Parametric Analysis of Time Delay on Using Video Modeling to Teach Discrete Trial Teaching

Kerri Krauss

A Dissertation Submitted to the Faculty of

The Chicago School of Professional Psychology

In Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in Psychology

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

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Approved by:

Michale Stowers, Psy.D., Chairperson

Jennifer Thompson, Ph.D., Member

Anibal Gutierrez, Ph.D., BCBA, Member

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Dedication

This journey has always been for you, dad. Thank you for teaching me that a Krauss can do anything. Your love and guidance has always been a ray of sunshine on the darkest days. You shared in my accomplishments and comforted me in my struggles. I will never will be able to express how important you are to me. I love you.

Abstract

To be successful, a business must ensure proper staff training of their team. Video modeling has proven to be an effective method to train staff, but the effect of a time delay with this method has not been analyzed. In Applied Behavior Analysis, team members are tasked to implement different programming depending on their client. In the current study, a time delay when watching a video model then performing discrete trial teaching was analyzed. Participants were randomly assigned to two groups. One group watched the video model then two minutes later performed discrete trial teaching. The other group watched the same video model, then 24 hours later performed discrete trial teaching. Both groups increased their percentage accuracy from baseline to treatment. The results of this study indicated no statistical significance between the groups.

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Chapter 1: Introduction

As the number of individuals diagnosed with Autism Spectrum Disorder (ASD) or a related disability rises, so does the number of professionals working with them. Applied Behavior Analysis (ABA) has proven to be an effective treatment, provided these professionals have the proper training.

As most facilities have a small budget for training and even less time, research continues to analyze how best to teach professionals new skills. Even though a company may spend millions on training and development programs, many do not know what benefits they are gaining from the training and development they conduct. For training to be seen by management as an important part of the company's operation, it must be seen as any other business component (Wexley & Latham, 2002).

Learning may be defined as "a relatively permanent change in behavior that occurs as a result of practice" (Wexley & Latham, 2002, p. 81). Behavior refers to the knowledge and skills obtained by people. To say an individual has learned something, one would be acknowledging an enduring behavior change (Wexley & Latham, 2002).

The labor cost of the trainee is typically the highest expense to the company in this process. The cost obviously rises with the more trainees involved. Thus, a company would find itself looking for a method to train employees in the shortest period of time (Wexley & Latham, 2002). Behavior modeling can be used successfully to do that. A large part of behavioral repertoire can be learned by observing others. Modeling becomes even more effective when the demonstration is clear. This can be done by presenting trainees with a specific list that identifies behaviors they should attend to while observing the model, and thus, emulate (Wexley & Latham, 2002).

Behavior modeling has been found to be an effective way to increase learning. This method was found to teach computer skills to 160 new users from a U.S. Naval Construction Battalion better than classroom instruction or a self-study course (Wexley & Latham, 2002).

As technology continues to advance, so does the ability to train staff. Video modeling allows an individual to observe someone correctly performing a skill and then having the opportunity to perform the skill themselves (Collins, Higbee, & Salzberg, 2009). This procedure uses the tools from behavior modeling, but combats limited funding and busy management staff by having a video that can be available to a learner at any time (Nielsen, Sigurdsson, & Austin, 2009).

Further evaluating training tools like video modeling will help companies use these strategies successfully. This will result in trained staff employing techniques correctly, leading to more productive treatment.

Chapter 2: Literature Review

Introduction

As Autism Spectrum Disorder (ASD) continues to affect children worldwide, treatment methods are employed to teach new skills and decrease challenging behaviors. One of these methods is discrete-trial teaching, an intervention from Applied Behavior Analysis (ABA). This method has demonstrated routine success in teaching children with ASD (Cummings & Carr, 2009). For these methods to be carried out successfully though, staff implementing them need specific training. As time constraints and other variables, such as staffs' knowledge of ABA, impact the quality of the training staff receives, video modeling has proven to be an effective and efficient answer (Catania et al., 2009).

By further evaluating variables of video modeling, this study hopes to add to the limited research in this area. This study will evaluate how a time delay between viewing the video model and performing discrete-trial teaching (DTT) affects correct implementation of the method. This review will include how ASD affects individuals and describe the use of ABA, specifically DTT to teach children with ASD. Different methods of training will be evaluated along with breaking down the use of video modeling as a successful strategy to train staff.

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) currently involves a triad of symptoms: “a) impairments of social interaction, b) impairments of verbal and nonverbal communication, and c) restricted, repetitive, and stereotyped patterns of behavior, interests, and activities” (American Psychiatric Association, 1994). This continuum of neurobehavioral conditions includes autistic disorder, Asperger's disorder, pervasive developmental disorder- not otherwise specified (PDD-NOS), Rett's disorder, and childhood disintegrative disorder (Floyd & McIntosh, 2009). This triad of symptoms finds children with ASD

continuing to have a unique disorder, even when compared to children with other disorders (Simpson, 2001). This section will describe the history, prevalence, symptoms, and treatment of ASD.

History

In 1943, Dr. Leo Kanner of John Hopkins University described autism for the first time based on eleven children he observed between the years 1938 and 1943. Before Kanner, those children who showed withdrawal from human contact as early as one year of age, were identified as emotionally disturbed or mentally retarded (Whitman & Kingsley, 2004). He described the children he observed as having "individual differences in the degree of their disturbance" (Kanner, 1943, p. 241-242), highlighting the spectrum of the disorder. After Kanner's first description and into the 1970's, the view of autism centered around it being a psychological disorder and treatment focused on psychopathological effects of poor parenting (Bryson, Rogers, & Fombonne, 2003). Although this view was dominant, the train of thought was not proving effective in treating the disorder. Thus, the 1960's saw the emergence of new thinking, including treating autism as a neurological disorder that affects the brain and its functioning (Bryon et al., 2003).

Prevalence

The most recent study found one in every 88 children has been identified with a spectrum disorder (Center for Disease Control and Prevention, 2012). In the state of Maine, special education identification of students with autism increased from 158 in 1995 to 1,255 in 2004, representing a nearly 800% increase (Maine Department of Education, 2005). It should be noted that school-age population decreased by 6% during that same time period (Steege et al., 2007). Also, males are affected three to four times more than females, but females appear to be more impacted by the disorder (Rice, 2007). ASD is found across ethnic, racial, and socioeconomic groups (Boyd, Odom, & Humphreys, 2010).

There may be several factors related to this increase in prevalence. Clinicians are making reliable and accurate diagnoses for children at earlier ages, with diagnoses occurring for children as young as two years old (Lord et al., 2006). Also, as autism is a spectrum disorder, characteristics and severity will differ across individuals. Thirdly, agencies such as the Department of Education did not have a separate classification for autism until the 1990's. This means the disorder was classified in a different category (Newschaffer et al., 2007), possibly creating an increase in prevalence once the classification was created. Society has also become more aware of the disorder and the public demonstrates awareness through movies, books, magazines, and other medias (Lord et al., 2006).

Diagnostic techniques have also evolved over time, which may affect prevalence as well (Frith, 2003). Despite the fact that diagnostic techniques have improved, parents still face difficulties obtaining a diagnosis, which results in delayed interventions (Nissenbaum, Tollefson, & Reese, 2002). Most children are seen by at least three professionals before a diagnosis is given, increasing the stress felt by families (Bryon et al., 2003). The longer the diagnosis is delayed, the longer the child will have to wait for appropriate education and/or intervention. This may result in inappropriate methods being used, which in turn will lead to academic failure, possibly causing emotional problems (Howlin & Asgharian, 1999).

Symptoms

Most parents notice symptoms of ASD during infancy, but a diagnosis typically will be made between 2-4 years of age (Matson, Neal, Fodstad, & Hess, 2010). The etiology of ASD is unclear and there is no cure. This lifelong condition brings up quality-of-life issues and society-based costs, which may include special education programs, support services, and the individual's loss of productivity (Autism Society of America, 2009).

To help increase early detection, it has been recommended that screenings for autism should occur and be made of two stages. The first stage should include routine check-ins based on specific measures to detect delays. This may include examining adaptive behaviors such as coordinated eye contact and functional toy play (Baranek et al., 2005). The second stage should specifically look for red-flags of autism including delayed speech, repetitive movements, and lack of social interaction (Filipek et al., 2000). Nine children clinically diagnosed to have autism at 20 months retained a diagnosis within autism spectrum disorder at 42 months, with six meeting DSM criteria for autism, two for atypical autism, and one for PDD-NOS (Cox, Klein, & Charman, 1998), demonstrating the effectiveness of early detection.

