding for both
communicative responses and problem behaviors over four sessions. Data were recorded for all sessions at 3 responses per 10 min and 0 responses per 10 min for communicative responses and problem behaviors, respectively. Overall, for Jason’s problem behaviors, there was a 100% decrease once FCT was implemented. Further, Jason’s data recorded for communicative responses increased by 30% relative to baseline values.

**Harry.** The final participant, Harry, also showed similar results regarding an increase in communicative responses and decreases in problem behavior during FCT. Intervention sessions for Harry show data recorded at 0, 1, 0, 0, 0, and 0 responses per each 10 min session for problem behaviors with communicative responses recorded at 3, 5, 6, 5, 5, and 4 responses per session. Overall, for Harry’s problem behaviors, there was a 100% decrease once FCT was implemented. Further, Harry’s data recorded for communicative responses increased by 50% relative to baseline values.

**Maintenance.** Figure 1 also displays the results of the maintenance probes for each participant. The first maintenance probe was conducted 11 days after the final intervention session while the second maintenance probe was conducted 18 days after the final intervention session.

**Sean.** Sean’s data shows an increasing trend of maintaining the skills over time. Sean’s first maintenance probe shows problem behaviors occurring 1 time per 10 min session while his independent manding responses occurred 8 times per 10 min session. Sean’s second maintenance probe shows no problem behaviors per the 10 min session and 9 independent manding responses per 10 min session.

**Jason.** Similar to Sean, Jason’s data shows an increasing trend of maintaining the skills over time. Jason’s first maintenance probe shows neither problem behaviors nor
independent manding responses per 10 min session. Jason’s second maintenance probe, however, shows no problem behaviors per 10 min session and 1 independent manding response per 10 min session.

**Harry.** Unlike both Sean and Jason, Harry’s data shows a slight decreasing trend of maintaining the skills over time. Harry’s first maintenance probe shows problem behaviors occurring 1 time per 10 min session while his independent manding responses occurred 7 times per 10 min session. Harry’s second maintenance probe shows no problem behaviors per the 10 min session and 4 independent manding responses per the 10 min session.

**Social Validity**

Upon completion of the study, the experimenter gave the participating students’ teachers a 5-point rating scale asking them about the goals, procedures, and outcome of the study (see Appendix F). Both teachers agreed that the participating students have shown a decrease in problem behaviors and an increase in appropriate manding responses since the start of the study. Further, both teachers agreed that they spend less time tending to problem behaviors after the implementation of FCT in their classroom. Both teachers also agreed about the feasibility to acquire the materials in order to implement the intervention as well as believing they can implement FCT now or in the future.
Figure 1. Responses per 10 minute session of problem behaviors and alternative responses during baseline, FCT, and maintenance for Sean, Jason, and Harry.
Chapter 4: Discussion

Past research regarding functional communication training generally demonstrates that children who participate in FCT show an increase in appropriate communicative responses and a decrease in communication related problem behaviors (Doughty and Anderson, 2006; Lambert et al., 2012; Sigafoos and Meikle, 1996). This study’s results support the results of previous studies. All three participants demonstrated a functional relation between their challenging behaviors and communicative responses by showing an increase in manding responses and a corresponding decrease in challenging behaviors when participating in FCT. At the conclusion of the study, the frequency of manding responses remained higher than the frequency of challenging behaviors for each participant indicating the overall effectiveness of functional communication training with elementary aged students diagnosed with Autism Spectrum Disorder.

Sean

Sean began the study with relatively high frequency problem behaviors (i.e., non-compliance and hand biting). It was hypnotized that the function of his problem behaviors was escape/avoidance. Sean did not demonstrate independent communication skills during baseline. Problem behaviors appeared during demand situations or when directions were given. Immediately upon entering intervention, Sean was instructed how to appropriately request a break and his data reversed. That is, manding increased and problem behavior decreased. This could be a result of 1:1 attention from the experimenter
as well as engaging in an enriching educational environment. During the first three intervention sessions, Sean’s data remained relatively stable regarding both problem behaviors and communication. Sean worked well on the task demands and required few verbal prompts to stay on task; he was most distracted by other students entering or exiting the room or moving around close to his seat. However, with few verbal prompts, Sean was able to complete the sessions appropriately.

