Spring 2019

Using video-prompting and BST to promote social skills in children with Autism Spectrum Disorder

Alexa Ina

Using Video –Prompting and BST to Promote Social Skills in Children with Autism Spectrum Disorder

Alexa Ina

A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of Requirements

For the degree of

Master of Arts

Department of Graduate Psychology

May 2019

FACULTY COMMITTEE:

Committee Chair: Dr. Trevor Stokes

Committee Members/ Readers:

Dr. Daniel Holt

Dr. Tracy Zinn

Dedication

I dedicate this thesis to my research participant Rufus. Rufus has had a profound impact on my educational and professional journey. He has fostered my passion for helping others while providing me with an environment to grow and develop my skills. My passion for Applied Behavior Analysis would not be where it is today without his love, growth and support.

Acknowledgements

I would like to acknowledge the contribution of both Dr. Trevor Stokes, Allison Brandmark and Melissa Grant as their effort, support, and advise was crucial to the success of this study. I would also like to express my deepest gratitude to my family, colleagues, friends and educational mentors that have been such an integral part of my six-year journey here at James Madison University. Thank you for standing by my side and encouraging me to become the best student and professional that I can be.

Table of Contents

Dedication ii

Acknowledgements iii

Abstract viii

Introduction 1

Autism Spectrum Disorders 1

Behavioral Deficiencies 1

Early- Intervention 3

Applied Behavior Analysis 3

Generalization 4

Scripting and Script Fading Procedures 9

Social Narratives 12

Behavior Skills Training 14

Video Modeling 18

Present Study 28

Method 29

Confidentiality and Human Subjects Research 30

Participants 30

Setting 32

Experimental Design 33

Dependent Variables 34
Independent Variable(s) 34
Data Collection 36
Procedural Fidelity 38
Baseline Condition 38
BST and Video Modeling Training Sessions 39
Post-Training Condition 41
In-Vivo Prompting Condition 41
Generalization + Rx Condition 42
Generalization Condition 42
Results 44
Discussion 48
Baseline 50
Training 53
Post -Training 54
In-Vivo Prompting Condition 56
Generalization + RX Condition 57
Generalization Condition 58
Practical Implications 59
References 62

Figures..... 71

Appendix A..... 74

List of Figures

Figure 1. Benji Training Data ……. 71

Figure 2. Rufus Training Data …….71

Figure 3. Rufus Generalization Data……72

Figure 4. Benji Generalization Data…….73

Abstract

The purpose of the present study was to examine the effectiveness of implementing a combined and integrative Behavior Skills Training (BST) and video-prompting paradigm. The training focused on enhancing social interactions and fostering the development of age-appropriate social skills in children diagnosed with Autism Spectrum Disorder (ASD). This package included explicit training for generalization, as a means of fostering skill acquisition across untrained people and settings. Social initiation and reciprocal play are fundamental aspects of sustaining and maintaining relationships therefore, the training focused on teaching these two behaviors. The researcher used a quasi-single subject research design to analyze and measure the effectiveness of the intervention. Overall, the training was successful in increasing both participants independent skill acquisition of the target behaviors however, only one client was able to generalize the skills to the target population.

Keywords

Autism Spectrum Disorder (ASD), Video-Modeling, Behavior Skills Training (BST), Generalization, Social Skills Training

Introduction

Autism Spectrum Disorders

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects 1 in every 68 children (Baio, Wiggins, Christensen, 2014). ASD tends to inhibit a person's ability to communicate and interact appropriately with those around them. The symptoms of ASD tend to present themselves in early childhood however, it is important to understand that this disorder affects individuals in vastly different ways (Lord, Cook, Leventhal & Amaral, 2000). The American Psychiatric Association (2013) recently released the fifth edition of the Diagnostic and Statistical Manual (DSM-V) and this publication provides the criteria for properly assessing and diagnosing individuals with ASD. The DSM-V highlights the commonality of "persistent difficulties in social communication and social interactions across contexts" and "restrictive and repetitive patterns of behavior and interests" (American Psychiatric Association, 2013, p.50-59). The specific cause(s) of ASD are elusive however, previous research has pointed towards a combination of environmental, genetic, neurological and biological risk factors (Lord et al., 2000).

Behavioral Deficiencies

Individuals diagnosed with ASD tend to display a variety of deficits when it comes to the development of their social, behavioral, linguistic and sensory repertoires. The American Psychiatric Association (2013) reports that if the behavioral deficits associated with ASD remain untreated, they have the potential to pose significant challenges for both the learner and related-care staff.

Individuals with ASD have difficulties engaging and maintaining meaningful and intimate relationships (Hood, Luczynski, & Mitteer, 2017). Social communication is a complex response class of behaviors and therefore, research advises investigators to break down complex behavioral units into smaller more observable behaviors. Research has also been published on a wide range of social and prosocial behaviors varying from deficits in verbal and nonverbal communication (Woods, Mahdavi, & Ryan, 2013) social initiation (Gable, Hendrickson & Strain, 1978), turn-taking (White, Keonig, & Scahill, 2007), reciprocal communication, reciprocal play (Gable et. al., 1978) and deficits associated with interpreting and recognizing one's own emotions (Krantz & McClannahan,1998). Research also supported the use of a multitude of evidence-based practices as effective in improving both the quantity and quality of social interactions for these children (Cooper et. al., 2007 pg. 13).

The present study focuses on teaching and promoting the generalization of social behavior in students with ASD. Research has reported that students with a deficit in social communication often times remain socially isolated and excluded from their peers until they are provided with specific and systematic training. Research also reports that students who remain socially isolated have an increased chance of developing future behavioral issues such as; anxiety and depression (McCracken et al., 2002). The goal of the present study was to teach individuals with ASD to enhance the frequency and quality of their social interactions, as a means of avoiding social isolation and increased stigmatization.

Early- Intervention

Early-intervention procedures have been empirically supported as an effective treatment for children diagnosed with ASD (Corsello, 2005). Research has supported that children who enter behavior programs at younger ages (less than 48 months) tend to make more progress than those who enter these programs at older ages (greater than 48 months) (Harris & Handleman, 2000). Virués-Ortega (2010) conducted a meta-analysis assessing the effectiveness of early-intervention procedures for children with ASD and the study reported that children who received early-intervention procedures tend to display a significant increase in their level of intellectual functioning, language development, daily living skills, and social functioning.

Both of the selected participants for this study are in elementary school. Elementary school students were chosen as the target age because students with ASD tend to socially isolate themselves during elementary school whereas, typically developing elementary schoolers tend to socially thrive during this time. Therefore, teaching social initiation and reciprocal play behaviors are crucial when it comes to teaching students to navigate the complex social repertoires that accompany elementary school and the upcoming transition to middle school. Even though there are no known cures for ASD at the moment, evidence supports the use of specific behaviorally-based therapies as effective in decreasing some of the symptoms associated with ASD.

Applied Behavior Analysis

The field of Applied Behavior Analysis (ABA) has been empirically supported by an extensive litany of scientific research. ABA is one of the most effective treatments in producing and maintain lasting behavioral change for individuals diagnosed with ASD

(Foxx, 2008). Behavior analysts tend to focus on improving behaviors that are of social importance and or social significance to the child and or their family. Behavior analysts objectively identify and systematically implement behavior plans based on the science of learning and behavioral development (Cooper, Heron & Heward, 2007). The seven dimensions of ABA help to ground the field in its systematic and scientific nature. These seven dimensions help to ensure that researchers obtain information and results that are behavioral, analytic, conceptually systematic, effective, applied, technological and have some degree of generality (Baer, Wolf & Risley, 1968). The foundation of behavior analysis has been around since the early 1960s and the field has been growing ever since the first publication of *The Journal of Applied Behavior Analysis* (JABA) in 1968 (Cooper, et al., 2007).

Generalization

Children with ASD lack the ability to generalize skills across contexts therefore, explicit training for generalization is often necessary to produce socially valid behavior change. Baer, Wolf, and Risley (1968) include generality of behavior change as one of the seven defining characteristics of ABA. Generality deals with the durability and maintenance of behavior change procedures over time. It wasn't until the publication of Stokes & Baer (1977) that researchers truly began to understand and note the importance of explicitly programming for generalized outcomes. This paper remains critical to the field of behavior analysis because behavior change procedures that lack generalized outcomes also lack a major degree of social significance as well.

Stokes and Baer (1977) highlight the importance of viewing generalization as an active rather than a passive process. Prior to this publication, most of the field adopted

what is referred to as a "train and hope" approach. Utilizing a train and hope approach involves no explicit training related to the programming of generalization. Instead, researchers would simply hope that behavior change would generalize automatically across novel environments, people and situations. In hindsight, researchers should not play a passive role when it comes to fostering generalized outcomes as researchers simply can't guarantee that generalization will occur. The publication of Stokes and Baer (1977) provided the field of behavior analysis with seven core strategies that can be used to explicitly train and promote generalized behavior change.

When it comes to promoting generalization, Stokes and Baer (1977) suggest that it is beneficial to make sequential modifications and train loosely throughout your procedures. These tactics help the leaner to better understand the salient contingencies in place by varying noncritical aspects of the environment to preventing irrelevant stimuli from gaining stimulus control over the target behavior (Cooper et.al., 2007).

The ultimate goal of any behavior change program is for the leaner to demonstrate independence and maintenance of behavior change and researchers can accomplish this by teaching behaviors that subscribe to naturally maintaining contingencies. Explicitly choosing target behaviors that subscribe to naturally contingencies. This helps to promote generalization because it allows our learners to come into contact with naturally reinforcing and naturally maintaining contingencies within their environment. These contingencies help our learners to transfer of stimulus control from the strict teacher-experimenter role to a more independent and naturalistic environment (Stokes & Baer, 1977). The behaviors targeted within the current study subscribe to the natural

contingencies of social interactions and should aid the participants in sustaining social behavior independent of the researcher.

When it comes to mimicking the natural environment researchers can also promote generalization by programming indiscriminable contingencies into their behavioral programs. Creating these indiscriminate contingencies makes it difficult for learners to discriminate which responses will produce reinforcement. This, in turn, helps to promote behavior change and generalization across unknown settings and situations. The natural world is full of indiscriminate contingencies and exposing the leaner to these contingencies during training will allow them to better adapt when asked to demonstrate the skills within a generalized setting.

The present study employed the principles of programming for common stimuli as well as multiple exemplar training. Programming for common stimuli involves providing the learner with a training environment that contains similar stimuli to the desired generalization location (Cooper et. al., 2007). The present study embedded programming for common stimuli as the video model was filmed within the generalization setting (playground) as a means of providing the leaners with salient cues and information associated with the generalization environment.

Multiple exemplar training involves teaching individuals' a multitude of different exemplars. This includes training students on the appropriate as well as inappropriate forms of engaging in the target behaviors. Providing the student with multiple examples is important because it promotes increased skill acquisition across a multitude of stimuli. The video model created for the present study highlights multiple exemplars as the video model includes training on how to engage in a variety of different

greeting responses as well as a multitude of ways to appropriately and inappropriately engage in reciprocal play.

The outcomes of Gaylord- Ross, Haring, Breen, and Pitts- Conway (1984) and Stokes, Baer & Jackson, (1974) provide support for the importance of explicitly training generalization, as it relates to the development of social skills. Gaylord- Ross et. al., (1984) conducted a study measuring the generalization of social interaction skills amongst two children diagnosed with ASD. This study taught the participants how to properly initiate and sustain social interactions with three same-age peers within their classrooms. After receiving some training on how to properly socially initiate the participants were able to generalize these skills to different peers within the same setting. The researcher provided training in both the classroom and various generalization settings, as a means of promoting the generalization of the newly developed skill. The researchers utilized sufficient exemplars to train the behaviors in a variety of settings (Stokes & Baer, 1977). The results of this study supported the facilitation and generalization of trained skills across a variety of novel settings and individuals. This study helps to emphasize the importance of training and teaching individuals the behavioral contingencies within multiple locations and across multiple people.

In support, Stokes, Baer & Jackson, (1974) studied the generalization of social greetings across a variety of novel settings and people. The participants were four intellectually disabled individuals. The researchers used the principles of prompting and shaping to development a gestural hand-wave that served as a social initiation and or a greeting response. Of the participants who reached mastery criteria, novel staff members were instructed to probe for the generalization of hand-waving. It is important to note that

the use of one experimenter was not sufficient enough for the participants to demonstrate generalized outcomes, however, the addition of a second experimenter fostered the generalization of these outcomes to novel people. These results were maintained during a 6-month follow-up assessment. This study helps to provide support for the need to explicitly train for generalization, as the results of behavior change don't naturally transfer across novel stimuli.

Generalization is beneficial when researchers are training behaviors that serve as potential behavioral cusps. Behavioral cusps occur when newly learned behavior expose a person to new environments, reinforcers, contingencies, responses and stimulus controls (Cooper et al., (2007). Linguistic development and social skills training often pave the way for the development of new untrained skills and therefore, the present study will train two behaviors that have the potential to serve as behavioral cusps for each participant; social initiation and reciprocal play.