Current research demonstrates that ASD symptoms may develop in three different ways. The first pattern is the most frequent with a child demonstrating symptoms during the first year of life. The second pattern involves the regression of a child's skills before 36 months of age. There are conflicting findings whether those with regression ASD will have poorer outcomes in verbal, social, and behavioral areas than those with nonregressive ASD. The final pattern is a milestone being achieved followed by a plateau of learning. Little is known about this third onset (Kalb et al., 2010).

Typically developing children will learn skills naturally from their environment through modeling, language, creative play, and so on (Bredekamp & Copple, 1997). A child with autism has decreased motivation to learn this way, along with struggling to understand the communication an adult is using to help him or her learn. This leads to children feeling frustration with the learning process that in turn may result in aggression and attempting to escape demands. This leads to the difficult, but crucial task to create learning opportunities and increase motivation to learn (Smith, 2001). Noncompliance becomes particularly important to work on as improved cooperation is a fundamental skill for development (Bryson et al., 2003).

Joint attention and symbol use are communication skills children with autism have a difficult time learning. A deficit in joint attention will include struggles to attend to a specific communicative partner, shifting gaze between objects or people, sharing emotions with others, following the gaze or point of someone else, and obtaining a person's attention to share a specific experience. A lack of joint attention may be linked to a decrease in play skills, emotional responsiveness, and interactions with peers. This particular communication skill has been a predictor of future language development (Woods & Wetherby, 2003).

Symbol use includes using gestures, understanding and using meanings for words, and using objects for their intended purpose and also for symbolic play. Children with ASD will not replace their lack of verbal language with symbol use, but will use primitive motor gestures (Woods & Wetherby, 2003). An example of normal symbol use may be leading an adult by the hand into kitchen and placing their hand on the refrigerator door to signal the need for a drink. The lack of typical gestures may find children with autism instead using other means to communicate, including self-injurious behaviors and aggression (Woods & Wetherby, 2003).

Individuals with autism struggle with the ability to imitate others, including both verbal and motor imitation (Dawson & Osterling, 1997). Motor imitation is important as many other skills are learned as a by-product of imitation. Social skills are often learned by imitating others. Having the ability to observe one's environment and imitate peers is typically decreased in a child with autism (Koegal & Lazebnik, 2009).

Social skills are inherently complex and usually need to be broken down into smaller steps. Individuals with autism demonstrate deficits in social skills such as poor eye contact (Willemsen-Swinkels, Buitelaar, Weijnen, & Van Engeland, 1998), failure to initiate social interactions (Matson, Sevin, Fridley, & Love, 1990), and the presence of odd mannerisms and speech (Matson & Minishawa,

2006). These symptoms have been known to continue into adulthood and tend to increase rather than decrease with age (Howlin, Mawhood, & Rutter, 2000). There is also a lack of pretend play, which leads to fewer interactions with their peers (Hess, 2006). Without intervention, a child with autism will not develop the history that social interactions are motivating, thus decreasing the ability to develop friendships and relationships as he or she gets older (Koegal & Lazebnik, 2009).

Children on the spectrum may attend to few or irrelevant stimuli in the environment (Shrandt, Townsend, & Poulson, 2009). It has been well documented that there are deficits in empathy and perspective taking in children with autism (Yirmiya et al., 1992). These skills serve an important role in pro-social behavior, which include behaviors such as helping, sharing, and turn taking. These social behaviors can be seen in typically developing children as young as 18 months (Rheingold & Hay, 1980). Skills such as these are vital to the development of social relationships. Peers may initiate social interactions more frequently with children who display perspective and demonstrate empathy (Shrandt et al., 2009), thus leaving behind children with autism.

Maladaptive behaviors such as aggression, self-injury, property destruction, noncompliance, and motor and vocal stereotypies are common in those diagnosed with autism. A lack of communication has been associated with these problem behaviors (American Psychiatric Association, 2003). Stereotypies and rituals may be the most intrusive deficit. They typically occur in high-frequency and will interfere with normal development along with causing a family an increased amount of stress (Matson, Dempsey, & Fodstad, 2009). These repetitive movements may affect their ability to play appropriately with toys (Dawson & Osterling, 1997). Children with PDD may engage with leisure items in a stereotyped manner, but research has shown that children with autism can play appropriately with toys when provided specific prompts (Lewis & Boucher, 1988).

Treatment

Once symptoms have been identified, families will begin to seek treatment for their child. Knowledge of the disorder, social acceptance of the disorder, demographic residence, and socioeconomic status will all play a role in families receiving treatment (Richmond, 2011). Families that live in an urban community are more likely to seek and receive an ASD diagnosis than those living in rural areas. They are also more likely to seek out ASD specialists. Families of lower socioeconomic status may have trouble seeking assistance due to lack of access to services. Also, if the family has a more pressing issue, such as a need for food or shelter, an ASD diagnosis may not be made the priority (Chen et al., 2008).

Early intervention for children with a diagnosis of ASD, or those demonstrating symptoms of the disorder, may make substantial developmental gains and can be placed into a general education classroom by the time they enter elementary school (Dawson & Osterling, 1997). Comprehensive early intervention programs have been shown to be effective in changing the developmental course of children with autism (Bryson, Fombonne, & Rogers, 2003). These programs will include individualized teaching programs that target development in the areas of cognition, motor abilities, and self-help abilities. There has only been one program with published data on a control group of children with autism who did not participate in an early intervention program (Lovaas, 1987, Lovaas et al., 1989), and, to date, "there have been no true experimental studies that would require, at minimum, random assignment to different intervention groups and outcome assessments conducted by people naïve with regard to intervention status" (Dawson & Osterling, 1997, p. 8).

Along with early intervention, coordination of care is particularly effective to ensure team members have the latest information regarding the individual and a clear view of current skills. This may include coordination between preschool and elementary school and teacher to teacher. Educating

teachers and other professionals involved with working with children with ASD is particularly important. Lastly, the social well-being on a child in a school setting should not be overlooked. It is important the child is included in events and feels a sense of belonging (Bryon et al., 2003).

Treatment for a child with autism in the public education system comes with its own unique complications. Individual Education Plans (IEP) are put into place to ensure the learning styles of each child are met and changed as needed. A promotion of evidence-based interventions in schools would increase development of skills and help advance these young learners as they continue through the education system (Bryson et al., 2003).

As social skills is a deficit for individuals with ASD, a common treatment is modeling. It is typically done by an individual who will present a social situation that results in eliciting a response from the child. Generalization is important, and an experimenter, therapist, or teacher can work to teach a peer to model and/or prompt appropriate social behaviors for children with autism (Matson, Matson, & Rivet, 2007). Along with using behavior and education therapies to treat these behaviors, psychopharmacological interventions may be used (Floyd & McIntosh, 2009). These measures should be implemented sparingly and after other strategies have failed (Bryson, Rogers, & Fombonne, 2003). It is recommended that drugs are infrequently used before the age of five and is weighed against the possible increase of seizure activity (Bryson et al., 2003).

Even with the treatments that are currently being used, half of all children with ASD will be nonverbal (Simpson, 2005). Augmentative and alternative communication (AAC) methods can be individualized based on a child's age and cognitive functioning. These communication methods highlight visual strength and preference of many individuals with ASD. These can include augmented input such as visual schedules, augmented input and output like aided language stimulation, augmented output only, and assistive technology for communication and learning such as a speech-generating

device (Mirenda, 2001). One example of an augmented output only is the Picture Exchange Communication System (PECS). Children are taught to use printed cards to express their wants and needs. This method can go beyond requesting to target commenting and social responses, such as labeling something they see or responding to a greeting. Instruction occurs in phases, with a limited field in the beginning and the opportunity to expand as the child's understanding grows (Simpson, 2005).

The ever-growing list of treatment options serves to increase the difficulty of parents and professionals to choose the one that may be most effective (Heflin & Simpson, 1998). Treatments that are adult-directed have proven effective. Also, peer-mediated interventions such as social groups and visual supports (e.g., PECS) are emerging as effective (Odom, 2003). Analyzing treatments based on category (e.g., skill based, cognitive, psychological), found empirical support to qualify ABA, DTT, and pivotal response training (PRT) as evidence-based practices (Simpson, 2005). Those that still remain in an exploratory stage are classroom-based interventions, social skills treatments, and functional communication treatment (Brunner & Seung, 2009).

A treatment that is implemented at least 20 hours weekly, individualized to the child and promotes acquisition of language and other areas of development will increase development when compared to minimum or no treatment (Bryson et al., 2003). The National Professional Development Center on Autism Spectrum Disorders suggest practices to increase appropriate behaviors and decrease maladaptive behaviors that have been adopted from applied behavior analytic procedures (Boyd, Odom, & Humphreys, 2010).

A wide variety of treatment options are available to families. ABA has demonstrated to be an empirically-based effective treatment. With its ever-growing popularity, it is vital those implementing it are receiving the proper training.