Sean’s problem behavior data increased during the fourth intervention session though his communication responses remained consistent to those previously observed. During this session, Sean appeared to have a cold and additional people were in the classroom observing his session. This could have contributed to the increase in behaviors as he was unwell and new faces were in the room. Sean’s second probe, however, showed a significant increase in communication as well as no problem behaviors. Prior to starting the session, the experimenter was informed that Sean was having a bad day and may not perform to his usual standards. This session was Sean’s best day throughout the intervention and maintenance phases. This could be a result of the strength of the intervention and the experimenter being a conditioned reinforcer. Sean’s next two probes returned to previously observed occurrences of communication and problem behaviors with no significant environmental occurrences during the session. Sean’s final probe showed an increase in communication responses that continued into the maintenance phase. By Sean’s maintenance data showing a higher frequency of manding responses and low to no problem behaviors, this demonstrates the strength of the intervention on Sean’s communication and problem behavior.
Jason

Like Sean, Jason began the study with high frequency of problem behaviors (i.e., repetitive behaviors) with the function determined to be automatic. Jason did not demonstrate independent communication skills during baseline. Problem behaviors appeared most often when Jason was not engaging in instructional demands or appropriate down time activities such as coloring, iPad games, or puzzles. Immediately upon entering intervention, Jason’s data reversed. Similar to Sean, this could be a result of 1:1 attention from the experimenter as well as engaging in an enriching educational environment. Jason worked well with the experimenter during intervention and maintenance phases and rarely was distracted by classroom occurrences or engaged in off task behaviors.

Despite the desired reversal of Jason’s behaviors, he was caught in the ceiling effect of prompted mands allotted during the intervention. How the methods were written allowed for three prompted mands per intervention session and 20 independent mands. Jason did not emit an independent mand throughout the intervention phase of the study. This could be due to Jason relaxed and easy-going personality or the enjoyment of working 1:1 with the experimenter. Due to the lack of independent manding responses during intervention, maintenance probes were expected to be zero communication and zero problem behaviors. The first maintenance probe proved as much, however, during the second maintenance probe, Jason emitted one independent mand. This could be a result of the repeated exposure to the skill and the beginnings of independent practice. Unlike Sean, Jason’s data shows a small positive effect of FCT with regards to increasing communication skills though his problem behaviors remained consistently at zero. It is
possible that remaining engaged in activities was enough reinforcement for Jason to not engage in problem behaviors. This may mean that he would benefit from a more structured school program with active student responding (ASR).

**Harry**

Harry began the study with relatively inconsistent problem behaviors with the function determined to be automatic and no independent communication skills during baseline. Problem behaviors appeared most often when Harry was not engaging in instructional demands or appropriate down time activities such as coloring, iPad games, or puzzles. Further, Harry’s problem behavior (i.e., spitting) drastically increased when engaging in a non-preferred activity such as scheduled walks. During baseline, it was noted that Harry’s behaviors seemed to cease when he was eating so FCT embedded with a DRI procedure was used. Immediately upon entering intervention, Harry’s data reversed. Similarly to Sean and Jason, this could be a result of 1:1 attention from the experimenter as well as engaging in an enriching educational environment. This reversal could also have been a result of the reinforcing power of the snack Harry was asking for in the DRI embedded FCT procedure. Overall, Harry worked well with the experimenter during intervention and maintenance phases and rarely was distracted by classroom occurrences or engaged in off task behaviors. Harry did engage in pinching the experimenter when frustrated during the intervention phases of the study but these occurrences were few and far between. The experimenter ignored this behavior and continued with the session as pinching was not a targeted behavior.