Both Dixon, Peach, Daar & Penrod (2017) and Grow, Kodak & Clements (2016) directly programmed for the generalization of behavior change through teaching social skills that serve as behavioral cusps. Daar et. al., (2017) taught students with ASD to use autoclitic mands, distorted tacts, and creative pathfinding while Grow et. al., (2016) studied the use of interactive feedback as a means of teaching two simultaneous skill sets. The development of these skills will help to expose the participants to new contingencies while simultaneously teaching them to access new skills. For example, if students are learning to tact a variety of aquatic animals (primary skill set), the researcher would also teach the learners to tact items such as fins, gills, and scales (secondary skill set). Both of these studies explicitly programmed for generalization through the use of multiple

exemplar training and programming for common stimuli (Stokes & Baer, 1977). These studies help to demonstrate the true effectiveness of explicit teaching as a means of increasing the generalization of behavior change. The results from both of these studies reported that the researchers were able to see generalized across untrained settings, situations, and behaviors.

Previous research has supported the use of scripting, social narratives, BST and video- modeling as an effective means of teaching and promoting social skills in individuals with ASD. Generalization tactics can and should be explicitly embedded within these procedures as a means of ensuring and obtaining generalized outcomes.

Scripting and Script Fading Procedures

Scripting and script- fading procedures are both evidence-based practices that involve providing learners with a visual and/or auditory script, as a means of teaching, initiating and facilitating social communication in children diagnosed with ASD (Griffin & AFIRM Team, 2017). Scripts provide individuals with the ability to practice context-specific and peer-directed language (Krantz & McClannahan, 1993). Most scripts include a dialogue between two or more individuals and utilize comments/ questions to help the learner sustain reciprocal communication. Loveland and Tunali (1991) discuss the use of scripts and script fading, as a means of providing individuals with a set of expectations when engaging in social situations.

Scripting procedures involve transferring stimulus control from a visual/auditory script to a more naturalistic situation and/or setting. Depending on the level of the learner, pictures and icons can be used in combination with textual and auditory scripts (Griffin &

AFIRM Team, 2017). Therefore, it is important to understand both the expressive and receptive level of the learner before introducing a scripting procedure.

Scripting procedures alone are effective in fostering behavior change however, the systematic fading of these scripts is essential for maintaining and generalizing the skill across contexts. Script -fading helps to prevent individuals from becoming prompt dependent, as this procedure involves the thinning and/ or gradual fading of scripts (Cooper, Heron & Heward, 2007 and Wong et al., 2005). Scripts can be faded from *back- to -front* or from *front- to- back,* however, previous research cites *back- to -front* fading more often than the *front- to- back* fading (Krantz & McClannahan, 1993; Sarokoff et al., 2001; Reagon & Hibgee, 2009). *Back -to -front* fading is the process of fading the length, intensity or topography of the script from the back of the script to the front. *Front -to - back* fading involves fading scripts in length, intensity or topography from the front of the script to the back. Scripts are often removed once a predetermined percentage of the script has been mastered.

Charlop-Christy & Kelso (2003) along with Reagon & Hibgee (2009) studied the effects of using a script-fading procedure to promote social skills in children with ASD. Reagon and Hibgee (2009) taught parents of children with ASD to use a script-fading procedure. This procedure taught their children how to engage in a play-based verbal initiations. The parents in this study received a two-hour training session on the procedures of script -fading. All the participants in this study showed an increase in both their scripted and unscripted initiations, validating the effectiveness of using scripts to promote social skills in children diagnosed with ASD. Researchers were also able to

obtain measurable outcomes by effectively teaching a third-party to implement this procedure.

Engaging in abstract thinking is often difficult for individuals diagnosed with ASD. Abstract thinking is difficult because it involves thinking about events that are removed from the direct here- and- now (Minshew, Meyer, & Goldstein, 2002). Charlop-Christy and Kelso (2003) studied the effectiveness of implementing a scripting procedure to teach children diagnosed with ASD to engage in appropriate abstract thinking and conversational speech. The researchers used scripts that were approximately seven lines long. The scripts addressed abstract concepts through prompting the learners to ask communicative peers about their favorite sport, activity and school subject. The participants were then taught to respond to these conversational questions and or comments through the use of written scripts presented as cue cards. The participants were also taught to ask contextually appropriate questions, as a form of reciprocal communication. The scripts were faded each time the child completed the procedure accurately for two consecutive conversations. The participants were then tested without the scripts in a subsequent testing condition. The results of this study showed an increase in the frequency of conversational speech as well as the generalization of results across untrained people and settings. This study helps to support the effective use of scripts when it comes to teaching abstract concepts to children with ASD.

The current study focuses on increasing the frequency and duration of social initiation and reciprocal play behaviors in children diagnosed with ASD. One study that addressed similar behaviors was conducted by Krantz and McClannahan (1993). The researchers taught four children diagnosed with ASD to socially initiate with peers using

a back to front script-fading procedure. The implementation of the scripting procedure helped to increase the participants' frequency of social initiation. When all of the participants reached a pre-specified criterion level, the scripts were faded systematically. The script-fading procedure helped to increase the frequency of unscripted social initiations across novel settings and activities. The children were even compared to a normative sample of three typically-developing children and the results demonstrated no significant deficits when compared to a normative sample (Krantz & McClannahan, 1993).

Social Narratives

Social narratives are evidenced-based practices that can be used to teach individuals how to behave appropriately in social situations (Zimmerman & Ledford, 2017). Social narratives are an antecedent-based intervention procedure that has been documented as being effective in children as early as 3 yrs. old and as late as 22 yrs. old (Bornstein, Bellack & Hersen, 1977; Sansosti & Powell-Smith, 2006; Scattone, Tingstrom, & Wilczynski, 2006).

Barry and Burlew (2004) studied the effects of using three different social narratives to promote both choice-and appropriate play behavior in children diagnosed with ASD. This study was conducted in a self-contained special education classroom. Three different social narratives were taught to each participant as a means of promoting generalization across contexts. These social narratives highlighted contexts related to emotions, feelings, reactions, environmental cues, behavioral cues and how to appropriately answer directive statements. The narratives were read to the participants each day. Once the individuals finished the social narrative, they were prompted to act

out and practice the skills accordingly. Social narratives were systematically faded in order to promote independence. Similarly, the current research design requires participants to engage in repeated practice and behavioral rehearsal, as part of the BST component of the training paradigm.

Both Delano & Snell (2006) and Dodd, Hupp, Jewell & Krohn, (2008) helped to provide evidence in support of using social narratives to train individuals how to appropriately engage in a variety of social skills. Delano & Snell (2006) used a multi-probe across-participants design, as a means of measuring the effects of using social narratives to promote social engagement in three children diagnosed with ASD. The study measured the duration of appropriate social engagement and the frequency of four specifically targeted social skills (seeking attention, initiating comments, initiating requests, and making contingent responses). The social stories were individualized based on the needs of each participant. The intervention condition consisted of three different parts; reading a social story, comprehension check and a play session (Delano & Snell, 2006). After the social story and subsequent comprehension checks, the participants were observed in a ten-minute play session. Both the duration of play skills and the frequency of the four targeted social skills increased after the intervention. These skills were maintained and generalized across settings as demonstrated through the follow- up results (Delano & Snell, 2006). This study helps to support the effectiveness of using social narratives to increase social behaviors in children with developmental disabilities.

Dodd, Hupp, Jewell, and Krohn (2008) studied the effects of using social narratives as a means of teaching participants to increase their prosocial behavior (giving compliments, being a good sport and appropriately following directions). The treatment

involved reading participants individualized social stories and subsequently asking three context-specific comprehension questions. These comprehension questions were a way of testing each participants' current level of understanding. After the completion of the comprehension questions, participants were observed interacting with their sibling for a 10-15-minute session. During this observation, researchers collected data on the use of the target behaviors. This intervention procedure was shown to increase the social skills of each of the participants however, no measures of generalization were reported limiting its practicality (Dodd, et. al., 2008).

Previous social skills literature has supported the use of both social narratives and scripting when it comes to teaching social skills, however, the present study employs the principles of Behavior Skills Training (BST) and Video- Modeling.

Behavior Skills Training

Behavior Skills Training (BST) is a multi-faceted training procedure that utilizes the principles of instruction, modeling, behavioral rehearsal (role- play), instructive feedback, and incentives (Fetherston & Sturmey, 2014). Research has supported the use of BST to be effective in teaching a wide variety of skills across a wide variety of populations and contexts. BST has been used to teach individuals diagnosed with developmental and intellectual disabilities, along with parents (Seiverling et al.,2012; Dib & Sturmey, 2007), care-staff (Sarokoff & Sturmey, 2004), and teachers (Miles & Wilder, 2009).

The overarching framework of BST allows learners to engage in repeated opportunities to systematically practice and receive feedback contingent upon their performance (Dib & Sturmey, 2007). During the implementation of BST, the learner

progresses through a set of pre-determined task analyzed skills until some sort of mastery criterion has been reached. BST is designed to be implemented in a group format however, the procedures can be adapted to teach individualized skill sets to a smaller group of learners.

The first phase of BST involves provides the learner with access to appropriate and sufficient instruction regarding the behaviors under study. Initial instruction should explicitly define and operationalize the target behavior. Once behavior has been explicitly defined, adequate instruction should be given to all participants. Depending on the current skill level of each participant instruction can be delivered either verbally or textually. Making slight modifications to the BST procedures allows researchers to be flexible when it comes to designing and individualizing their procedures.

The next phase of BST involves physically modeling the target behavior for the learner. Modeling the behavior for the learner provides them with the opportunity to watch the behavior being performed appropriately before being required to physically engage in the behavior. Modeling can occur in -vivo or through the use of a video-modeling procedure. No research has been found on the use of video-modeling and BST in combination therefore, the present study hopes to integrate these two procedures as a means of obtaining positive behavior change. The current study will employ a video-modeling procedure as a means of supplementing the in-vivo modeling phase of BST.

The next phase of BST requires the learner to practice and rehearse engaging in the target behaviors independently. The behavioral rehearsal phase allows learners to repeatedly engage and practice the targeted skills. Role-playing is commonly used during this phase of training, especially when the target behavior involves some sort of physical

or social interaction. The current study will use role-play and behavioral rehearsal to help teach each participant the contingencies that are in play during reciprocal engagement.

The last step of BST involves providing the learner with feedback contingent upon their performance. Providing feedback to our learners allows them to understand exactly what they are being praised for and how they can improve upon their behavior in the future. Using labeled praise ("I like how you got my attention") versus unlabeled praise ("Good Job") allows children to determine exactly what they were being praised for. The idea of labeled and unlabeled praise is derived from the Parent-Child Interaction Therapy (PCIT) literature which, deals with building rapport and increasing the frequency of positive interactions between parent and child dyads (Eyberg & Robinson, 1982).

Drifke, Tiger, and Wierzba (2017) conducted a study to analyze the specific components of BST that contributed to positive behavior change. The participants within this study were two separate children- parent dyads. Each parent was taught to use a three-step prompting procedure to teach their children to engage in an appropriate replacement behavior. In the first condition, the parents were only given access to written instructions. In the second phase, parents were provided with both written instructions and an in-vivo model of how to appropriately implement the prompting procedure. In the third condition, the parents were given access to written instructions, modeling and feedback. The results depicted that the third condition was most effective in teaching parents to properly implement a three-step prompting procedure. This study highlights that the entire treatment package should be implemented as each component of BST

helps to contribute to its success. This study subsequently highlights the benefits of using BST to train others to engage in a multi-step behavioral sequence.

BST has been supported as effective in teaching a wide variety of social skills to children with developmental disabilities. Stewart, Carr and LebBlanc (2007) conducted a study using BST to teach social skills to students diagnosed with Asperger's. The researchers used an AB design to measure the effectiveness of treatment. Two confederates were taught to implement a social skills procedure using the principles of BST. The confederates received training on the procedures and then were subsequently assessed on their implementation. The training focused on delivering appropriate instructions, modeling, rehearsal, and feedback. Each confederate remained in training until they met proficiency as determined by the researchers. The results showed an increase in the participants level of conversation skills after the implementation of the social skill training when compared to baseline responding. BST is highly interactive and works well when training social skills. Repeated exposure and access to corrective feedback is also beneficial when training social skills because it allows our learners to improve upon their performance while subsequently increasing in proficiency.

BST has also been documented to be effective in teaching participants to increase their frequency of conversational speech. Nuernberger et al., (2013) studied the effects of using BST to promote conversational skills in both verbal and nonverbal adults diagnosed with ASD. This study involved the creation of a task analysis to further break down and train a variety of basic conversational skills. The researchers trained participants on how to make comments related to the conversational topic and how to maintain appropriate proximity when in a conversation. This treatment package involved BST, in -situ training

and reinforcer delivery. The participants were provided with a behavioral model, an opportunity to role-play, and feedback contingent on their performance. The participants were given access to a preferred reinforcer for increased performance. The results of this study depicted that the BST training package was effective in increasing the conversational skills of each participant. This improved performance was maintained during a 4 to 8 week follow up assessment. This study helps to highlight the effectiveness of using BST to train behaviors that involve some degree of reciprocity. For example, both conversational speech and reciprocal play involve the mutual interaction of two or more people which in turn, help to support the use of BST when it comes to training reciprocal contexts.

Nuernberger et al., (2013) also supports the ideals of breaking down a complex behavioral sequence into a smaller task analyzed skill set (Nuernberger et al., 2013). Therefore, the current study will use BST to train participants on a 6-step task analysis. All of these studies provided evidence in support of the efficacy and effectiveness of using BST to train and promote social skills. Therefore, the current study will use a multi-faceted BST and video- prompting procedure as a means of fostering positive behavior change within its participants.