Applied Behavior Analysis

According to Heward (2006), children with autism are difficult to teach because they require planning, modification, and instruction that is continually evaluated and analyzed. One way to effectively teach children with autism is to use interventions based on the principles of behavior analysis (Lerman, Vondrann, Addison, & Kuhn, 2004). "ABA is the only therapy or treatment endorsed by the United States Surgeon General (2000) and is considered by many to be the standard approach for individuals with autism" (Wolfe & Neisworth, 2005, p. 45). This science draws from operant conditioning with the intent to teach positive behaviors and decrease negative behaviors (Lovaas, 1987),which parallels to the deficits in Autism Spectrum Disorder.

ABA has proven to be an effective method to teach children with autism. Gena, Krantz, McClannahan, and Poulson (1996) used ABA techniques such as prompting, modeling, and reinforcement to teach four children with autism appropriate affective responding to various scenarios (Shrandt et al., 2009). With this treatment, all four participants showed an increase in appropriate affect. There was also generalization across novel scenarios, new people, and settings (Shrandt et al., 2009).

History

Applied Behavior Analysis is defined as the use of knowledge gained for improvement of behaviors that are socially important (Baer, Wolf, & Risley, 1968) and is based upon more than 50 years of scientific investigation with individuals affected by a wide range of behavioral and developmental disorders (Leaf & McEachin, 1999). Behavior analysis looks at the interaction between antecedents and consequences to plan the skills that will be targeted and make changes to the programming (Alberto & Troutman, 2006). Manipulating environmental conditions and implementing

behavior principles, such as reinforcement, build the foundation for behavior change and programs (Simpson, 2001).

The branch of behavior analysis that would later be called Applied Behavior Analysis can be found in the 1959 paper, “The Psychiatric Nurse as a Behavioral Engineer” by Ayllon and Michael. This publication described how personnel in a state hospital used various techniques based on the principles of behavior to improve the skills of residents with psychotic disorders or mental retardation (Cooper, Heron, & Heward, 2007). Many researchers during the 1960's began to apply the principles of behavior to improve “socially important behavior” (Cooper et al., 2007).

Early practitioners found themselves developing new procedures as they practiced in applied settings instead of a traditional laboratory. There was little funding for this new discipline and there was no outlet for communicating new methodologies or findings of research. The answer to this was the Journal of Applied Behavior Analysis that began publication in 1968 and led to an improvement of applications and experimental methodology (Cooper et al., 2007).

Using ABA

Assessments to confirm a diagnosis vary; some investigators review a medical record and any related information and make a judgment regarding the child. There are also more comprehensive surveys that involve a team of specialists directly assessing the child, interviewing the parents, and employing a structured diagnostic tool. An assessment before beginning an intervention will typically also take place and involve identification of the individual behaviors, needs, and characteristics of the client, looking at the individual's environment, and understanding the complex interactions between the individual and his/her environment. The result of the assessment is to design individualized intervention plans and procedures. Assessments also occur during intervention to monitor progress (Chakrabarti & Fombonne, 2005).

Analyzing data on a regular basis allows the intervention team to ensure interventions are having the desired effects and make changes to the program as necessary (Steege et al., 2007). This will include looking at target responses and analyzing the effects of manipulating antecedents and consequences. It is important to determine if the intervention is responsible for a change in behavior (Simpson, 2001). Two components are incorporated into programming to ensure success. The first is assessment of behavior in the educational context and the second is intervention based upon the assessment to improve academic, vocational, life-skills, and social behavior (Steege et al., 2007).

Behavior analysis uses a wide range of interventions that include Picture Exchange Communication System (PECS), precision teaching which uses a child's motivation in a naturalistic setting to teach language (Koegel et al., 1998), shaping (using successive approximations to get desired behavior), generalization, chaining (putting learned responses together to form a behavior such as tying shoes), DTT, modeling, and maintenance (Dillenburger et al., 2004). These methods are used to support persons with developmental disabilities in at least five ways: "a) to teach new skills, b) to reinforce and maintain previously acquired skills, c) to generalize behavior from one situation to another, d) to restrict or narrow conditions under which interfering behaviors occur, and e) to reduce interfering behaviors by discontinuing their reinforcement and reinforcing competing replacement behaviors" (Steege et al., 2007, p. 92).

Individuals diagnosed with ASD may attend to few or irrelevant stimuli in the environment (Shrandt et al., 2009). This is one of the challenges when attempting to teach a child on the spectrum new skills. ABA has been proven to be an effective method, with DTT being the cornerstone method utilized (Sundberg & Partington, 1998). Each methodology comes with its own challenges when teaching it to new staff. As DTT is the most utilized strategy in behavior analysis, it is imperative staff understands its components and how to successfully use it.

Discrete Trial Teaching

DTT is considered the cornerstone of ABA. It breaks down skills into small steps and allows for repeated practice in a concentrated period (Sundberg & Partington, 1998). A program such as identifying body parts will be broken down into successive steps or phases for meeting the objective (Ferraioli, Hughes, & Smith, 2005). During each trial in this instructional methodology: "a clear instructional antecedent is followed by an opportunity to respond, which is then followed by error correction or programmed reinforcement" (Smith, 2001, p. 86). An example may be asking a student to "touch sock". If the student provides the correct response the instructor provides positive reinforcement. If the correct response does not occur, the instructor will prompt the correct response (Steege et al., 2007).

DTT was developed in the late 1950s and early 1960s as a way to teach mentally handicapped individuals (Lindsley, 1996). One of the earliest demonstrations of the success of DTT is with Dicky, a young boy visually impaired with autism. Dicky seldom used vocal responses on his own, but through the implementation of DTT he was taught higher levels of verbal communication (Ghezzi, 2007).

Skills taught using DTT are usually developmentally sequenced with multiple skills being worked on concurrently (Maurice, Green, & Luce, 1996). As programs are taught concurrently along with the intensity needed to master the skill, thousands of trials may be run each week (Cummings & Carr, 2009). DTT has proved effective in teaching skills in areas such as imitation, receptive language (understanding language), expressive language (vocal use of language), grammar and syntax, and alternative communication systems (Smith, 2001).

Prompting is used to help teach a correct response. Various prompts are used depending on the learner and intrusion level necessary. Verbal prompts can be described as an instructor saying something that helps the student make the correct response (Ghezzi, 2007). An example may be asking

a student their name and providing a verbal prompt of "Jo" for "John." As the student demonstrates success with this level of prompting, it can be faded to "J." Gestural prompts are when an instructor gestures or moves his or her body to guide the student to a correct response (Ghezzi, 2007). An example may be saying "sit down", and then pointing to the chair.

A physical prompt may be used when the learner needs physical guidance to complete the response. Many times this involves hand-over-hand assistance and is useful for tasks such as teaching tying shoes or following directions. Just as important as prompting, is prompt fading. The goal is to eliminate the instructor's assistance and using prompt fading allows a systematic way to decrease the level of prompting and increase the student's independent response (Ghezzi, 2007).

An underutilized, but effective prompt is a tactile prompt (Ferraioli et al., 2005). An example may be a student wearing a pager that signifies the student to engage in the target response when activated. The Gentle Reminder, a oversized pager, was the first device in DTT to be used as a tactile prompt Davidson, 1995). Tactile prompts are useful to teach social skills and since the device is not observable to anyone else, they are non-stigmatizing. Also, as this prompt can be given at a distance, independence for a student can increase (Ferraioli, et al., 2005).

When teaching a new skill, the instructor may reinforce approximations of the target behavior (Smith, 2001). For example, if the skill is saying the word "bubbles", the instructor may reinforce the child for saying "ba". As the skill progresses, the instructor will require closer approximations to the word, bubbles. This process is called shaping (Smith, 2001).

Defining a target response using "directly observable action verbs" (Ghezzi, 2007) will help determine how the response should be measured. An instructor may use the frequency of responses, the amount of time it takes a learner to meet a mastery criterion, or the percent of correct responses to measure responses (Ghezzi, 2007). Teaching sessions typically consist of 10 trials (Romanczyk, 1996)

with the program itself being run 1-2 times a day (Weiss, 2001). The data collected is summarized and graphed to provide pictures of the learner's progress and ensure changes are made if the learner is not making gains (Green, 2001).

Consequences that increase learner attending and following instructions on future trials are called reinforcing (Ghezzi, 2007). Positive reinforcement is demonstrated when a behavior is followed by a consequence that increases behavior (Alberto & Troutman, 2006). Examples for a child with autism may be a favorite snack, a toy, tickling play, or social praise. For reinforcement to be effective, the student must receive the reinforcer immediately after the target behavior is performed (Alberto & Troutman, 2006). This helps teach the learner there is a relationship between a response and the consequence that follows it. It also helps avoid inadvertently reinforcing an undesired response such as crying or stereotypies. It is important to demonstrate that a learner's response is more accurate as trials continue. It should also be demonstrated that the improvement is due to the consequences or withholding of consequences (Ghezzi, 2007).