Harry’s first three intervention points show one or less problem behavior and an increasing trend of appropriate communicative responses despite having the sessions
conducted in a different room. Prior to beginning his sessions, behavior support entered
the classroom to tend to another student so Harry’s sessions were moved to a different
location. As his behavior data remained consistent and his communication data
increased, this demonstrates the relative strength of the procedure. Data obtained in
Harry’s next three intervention sessions plateaued; neither an increasing nor decreasing
trend was observed for neither challenging behaviors nor communication responses.
During Harry’s first maintenance probe, the most manding responses during the study
were observed. The snack was highly reinforcing and Harry continually tried to reach for
the bag of snacks. This was ignored and Harry was prompted to continue working on his
task until he independently manded. Harry’s second probe returned to previously
observed levels of manding and behaviors as seen in the intervention phase. Though
maintenance decreased, Harry’s data demonstrated the strength and effectiveness of FCT
on increasing communication and decreasing behaviors.

**What effect does functional communication training have on the emission of mands
for elementary age children with autism who have both poor communication and
frequent problem behaviors?**

The effects of FCT on the emission of mands for elementary age children with autism
who have both poor communication and frequent problem behaviors was largely positive.
All participants demonstrated an increase in manding responses from levels observed
consistently at 0 during baseline to levels observed during intervention and maintenance
phases. This supports previous results (Lambert et al., 2012; Volkert et al., 2009). The
increase in appropriate communication could be a result of giving the students a more
appropriate and functional way to communicate. Improved communication skills can
improve the quality of the school experience, as well as in other environments, as students would have more access to the material or activity through requesting additional items, commenting, or asking questions. Tiger et al. (2008) discusses the importance of communicative responses to recruit reinforcement from persons at a distance in an appropriate way. By teaching students appropriate ways to recruit reinforcement, students would achieve an improved quality of life as the maintaining problem behavior would be unnecessary to gain access to their desired item or activity. Each participant communicated using gestures or prompted picture cards that presented some challenges during regular school day instruction. If a teacher was not focusing on the students’ gestural attempts at communication or prompting the communication via a classroom picture exchange communication system (PECS) book, the communicative action was largely missed. By providing each participant with FCT, they learned a consistent and appropriate way to communicate wants or desires that also worked to decrease communication related problem behaviors. Research conducted by Lambert et al. (2012), Sigafoos and Meikle (1996), Schmidt et al. (2014), and Volkert et al. (2009) confirm the positive effects of FCT on the emission of manding responses. The present study extends previous research as the age group of the participants included older children. Previous research typically used children ages 2-8 years old (Lambert et al., 2012; Volkert et al., 2009; Sigafoos and Meikle, 1996) while the current study used children 11 years of age. After completion of the study, teachers commented that the participating students have shown a decrease in problem behaviors and an increase in appropriate manding responses since the start of the study.
What effect does functional communication training have on decreasing the problem behaviors of children with autism who have both poor communication and frequent problem behaviors?

The effects of FCT on decreasing the problem behaviors of children with autism who have both poor communication and frequent problem behaviors was positive. In all participants, problem behaviors drastically decreased from levels observed during baseline to at or near 0 during intervention and maintenance phases. These results are consistent with the findings of other researchers who examined the effects on FCT on problem behaviors (Lambert et al., 2012; Volkert et al., 2009; Sigafoos and Meikle, 1996; Schmidt et al., 2014). Similar to the effects of FCT on the emission of mands, it is possible that providing each participant with a more appropriate and functional way to communicate contributed to the decrease observed with problem behaviors. As intervention sessions progressed, each participant began to appropriately mand for their desired item or activity either independently or prompted over engaging in a problem behavior. FCT allowed for the positive effect regarding a decrease in behaviors as each participant learned to communicate without the need for problem behaviors as confirmed by research conducted by Lambert et al. (2012), Sigafoos and Meikle (1996), Schmidt et al. (2014), Doughty and Anderson (2006), and Volkert et al. (2009) though the participants in these studies were younger than those in the current research. Benefits of decreased problem behavior for the student include increased access to instructional material or enjoyable activities throughout the school day as well as increased access to positive interactions from peers and teachers. The participating students’ teachers agreed that the participants have shown a decrease in problem behaviors as well as a
corresponding increase in appropriate manding responses. Further, both teachers agreed that they spend less time tending to problem behaviors after the implementation of FCT in their classroom.