Video-Modeling

Children with ASD tend to be strong visual learners (Bryan & Gast, 2000). Video-modeling (VM) is an evidence-based practice that is used to promote skill development within the ASD community (Keenan & Nikopoulos, 2006). Research has supported the use of video -modeling to be effective in teaching a wide range of skills across a wide variety of ages (Coxx & AFRIM Team, 2018). Research has documented

positive outcomes as early 3 months and as late as 22 years. Video-modeling uses technology to help individuals learn through providing them with a video model of the targeted skills (Coxx & AFRIM Team, 2018). It is not uncommon for video- modeling to include other helpful learning tools such as; task analysis, differential attention, prompting, social narratives, and/or self-management procedures (Coxx & AFRIM Team, 2018; Coyle, Cole, 2004). Using video- modeling allows learners to imitate, memorize and generalize their behavior across a variety of novel situations (Hitchcock, Dorwrick & Prater, 2003). Video- modeling has also been documented as effective in teaching a wide range of behavioral skills including; social skills, play skills, motor skills and vocational skills (Coxx & AFRIM Team, 2018).

When implementing a video -modeling procedure, it is important to consider the environment in which the video will be watched. The training area should be void of all distractors as this has the potential inhibit the student's learning environment. The current study will conduct the video-prompting procedure within a school resource room as a means of controlling for the presence of extraneous variables that could exist within the student's classroom environment.

Providing the learner with feedback and reinforcement throughout the video -modeling process helps to further improve upon the learner's skill set and decrease prompt dependency. When it comes to systematically fading video models research has supported stopping the video before it is over (LeBlanc et. al., 2003). Pausing the video before it is shown in its entirety will require the learner to independently demonstrate appropriate responding without relying on the visual prompts from the video model.

There are four different sub-types of video-modeling that are commonly referenced within the literature; basic video modeling, video self-monitoring, point-of-view modeling, and video- prompting. Basic video modeling involves simply recording a novel peer or adult performing the targeted skills (Coxx & AFRIM Team, 2018). Video self-modeling (VSM) involves watching a video of oneself completing the task. In point-of-view video- modeling (POVM), the video is taken in the first-person point-of-view making it easier for the learner to take on the perspective of the video model (McCoy & Hermansen, 2007). Video- prompting is a form of video- modeling that breaks down the skill into a task analysis and a smaller video model is filmed for each step within the task analysis. This kind of modeling is often used when the target behavior involves teaching a complex sequence of skills. Video -prompting employs the principles of stopping the video and requiring the learner to perform the skills as they were demonstrated in the video (Coxx & AFRIM Team, 2018). Each form of video-modeling has been demonstrated as effective in fostering and obtaining meaningful results however, the current study will employ a video-prompting model as the researcher strives to teach a complex behavioral sequence to participants.

When it comes to determining which form of video- modeling is most effective previous research has shown mixed reviews. Sherer et. al., (2001) studied the effects of using video self-modeling versus that of basic video modeling to teach children with ASD to engage in variety of conversational skills. Five individuals ranging from 4 to 11years old served as participants for this study. The researchers used a combination of a multiple baseline and an alternating-treatments designs to assess the results. The individuals were taught to answer questions through the use of two separate mediums.

One skill set was taught through the use of video self-modeling. This video included the individual themselves engaging in the appropriate target behaviors. The other skill set was taught using basic video modeling. The basic video modeling video included a peer model engaging in the appropriate behaviors. The results depicted that there was no overall difference in the acquisition level between video self-modeling and that of basic video modeling. The results help to provide support for the overall effectiveness of video -modeling as a means of promoting social and conversational skills in children diagnosed with ASD.

Cannella-Malone et al., (2006) studied the effects of using both basic video modeling and video -prompting as a means of teaching daily living skills to adults diagnosed with developmental disabilities. All of the participants were identified as lacking the ability to engage in any form of independent living skills. This study was conducted at the participant's residential in-home facility. The researchers used a multiple-probe across subject's design along with an alternating treatments design as a means of studying two different functional relationships. Each participant received individual training and was taught two different age-appropriate independent living skills such as; putting away the groceries and/or setting the dinner table. During baseline, the participants were simply brought to the kitchen or dining room and were told to "set the table" or "put away the groceries".

The two intervention conditions involved the use of two different types of video modeling. One of the skills was taught using basic video- modeling whereas, the second skill set was taught using video- prompting. During the video prompting condition, the researchers filmed 10 separate videos. The video clips included a voice-over instruction

which served as an additional level of prompting for the learners. The video clips ranged anywhere from 10 to 18 seconds in duration. During the video prompting sessions, the adults were shown each segment and then were asked to model the same behavior. The participants were then given 30 seconds to complete the task. If the participant failed to complete the task the trainer immediately completed the step and proceeded with the next video prompt. The basic video model employed a single video which depicted all ten steps from beginning to end. The average duration of this video was about 1 minute and 37 seconds. This video employed a novel individual performing the task in which a voice-over was used as a means of providing instruction to the learners. The participants were shown the video and then asked to perform the task. The subjects were given 30 seconds to initiate the task and two minutes to complete it. The session was terminated if the student was unable to perform the task. At the end of each session, the participants were given access to a variety of snacks. The snacks were presented regardless of the participants' performance. The results depicted video -prompting was more effective in teaching the participants to mastery as compared to the results from the basic video modeling condition.

A second study was conducted in which all of the participants were exposed to a video- prompting procedure. An error correction procedure was then added to the model which, included verbal feedback and repetition of the video model. This error correction procedure was implemented for each step in the video -prompting model. The results from the second study demonstrated an increase in skill acquisition across all participants (Cannella-Malone et. al., 2006).

This study helps to support the use of video-prompting over that of basic video modeling. It is important to note that the functional living skills taught to the learners within this study were complex behavioral sequences that required the participants to engage in multiple discrete steps. With that being said, the current study will rely on the principles of video-prompting and the use of a task analysis to train social behavior. The results of Cannella-Malone et. al., (2006) also supports an increased skill acquisition when an error correction and behavioral rehearsal component was embedded within the training paradigm. Therefore, the current study will employ an error correction procedure along with behavioral rehearsal as highlighted by BST component of the training paradigm.

Similarly, Coyle & Cole (2009) studied the effects of using video self-modeling as a component treatment package. Coyle and Coyle (2009) used self-modeling to decrease off-task behaviors in children diagnosed with ASD. The participants in this study were three males between the ages of 9 and 11 years old. The researchers used an A-B-A-C-A design to measure the effectiveness of the procedures. The results showed that video-self modeling used in combination with self-monitoring was effective in decreasing the off-task behaviors of all of the participants.

This study helps to support the versatility of using video-modeling procedures in combination with other evidence-based practices. The present study will employ a combination of video-prompting, a task analysis, prompting, differential reinforcement, and BST in hopes of enhancing and increasing the effects of the treatment package.

Charlop-Christy, Le and Freeman (2000) studied the effects of using video-modeling as compared to that of in- vivo modeling. Each of the five participants varied in

age from 7yrs old to 11yrs old. Each of the participants had a previous diagnosis of ASD. The treatment was conducted bi-weekly at the participant's after-school program. A multiple baseline across participants was used to analyze the results. Each participant was taught two different tasks. One task was taught using in-vivo modeling while the other task was taught using video-modeling. Some of the skills that were targeted involved expressive labeling of emotions, independent play, spontaneous greetings, conversational speech, social play, self-help skills, corporative play, and oral comprehension. In the in-vivo modeling condition participants watched a live model engaging in the appropriate skill whereas, in the video-modeling procedure participants were shown a video model of a novel individual person engaging in the targeted skill. All factors were kept the same across conditions except for the medium in which the targeted skills were being modeled. The video models employed multiple exemplars training, displaying natural contingencies and programming for common stimuli to help promote and foster future generalization (Stokes & Baer, 1977). The results demonstrated that the video- modeling procedure provided the participants with quicker skill acquisition as compared to the rate of skill acquisition in the in-vivo modeling condition. Researchers saw generalized outcomes for behaviors that were learned through video- modeling medium however, no generalized behavior change was demonstrated from the in-vivo prompting conditions.

Overall, is study helps to support the overall effectiveness of using a video-modeling over that of in-vivo modeling to teach social skills to individual with ASD. Similar to the present study, the video modeling procedure used explicit generalization training which helped to increase the generalized outcomes across participants and settings. The present study will use programming for common stimuli as well as multiple

exemplar training to help foster the generalization of the targeted skills within the student's recess environment.

Video- modeling has also been documented to be effective in promoting and improving the social skills repertoires in children with developmental disabilities. Charlop, Dennis, Carpenter, and Greenberg (2010) used a multiple-baseline across participants design to study the effects of using video-modeling to teach children a variety of socially expressive behaviors. The three participants used in this study were all previously diagnosed with ASD. The specific target behaviors under study were appropriate verbal comments, intonation, gestures and facial expressions. Each of the children were given access to an individualized 90 second basic video-model that consisted of two people mutually engaging. Each of the videos consisted of a variety of different discriminative stimuli as an additional means of cueing the learners. After the participants watched the video their skills were assessed in a subsequent 10-minute play session. In both the baseline and treatment conditions the participants were prompted to use the target skills within the play sessions, however, if the learners did not emit the appropriate responses the trial was terminated. Each play session provided the children with 9 opportunities to engage in the target behaviors. The participants reached mastery when they were able to display appropriate skills usage in 7 out of the 9 trials for two consecutive play sessions. The results of this study showed the rapid acquisition of the target behaviors after the implementation of the video -modeling procedure. All participants were able to reach mastery after the third or fourth trial.

This study helps to support the effectiveness of using video-modeling to promote and teach social skills to learners with ASD. Charlop et. al., (2010) also demonstrated the

effectiveness of using video-modeling to promote generalized behavior change across contexts. In order to obtain similar results, the current study will employ explicit generalization training rather than using a "train in hope method". When training social skills, the social validity of the treatment outcomes is crucial, as social skills are required across a variety of contexts, settings, and people.

Similarly, LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, and Lancaster (2003) studied the effects of using video-modeling to teach children perspective turn-taking skills. The participants included three individuals diagnosed with ASD. The video-modeling sessions took place after school or within the participants' special education classroom. The training was conducted 2-3 times per week. The researchers used a multiple baseline design across behaviors design to assess the skill acquisition across two novel tasks. Each session lasted anywhere from 4 to 10 minutes. The researchers used a basic video modeling procedure in which, an adult model was shown accurately engaging in the targeted skills. Immediately after the video model the participants were then asked a series of questions. If the child answered the questions correctly, they were given social praise and access to preferred edible items and/or stickers. Incorrect responses resulted in the researcher replaying the video. The video-session ended when the child was able to demonstrate appropriate responding for three consecutive trials. The researcher then tested and probed for generalization yet, only two of the three participants showed generalized outcomes to untrained tasks. This study stresses the importance of training and probing for generalization, especially as it relates to social skill training (LeBlanc et al., 2003). As discussed by Stokes and Baer (1977) when a train and hope method is employed, it is not always effective in fostering generalized results.

Nikopoulos and Keenan (2004) utilized a multiple-baseline across subject's design to study the effects of video- modeling on both promoting and teaching social initiation and reciprocal play behaviors. This study involved three participants diagnosed with ASD. The participants ranged in age from 7 to 9 years old. This research design involved showing the children the video model and subsequently measuring the target behaviors in another room after completion of the video session. The researchers used a basic video-model depicting a typically-developing peer completing and modeling the appropriate behaviors. Nikopoulos and Keenan (2004) measured the latency of social initiation and the duration of reciprocal play throughout the study.

The intervention involved showing the participants a 35s clip. After the clip was done, the researchers instructed participants to go play in a nearby room. The target behaviors were assessed during the play session. The mastery criterion set for the first condition was that social initiation needed to occur within the first 25 seconds for 3 consecutive sessions. If the participant was not reaching the mastery criteria, the researcher implemented a whole new video model altogether. The new video model depicted the target behaviors in a much more simplified fashion. In this condition, toys were removed after the first 5 minutes. As the toys were removed, the reciprocal play behaviors of the children generalized to the other novel toys. All three participants significantly improved in their ability to engage in both social initiation and reciprocal play behaviors.

Nikopoulos and Keenan (2004) provided support for the use of video-modeling as a means of teaching social initiation and reciprocal play behaviors. These results were shown to have maintained during a 1 to 3-month follow-up. It is important to note that

Nikopoulos & Keenan (2004) incorporated an error-correction contingency into their video-modeling procedure as a means of increasing the student's ability to independently engage in the skills. The Nikopoulos & Keenan (2004) study served as the basis for designing and implementing the current study as the variables under study and the overarching goals were aligned.

Previous research has supported the use of video-modeling procedures when it comes to teaching a variety of skills. More specifically, research has supported the efficiency of using video-modeling to teach a variety of social skills and complex behavioral sequences. Research has also supported embedding explicit generalization training into the video model itself as a means of transferring stimulus control across a variety of untrained contexts, situations, settings and people. Limited research is published on the use of video-prompting therefore, the current study will use this format in combination with BST to train participants to appropriately engage in the target behaviors.