A learner acquiring a new skill will need reinforcement on a continuous basis. As the skill is acquired, the reinforcement schedule may be thinned. Learned behaviors will maintain over time with intermittent reinforcement. When moving to a thinner schedule, an instructor will have the opportunity to also move to more natural reinforcers (Ghezzi, 2007), such as verbal praise or a thumbs up.

It is especially important to be aware of reinforcement with learners with autism. Due to their lack of social interaction, an individual with autism may prefer time spent alone over verbal praise from an adult. So an instructor that may typically provide praise after a correct response, may instead need to stay quiet after a correct response (Ghezzi, 2007).

Three aspects of DTT should be mentioned that increase a child's motivation and learning. The first is the small amount of time needed to perform a trial, resulting in a larger amount of learning

opportunities (Smith, 2001). DTT trials can be run consecutively allowing the learner more practice. Second, since this particular method is used in a one-to-one format, each child receives programming individualized to their needs. The last piece is because of the concrete style of DTT, it is easily picked up by a child with autism, allowing them to understand when a task will begin and when it will end. The goal of DTT is to maximize successes and minimize failures (Smith, 2001).

Discrimination describes the child using different responses for different stimuli. This process typically includes teaching the student one response and once that response has been mastered a new response is taught (Smith, 2001). An example may be teaching a student to identify a cup, then identify a spoon. After these two responses are mastered separately, the instructor will alternate between the two ("touch cup" and "touch sock") so the child learns to discriminate between them (Smith, 2001).

DTT is possibly the best tool behavior analysts have for teaching single units of behavior to children with autism. It is the only documented approach for teaching children new speech sounds, combining these sounds into words, and forming phrases (Smith, 2001). It does, though, have its disadvantages.

As it requires additional procedures to promote generalization, it may generate rote responding (Sundberg & Partington, 1998) or prompt dependency (Simpson, 2001). Also, the prompts and reinforcers used in DTT are usually unnatural and would not happen in the outside world (Sundberg & Partington, 1998). For example, one may teach a child to say "apple" when they see a red apple on a picture card. After the child says "apple", they are given a gummy bear, their favorite candy. If generalization procedures are not addressed, one may notice the child only saying "apple" when they see that particular card in that particular environment. Another disadvantage is because children are responding to clear cues from instructors, they may have difficulty learning to imitate behaviors without the presence of those clear cues (Ferraioli et al., 2005).

Children with autism struggle with overselectivity, in which they attend to specific features during teaching (Lovaas, Koegel, & Schriebman, 1979). This may then lead to the student not displaying the learned skill in other settings. To combat this, different examples of items are used (different types of cookies and different cookie pictures). When a student demonstrates a skill in only one setting, instructors will systematically begin to give instructions in different locations or will utilize different people to provide the instruction (Ferraioli et al., 2005).

Efficiency and effectiveness of this method has been demonstrated with the field of ABA. Outside of the field though, DTT is often not portrayed correctly. Many falsely believe that DTT is the only method ABA utilizes. Also, behavior analysts, over time, have chosen the term discrete-trial teaching over discrete-trial training. The word, training, reminds individuals of animals training for a circus or in a marine park. This leads to a misconception that children with autism learn and should be taught in the same way as animals. A parent may be disheartened thinking their child is simply performing on command (Ghezzi, 2007). ABA itself has been referred to as a narrowly focused approach that does not teach functional skills in natural settings. ABA, though, has proven over time to be a flexible method that can be successfully used in a multitude of settings and ways with students with autism (Simpson, 2001).

As many children with autism demonstrate challenging behaviors in the form of aggression, self-injury, tantrums, and stereotypy, functional communication training may be used to teach appropriate communication skills. Once the function or the reason for the behavior has been determined, teaching a replacement behavior, such as using sign language to request a cookie, will be instituted (Brunner & Seung, 2009). Using functional communication training, milieu teaching which combines incidental teaching, mand model, and a time delay (Brunner & Seung, 2009), and PRT are more natural approaches used in behavior analysis that may combat the disadvantages of DTT. These

methods allow for the individual to continue to develop skills using the natural environment to teach them.

Advantages of DTT are its use of data to make changes in programming and interventions (Heflin & Simpson, 1998), along with prompting and differential reinforcement, both specific components of DTT, that have proven to be effective treatment methods (Odom et al., 2003).

Downs, Downs, Johansen, and Fossum (2007) looked at the effectiveness of DTT in a preschool program. Participants were randomly assigned to receive DTT or individual attention in a control condition. The DTT session lasted about 15 minutes, then the participants were given 5-15 minutes to play between the sessions. The control group received their regular preschool programming. All students in the study received an evaluation within two weeks of the beginning and end of the academic career. The results of the study showed that students in the DTT program made more gains in communication, daily living skills, and socialization than the control group (Downs et al., 2007). Discrete trial teaching is an important tool in a behavior analyst's repertoire. For this method to be effective, though, those implementing it must have proper training.

DTT is a vital component to teaching children with ASD. Most staff, though, have no previous experience with these methods and will need specific training to understand how to implement them. This falls on the company that has hired them to ensure they have been given the tools necessary to be successful with their clients.

Staff Training and Video Modeling

As most staff members do not have specific training in behavior analysis, they require extensive training which may be difficult to obtain due to limited funding and large supervisor caseloads. These staff members will be responsible for multiple intervention plans with multiple clients and if an

intervention is not implemented successfully, positive client outcomes may not occur (Collins, Higbee, & Salzberg, 2009).

A video modeling intervention associated with staff's implementation of discrete trial teaching involves the trainee watching someone correctly perform a skill and then having the opportunity to perform the skill themselves (Collins et al., 2009). This tool has numerous benefits such as demonstrating the skill in context and using multiple stimulus and response examples (Catania et al., 2009), along with helping to overcome funding limitations and busy supervisors (Collins et al., 2009). Once the video model is recorded, it is available for learners at any time (Nielsen, Sigurdsson, & Austin, 2009).

Continuing development of effective training methods to teach staff to conduct methods such as DTT is important. Staff that has been properly trained increases the likelihood that programs will be carried out with procedural integrity. Procedural integrity can be defined as the implementation of an intervention the way it was intended (Gresham, 1989). A higher procedural integrity will produce greater intervention outcomes. Measuring this integrity will also help clinicians determine if the intervention would be more effective if it were carried out correctly or if changes need to be made (Arkoosh et al., 2007). Currently, there is little published research on training staff to implement discrete-trials (Catania et al., 2009).

Different methods of training staff were compared with video modeling demonstrating video modeling's effectiveness (Ducharme & Feldman, 1992). Providing staff with written instructions did not increase their success in implementing procedures. Modeling, rehearsal, and feedback, though, demonstrated a clear increase in staff's ability to carry out interventions. Collins et al., (2009) incorporated video modeling into increasing staff's correct implementation of programming. The staff was shown a video of the program being implemented before they began running the program

themselves. This strategy showed an increase from a baseline of 38% correct prompts used, to a mean of 91%.

Training packages including “verbal and written instruction, a review of graphed baseline performance, rehearsal of the skills by the trainee, verbal feedback, and modeling of the correct skills by the trainer” (Catania et al., 2009, p. 387) demonstrated increases of correct implementation of DTT by all three participants. Another treatment package consisting of a review of a skill checklist and feedback after skill demonstration led to acquisition of correct implementation and maintenance in follow-up assessments (Catania et al., 2009). Instructions, feedback, rehearsal, and modeling resulted in a successful treatment package for thre educators using DTT with children with autism (Sarakoff & Sturmey, 2004). These procedures demonstrate effective staff training, but do not address problem areas such as time and money constraints.

Another study looked at the effects of video modeling on teaching discrete trials (Catania et al., 2009). During baseline, participants were given a brief description of the lesson plan, but no specifics about running the discrete trials. The participants ran their lesson, with those involved in the research posing as students. The “students'” responses were randomized using a random number generator. The treatment procedure utilized a 7-minute video of two instructors simulating a student and a teacher. Within 10 minutes of watching the video, the participant was asked to run discrete-trials exactly like baseline.

Generalization probes were conducted by giving the participant a similar lesson plan, but not utilizing the video model. During baseline, each participant's performance was at a mean of under 63%. During treatment, the means rose to 85%, 94%, and 98%. The week 1 follow-up probe, showed skills were maintained in the absence of video modeling with means of over 99% (Catania et al., 2009). The results demonstrated video modeling may be an effective strategy to teach staff, but there are more

variables that need to be explored. The video included a voice-over and the participants began their own discrete-trials quickly after watching the video. It is unclear if either of these variables effected the treatment.