**What is the frequency of mands after the intervention concludes?**

The frequency of mands after the intervention concluded varied between participants. Independent manding responses ranged from 0 to 9 during the maintenance phase of the study. The frequency of manding observed during maintenance differs slightly from the frequency of manding in previous research. Manding responses during maintenance phases in previous studies include independent manding responses ranging from 3 responses per minute to 100% of trials (Sigafoos and Meikle, 1996; Schmidt et al., 2014; Volkert et al., 2009). Previous research shows a slightly higher frequency of manding in maintenance than the current study. Maintenance phases for the present research were conducted 11 and 18 days after the intervention concluded. The increase in manding responses during the maintenance phase for each participant could be a result of the overall strength of the procedure. The reinforcing items or activities that each participant was manding for may have been the appropriate strength reinforcer to elicit a manding response despite low aversion task demands. An increase in manding responses after the intervention concluded confirms previous research conducted by Sigafoos and Meikle (1996), Schmidt et al. (2014), and Volkert et al. (2009) which indicate manding responses that were comparable to responses during intervention procedures. Frequency of manding responses during maintenance phases shows a similar frequency of manding responses observed during the intervention phase within the previous research studies. This observation was similar to what was observed during the present study regarding
manding responses during intervention being comparable to maintenance. However, the current study conducted only two maintenance sessions while previous research included 5 to 17 maintenance sessions (Sigafoos and Meikle, 1996; Schmidt et al., 2014; Volkert et al., 2009). With a longer maintenance phase, it is possible to observe increased manding over time due to increased exposure to the skills and prolonged practice.

**What is the frequency of problem behaviors after the intervention concludes?**

The frequency of problem behaviors after the intervention concluded remained consistent (i.e., no more than one instance per 10 min session) between participants. The decrease in problem behaviors from baseline to intervention and maintenance for each participant could be a result of 1:1 engagement of each participant with the experimenter. Benefits of decreased problem behavior for the student include increased access to instructional material or enjoyable activities throughout the school day as well as increased access to positive interactions from peers and teachers. The participating students’ teachers agreed that the participants have shown a decrease in problem behaviors as well as a corresponding increase in appropriate manding responses. Further, both teachers agreed that they spend less time tending to problem behaviors after the implementation of FCT in their classroom. By engaging each participant in an enriching environment with 1:1 instruction, it is possible that actively engaging in material, as opposed to instructional down time during the regular school day, was reinforcing to each participant which would limit the appearance of challenging behaviors. A decrease in the frequency of problem behaviors confirms previous research conducted by Lambert et al. (2012), Doughty and Anderson (2006), Schmidt et al. (2014), and others in which results indicate a drastic decrease in problem behaviors after engaging in FCT. The current
research is similar to the frequency of problem behaviors observed in previous research as problem behaviors decreased to levels at or near zero, which is comparable to what was observed during the current study. One slight difference between previous research and current research regarding problem behaviors is when the decrease occurred. In previous research, the decrease was more gradual over time while in the current study, the decrease was immediately observed in the first intervention session.

**Will increases in mands maintain over time?**

After completion of the present study, it is clear that increases in manding responses may maintain over a short time though it is still unclear if these responses will maintain over longer periods. Each participant demonstrated independent manding responses during one or more maintenance probes included in the maintenance phase of the study. It is possible these increases maintained over time due to the continued exposure of the skill with the experimenter throughout the intervention sessions and a weak but present motivating operation (MO). The participants were not always engaging in instructional material throughout the regular school day so it is possible that when the experimenter returned for maintenance and presented task demands, the MO increased relative to the MO during intervention sessions. Maintaining independent manding responses over time confirms previous research findings from Sigafoos and Meikle (1996) in which all participants continued to independently mand for desired items or activities during follow-up sessions.

**Limitations**

While the current study yielded desirable results regarding the effectiveness of FCT with children diagnosed with ASD, there were several limitations including issues with
possible ceiling effects, the length of intervention sessions and exposure to the skill, the level of difficulty of the task demands, and the lack of a motivating operation. Despite the data showing the desired results regarding functional communication training, appropriate communicative responses, and challenging behaviors, the previously listed limitations must be considered when discussing the overall efficacy of the present study.