Present Study

Previous literature supports the effectiveness of using both BST and video-prompting as separate interventions however, limited research supports the use of these practices in combination. The purpose of the present study was to examine the effects of a combined and integrative BST and video-prompting paradigm to promote social skills in children with ASD. The researcher administered these two procedures as a means of promoting positive behavior change, the development of age-appropriate social skills and enhancing the quality of social interactions for two children diagnosed with ASD. Social initiation and reciprocal play were chosen as target behaviors as these two behaviors are

fundamental when it comes to sustaining social interactions. This study employed the principles of ABA and positive behavior change as a means of promoting socially significant behavior change across participants, settings, and stimuli.

The literature places importance on attaining generalized outcomes when training and teaching social skills, as social behavior occurs across a variety of contexts. In order to promote generalization, the training paradigm incorporated explicit generalization training as the video-model utilized the principles of; programming for common stimuli and multiple exemplar training (Stokes & Baer, 1977). Additional measures of generalization were added to the study as a means of enhancing the social validity of the treatment outcomes.

Method

Confidentiality and Human Subjects Research

The present study was approved by James Madison University's Institutional Review Board (IRB). All of the relevant consent and confidentiality forms were signed in accordance with the IRB and HIPAA regulations. Both the primary researcher and the research team were up-to-date on all required certifications and research trainings (HIPAA and CITI) as mandated by the IRB and James Madison University's research policies. Upholding participant confidentiality throughout this study was of crucial importance to the researcher therefore, any and all data that was collected off JMU's campus was securely transported to and from the school in a mobile password-encrypted lock box. The parental consent forms along with the child assent forms were stored separately from the raw data as a means of further protecting client confidentiality. The consent forms were stored in a secured location within the Alvin V. Baird Attention and Learning Disabilities Center records room. The only people who had access to this password-encrypted filing system was the primary researcher, the clinic supervisor, and the research team. Post-data-analysis and presentation all of the raw data and consent forms will be destroyed.

Participants

The participants within this study were enrolled at two different elementary schools located within rural Virginia. Both participants were currently receiving special education services and a variety of instructional supports throughout their day. The participants both spend some time within the general education setting throughout their

day, which subsequently helped to increase the socially validity of teaching appropriate social interactions amongst peers.

The first participant was given the student pseudonym of Rufus. Rufus was a 10-year-old fourth-grade student with a diagnosis of ASD. Rufus was identified as having deficit in social communication by teacher report and his subsequent scores on the VB-Mapp and AFLS assessment. Rufus came into the study with a higher level of communication skills than the second participant as he had the pre-requisite skills necessary to socially initiate and maintain reciprocal communication with adults. However, this skill was absent when initiating and reciprocally engaging with same-age peers.

The second participant was given a student pseudonym of Benji. Benji is a 10-year-old fourth-grade student with a diagnosis of ASD. Benji was identified as having a lack of social skills as determined by his IEP goals, teacher report, and subsequent scores on the VB-Mapp assessment. Benji came into the study with the ability to socially initiate however, he often recruited attention inappropriately by using non-contextual verbalization and or verbal stereotypy when attempting to sustain reciprocal interactions.

Research Assistants

The lead researcher and the two research assistants were all graduate students pursuing their degree in Applied Behavior Analysis from James Madison University. The research team had extensive experience in conducting applied research and data collection. This study was supervised by a Virginia Licensed Clinical Psychologist and Board Certified Behavior Analyst (BCBA-D) licensed within the state of Virginia

Setting

All of the conditions within this study were conducted at the participant's public elementary school. The baseline, post-training, in-vivo prompting, and generalization conditions were all assessed during the participants' regularly-scheduled recess time. The recess environment is a host for many natural communication opportunities therefore, it was chosen as the target location. There is also an increased degree of social validity placed on both social and peer interactions during this time. When the students had outdoor recess, the playground area consisted of; swing sets, slides, monkey bars, and climbing towers. A variety of field games (football, kickball, soccer, etc.) were also available for the students to play with throughout recess. Due to inclement weather, some of the recess observations took place during indoor recess. Indoor recess was located within the participant's general education classroom. During indoor recess, the students had access to coloring materials, card games, board games, and the ability to use the classroom tablets.

The training procedure was implemented within the school's resource room. During all training sessions, no other students and/or teachers were present within the room. The student was allowed to explore the materials in the room for one minute prior to the initiation of training, however, the participants often chose to begin training immediately. All of the training sessions were conducted at a small table located within the resource room. Once the participant was seated, the primary researcher delivered an attentional cue to secure the leaner's attention. The video model was started as soon as the student-orientated their entire body towards the computer screen. The video model was displayed on a .3m x .3m MacBook computer using the QuickTime application.

Experimental Design

A quasi-single subject research design was employed to analyze the effects of training across participants. In order to demonstrate experimental control, the researcher relied on the principles of a multiple-baseline design. Multiple-baseline designs are commonly used within the field of single-subject research as an accurate means of depicting behavioral data (Johnson & Pennypacker, 2007). Johnson & Pennypacker (2007) suggest that multiple baseline designs provide experimental control through the sequential introduction of experimental conditions while also reducing the need for researchers to implement a reversal or withdrawal of effective treatment.

This research design employs a baseline condition as a means of measuring behaviors under typical conditions prior to the implementation of the training. Researchers are able to use the rates of responding during baseline as a comparison of behavior change across conditions. Both the baseline and treatment conditions remained systematically delayed amongst participants as a means of keeping the baselines independent from one another. Systematically delaying treatment and employing an extended baseline allows researchers to assert some degree of experimental control. Delaying treatment allows researchers to ascertain that the introduction of treatment for one client did not have any subsequent effects on the baseline responding of the other participant.

The researcher also made sure to obtain stable responding prior to the introduction of treatment. Stable responding allows the researcher to assume that behavior has adjusted to the specific contingencies in place.

A post-training generalization condition was also included within the research design as a means of assessing the generalized nature of behavior change. If the participant lacked generalization during the post-training condition, two additional generalization tactics were employed.

Dependent Variables

Child Behavior(s)

1. Social Initiation- any instance in which an individual approaches a peer, emits a vocal (e.g., ‘‘Let’s play”, “Hi”, “Excuse me’’ “Do you want to play?”) or gestural (tapping shoulder, waving, pointing) behavior in order to gain the attention of the communicative partner (Nikopoulos & Keenan, 2004). This behavior was measured as frequency per observation.
2. Reciprocal play- consists of any discrete interactive pattern engaged in by 2 or more children mutually playing and or physically/verbally interacting with the same object, materials, or set of objects for at least 5 seconds. (Nikopoulos & Keenan, 2004). This behavior was measured as occurrence/nonoccurrence across intervals. Occurrences of reciprocal play must occur for five seconds in each interval in order for the interaction to count as an instance of reciprocal play. This measure was calculated as the percentage of intervals containing reciprocal play.

Independent Variable(s)

BST + Video- Prompting Training Package

The researcher implemented a combined treatment package utilizing the principles of BST and video-prompting. The video model was filmed and edited by the primary researcher and the video consisted of two graduate students engaging in the

target behaviors of social initiation and reciprocal play on a school playground. The video model as used voice-over instruction as a supplemental instructional cue. The video model also included explicit training for generalization as it utilized the principles of programming for common stimuli and multiple exemplar training (Stokes & Baer, 1977). The video was filmed on a school playground as a means of programming for common stimuli. The video also displayed multiple ways in which one could appropriately greet and interact with a peer as a means of training multiple exemplars.

Programming for generalized outcomes was a crucial aspect of the training procedure and participants were later assessed for the explicit generalization of these targeted skills.

The video- prompting model was filmed utilizing the following task analysis of 6 discrete steps:

1. Walk towards your friend
2. Get your friends attention
3. Make eye contact and ask your friend to play
4. Ask your friend what game they want to play
5. Begin playing
6. Thank your friend for playing

After each successive step in the task analysis, the researcher would subsequently pause the video and implement the BST procedure.

During the BST procedure, the researcher would verbally prompt the student to model the behavior, as it was previously shown on the video. The researcher would then provide corrective feedback and positive praise based on the child's performance.

Intermittently dispersed throughout the training procedure the child would be asked a series of questions related to the video- prompting procedure. The questions consisted of a variety of applied questions such as; “Who could you ask to play at recess?”, “What should you do if your friend tells you that they don’t want to play?”, “What games do you like to play at recess?” (etc.).

After the brief BST procedure, the child was then prompted to sit down and repeat this procedure for the remaining 5 steps in the task analysis. Each participant was given a preferred reinforcer at the end of the training sessions independent of performance. Reinforcers were chosen based on teacher report and client preference.

Data Collection

During all data collection sessions, the primary researcher and the research assistants collected data to create a permanent product for later data analysis. The data were collected using specialized data sheets (Appendix A), and an iPhone interval timer.

Each research assistant was trained on all aspects of the procedure and data collection methods prior to any formal data collection. Throughout the study, the research assistants needed to maintain an interobserver agreement (IOA) of at least 80% across all data collection sessions or additional training would ensue. After proper training was implemented, the research assistants were given the data sheets with the operational definitions of the target behaviors as a means of controlling for observer drift and /or observer reactivity. All of the finalized data and graphs were created using an online spreadsheet software (Microsoft Excel).

Social initiation was scored using a frequency recording. These data were reported as a frequency per observation measurement. When collecting social initiation

data, the researcher would tally the number of times the participant engaged in the target behavior throughout each observation. Each observation session was 10 minutes in duration as a means of allowing the researchers to make comparisons across equal time intervals.

Reciprocal play was measured using a 10- second partial interval recording system. The researcher was trained to collect data using this system and would subsequently record each occurrence of the target behavior in the corresponding interval box on the data sheet. Using a partial interval recording system was used to display the percentage of intervals containing reciprocal play. The total percentage per session was calculated, reported and graphed accordingly.

Percent independence was calculated during each training session. Percent independence was calculated by dividing the number of steps each participant completed independently (without prompting) and dividing this by the total number of steps in the task analysis. This number was then multiplied by 100 in order to obtain a percentage. For example, if the child completed 8 out of the 10 steps independently the child would then have completed that trial with an 80% independence. *See Appendix A for Data Collection and Scoring Sheets*

Interobserver Agreement (IOA)

Each research assistant was given specific training related to the data collection procedures. This training was given prior to the implementation of the baseline condition. The research assistants were given additional training if IOA fell below 80%.

The primary researcher and research assistants scored the data independent of each other and the scores were compared between observers. IOA was conducted in at

least 20% of all sessions within each condition. IOA was calculated using the gross methods in which the data was assessed by looking at total agreements/ total disagreements. This method consisted of calculating the number of intervals in which the observers agreed and dividing it by the total number of intervals in which the researchers disagreed and multiplying this number by 100 (Cooper, Heron, & Heward, 2007). Due to strict time constraints and research assistant illness, IOA was not conducted during the post-training phase for Benji (sessions 12 & 13).

Procedural Fidelity

The implementation of fidelity checks also allowed the researchers to advocate for an increased level of internal validity. Therefore, it was required that the IOA stay above an average of 80% for all prospective conditions. If the IOA dropped below an average of 80% for each condition, further training was given to both the primary researcher and the research assistants. The criterion for acceptable IOA is a common convention used within the field of ABA as a means of ensuring reliability and accuracy of the data collection methods (Cooper et al., 2007).

Baseline Condition

During the baseline condition, researcher observed the participant during their regularly scheduled recess time. The researchers made sure to keep the participant in sight at all times and collected data in accordance with the behavioral definitions. The researchers remained as inconspicuous as possible and were instructed not to interact or interfere with the student in any way. Both the participants attempted to engage with the researchers therefore, the researchers were instructed to greet the child and redirect them using the phrase “go back and play”.

Each baseline condition was staggered as a means of ensuring an extra degree of experimental control. Stable baseline responding was also obtained before each participant was introduced to the integrated training paradigm.

BST and Video Modeling Training Sessions

The training package was delivered once or twice per week during the participant's regularly scheduled school day. The number of training sessions provided each week was made on a week- to-week basis as many extraneous factors such as; weather, client absences, client sicknesses as well as school delays/cancellations interfered with the delivery of training. The time of day in which the training was delivered was determined by the student's special education teacher. Both Rufus and Benji received training first thing in the morning before starting their regularly scheduled school day.

Prior to training, each participant was told that they were going to watch a few videos and be required to copy/imitate what was depicted on the screen. Each training session lasted an average of 15 minutes. Both clients were also informed that they would receive accesses to a small reinforcer contingent upon the completion of each training session. Both participants were able to choose their own form of reinforcement prior to the initial training session. The self-selection of reinforcement allowed the researcher to sustain and maintain participant engagement throughout the training procedure. The small reinforcer for Rufus consisted of him being able to play approximately 1 minute of angry birds on the researchers iPhone and or tablet. The small reinforcer chosen by Benji was a small cup of Coke- Zero soda.

Training began as soon as the researcher delivered the instructional cue of “Look at me” and once the leaner’s attention was secured, the participant was instructed to watch the video on the computer. The researcher started the video and provided the participant with intermittent praise for appropriate attending behavior. After each step in the task analysis was displayed, the researcher would subsequently pause the video and require the student to imitate the behavior just shown on the screen. One generalization probe was conducted for Rufus at an outside location as the primary researcher had the opportunity to work with this client at a subsequent clinic. Implementing the training procedure in a new environment was done as a means of explicitly programming for generalized outcomes. Benji received no training outside of the school setting as this participant wasn't involved in any supplementary clinics.