Video modeling has also proven effective to increase correct implementation of behavioral interventions designed to reduce maladaptive behaviors (Digennaro-Reed, Codding, Catania, & Maguire, 2010). After other training opportunities such as live modeling, coaching, and feedback demonstrated poor treatment integrity, video modeling increased percentage correct of implementation of three teachers from 41% to 84%. Correct implementation further increased to 100% when feedback was added. Video modeling has also been utilized to effectively teach staff to conduct preference assessments (Lavie & Sturmey, 2002) along with successfully implementing functional analysis procedures (Moore & Fisher, 2007).

Even though video modeling has proved an efficient way to train staff, little research has been on the content of the video itself. The actual content of the video may determine whether skills learned during training generalize to the everyday environment (Neef et al., 1990). A failure of generalized performance may be attributed to a lack of multiple exemplars (Moore & Fisher, 2007).

The use of video modeling as a training tool has proved effective, although maintenance and generalization of this skill are unclear (Collins, et al., 2009). The results of these studies all show an improvement in the accuracy of teaching. DTT is an important intervention that has been effectively used to increase skills. It is vital treatment fidelity be considered and measures be taken to ensure DTT's correct implementation. Video modeling is an increasingly used strategy that has proved successful in previous literature and may help increase correct implementation of DTT.

Video modeling may vary in the task that is taught, but may also vary in the delay between viewing the model and performing the skill. A number of studies have analyzed teaching skills to

individuals with autism using a video model and having them immediately perform the skill (Nikopoulos & Keenan, 2004; Geiger, LeBlanc, Dillon, & Bates, 2010) or at least an hour after viewing the video model (D'Ateno, Mangiapanello, & Taylor, 2003; Alberto, Cihak, & Gama, 2005). Presently, no research has been found analyzing a time delay in training staff using a video model.

Current Study

This study will manipulate variables of time to determine how increasing time between viewing a video model and conducting a DTT session will affect an individual's correct implementation of DTT. Two groups will be randomly assigned to either view a video model then immediately begin a DTT session or view a video model, then 24 hours later begin a DTT session.

The hypothesis is the results of this study will demonstrate that increasing the amount of time will decrease staff members' percentage correct of DTT implementation. Through the use of a one-way ANOVA, group performance will be analyzed, ultimately showing that increasing the amount of time between viewing a video model and implementing a DTT session affects one's ability to properly use DTT.

Chapter 3: Methodology

Population

Participants for the study included individuals that fall below 100% of correct implementation of DTT. Participants were behavior therapists and other professionals working with the autism population. General information was collected including age, gender, and number of years in the field. An informed consent was given to each participant discussing their confidentiality in the research and the opportunity for them to withdraw their consent at any time. This consent form also required participants' signatures and the researcher's signature. All paper data and video was kept in a locked

drawer. All participants received a 45- minute module on DTT prior to conducting baseline, including a spoken lecture to accompany a copy of a PowerPoint presentation. This module gave a brief history on what ABA and ASD is, along with pertinent vocabulary the participants needed to know to perform the procedure.

Procedure

As recent literature has demonstrated that the use of video modeling can increase correct implementation of DTT (Catania et al., 2009; Collins et al., 2009), a parametric analysis examining the lengths of time between viewing the video model and conducting the therapy was conducted to further explore this staff training procedure. All participants were recorded conducting DTT. Six components of DTT were examined based on previous components used by Sarokoff and Sturmey (2004) and one was added:

1. Identifying preference
2. No verbal instruction given until student demonstrates a readiness response of being still
3. Matching instruction to program
4. Delivering instruction once
5. Implementing the correct predetermined correction within 2 to 4 seconds after the verbal instruction if the student does not respond or begins to error
6. Providing immediate reinforcement for the correct response
7. Recording data for each response (see Appendix A)

Percentage correct was calculated by dividing total number of correct participant responses by the total number of examined components, which is seven. Participants who fell below 100% of percentage correct were randomly assigned to groups.

Participants were chosen randomly to be in Group 1 or Group 2. Group 1 was shown a 9-minute video model and began a DTT session after two minutes. Group 2 was shown the same 9-minute video video and began a DTT session after 24 hours. Participants were recorded again conducting their DTT session with a receptive program and percentage correct was calculated the same as in baseline. It is hypothesized that the longer the elapsed time between the video model and instructor performance, the fewer the steps in DTT that will be completed correctly.

The 9-minute video was the same for all participants. A BCBA (Board Certified Behavior Analyst) or BcaBA (Board Certified Assistant Behavior Analyst) was shown conducting DTT with a student. The video model only demonstrated receptive programs to increase the possibility that the effects are due to the increased time and not due to the therapist failing to generalize the method. The included programs will be: body identification, object identification, and attribute identification. Parents of the students in the video received an informed consent form of their participation in the project and their opportunity to withdraw at any time.

Data Collection

All DTT sessions of participants were recorded and coded by a BCaBA using a checklist of the seven components of DTT being analyzed (Appendix A). This individual demonstrated competency of the checklist before research began, reaching 100% accuracy across 20 examples. This was conducted through YouTube clips and sessions that occurred in the office.

Measures

There were three variables for this study. The independent variable is the time delay for each group, either two minutes or 24 hours. The first dependent variable was baseline DTT, which determined the participants that fell below 100% and also gave information regarding their current

accuracy of implementation. The second dependent variable was intervention, which measured participants' accuracy after viewing the video model.

Data Analysis

A one-way ANOVA and repeated measures ANOVA design were utilized to analyze the data. The study compared a baseline of accuracy to intervention accuracy with the two-minute group and the 24-hour group.

Rationale for Method

The one-way ANOVA design analyzed between and within- group information and allowed for the one independent variable and two dependent variables. The repeated measures ANOVA examined the effectiveness of the training itself.

Chapter 4: Results

Participants: Demographics

There were a total of 20 participants: 10 in each of the two groups. Participant ages ranged between 20-53 years, with an average age of 28 years. Number of years in the field of ABA ranged from 0-5 years, creating an average of 1.4 years. Eleven participants had no previous experience in the field of ABA. There was one male and 19 females. Group 1 had the oldest participant as well as the only male. In that group, seven out of the 10 student participants had no previous experience in the field. In Group 2, four participants had no previous experience and this group also held the youngest participant.

Baseline

Each participant had completed a 45-minute module describing DTT and the related vocabulary before becoming applicable to participate in the baseline of this research. This was included as it was a

requirement for the company that many of the participants worked for and ensured all participants started off with the same skillset.

Baseline was conducted in a 10x10 room with an individual with ASD that was a current client of the therapy office that was being utilized. The participant was given a paper version of the data collection form. This paper form was reviewed during the module as well. This form gave the skill they would be teaching (see Appendix B). The skill was one out of four that would be appearing in the video model and was a receptive skill. The skill was either: body identification, object identification, or attribute identification. The participant was told they would be recorded and that the researcher could not answer any questions.

If a participant's baseline was below 100% they were then applicable to the study. Data was collected on seven components of DTT. Each component is imperative to the success of the method, so it was decided that 100% was the desired accuracy criteria. All participants fell well below this percentage of accuracy and were applicable to the study. Four participants completed baseline at 0%, seven participants at 14%, three at 29%, one at 43%, and five at 57%. So even though all participants completed a module on DTT, none demonstrated competency of the skill, further demonstrating how traditional teaching may not be the best method. Participants were then randomly selected into two groups.

Table 1

Accuracy Before Treatment

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.05	1	42.05	0.09	0.77
Within Groups	8788.50	18	488.25		
Total	8830.55	19			

Treatment

Group 1 watched the video model and then two minutes later performed the same skill they had performed during baseline. Group 2 watched the video model, and then 24 hours later performed the same skill they performed during baseline. Treatment was conducted in the same location as baseline. Participants also used the same client for baseline and treatment. This was to ensure accuracy was achieved with the same client the therapist worked with during the baseline condition.

Table 2

Accuracy After Treatment

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39.20	1	39.20	.158	0.696
Within Groups	4473.00	18	248.50		
Total	4512.20	19			

Main Effects

A one-way ANOVA was conducted to compare the effect of therapist accuracy of performing DTT after viewing a video model with a two-minute delay or a 24 hour delay. The data supports that there was no statistically significant difference on the accuracy of performing the skill at the $p<.05$ level for the two conditions [$F(1, 18)=.158$, $p= .696$]. Group 1 started with a mean of 27.1 and a SD of 57. Group 2 began with a mean of 24.2 and a SD of 57.