Ceiling effects were a possible limitation regarding the methods of the current study. Within the 10 min intervention session, each participant had the opportunity to engage in a maximum of 20 independent mands and 3 experimenter prompted mands. While no participant reached the maximum of independent mands, Jason was affected by ceiling effects with the prompted mands. How the methods were written allowed for a prompted mand approximately every 2 minutes if no independent manding response was made and no problem behavior was exhibited although the 10 min session timer continuously ran. This led to the maximum of three prompted mands per 10 min session. The methods were written to prompt a mand every 2 minutes to maximize exposure to the skill of manding with the hopes that the participant would become independent with the skill over time, however, this was not observed with Jason. Jason continued to reach the ceiling of prompted mands throughout the intervention phase of the study. This may have been due to Jason’s relaxed and easy-going personality while working with the experimenter; he did not show an aversion to working with the experimenter during sessions to warrant a manding response. Further, Jason may find work reinforcing which would inhibit the demonstration of unwanted problem behaviors.

Along with the ceiling effects noted in this study, the length of the intervention sessions and the amount of exposure to the skill were also identified as limitations. The
length of intervention session and time of skill exposure during the study were possible limitations for the weak response noted with the positive behavior of desired manding responses. As intervention sessions were only 10 minutes long, it was difficult to teach an important life skill such as appropriate communicative responses in such a short timeframe. Further, when the experimenter finished each session, the participant’s exposure to the skill ended. The skill was not targeted with as much focus during the regular school day as when intervention session took place as other skills, such as functional skills, took precedence. Subsequently, the participants’ exposure to the skill was very limited and fluent usage of the skill would take longer to master.

Further, the difficulty of each task may have functioned as a limitation as problem behaviors decreased rapidly immediately after the intervention began. It is possible that while there was a lack of a motivating operation to mand, the task demands were also not hard or aversive enough to elicit a problem behavior in which manding would be appropriate. Tasks demands for each participant were picture matching, letter matching, and number sequencing. All task demands remained constant throughout the study to avoid problem behaviors only occurring with specific task demands and not with others. Further, by keeping the tasks constant, the participants became more fluent in the work which may have contributed to the lack of problem behaviors throughout the intervention.

In addition, the motivating operation (MO) acted as a limitation of the study due to the experimenter becoming a stimulus of reinforcement, specifically a conditioned reinforcer, for each participant. Upon observing the classroom during baseline, there were periods of time in which the students were required to sit at their desks without immediately
participating in instructional material. As the students were not actively engaging in tasks or instruction, this promoted a time for challenging behaviors. Once the experimenter began intervention, each participant had access to an enriching environment with 1:1 attention as well as stimulating task work. This caused a problem with the MO as the students were enjoying their time working with the experimenter in a fun, educational setting and were not engaging in challenging behaviors that would motivate each participant to mand for their desired item or activity.

Further limitations regarding the present study consist of the inclusion of participants with automatically reinforced problem behaviors, the use of an indirect FBA to determine the function of problem behaviors, and the use of food as a reinforcer. Previous research regarding functional communication training does not address automatically reinforced behaviors; FCT more commonly addresses behaviors with the function of escape/avoidance (Lambert et al, 2012). Automatically reinforced behaviors may not be a good fit for FCT research as it is difficult to obtain an alternative communicative response that would access the same type of reinforcement as the maintaining problem behavior. For example, Jason engaged in rigid and repetitive behaviors that were automatically reinforced. Given the definition of functional communication training, the 30s reinforcement periods for manding responses with Jason did not include activities that provided the same type of sensory stimulation as the maintaining problem behavior and therefore does not fit the given definition of FCT. Consequently, students with the function of behavior determined to be automatic may not be the best fit to participate in functional communication training research.
Another limitation recognized in the current study is the use of an indirect functional behavior assessment (FBA) consisting of teacher interviews and classroom observations instead of conducting a full functional analysis (FA) or trial-based FA to determine the function of a behavior. While the use of an indirect FBA is beneficial in determining the function of a behavior, conducting a full FA or trial-based FA provides more concrete information regarding the function. Generally, previous research regarding FCT consists of full FAs or trial-based FAs in determining the function of a behavior over the use of an FBA (Lambert et al., 2012; Mancil, 2006; Volkert et al., 2009). Further, an indirect FBA, such as what was used in the current study, could consist of anecdotal information (i.e., teacher interviews) that could be misinterpreted while the FA provides accurate and reliable information obtained during conditions related to each function of behavior.