During the BST component of the training the researcher provided the participants with positive and or corrective feedback based on their performance. Social praise was given to each participant as a form of positive feedback however, if the student did not engage in the appropriate behavior, they were given prompting and asked to repeat the behavior. Requiring the student to repeat the appropriate behavior helped to create an errorless learning environment. After imitating the behavior, the participants were redirected to sit back down and watch the following segment of the video model. This procedure was repeated until the video model was shown in its entirety.

When the video model ended, each participant was required to imitate the entire behavioral sequence 3 times. Data were subsequently taken on the child’s independence in skill acquisition during each of the three trials. Step 5 involved physically playing and interacting with the researcher therefore, the participants were allowed to pick the game

that was played. Benji repeatedly chose to play a Frisbee game while Rufus repeatedly chose to play angry birds. The researcher would focus on teaching turn-taking and commenting during this phase of the training paradigm.

The training condition was terminated once the child reached 100% independence (without prompting) for 4 consecutive sessions. Data were collected during the training procedure and graphed independently to highlight the behavioral changes throughout the training sessions.

Post-Training Condition

Data were collected in the post-training condition after the participants reached mastery criterion during training. This condition was implemented as a means of measuring generalized behavior change across untrained stimuli. This condition took place during the participants regularly scheduled recess time and it resembled the same conditions and procedures outlined in the initial baseline condition. The researchers were subsequently advised not to engage with the participants in any way.

In-Vivo Prompting Condition

Due to the lack of generalized outcomes, depicted in the post-training phase, this condition was added to the study. During the in-vivo-prompting condition, the participant was directly prompted to engage with his friends. For example, the researcher would say "Go ask ____ to play". The researcher would also prompt other kids to ask the participant to play as a means of prompting the client to engage in the trained skills of social initiation and reciprocal play. This condition was only applied for Rufus and not Benji. This level of intrusive prompting was needed for Rufus as he recruited social interactions with other students on the spectrum. The researcher, therefore, had to subsequently

prompt the communicative partner to respond appropriately whereas, Benji recruited social interactions from typically-developing peers who were able to naturally sustain and interact without any additional adult prompting.

Generalization + Rx Condition

The Generalization+Rx condition was implemented for Benji, as a means of increasing his motivation to engage in the targeted skills. Prior to the start of each recess observation Benji was told that if he demonstrated the targeted skills that he would receive a small reinforcer contingent upon his behavior. Benji did not demonstrate the need for an intrusive in-vivo prompting condition because his peers were able to sustain reciprocal engagement without any adult assistance. The researcher also chose a peer model to engage with Benji contingent upon his appropriate demonstration of social initiation and reciprocal play behavior. This peer was chosen as a means of ensuring that Benji had someone to appropriately engage with as some of his peers were uninterested in interacting with him. The peer model was chosen based off of teacher-report and the researchers' classroom observations. This condition helped to reinforce the targeted behaviors within Benji's natural environment. This condition was systematically faded with the hope that the behavior would generalize once the reinforcement contingency was removed.

Generalization Condition

This condition was added to the study for both Rufus and Benji as a means of assessing the generalized outcomes of the target behavior after the in-vivo prompting and generalization + rx conditions were systematically faded. This condition helped the researcher to note the generalization of skills across both untrained settings and people.

Social praise was provided contingent upon the demonstration of the target behavior during this condition.

Results

Results indicated that the training paradigm was effective in increasing both participants independent skill acquisition of social initiation and reciprocal play skills. However, only one participant demonstrated generalized outcomes to the target population, even after additional measures of explicit generalization training were added to the study.

Rufus

Baseline responding for Rufus's social initiation and reciprocal play behaviors remained at a consistently stable and low level. Rufus did not socially initiate or engage in reciprocal play with his peers. IOA was conducted during 70% of Rufus's baseline sessions. The researchers were able to maintain 100% agreement for both social initiation and reciprocal play behaviors throughout the entirety of this condition.

During training, Rufus reached mastery criterion within a total of 7 sessions (21 trials) as each session consisted of 3 trials. Step 6 (thanking your friend for playing) and step 4 (asking your friend what game they wanted to play) were difficult for Rufus as these steps required the most prompting throughout training. Overall, Rufus demonstrated an increasing trend in his ability to independently demonstrate each of the targeted skills identified within the task analysis. Rufus started out training demonstrating 33% independence in the targeted skills however, towards the end of training he was able to maintain 100% independence across four consecutive trials. IOA was conducted on 42% of the sessions. IOA was maintained at 100% agreement throughout the entirety of the condition.

Rufus's post-training data remained at a consistently low and stable level, as there was an absence in his engagement in the target behaviors within this condition. His levels

remained at zero for both behaviors, which helped to document the absence of generalized outcomes, even after both skills were trained to mastery. Training was re-introduced between session 10 and session 11 to ensure the maintenance of skill acquisition following the fading of the training condition. After conducting a maintenance probe to ensure there was no loss of skill acquisition, Rufus still showed no engagement in either of the targeted behaviors within the generalization setting. IOA was conducted during 60% of post-training conditions. Researchers were able to maintain 100% agreement for both behaviors throughout this condition.

Due to the lack of generalized outcomes, the researcher implemented an in-vivo prompting condition. During this condition, Rufus showed an increased frequency of both social initiation and reciprocal play. Throughout this condition, Rufus, engaged in a mean of 2.8 social initiations per observation. His social initiation data was somewhat variable. However, there is an overall increasing trend in his social initiation behavior. Rufus demonstrated an increased level change in reciprocal play as well. The data are somewhat variable however, there is an overall increasing trend. The mean intervals containing reciprocal play increased from 0% to 63.4% as compared to baseline responding. IOA was conducted on 28% of sessions and the mean IOA for social initiation was 87.5% agreement. The mean IOA for reciprocal play was 80% agreement.

During the generalization condition, Rufus's levels of both social initiation and reciprocal play decreased to be consistently low and stable levels as previously seen during post-training and baseline. Two adult probes were conducted to demonstrate Rufus's ability to generalize the target skills to a non-targeted population. His adult interactions remained at higher levels than his peer interactions as evidenced by the two

adult probes collected in Figure 3. IOA was conducted on 33% of sessions and the average IOA for both social initiation and reciprocal play maintained at 100% agreement.

Benji

Baseline responding for Benji's social initiation behaviors depicts limited variability and a relatively low level throughout this condition, as Benji demonstrated a mean of less than one social initiation per observation. Benji's reciprocal play baseline was highly variable however, the data displayed a decreasing trend in the percentage of intervals containing reciprocal play prior to the introduction of training. IOA was conducted in 27% of sessions and the IOA for social initiation maintained at 100% agreement. The mean IOA for reciprocal play maintained at 92.8% agreement.

Benji met mastery criterion within 5 sessions (15 trials) as each session consisted of 3 trials. Step 3 (Asking your friend if they want to play) and Step 6 (thanking your friend for playing) required the most prompting for Benji. Overall, Benji demonstrated an increasing trend in his ability to independently demonstrate and complete each step in the task analysis.

During post-training, Benji decreased to low levels of responding for both social initiation and reciprocal play when compared to baseline. Benji did not demonstrate either of these skills throughout the post-training condition.

Due to the lack of generalized outcomes, the researcher implemented a Generalization + Rx condition. During this condition, Benji demonstrated an increase in both his social initiation and reciprocal play behaviors. The mean percentage of intervals containing reciprocal play increased from 17% during baseline to 81.6 % during the Generalization + Rx condition. Figure 4 also depicts Benji increased frequency of social

initiation as he was able to engage in an average of one social initiation per observation. IOA was conducted on 50% of sessions. The IOA for social initiation maintained at 100% agreement whereas, the average IOA for reciprocal play was 94.6% agreement.

After the Generalization + Rx condition was faded, the researcher implemented a true generalization condition. During this condition, Benji displayed a higher level of social initiation and reciprocal play behavior as compared to his baseline, post-training and generalization + rx conditions. Benji's average frequency of social initiation increased to an average of 1.5 social initiations per observation. Benji's social initiation data depicts an increasing trend over time. Benji engages in a higher level of reciprocal play than in the previous condition as, the data displays an increasing trend over time. During this condition, Benji engaged in reciprocal play for an average of 46.5% of each observation. IOA was conducted on 25 % of sessions. The average IOA for social initiation remained at 100% agreement and the average IOA for reciprocal play was 98% agreement.

Discussion

This study was implemented to measure both the skill acquisition and generalized outcomes of an integrated behavior skills training and video-modeling paradigm. The video model itself included explicit programming for generalization, utilizing the principles of programming for common stimuli and multiple exemplar training (Stokes & Baer, 1977). Overall, the results indicated that the training paradigm was effective in teaching both participants how to independently engage in the targeted skills, as Benji and Rufus reached mastery and demonstrate a higher level of skill acquisition as compared to their baseline levels. There was a clear level change in the participant's ability to independently engage in the targeted skills however, limited generalization results were obtained.

After training both participants required additional procedures to be implemented before any generalization was observed within the recess environment. Only one participant was able to demonstrate the generalization of the targeted skills with peers during recess, whereas the second participant demonstrated generalization to a non-targeted population (adults).

The researcher employed a quasi- single-subject experimental design utilizing the principles of a multiple baseline design to demonstrate and sustain experimental control (Kazdin, 2011). Quasi-single-case experimental designs can provide useful data and information when true experimental designs cannot be implemented due to the nature of the behaviors being evaluated (Kazdin, 2011). The principles of multiple baseline designs are extremely versatile when it comes to conducting both single-subject and applied research, as they provide researchers with information regarding both within-subjects and

between- subjects comparisons (Huck, Cormier & Bounds, 1974). The internal validity of multiple baseline designs is ensured by the multiple replications of conditions across subjects. In this research, the intervention was conducted at different times, whereby the sequential introduction of training occurred in a format consistent with multiple baseline designs. Systematically delaying the onset of conditions across participants is also crucial to maintaining the internal validity of the procedures as this allows the researchers to ensure that the onset of treatment for one participant had no subsequent effects on the behavior of the second participant. The researcher began the intervention at different times and also delayed the training paradigm across participants. As depicted by Figures 3 and 4, the start of intervention and subsequent generalization conditions occurred after a different number of baseline sessions for each participant. There were no changes in Benji's baseline responding when training was introduced for Rufus. This helps the researcher to ensure that the training for one client had no subsequent effects on the other client.

When using multiple baseline designs, it is important to note that each participant is serving as their own control which in turn, increases the importance of the obtaining reliable, steady and valid baseline measurements. Maintaining a steady-state of responding allows researchers to obtain typical levels of responding prior to the implementation of the intervention which allows researchers to make comparisons of behavior change across conditions. The researcher obtained stable responding within each condition prior to the introduction of a new condition for both Benji and Rufus. Obtaining these measurements allowed the researcher to made conclusions regarding the effectiveness of the procedure. In the future, alternating and or extending the in-vivo

prompting and generalization conditions might help to reveal a higher degree of experimental control when it comes to extending the generalization of the target skills within a novel environment.

Baseline

During baseline, the researcher conducted two 10-minute observations per sessions with Rufus and one 10-minute observation per session with Benji. Benji had a shorter recess than Rufus which only allowed for only one observation per session. Observations for both Benji and Rufus were kept at 10 minutes as a way of ensuring equal intervals across participants. Due to tight time constraints and inclement weather, some observations were conducted during indoor recess while the other observations were conducted during outdoor recess. Future research should keep the observation locations consistent as there are often times more opportunities to engage with peers at outdoor recess than during indoor recess.

After a few baseline observations, it became apparent that the behavioral definition needed to be altered. One of the participants displayed a high frequency of social initiation behaviors however, what wasn't being depicted was that the participant often approached his peers inappropriately. He would inappropriately touch or volume when attempting to greet his peers therefore, the definition was then revised to include only those social initiation behaviors that were appropriate. All data collected prior to the change in this definition were discarded and not reported.

The variability of Benji's baseline was affected by the natural reciprocity that exists within play. The change in setting from indoor to outdoor recess truly had an effect on the variability of Benji's baseline. Benji demonstrated a lack of both social initiation

and reciprocal play skills during all indoor recess observations. Future research should only conduct observations during either indoor or outdoor recess as a means of keeping the location consistent.

During outdoor recess, Benji was able to reach a higher level of reciprocal play during some of the baseline observations due to a few of his peers consistently recruiting, prompting and modeling appropriate behavior for the student. His peers would consistently engage Benji in a game of football as evidenced by the peers physically taking the student's hands, providing direct evaluative feedback and verbal directions, commenting upon the student's behavior and modeling it accordingly. It is important to note that the student did not independently recruit or initiate the reciprocal play however, he was simply following the lead of his peers when given a consistent social reinforcement and prompting. This helped to demonstrate that when Benji was provided with an appropriate peer model, he is able to sustain the play and follow peer directions. Due to the restrictions of a naturalistic environment, the researcher was not able to control for the behavior of Benji's peers. Future research should take into account the various extraneous variables that exist when conducting research during recess. Continued research should control for this issue by operationally defining reciprocal play only when it is initiated by the target student.

Observational learning is a higher-level skill for students on the spectrum, however, the power of observational learning should not go unnoticed especially, on the playground as it is a hub for experiencing a diversity of social behavior. Ben's baseline data helps to support the efficiency of observational learning as he demonstrated reciprocally engagement through peer modeling and observational learning. It is

important to note that the student's approach behavior was infrequent throughout the baseline. The low frequency of social initiation helped demonstrate that Benji did not independently initiate interactions. Instead, his peers approached him. Prior to the implementation of the training, Benji demonstrated the ability to sustain reciprocal play when prompted however, he did not initiate social interactions.