After intervention, Group 1 showed a mean of 82.9 and a SD of 43. Seven participants were under 100% accuracy. Three participants were under 86% accuracy and they did not have any previous experience in the field. Group 2 had a mean of 85.7 after intervention with a SD of 43. In this group six participants were under 100%. Three participants again were under 86%. In this group, two out of the three participants that fell below 86% had no previous experience in the field. It should be noted that the individuals in Group 2, waiting 24 hours to perform the skill, had a higher mean than those that were able to perform discrete trial teaching two minutes after viewing the video model.

Out of the 11 participants that did not have previous ABA experience, one reached 100% accuracy. In the remaining nine that possessed experience ranging from 1-5 years, only one participant was below 86%.

In Figure 1 and Figure 2, the beginning and ending accuracy percentage for each group is demonstrated. The similar percentages, especially after treatment, highlight that those with the 24-hour delay were able to learn DTT just as well as the 2-minute delay group.

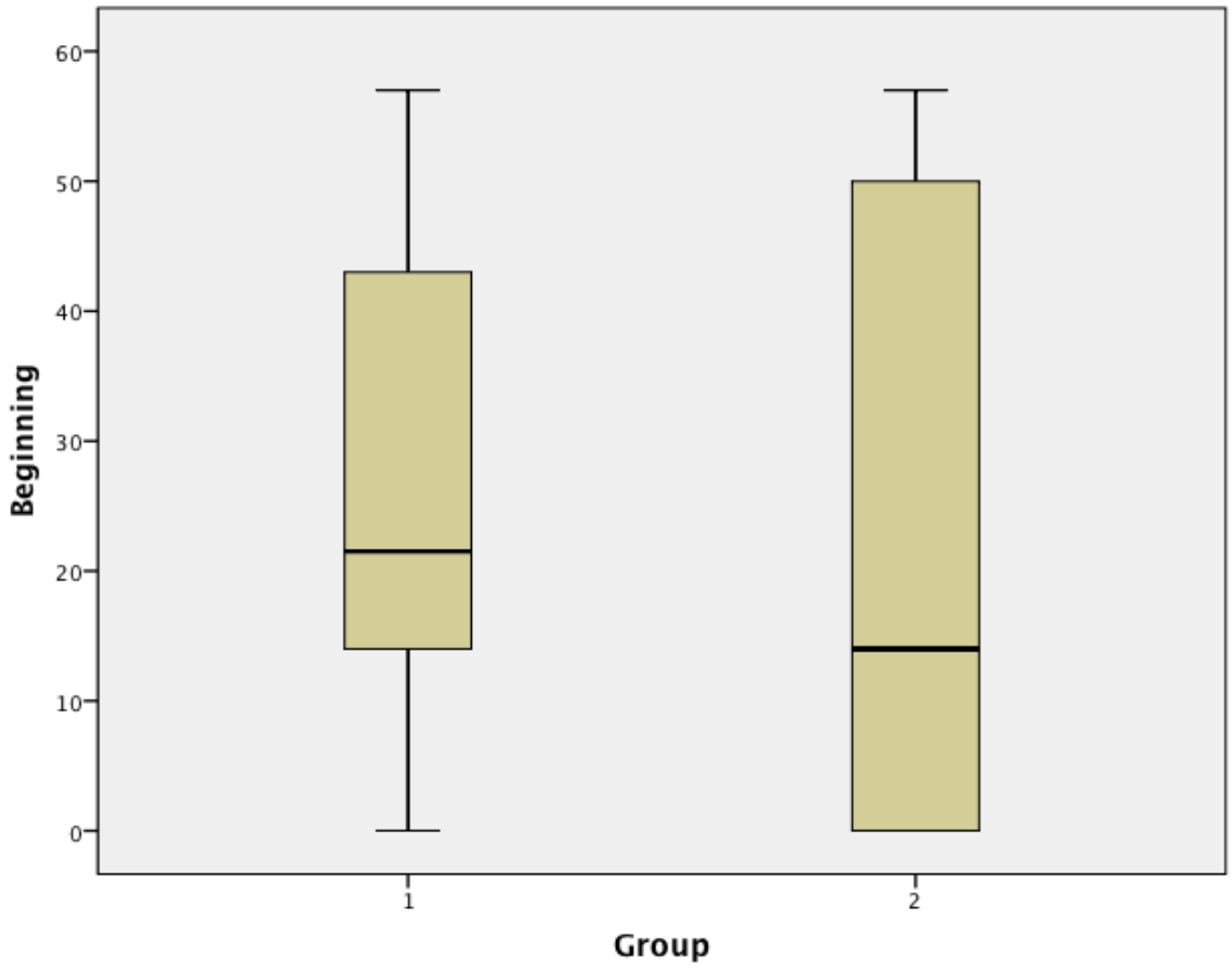

Figure 1. Comparison of Accuracy by Group Before Treatment

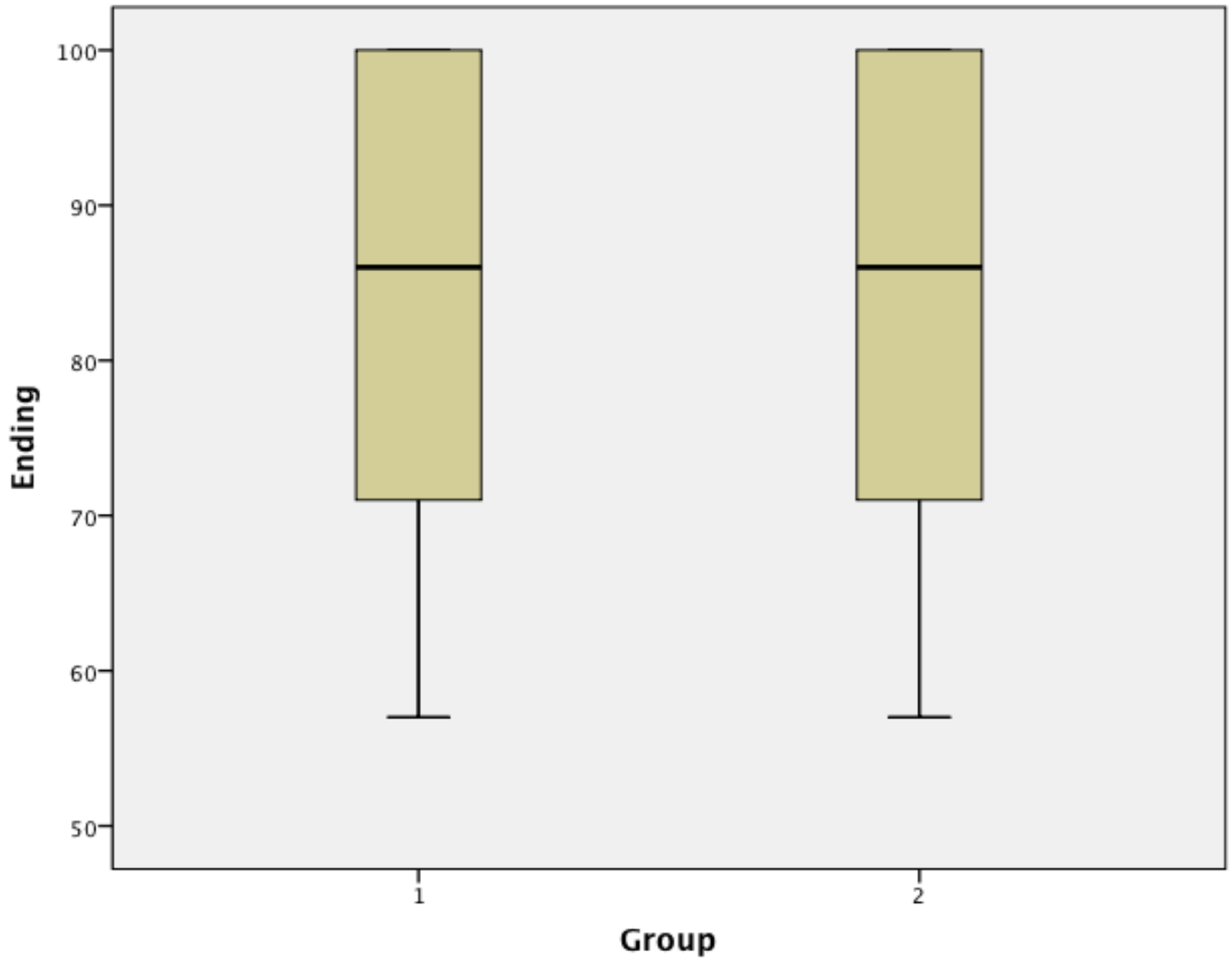

Figure 2. Comparison of Accuracy by Group After Treatment

A repeated measures ANOVA was conducted with the accuracy score for the baseline DTT as Time 1 and the accuracy score for post DTT Treatment as Time 2. The between groups independent variable was Group 1 and Group 2. These represent the random assignment of therapists to one of the two groups. The data supports that there was no statistically significant difference on the accuracy of performing the skill at the $p<.05$ level for the two conditions [$F(1, 18)=.158$, $p= .696$]. Group 1 started with a mean of 27.1 and a SD of 57. Group 2 began with a mean of 24.2 and a SD of 57.