The final limitation regarding the current study consists of the use of food as a reinforcer for FCT research. The use of food as a reinforcer is not feasible for extended periods of time. It is unlikely that a teacher, provider, paraprofessional, or parent will be able to deliver this type of reinforcement for long periods with no consequences. For example, Harry’s FCT consisted of an embedded DRI procedure in which he asked for a snack, typically M&Ms. While Harry only had access to this reinforcement during intervention and maintenance sessions with the experimenter, it would not be healthy to have Harry earning M&Ms throughout the school day or in his home environment as this could lead to unhealthy weight gain. When choosing edible reinforcers for students, it is important to keep in mind the potential long term effects and decide if the benefits outweigh the risks.
Future Research

Given the limitations regarding this study, there are ways to address these shortcomings in future research. Future research could address the limitations including issues with possible ceiling effects, the length of intervention sessions and exposure to the skill, the level of difficulty of the task demands, and the lack of a motivating operation and provide more concrete evidence regarding FCT. Future research can include modifying the methods to combat ceiling effects, increasing the length of intervention sessions to maximize exposure to the skill, increasing task difficulty to elicit a problem behavior, and increasing the motivating operation (MO).

Future research to address the ceiling effects observed during the intervention phase could include modifying the methods to allow for more prompted manding responses when neither a problem behavior nor independent mand was demonstrated or increasing task demands to elicit manding responses. While modifying the methods may not entirely rid ceiling effects from the study, the methods could be modified enough where ceiling effects could become a nonissue. For example, the methods could be modified to include stopping the 10 min session timer during independent or prompted manding reinforcement periods which would allow for more manding responses throughout the session as well as increasing the overall intervention session time. Further, by increasing aversion to task demands, the participant may be more likely to independently mand for their desired item or activity subsequently decreasing the need for experimenter prompted mands.

Further, future research to contest with the limitation of length of intervention sessions and exposure to the skill includes increasing the length of each intervention session and
spacing intervention sessions over a few days to maximize exposure to the skill. By increasing intervention sessions and spacing sessions over a few days, the participants would have more time to learn and practice the skill. Ten minute sessions is not a lot of time to learn, practice, and master such a crucial skill as communication and increasing the time with the skill would help to achieve fluency and mastery. Further, it was not uncommon for a participant to engage in two intervention sessions in one day. This limited exposure to the skill to 20 minutes on days two sessions were run and no exposure on days when the intervention was not run. By having a limit of one session per day with increased time (more than 10 min), the participants would have had more exposure to the skill overall.

To address the limitation of the difficulty of task demands, future research regarding FCT with respect to the current study could incorporate increasing the task demands to evoke challenging behaviors. All participants completed task work during the 10 min intervention sessions that may not have been aversive enough to contribute to problem behaviors. If the tasks were more difficult or aversive to the participants, it is possible that there would have been more problem behaviors throughout each intervention session that would have contributed to the motivation of each participant to mand for their desired item or activity. Further, if the tasks had been individualized for difficulty for each participant, different outcomes may have been observed.

The motivating operation was also identified as a limitation in this study. Future research to address this limitation could include increasing task demands (as previously discussed) to elicit more of an MO with each participant or to increase regular school day instruction to incorporate more academic task demands in conjunction with already
targeted functional skills as well as 1:1 attention. By incorporating academic task demands, it is likely the school environment would become more enriching as teachers would provide more individualized attention during these demands. This would cause the experimenter to become less of a stimulus of reinforcement and potentially increase the students’ motivation to mand for desired items during task demands in the intervention as the environmental arrangement is not so new and enriching from regular instruction.