Prior to the training, Rufus demonstrated the ability to initiate socially and engage in reciprocal play with adults. However, this skill was not displayed when it involved interacting with same-age peers. Rufus maintained a stable baseline responding which provided the researcher will the ability to draw conclusions about behavior when under "typical conditions". During all baseline observations, Rufus engaged in solitary play activities during both indoor and outdoor recess. When the student was at outdoor recess, he would sit on the swings or walk around the playground alone for the entire observation. During indoor recess, Rufus usually sat at his desk or the floor and read a book. Verbal scripting also accompanied his solitary play at both indoor and outdoor recess. Verbal scripting was described as an instance in which the child verbalizes non-contextual and inappropriate verbal exchanges to others and or oneself. This behavior was not formally tracked however, anecdotal observations were recorded and analyzed.

During baseline, Rufus would often run away from the researcher and would yell, e.g., "Stop watching me", "Stop following me". This made it difficult to collect data on the student because he spent a majority of the recess time trying to hide even when the researchers tried to remain as inconspicuous as possible. Towards the third or fourth baseline observation session, Rufus stopped hiding and began to show isolated engagement while at recess. It is also important to note that Rufus had a long

reinforcement history with both the primary researcher as well as the research assistants therefore, he would frequently approach them throughout the recess observations. This required the researchers to repeatedly redirect the student using the phrase "Go back and play". Trying to hear the participant's communicative exchanges from a distant also made it difficult to hear the participant's communicative exchanges. Therefore, future research should consider using a bug in the ear system during all conditions to eliminate this issue. Using a bug-in-the ear system would also be beneficial for the in-vivo prompting condition as it is a much more inconspicuous manner of collecting data and providing feedback.

Training

Both participants were able to demonstrate mastery during training as each individual was able to sustain 100% independence for four consecutive sessions. These results help to support the use of a BST and video-modeling as an effective means of promoting social skills in individuals with ASD. Both clients met mastery and were able to sustain this skill over time as the primary researcher prompted the use of this skill during the post-training and generalization conditions. No formal data were collected on these maintenance probes. However, both participants were able to engage in the target behaviors when prompted by the primary researcher. Each participant reached mastery criteria in under 8 sessions. Rufus met mastery after 21 trials (7 sessions) and Benji met mastery after 15 trials (five sessions).

As depicted by Figure 2, Rufus had some difficulty engaging in steps 6 (thanking your friend for playing) and step 4 (Asking your friend what game they want to play). Collecting and graphing data in this manner allowed the researcher to highlight and train

the steps that posed difficulty for the leaner. Due to school cancellations, trial 10 was conducted at a JMU affiliated clinic in which Rufus attends. These results helped to support the effectiveness of the training paradigm as Rufus was able to demonstrate the target skills when the training was delivered being delivered within a novel environment.

Figure 1 depicts Benji's training data. These data helped to support the increased skill acquisition across training sessions. As evidenced by the data, Benji struggled to independently complete step 6 (thanking your friend for playing) and step 3 (asking your friend to play) of the task analysis. The researcher provided direct training on these skills and was able to provide Benji with the supports necessary to increase his skill acquisition. Benji was given a visual support to help him engage in the specific step highlighted above. The task analysis was faded when the student demonstrated 100% independence for two consecutive sessions on both step 3 and step 6.

Post -Training

Both participants demonstrated low levels of the target behavior during the post-training condition. One factor that contributed to the lack of generalized outcomes in the post-training condition for both clients was the presence of indoor versus outdoor recess. Not only are there more opportunities to engage with peers during outdoor recess but indoor recess was also affected by the activities available within the classroom. During indoor recess, both students had access to the classroom iPads which also interfered with the student's ability to engage in the targeted skills as the iPad's competed with the reinforcing nature of peer interactions. Many of the typically developing peers also engaged with the iPad's however, they were able to sustain and maintain reciprocal play while doing so.

Another aspect that contributed to the robustness of generalized outcomes relates to the lack of consistency/control the researcher had when it came to collecting data and the implementing training. Many observations were missed due to extraneous factors that were out of the researcher's control such as; Inclement weather, school delays, school vacations/ holidays, participant illnesses and lack of teacher communication. These factors took away from the overall consistency and experimental control of the training paradigm. Less data collection sessions were obtained than originally scheduled as there would be weeks in which both clients would go without training due to the numerous scheduling constraints listed above. Due to the lack of consistency throughout training and data collection, it is hard to denote the true effectiveness of the procedure. Future research might consider using this training paradigm in a clinic and or more controlled setting when the researcher has consistent access to the student on a weekly basis.

During the post-training phase, training was reintroduced for Rufus as depicted by the dotted line on Figure 3. Training was reintroduced because there was a time gap between the end of training and the beginning of the post-training phase. The end of Rufus's training occurred right before school vacation and was prolonged by student illness. The purpose of reintroducing training was to ensure that there was no decrease in Rufus's skill acquisition in relation to the target behaviors.

Training was not reintroduced for Benji as there was no prolonged delay between the termination of the training conditions and the start of the post-training condition. The researcher moved Benji quickly from the post-training condition due to the time constraints associated with this research project however, future research should extend this condition further if time permits.

In-Vivo Prompting Condition

During the in-vivo prompting phase, Rufus demonstrated the appropriate use of the target behaviors within the generalized setting when prompted. As previously noted, Rufus tended to recruit attention from other peers with ASD, which posed a difficult situation for the researcher. Rufus would attempt to engage with his peers however, many of his initiations were often ignored or not reciprocated by his peers which, inadvertently put his social initiation and reciprocal play behaviors on extinction. In order to respond to this challenge an in--vivo prompting condition was employed for Rufus to further promote generalization and increased interactions with his peers. Within this condition, the researcher prompted both peers to mutually interact using both verbal and gestural prompts. For example, the researcher would say "Go ask ___ to play" and once the target behavior was initiated, the researcher would subsequently prompt the communicative partner to respond appropriately. This intrusive prompting method allowed Rufus to experience the natural contingencies that are associated with peer interactions, however, when this condition was faded little to no generalized outcomes were maintained. Due to Rufus's ability to socially initiate and sustain reciprocal play with adults during the final recess observations, the researcher hypothesized that peer attention was not reinforcing for Rufus. During a few of the in-vivo prompting observations, the participant would often engage in verbal escape behavior when told to ask a friend to play. These verbal escape behaviors included "I am too tired" and or "I don't want to play right now". It is also important to note that Rufus's recess period was at the end of the day just prior to being dismissed from school. Targeting this skill during the last period of the day tended to be a source of dysfunction for him. Future research should aim to conduct preliminary

observations to ensure that peer attention is reinforcing prior to implementing the training paradigm and if attention is not demonstrated to be reinforcing than researcher should pair peer attention with other reinforcing stimuli as, a means of ensuring each participant has the necessary pre-requisite skills needed to sustain both social initiation and reciprocal play.

The lack of generalized outcomes observed after the in-vivo prompting condition limits the social validity of the treatment package for Rufus, as generalization of the targeted skills is necessary when it comes to promoting and teaching social behavior to individuals with ASD. Future research should continue to assess the explicit programming of generalization as well as the best ways to sustain generalized outcomes when it comes to teaching social behavior. Future researcher should also consider providing the classroom teacher and paraprofessional with a social validity scale as a means of further assessing the social validity of the treatment outcomes within the classroom and recess environments.

Generalization + RX Condition

The generalization + Rx condition was implemented for Benji, as a means of increasing his motivation to engage in the targeted skills. This condition was implemented for Benji because he would seek out typically developing peers who were able to sustain and engage with the student without additional prompting. Within this condition, prior to the start of each recess observation, Benji was told that if he demonstrated the targeted skills that he would receive a small reinforcer contingent upon his behavior. Benji chose to earn a frisbee after the successful completion of the targeted skills. Offering Benji a small reinforcer after recess was enough to motivate him to engage in the targeted skills across

settings as well as across a variety of participants. During this condition, the researcher would provide intermittent (VR4) social praise to the client contingent upon the appropriate demonstration of the targeted behaviors. Benji was reinforced by social praise and would often approach the research and say, "I am doing good". On the 18th and 19th observation, Benji and his friends were given the frisbee during recess. The group of peers asked if they could play with it because they knew that Benji enjoyed playing with the frisbee. After this condition was faded, Benji was able to sustain a higher level of generalized behavior change when compared to his initial baseline levels.

Generalization Condition

Rufus did not show the generalization of the target behavior with his peers after the in-vivo prompting condition was removed. However, he did begin to engage in the targeted skills with adults towards the end of the study. Rufus approached and played with a variety of adults and teacher assistants during recess. This not only interfered with his engagement with his peers, but it also helped to highlight that adult attention was more reinforcing to Rufus than peer attention. Rufus's generalization data highlights that contriving situations within the natural environment (in-vivo prompting) is beneficial, however, if the establishing operation (EO) for peer attention is not present then it will be difficult to maintain sufficient behavior change in the absence of prompting.

During this condition, the data collection for Rufus seemed to display an unrepresentative picture of his social behavior. In order to respond to this issue, the researcher conducted multiple adult probes to demonstrate Rufus's ability to engage in targeted skills. No data were collected on adult interactions prior to the generalization condition as the researcher was focused on peer engagement. It may be unethical to stop

the adult interactions as Rufus was highly engaged and reinforced by these interactions. Future researchers should collect data on both peer and adult interactions throughout the study as adults can be used to promote the generalization of skills to peers by helping the individual to expand, pair and further foster peer engagement. Future research should also consider training adults to include peers within their interactions. This would help to explicitly program for generalized outcomes within the target environment as well as pairing the reinforcing nature of adult interaction with that of peer interactions.

Benji was able to demonstrate the generalization of the targeted skills within the recess environment when the Generalization + Rx condition was faded. Benji's levels of generalization were lower than during the Generalization + Rx condition however, the results were still higher than his initial baseline levels. This condition subsequently included both indoor and outdoor recess observations which helps to support the effectiveness of the training when compared to baseline responding. Benji showed inconsistent levels of social initiation during all conditions which can be explained by the topography of his interactions rather than a lack of skill acquisition. On numerous occasions, Benji's peers would approach him before Benji had the opportunity to exercise the skills himself. It also became apparent that socially initiating one time was often enough to sustain the reciprocal engagement throughout the entirety of the observation which, drastically decreased the need for repeated social interactions.

Practical Implications

Overall, the training paradigm was effective in increasing both participants independent skill acquisition of the targeted skills however, a lack of generalized outcomes to peers was seen for one client. This study would be best implemented in a

more controlled clinic environment rather than in a public school. If this intervention was to be replicated within a public-school system, the training should be delivered more consistently and reliably on a weekly basis. Subsequently, when replicating this study researchers should be prepared to add in explicit generalization training rather than relying on the "train and hope method" (Stokes & Baer, 1977). Using explicit instruction to generalize, systematic prompting, multiple exemplar training, and programming for common stimuli will help to increase the social validity of this treatment paradigm. Future professionals using video-modeling to promote social skills should continue to integrate a Behavior Skills Training component into the intervention as role play, rehearsal and feedback helped to diversify and improve the individual's social interactions.

Future research should also continue to use video-prompting as a means of breaking down a more complex behavioral sequence into smaller more discrete steps. Once the more complex skills were broken down into smaller units the participants were able to reach the pre-determined mastery criteria both efficiently and effectively.

Researchers should also consider providing training within the natural environment rather than within a school resource room. This might allow the researcher to obtain generalization much quicker than previously demonstrated. When assessing for generalization in the future, researchers should explicitly involve peers within the role - play aspect of the training paradigm to further the generalized outcomes across peers. Researchers should ensure that peer interactions are reinforcing prior to implementing the training paradigm as this should be a pre-requite skill required prior to training. If peer interactions are not reinforcing, the researchers should condition these interactions using

a paring procedure. This procedure would involve pairing already existing reinforcers to transfer stimulus control to peer interactions.

Adults within the generalization environment can be used as s facilitating agents throughout this process, especially if adult interactions are naturally more reinforcing than peer interactions. These adults can be used to promote the use of appropriate social skills while subsequently making sure to fade themselves from the interactions as a means of transferring stimulus control to peers.

Future research should continue to study what generalization tactics are beneficial in promoting social skills for students on the spectrum, especially as it relates to social skills training. These results support that generalization is not necessarily universally practical across participants and therefore, more research needs to be collected in order to enhance the social validity of the treatment outcomes.

References

American Psychiatric Association. (2013). Neurodevelopmental disorders. In *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (5th ed.). Arlington, VA: American Psychiatric Association, 50-59.

Baio, J. (2014). Prevalence of autism spectrum disorder among children aged 8 years-autism and developmental disabilities monitoring network, 11 sites, United States, 2010.

Barry, L. M., & Burlew, S. B. (2004). Using social stories to teach choice and play skills to children with autism. *Focus on Autism and Other Developmental Disabilities, 19(1),* 45-51.

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

Bornstein, M. R., Bellack, A. S., & Hersen, M. (1977). Social-skills training for unassertive children: A multiple-baseline analysis. *Journal of Applied Behavior Analysis, 10,* 183–195.