Box's test of equality of covariance matrices was not significant, indicating that the dependent variable had equal variance across groups, (Box's M = 1.67, F (3, 58,320) = .52, p = .67). Levene's test for equality of variance indicated that Time 1 (Levene's F (1, 18) = 1.01, p = .33) and Time 2 (Levene's F (1, 18) = .08, p = .79) also had equal variance. Therefore, the assumption of homogeneity of variance was met.

There was a significant multivariate effect of the DDT training, Wilk's Lamda = .13, $F(1, 18) = 122.29$, $p<.001$, partial eta square = .87. This is a very large effect. Participants from both groups increased in accuracy from baseline to treatment. Therefore, the training can be considered very effective for this sample.

Differences between groups were examined at baseline to ensure that these groups could be considered equivalent. There was no significant difference, therefore these groups were considered equivalent. Differences between groups after treatment would indicate that the delay from training, either 2 minutes or 24 hours, had a significant effect on accuracy of treatment. There was no significant difference, [$F(1, 18)=.158$, $p= .696$], therefore there was no significant difference in whether the video the participant performed the skill after 2 minutes or 24 hours.

Table 3

Multivariate Tests a

	Effect	Vaue	F	Hypotheis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.872	122.292b	1.000	18.000	.000	.872
	Wilks' Lambda	.128	122.292b	1.000	18.000	.000	.872
	Hotelling's Trace	6.794	122.292b	1.000	18.000	.000	.872
	Roy's Largest Root	6.794	122.292b	1.000	18.000	.000	.872
Time*Group	Pillai's Trace	.016	.289b	1.000	18.000	.598	.016
	Wilks' Lambda	.984	.289b	1.000	18.000	.598	.016
	Hotelling's Trace	.016	.289b	1.000	18.000	.598	.016
	Roy's Largest Root	.016	.289b	1.000	18.000	.598	.016

Table 4

Mauchly's Test of Sphericity a

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	1.000	.000	0	.	1.000	1.000	1.000

Table 5

Tests of Within-Subjects Effect

	Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphercity Assumed	34398.225	1	34398.225	122.292	.000	.872
	Greenhouse-Geisser	34398.225	1.000	34398.225	122.292	.000	.872
	Huynh-Feldt	34398.225	1.000	34398.225	122.292	.000	.872
Time* Group	Sphericity Assumed	81.225	1	81.225	.289	.598	.016
	Greenhouse-Geisser	81.225	1.000	81.225	.289	.598	.016
	Huynh-Feldt	81.225	1.000	81.225	.289	.598	.016
	Lower-bound	81.225	1.000	81.225	.289	.598	.016
Error (Time)	Sphericity Assumed	5063.050	18	281.281			
	Greenhouse-Geisser	5063.050	18.000	281.281			
	Huynh-Feldt	5063.050	18.000	281.281			.
	Lower-bound	5063.050	18.000	281.281			.

Table 6

Tests of Within-Subjects Contrast

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	34398.225	1	34398.225	122.292	.000	.872
Time * Group	Linear	81.225	1	81.225	.289	.598	.016
Error(Time)	Linear	5063.050	18	281.281			

Table 7

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Beginning	1.011	1	18	.328
Ending	.075	1	18	.787

Table 8

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	120890.025	1	120890.025	265.419	.000	.936
Group	.025	1	.025	.000	.994	.000
Error	8198.450	18	455.469			

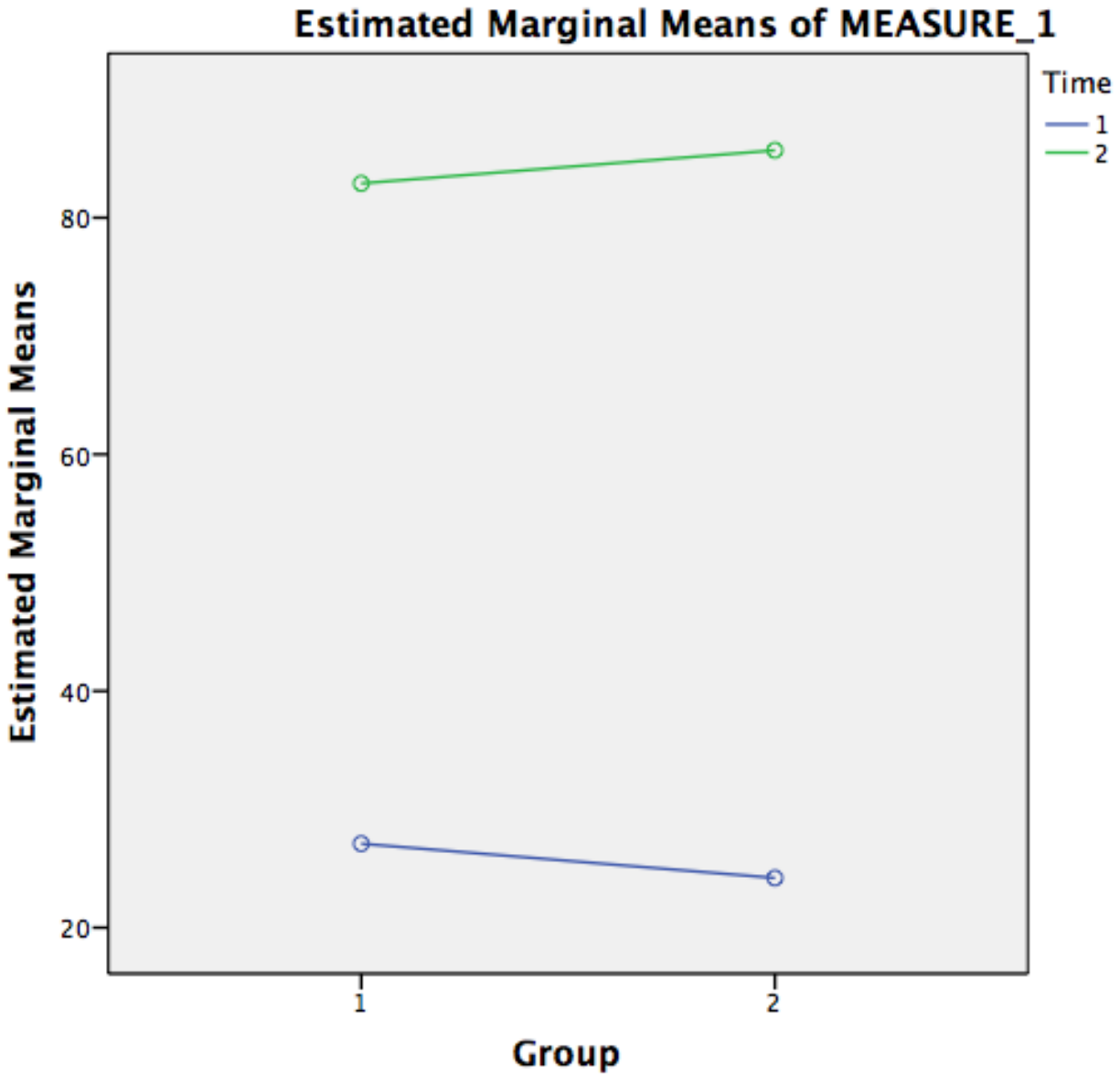

Figure 3. Comparison of Means by Group Before and After Treatment

Chapter 5: Discussion

The ultimate goal of this research was to determine if performing DTT 24 hours after viewing a model would be as effective as performing DTT two minutes after viewing the model. DTT is a method performed frequently in ABA, especially when working with individuals diagnosed with ASD. This method takes a skill, breaks it down into smaller steps, and conducts repeated practice in a concentrated period (Sundberg & Partington, 1998). DTT's success is dependent on the competence of the person employing this method. A literature review was conducted to research autism, ABA, and staff training. The research demonstrated the effectiveness of video modeling as it related to therapists performing DTT and other ABA methods with children with autism (Collins et al., 2009; Ducharme & Feldman, 1992; Catania et al., 2009).