Future research could also address the limitations of the use of an FBA to determine the function of a behavior and the use of food as a reinforcer during FCT research. Given the information obtained from an indirect FBA and a full FA or trial-based FA, it is more beneficial to use an FA to determine the function of a behavior as the information obtained is more accurate and reliable. As previously stated, anecdotal information obtained from an indirect FBA may be misunderstood or misconstrued while information obtained during an FA is true to the conditions that were applied. Further, to address the limitation of using food as a reinforcer, edibles should be considered if no other alternative is available or if the edible is of a healthy variety. If an edible is used, it should also be paired with social praise and eventually faded out until only the praise remains.

Additionally, most research regarding FCT with children diagnosed with autism has involved one of the simplest verbal operants (i.e., mand). Additional simple verbal operants include tacts and intraverbals, however, manding, more commonly known as requesting or asking, is typically the first verbal operant that is taught (Cooper et al., 2007). Since a consistent manding repertoire is necessary prior to learning to tact (i.e.,
label), studies involving FCT and tacting are very limited. However, FCT and tacting should only be considered if the function of a behavior is determined to be attention as the consequence of tacting is social reinforcement. By expanding FCT research in the future to incorporate tact and intraverbal operants, a more comprehensive conclusion of the effects of FCT on independent communicative responses may be made with more accuracy and certainty.

**Overall Conclusions**

Concurrent with previous research, the present study supports the effectiveness and value of functional communication training to increase the emission of independent mands and reduce problem behaviors of three elementary age participants with a diagnosis of Autism Spectrum Disorder with both poor communication skills and frequent problem behaviors. As this study confirms the results of previous research, the applicability of FCT to practitioners is strengthened. Results of the current study demonstrate that, with a functional relation, FCT can increase appropriate communicative responses while subsequently decreasing problem behaviors. Problems behaviors can cause large distractions in the classroom as well as drawing teachers away from instructional time to tend to these behaviors. When a function of a behavior is known, FCT can be introduced to teach appropriate communication that would result in the same class of reinforcement as the maintaining problem behavior. Once FCT is introduced, practiced, and mastered, problem behaviors should decrease and appropriate communication should increase and, with this change, better and more meaningful instructional time for children in the classroom could occur as their teachers are tending less to unwanted behaviors. Practitioners and teachers should consider FCT as a
treatment plan when dealing with challenging behaviors as research shows the effectiveness and reliability of this training with elementary aged children diagnosed with Autism Spectrum Disorder.
References


Lambert, J. M., Bloom, S. E., & Irvin, J. (2012). Trail-based functional analysis and


Appendix A: Multiple Stimulus without Replacement Preference Assessment
Date _____________________

Participant _____________________

**Multiple Stimulus without Replacement**

<table>
<thead>
<tr>
<th>Items</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
<th>Total</th>
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<tbody>
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</tbody>
</table>

Rank items from lowest to highest total to give preference hierarchy, where the lower number indicates a higher preference.

1. _______________________
2. _______________________
3. _______________________
4. _______________________
5. _______________________
Appendix B: Communication Matrix
Communication Matrix Questions and Answer Options
©Charity Rowland, 1994
Updated 09-2012

GETTING STARTED...

Please check ONE of the four statements below that best describes the communication skills of your child.

_____ A. My child doesn’t seem to have real control over his body yet. The only way I know that he wants something is because he fusses or whines when he’s unhappy or uncomfortable, and he smiles, makes noises or calms down when he’s happy and comfortable. Does this statement describe your child? If you checked this statement, go to Section A (p. 1)

_____ B. My child has control over her own behaviors, but she doesn’t use them to try to communicate to me. She doesn’t come to me to let me know what she wants, but it’s easy for me to figure out, because she tries to do things for herself. She knows what she wants, and her behavior shows me what she wants. If she runs out of something to eat, she will just try to get more, rather than trying to get me to give her more. Does this statement describe your child? If you checked this statement, go to Section B (p. 2)