Bryan, L. C., & Gast, D. L. (2000). Teaching on-task and on-schedule behaviors to high-functioning children with autism via picture activity schedules. *Journal of Autism and Developmental Disorders, 30*(6), 553-567.

Cannella-Malone, H., Sigafoos, J., O'Reilly, M., de la Cruz, B., Edrisinha, C., & Lancioni, G. E. (2006). Comparing video-prompting to video- modeling for teaching daily living skills to six adults with developmental disabilities. *Education and Training in Developmental Disabilities,*41(4), 344-356.

Charlop-Christy, M. H., & Kelso, S. E. (2003). Teaching children with autism conversational speech using a cue card/written script program. *Education and Treatment of Children, 26(2),* 108-127.

Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders, 30(6),* 537-552.

Charlop, M. H., Dennis, B., Carpenter, M. H., & Greenberg, A. L. (2010). Teaching socially expressive behaviors to children with autism through video modeling. *Education and Treatment of Children*, 33(3), 371-393.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). 2nd edition. *Applied Behavior Analysis.* Upper Saddle River, New Jersey: Pearson.

Corsello, C. M. (2005). Early intervention in autism. *Infants & Young Children*, *18*(2), 74-85.

Coyle, C., & Cole, P. (2004). A videotaped self-modelling and self-monitoring treatment program to decrease off-task behaviour in children with autism. *Journal of Intellectual and Developmental Disability*, *29*(1), 3-16.

Cox, A., & AFIRM Team. (2018). Video modeling. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorder, FPG Child Development Center, University of North Carolina. Retrieved from http://afirm.fpg.unc.edu/video-modeling

Cuvo, A. J. (1979). Multiple-baseline design in instructional research: pitfalls of measurement and procedural advantages. *American Journal of Mental Deficiency*.

Delano, M., & Snell, M. E. (2006). The effects of social stories on the social engagement

of children with autism. *Journal of Positive Behavior Interventions*, *8*(1), 29-42.

Dib, N., & Sturmey, P. (2007). Reducing student stereotypy by improving teachers implementation of discrete trial training. *Journal of Applied Behavior Analysis*, *40*(2), 339-343.

Dixon, M. R., Peach, J., Daar, J. H., & Penrod, C. (2017). Teaching complex verbal operants to children with autism and establishing generalization using the peak curriculum. *Journal of Applied Behavior Analysis*, *50*(2), 317-331.

Dodd, S., Hupp, S. D., Jewell, J. D., & Krohn, E. (2008). Using parents and siblings during a social story intervention for two children diagnosed with PDD-NOS. *Journal of Developmental and Physical Disabilities*, *20*(3), 217-229.

Drifke, M. A., Tiger, J. H., & Wierzba, B. C. (2017). Using behavioral skills training to teach parents to implement three-step prompting: A component analysis and generalization assessment. *Learning and Motivation*, *57*, 1-14.

Eyberg, S. M., & Robinson, E. A. (1982). Parent-child interaction training: Effects on family functioning. *Journal of Clinical Child & Adolescent Psychology*, *11*(2), 130-137.

Foxx, R. M. (2008). Applied behavior analysis treatment of autism: The state of the art. *Child and Adolescent Psychiatric Clinics of North America*, *17*(4), 821-834.

Gable, R. A., Hendrickson, J. M., & Strain, P. S. (1978). Assessment, modification, and generalization of social interaction among severely retarded, multi-handicapped children. *Education and Training of the Mentally Retarded*, 279-286.

Gaylord-Ross, R. J., Haring, T. G., Breen, C., & Pitts-Conway, V. (1984). The training and generalization of social interaction skills with autistic youth. *Journal of*

Applied Behavior Analysis, *17*(2), 229-247.

Griffin, W., & AFIRM Team. (2017). *Scripting.* Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorder, FPG Child Development Center, University of North Carolina.

Grow, L. L., Kodak, T., & Clements, A. (2017). An evaluation of instructive feedback to teach play behavior to a child with autism spectrum disorder. *Behavior Analysis in Practice, 10*(3), 313-317.

Harris, S. L., & Handleman, J. S. (2000). Age and IQ at intake as predictors of placement for young children with autism: A four-to six-year follow-up. *Journal of Autism and Developmental Disorders*, *30*(2), 137-142.

Harris, F. N., & Jenson, W. R. (1985). Comparisons of multiple-baseline across persons designs and AB designs with replication: *Behavioral Assessment,7*(2*)*.121-127

Hayes, S. C. (1985). Natural Multiple Baseline Across Persons- A Reply. *Behavioral Assessment*, *7*(2), 129-132.

Hitchcock, C. H., Dowrick, P. W., & Prater, M. A. (2003). Video self-modeling intervention in school-based settings: A review. *Remedial and Special Education*, *24*(1), 36-45.

Hood, S. A., Luczynski, K. C., & Mitteer, D. R. (2017). Toward meaningful outcomes in teaching conversation and greeting skills with individuals with autism spectrum disorder. *Journal of Applied Behavior Analysis*, *50(3),* 459-486.

Huck, S. W., Cormier, W. H., & Bounds, W. G. (1974). *Reading statistics and research* (pp. 74-102). New York: Harper & Row.

Johnston, J. M., & Pennypacker, H. S. (2009). Observing and recording. *Strategies and*

tactics of behavioral research, 115-138.

Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to initiate to peers: Effects of a script-fading procedure. *Journal of Applied Behavior Analysis, 26(1),* 121-132.

Krantz, P. J., & McClannahan, L. E. (1998). Social interaction skills for children with autism: A script-fading procedure for beginning readers. *Journal of Applied Behavior Analysis, 31*(2), 191-202.

Keenan, M., & Nikopoulos, C. (2006). *Video Modelling and Behaviour Analysis: A guide for teaching social skills to children with autism*. Jessica Kingsley Publishers. 17-18.

LeBlanc, L. A., Coates, A. M., Daneshvar, S., Charlop-Christy, M. H., Morris, C., & Lancaster,B. M. (2003). Using video modeling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis, 36(2),* 253-257.

Lord, C., Cook, E. H., Leventhal, B. L., & Amaral, D. G. (2000). Autism Spectrum Disorders. *Neuron*, *28*(2), 355-363.

MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis*, *26*(1), 89-97.

Marcus, A., & Wilder, D. A. (2009). A comparison of peer video modeling and self-video modeling to teach textual responses in children with autism. *Journal of Applied Behavior Analysis, 42(2),* 335-341.

McCoy, K., & Hermansen, E. (2007). Video modeling for individuals with autism: A

review of model types and effects. *Education and Treatment of Children*, 183-213.

Miles, N. I., & Wilder, D. A. (2009). The effects of behavioral skills training on caregiver implementation of guided compliance. *Journal of Applied Behavior Analysis*, *42*(2), 405- 410.

Minshew, N. J., Meyer, J., & Goldstein, G. (2002). Abstract reasoning in autism: A disassociation between concept formation and concept identification. *Neuropsychology*, *16*(3), 327.

Nikopoulos, C. K., & Keenan, M. (2004). Effects of video modeling on social initiations by children with autism. Journal of Applied Behavior Analysis, 37(1), 93-96.

Nuernberger, J. E., Ringdahl, J. E., Vargo, K. K., Crumpecker, A. C., & Gunnarsson, K. F. (2013). Using a behavioral skills training package to teach conversation skills to young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *7*(2), 411-417.

Reagon, K. A., & Higbee, T. S. (2009). Parent-implemented script fading to promote play-based verbal initiations in children with autism. *Journal of Applied Behavior Analysis*, *42*(3), 659-664.

Sam, A., & AFIRM Team. (2015). *Social narratives*. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorder, FPG Child Development Center, University of North Carolina.

Sansosti, F. J., & Powell-Smith, K. A. (2006). Using social stories to improve the social behavior of children with Asperger syndrome. *Journal of Positive Behavior Interventions*, *8*(1), 43-57.

Sarokoff, R. A., Taylor, B. A., & Poulson, C. L. (2001). Teaching children with autism to engage in conversational exchanges: Script fading with embedded textual stimuli. *Journal of Applied Behavior Analysis*, *34*(1), 81-84.

Sarokoff, R. A., & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis*, *37*(4), 535-538.

Scattone, D., Tingstrom, D. H., & Wilczynski, S. M. (2006). Increasing appropriate social interactions of children with autism spectrum disorders using Social Stories™. *Focus on Autism and Other Developmental Disabilities*, *21*(4), 211-222.

Seiverling, L., Williams, K., Sturmey, P., & Hart, S. (2012). Effects of behavioral skills training on parental treatment of children's food selectivity. *Journal of Applied Behavior Analysis*, *45*(1), 197-203.

Sherer, M., Pierce, K. L., Paredes, S., Kisacky, K. L., Ingersoll, B., & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology: Which is better, "self" or "other" as a model? *Behavior Modification*, *25*(1), 140-158.

Stewart, K. K., Carr, J. E., & LeBlanc, L. A. (2007). Evaluation of family-implemented behavioral skills training for teaching social skills to a child with Asperger's disorder. *Clinical Case Studies*, *6*(3), 252-262.

Stokes, T. F., Baer, D. M., & Jackson, R. L. (1974) Programming the generalization of a greeting response in four retarded children. *Journal of Applied Behavior Analysis*, 7, 599-610.

Stokes, T. F. & Baer, D. M., (1976) Preschool peers as mutual generalization-facilitating agents. *Behavior Therapy*, 7, 549-556.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, *10*(2), 349-367.

Stokes, T. F., & Osnes, P. G. (1989). An operant pursuit of generalization. *Behavior Therapy*, *20*(3), 337-355.

Virués-Ortega, J. (2010). Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose–response meta-analysis of multiple outcomes. *Clinical Psychology Review*, *30*(4), 387-399.

White, S. W., Keonig, K., & Scahill, L. (2007). Social skills development in children with autism spectrum disorders: A review of the intervention research. *Journal of Autism and Developmental Disorders*, *37*(10), 1858-1868.

Woods, A. G., Mahdavi, E., & Ryan, J. P. (2013). Treating clients with Asperger's syndrome and autism. *Child and Adolescent Psychiatry and Mental Health*, *7*(1), 32.

Wong, C., Odom, S, Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S., Schultz, T. R. (2015) Evidence- Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder: A Comprehensive Review. *Journal of Autism and Developmental Disorders,45(7).* 1951-1966

Watson, P. J., & Workman, E. A. (1981). The non-concurrent multiple baseline across-individuals design: An extension of the traditional multiple baseline design. *Journal of Behavior Therapy and Experimental Psychiatry*, *12*(3), 257-259.

Zimmerman, K. N., & Ledford, J. R. (2017). Beyond ASD: Evidence for the effectiveness of social narratives. *Journal of Early Intervention, 39*(3), 199-217.

Figures

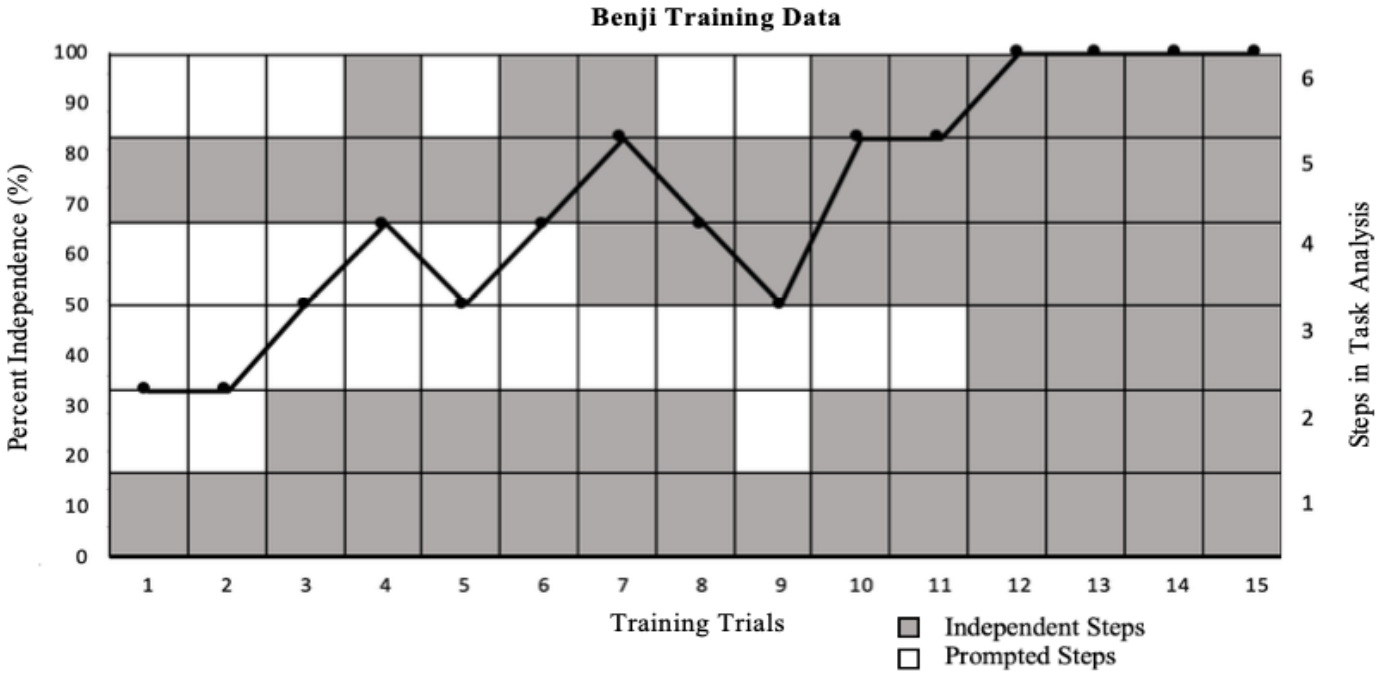

Figure 1: This figure displays Benji's percent independence throughout training. The solid squares represent each step within the task analysis that was completed independently whereas, the white squares represent the steps that required prompting.