As the numbers of individuals diagnosed with ASD continues to rise, then so does the number of professionals working with them, and the companies that oversee the treatment. Training must be seen as any other component for a successful business (Wexley & Latham, 2002). As the demographics in this study demonstrated, many behavior therapists begin working with a client and have no previous experience in the field or working with that diagnosis. Many facilities have a small budget for staff training and even less time (Wexley & Latham, 2002). The initial cost of a trainee is typically the most expensive to the company during the training process (Wexley and Latham, 2002). Video modeling helps combat that by recording a procedure or training once and providing it to incoming staff. It saves time and resources by allowing the new staff member to view it without having a current staff member taken away from their daily duties to perform the same training they have done multiple times before. Video modeling has proven to be an effective tool to train staff. It has also been shown to be effective when teaching a skill to individuals with autism. The individual will view a model, for example, a social skill such as responding to a question, and then be asked to demonstrate the skill. This method

has proven successful even with a short time delay of an hour between viewing the model and performing the skill (D'Ateno, Mangiapanello, & Taylor, 2003; Alberto, Cihak, & Gama, 2005). There was an evident gap, though, in any literature as it pertained to examining the time between viewing a model that pertained to behavior therapists learning DTT and performing the skill.

The results of the current study indicated no statistical significance due to the time delay in performing DTT after watching the training video. Both groups averaged between 24-27% accuracy before intervention. After intervention both groups increased to between 82-86% accuracy. Although, the after intervention averages did not meet the desired criteria of 100%, there was still an overwhelming increase in accuracy in both groups. The components missed were variable and no visible trend was identified in either group.

The level of experience was also variable throughout participants. Although, participants were randomly selected for groups, Group 1 held seven participants with no previous experience, while Group 2 held four. The participants who entered the research with no previous experience, had a baseline average of 20.7%. One participant with no previous experience reached 100% accuracy after treatment and five reached 86%. Two participants without previous experience reached 71% and three ended at 57%. The oldest participant at 53 years old, started with 57% and was the only participant to make no progress, ending at the same percentage. It could be hypothesized that the younger participants had more experience with technology.

Participants with experience had an average baseline of 31.7%. They were approximately 10% higher than those without experience, but still extremely low. Of those with experience, six reached 100% accuracy. Two had 86% accuracy and one participant ended at 71%. Variables such as developing poor habits, quality of ongoing supervision, and complacency may have attributed to below accuracy baseline percentages. The video model may have actually served as a refresher. Within this

last year, the Behavior Analysis Certification Board has started a regulated position for behavior therapists. Meaning that, before then, there was no concrete training regimen for behavior therapists across companies or the country.

Analyzing this research, an organization may find a video model useful to teach new skills to incoming staff members and may also be able to use it as guide for current ability with their current staff. Professional development guidelines could include a review of the video model material, should a staff member fall under a certain percentage of accuracy.

Overall, the hypothesis for this study was not supported. It was initially hypothesized that Group 2 would achieve lower percentage accuracy with the increased amount of time between viewing the model. The data results indicated this group did not statistically differ from the group with the shorter time delay. This is an important piece of information for those involved with training in businesses.

It should be noted, though, that the results of the repeated measures ANOVA did provide further evidence that using video modeling to teach DTT is a successful method. Both groups demonstrated a statistically significant increase in their accuracy.

This essentially equates to bringing in a new employee, having them fill out initial paperwork, and setting the standard of watching the video before beginning work the next day. Now the company has an employee that has already reviewed pertinent company components before even beginning their on-site work for the day. This will lead to a decreased amount of time between training and a staff member beginning to contribute and earn money for the company. The video model allows the company more training flexibility. Also, technology has provided numerous ways for an employee to gain access to the video based on company preferences. The video can be emailed, set up on a secure site, or sent home with the new staff member as a DVD. This will decrease the amount of time

management spends training and also provides multiple examples of the procedure which are hard to recreate every training session with every new employee. Specifically, with ABA a behavior therapist will come across multiple clients with multiple skill sets and interfering behaviors. A video model that has taken initial time to produce, will then provide that therapist with more upfront ideas of what a session may look like, increasing the chance they will make correct decision in their own sessions because they have seen multiple examples.

Limitations

Even though the results indicate staff members can watch a video model and accurately perform the skill 24 hours later, there are limitations to this research. The limitations include the number of participants, the demographics of the participants, the time between watching the model and performing the skill, and the DTT skill itself.

There were 20 participants in this study. A greater number of participants would have provided more diversity between Group 1 and Group 2, and may have more accurately reflected the possible range of experience in the field. One of the local colleges contacted was unable to allow any of their psychology students to be a part of the research as students were mandated to be on campus and required special permission to go off campus. Unfortunately, this study did not meet the requirements of special permission, so the students were not allowed to participate. Also, some participants declined to participate in the research after the informed consent was reviewed as they did not want to come to the office setting twice over 24 hours.

The time between watching the model and performing the skill was based on subjective data. As no previous research had been done utilizing a parametric analysis, the time delay was picked based on informal interviews with ABA practitioners. It was hypothesized that a new staff member could be emailed the video model or given the video model during their initial company intake, then return 24

hours later to begin training. Research should continue to evaluate the lengths of time between viewing the model and accurately performing the skill. It will be vital to know at what point the length of time is ineffective and learning breaks down.

It should also be noted that in the video model only three receptive skills were demonstrated across six different models, two examples of each receptive skill. The participants then were given one of those 3 skills to perform. The effectiveness of this research with other skills, such as expressive labeling, is not known as well as if increasing the number of models from six could have increased participant accuracy.

Recommendations

As technology continues to improve, so does the way in which data is collected. Many companies are moving from a paper and pen system to collecting data on an electronic device. This may have an effect on training and the video models as a new employee will need to learn to navigate the system as well. Future studies should include models utilizing this advanced way to collect data to determine if it has an effect on staff learning from the model and performing data collection accurately.

For participants that performed under 100% after the intervention, further teaching was not conducted. Future research should address participants that do not meet criteria and identify what follow-up methods may prove useful to increase accuracy.

Maintenance, or the lasting change in behavior (Cooper, 2007), was not performed in this study. Nine of the participants had previous experience and after treatment reached criteria. It was hypothesized that they learned the skill correctly initially, but developed their own habits over time. The behavior therapist carries out the interventions day-to-day, teaching skills in repetition. If supervision is not consistent, running programming incorrectly or a general sense of complacency may occur. Thus, another way to utilize video modeling is for ongoing training. Should a therapist fall

below 100% during routine supervision, the video model could be used as an ongoing training tool. This research area should be further explored to identify if video modeling could be coupled with a particular supervision schedule to maintain behavior therapists' accuracy.

Further research should continue to manipulate time with video modeling. It was previously mentioned that time was picked arbitrarily as research utilizing a parametric analysis for this procedure was not found. As literature continues to demonstrate this method's success, more studies should work towards identifying the intervals of time that are most effective for learning. Also, replicating this study with more participants is recommended to demonstrate generalization. Even though there was random placement in groups, Group 1 ended up with seven participants that had no previous experience in ABA while Group 2 had four. In future research, it may be beneficial to work either with a particular experience level or balance the number of individuals without experience across groups.

Conclusion

This study was developed to analyze the delay of performing DTT after viewing a video model and determine if accuracy could be achieved. The original hypothesis was that a 24- delay in practicing the skill after viewing the video modelnwould impact therapist accuracy and would not be an effective way to teach DTT. After conducting the research, it was determined that in fact there was not a statistical difference between viewing the video model and performing the skill with a 2-minute and 24- hour delay. The results of this research will contribute to the effects of video modeling and its importance with training professionals in a business setting.

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Appendix A: Data Collection Form

Skill	Correct	Incorrect
1. Identify preference		
2. Student demonstrates readiness, then Sd is given		
3. Sd matches program		
4. Sd is given one time		
5. Prompt implemented within 2-4 seconds if student errors or does not respond		
6. Immediate reinforcement for correct response		
7. Data recorded		

Skill Acquisition Program

SKILL: Receptive Idenification of Body Parts		**CHILD'S NAME:**
AREA: Expressive Language		**TARGET BEHAVIOR:** The stud identify body
Sd: " Touch your _____"		parts when given the Sd.
PREREQUISITES:		**PRIMARY INSTRUCTOR:**
PROCEDURAL STEPS: 1. Student touches first body part. 2. Student touches next body part. 3. Student touches learned body parts randomly.		**Body Parts:** **A) Head** **B) Stomach** **C) Ears**

DATE:														
STEP:														
BODY PARTS:														
	10	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
	9	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**
	8	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**
	7	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
	6	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
	5	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
	4	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
	2	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
	1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
STAFF INITIALS:														
LEVEL OF MASTERY:														

Scoring Code	**Reinforcer Schedule**	**Reinforcers**	**Comments/Observations:**
/ Correct **- Prompted** **X Incorrect** **O Circle Total Correct**	**☐ Fixed Ratio 1:1** **☐ Fixed Ratio 2:1** **☐ Variable Ratio**		___/___/_____ _____/___/_____ _____ ___/___/_____ _____ ___/___/_____ _____
Criterion for Mastery: 80% for 2 consecutive days for each step.			**Prompts: P- Physical G-Gestural Verbal I-Visual**