_____ C. My child clearly tries to communicate his needs to me through gestures, sounds or language. He knows how to get me to do something for him. He uses some of the kinds of behaviors below to communicate:

• Gestures such as pointing, shaking his head, tugging at my arm or looking back and forth between me and what he wants
• Sounds such as squealing to show you he wants something or fussing when he doesn’t want something
• Language or symbolic forms of communication such as speech, written words, Braille, picture symbols, 3-dimensional symbols or sign language

If you checked this statement, go to Section C (p. 4)

SECTION A

At this stage your child doesn’t seem to have control over her own behaviors, but seems mostly to react to sensations. Her reactions show you how she feels.

A1. Expresses Discomfort. Can you tell when your child is uncomfortable (in pain, wet, hungry, startled)? If so, what does your child do to make you think s/he’s uncomfortable?

Body movements
• change in posture (stiffen body, twist, turn away)
• limb movements (kick legs, bat arms)
• head movements (turn head away)

Early Sounds
• cry, grunt, scream

2 Communication Matrix is available online in full
Appendix C: Data Collection Sheet
<table>
<thead>
<tr>
<th>IND or PROMPTED</th>
<th>BEHAVIOR (check)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Appendix D: Picture Icons
Used with Sean and Jason:

![Take a Break](image)

Used with Harry:

![Snack](image)
Appendix E: Procedural Fidelity Checklist
<table>
<thead>
<tr>
<th>Date __________________________</th>
<th>IOA __________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant ____________________</td>
<td></td>
</tr>
</tbody>
</table>

### GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the experimenter sit in a position where they could clearly see the student?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter take data on the appropriate data sheet?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter set a timer for 10 min and a timer for 2 min?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter collect data for the full 10 min?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
</tbody>
</table>

### PROMPTED MANDS

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the experimenter use a prompt to elicit a manding response (either after 2 min timer or after a problem behavior)?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter immediately provide a reinforcer after the manding response?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter set the timer for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the participant have access to the item for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter reset the 2 min timer after the 30s elapsed?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter record every instance of prompted manding responses?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
</tbody>
</table>
### INDEPENDENT MANDS

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the experimenter immediately provide the reinforcer after the manding response?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter set the timer for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the participant have access to the item for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter reset the 2 min timer after the 30s elapsed?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter record every instance of independent manding responses?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
</tbody>
</table>

### PROBLEM BEHAVIORS

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the experimenter wait 10s after the cessation of the behavior to prompt a manding response?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>Did the experimenter use a prompt to elicit a manding response?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
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<tr>
<td>Did the experimenter immediately provide the reinforcer after the manding response?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
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<tr>
<td>Did the experimenter set the timer for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
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<tr>
<td>Did the participant have access to the item for 30s?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
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<tr>
<td>Did the experimenter reset the 2 min timer after the 30s elapsed?</td>
<td>YES</td>
<td>NO</td>
<td>COMMENTS</td>
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</tbody>
</table>
Appendix F: Social Validity Survey
Please circle your response to each question.

<table>
<thead>
<tr>
<th>Question</th>
<th>NEVER</th>
<th>RARELY</th>
<th>SOMETIMES</th>
<th>VERY OFTEN</th>
<th>ALWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>My students communicate to me what they want in a way I can understand.</td>
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<tr>
<td>My students do not disrupt classroom activities or their peers during the school day.</td>
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<td>I often have to stop teaching to tend to a student who is engaging in a problem behavior.</td>
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<td>My students currently engage in problem behaviors.</td>
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<td>To what extent have you noticed an increase in manding responses?</td>
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<td>To what extent have you noticed a decrease in the occurrences of problem behaviors?</td>
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<td>To what extent was FCT beneficial in your classroom?</td>
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<td>Would it be feasible to acquire the necessary materials in order to implement the intervention?</td>
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<td>Have you noticed that you spend less time tending to problem behaviors?</td>
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<td>Do you think you can implement FCT with another student in your room (now or in the future)?</td>
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Any additional comments?

____________________________________________________________________
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