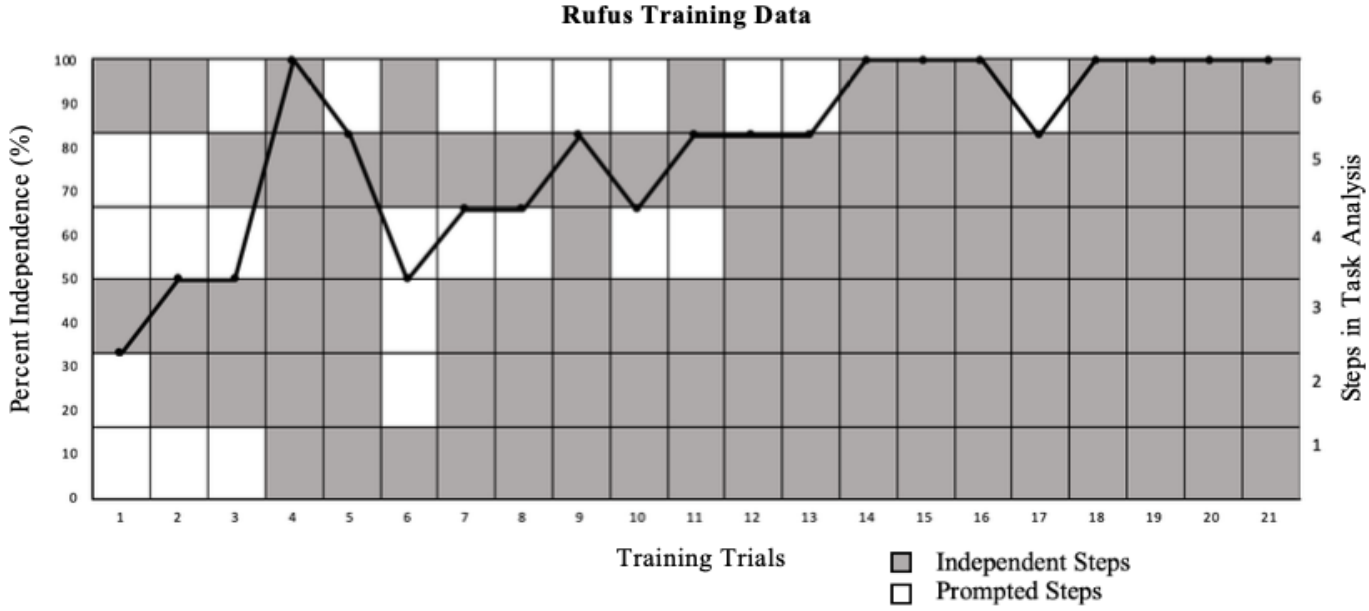

Figure 2: This figure displays Rufus's percent independence throughout training. The solid squares represent each step within the task analysis that was completed independently whereas, the white squares represent the steps that required prompting.

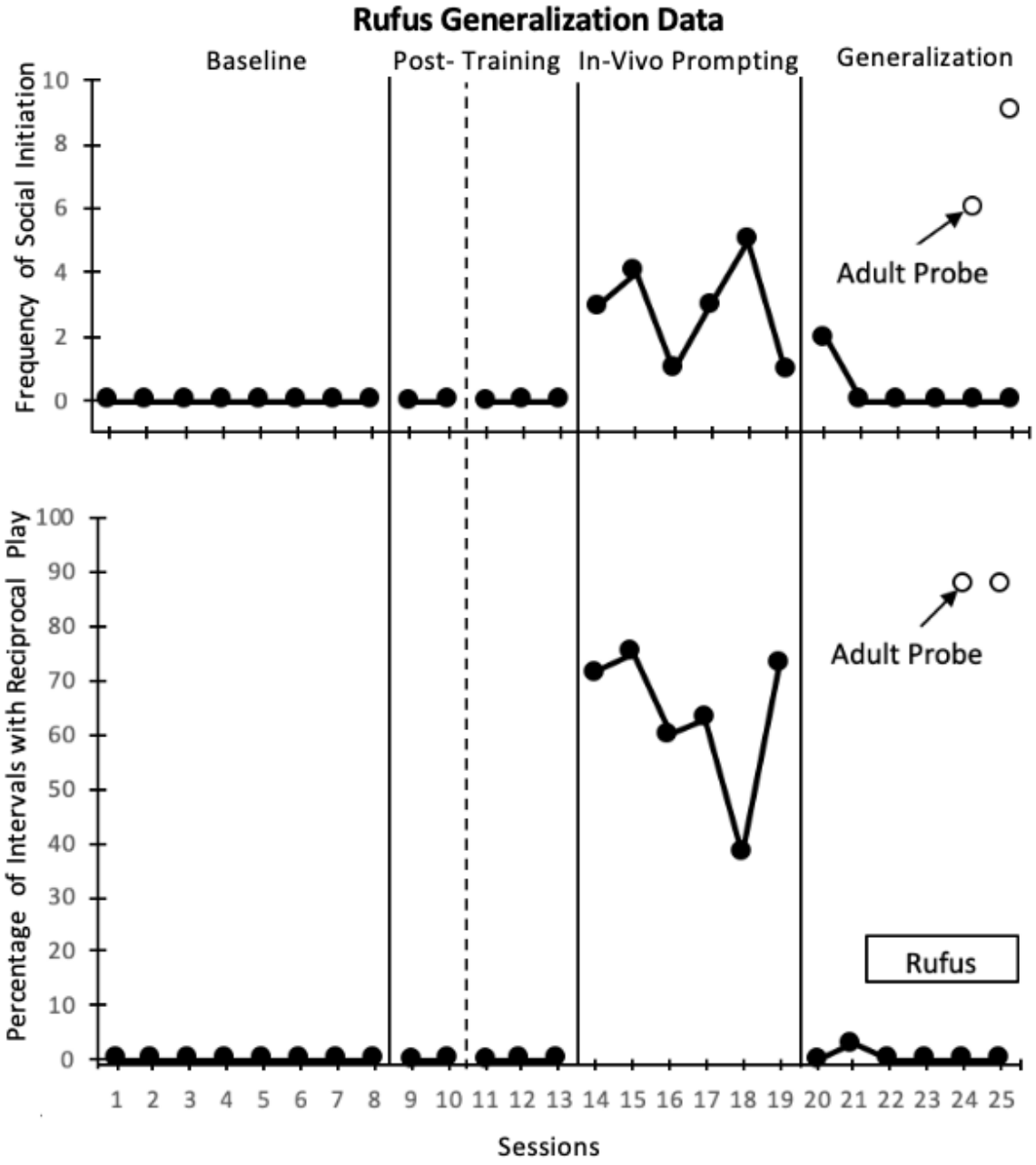

Figure 3: This figure depicts Rufus's generalization data prior to training and after training. Training was re-introduced on the dotted line to ensure that Rufus had maintained appropriate levels of skill acquisition after the fading of the training condition. The data shows a decrease in the generalization of skills with the targeted population.

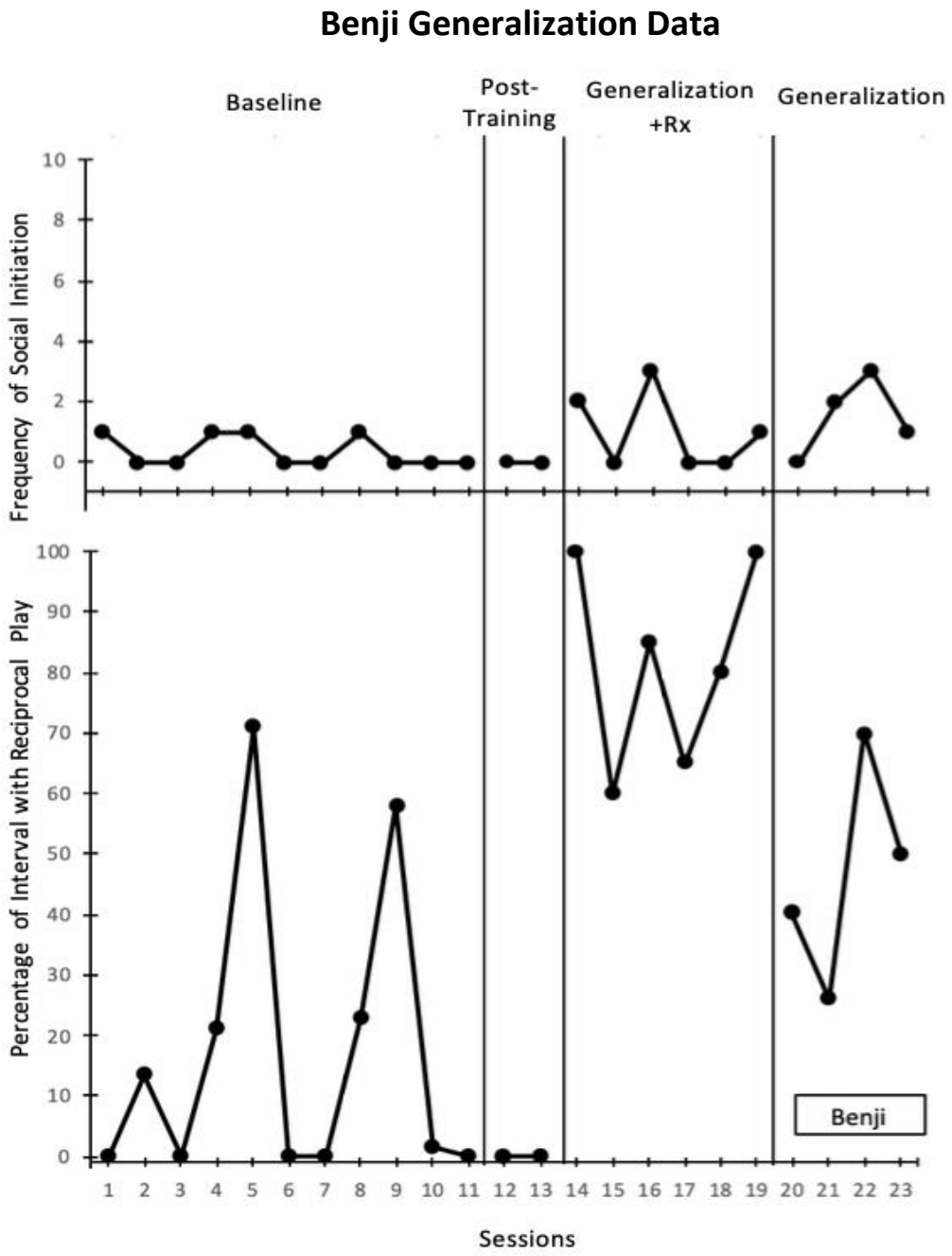

Figure 4: This figure depicts Benji's generalization data prior to training and after training. Benji did not generalize the skills to the target environment until additional generalization measures were implemented. Once these conditions were faded, Benji was able to sustain generalization of the targeted skills within the recess environment.

Appendix A- Data Sheets

Pseudonym: Date:
Interval Length: 10 sec **IOA** Y or N

Instructions: Record a + if the behavior occurs and leave it blank if behavior does not occur.

Minute	10 sec	20 sec	30 sec	40 sec	50 sec	60 sec
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
Total						
Percentage of Intervals	___/___	___/___	___/___	___/___	___/___	___/___
IOA						

Reciprocal play- consists of any discrete interactive pattern engaged in by 2 or more children mutually playing and or physically/verbally interacting with the same object, materials, or set of objects for at least 5 seconds. Occurrences of reciprocal play must occur for five seconds in each interval in order for the interaction to count as an instance of reciprocal play.

Date:	Frequency of Approach BX
Approach BX- Exact Count **IOA-** (number of intervals with 100% agreement x100)	

Approach behavior- any instance in which an individual approaches a peer, emits a vocal (e.g., ''Let's play", "Hi/Hello", "Excuse me'', "Do you want to play?") or gestural (tapping shoulder, waving, pointing) behavior in order to gain the attention of the communicative partner (Nikopoulos & Keenan, 2004).

Date: _____ Research Assistant: _____ Circle: IOA

Task Analysis Data Sheet

PROMPT HIERARCHY:
I = Independent
PP = Partial Verbal
FV= Full Verbal Prompt
G=Gesture Prompt

Student Pseudonym: _____
SKILL: Social Initiation

Record the level of prompting needed to complete each step.

SD: When the student is told to practice the entire routine after full BST procedure is completed.

Deliver the SD.			
Step in TA	**Prompt Level**		
1.Walk towards your communicative peer			
2. Get your friends attention			
3. Make eye contact and ask communicative partner if they want to play			
4. Ask your friend what game he/she wants to play? 4a. If no, the child finds another friend to play with			
5. Begin playing			
6. Thank your friend for playing			
IOA Calculation (if applicable):	**Percent Independence:**		

***Reinforce completion of sequence social praise and access to preferred tangible.**