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Comparison of Stimulus Delivery Methods via an iPad to Teach the Expressive Labeling of Action Verbs to Children With Autism

Amy M. Heaps
Utah State University

COMPARISON OF STIMULUS DELIVERY METHODS VIA AN IPAD TO

TEACH THE EXPRESSIVE LABELING OF ACTION VERBS TO

CHILDREN WITH AUTISM

by

Amy M. Heaps

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Approved:

Thomas S. Higbee, Ph.D. Major Professor	Tyra P. Sellers, Ph.D. Committee Member
Melanie R. Dawson, Ph.D. Committee Member	Richard S. Inouye, Ph.D. School of Graduate Studies

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ABSTRACT

Comparison of Stimuli Delivery Methods Via an iPad to Teach the Expressive Labeling of Action Verbs to Children with Autism

by

Amy M. Heaps, Master of Science

Utah State University, 2018

Major Professor: Thomas S. Higbee, Ph.D.
Department: Special Education and Rehabilitation

Characteristics of autism include delays in communication, including difficulties in labeling stimuli. Technology is becoming more prevalent in classrooms and is being used as a teaching tool. Research is needed, however, to determine if teaching procedures using technology are effective. This study aimed to compare the effectiveness of delivering dynamic or static stimuli via an iPad. Five students (3-4 years old) with Autism Spectrum Disorder (ASD), participated in this study, all of whom attended a university-based center for preschoolers with autism. The student researcher used an adapted alternating treatments design embedded within a multiple baseline design to compare the learning acquisition of expressive labeling, in the form of action verbs, as presented as static and dynamic on an iPad. We tested for generalization with the participants that met criterion, to see if action verbs mastered as static stimuli generalized to dynamic stimuli on the iPad, and vice versa. We also conducted maintenance probe sessions 2 weeks after participants met criterion. We also conducted a choice assessment with each of the participants to test for preferred stimulus delivery method. We found that each of the five preschoolers with ASD learned to identify action verbs nearly equally in both conditions.

(70 pages)

PUBLIC ABSTRACT

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Amy M. Heaps

Delays in communication are one of the defining characteristics of Autism Spectrum Disorder (ASD). Educators have begun using technology to teach students with ASD to label different items. However, more research needs to be conducted with technology (such as iPads and other tablets) to find the most effective teaching procedures. We wanted to find the most effective way to teach children with ASD age-appropriate action verbs, such as drawing and painting. Five preschool-aged students with ASD participated in this study. We taught these participants to label action verbs using pictures and short video clips, to test which method was the most effective. With two of the five participants, we wanted to see if the action verbs we taught as pictures generalized to video clips, and vice versa. With these same two participants, we asked if they remembered all of the verbs two weeks later, to see if the skill maintained. At the end of the study, we conducted an assessment with the participants to see if they preferred learning action verbs with pictures or video clips. The results show that all of the preschoolers with ASD learned to identify verbs both as pictures and video clips.

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Amy Heaps

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CHAPTER I

INTRODUCTION

Individuals with autism spectrum disorder (ASD) often display difficulties or delays in communication (Centers for Disease Control and Prevention [CDC], 2018). These difficulties can affect several different areas of communication including: mands (requests), echoics (ability to repeat words/phrases), and tacts (labels). Skinner (1957) described tacts (or, labels) as responses to a particular object or event. Early and intensive behavior intervention programming for children with autism often focuses on building an extensive generalized labeling skillset because so “much of human communication involves tacting objects, actions, concrete and abstract properties of objects and actions, relationships between objects (e.g., prepositions) and even private events (e.g., pain and emotions)” (Higbee & Sellers, 2011, p. 374). Marchese, Carr, LaBlanc, Rosati, and Controy (2012) demonstrated that one common way labeling can be taught to children with autism is to present picture cards and asking, “What is this?” The child, in turn, responds by identifying the stimulus and the adult provides any necessary prompts, including naming the object, to facilitate the child’s response.

Teaching individuals to label stimuli might be facilitated by using technological devices that are commonly used by young children, such as iPads and related devices. Although the initial costs of iPads and other touch screen devices may be high, the benefits of such devices may outweigh the potential cost. Tablets are easy to transport, can store hundreds of pictures used for object identification, offer hundreds of apps that can assist in academic learning and communication, and can hold apps that can potentially be used as reinforcement (Douglas, Wojcik, & Thompson, 2012). Researchers also demonstrated that iPads can be used as augmentative and alternative communication systems for children with autism to generate speech (Flores et al., 2012; Lorah, Parnell, & Speight, 2014; Van der Meer et al., 2014). Additionally, research using technological devices has been conducted to demonstrate that video modeling is an effective tool to teach individuals with disabilities to complete tasks or chains (Cannella-Malone et al., 2012). Finally, research has also demonstrated that technological devices can be used to teach social and play skills (Bellini, Gardner, Hudock, & Kashima-Ellingson, 2016; Sani-Bozkurt & Ozen, 2015) to individuals with disabilities. Collectively, each of these studies demonstrate that technological devices can be used in a variety of different ways to effectively teach individuals with disabilities new and different skills.

There is extensive literature demonstrating that technology can promote communication, social, and play skills in children with autism (Bellini et al., 2016; Cannella-Malone et al., 2012; Flores et al., 2012; Lorah et al., 2014; Sani-Bozkurt & Ozen, 2015; Van der Meer et al., 2014). However, there is a lack of literature that focusing on using technology to teach children with autism academic tasks (Douglas et al., 2012; Eadon, 2017; Van der Meer et al., 2015). More research needs to be conducted focusing on the use of technology to teach children with autism academic tasks, particularly expressive academic tasks (e.g., labeling stimuli). The following literature review examines some current research examining methods for teaching individuals with autism academic tasks. This review of the literature also displays some of the gaps in the literature and highlight potential next steps moving forward in this research line.

CHAPTER II

LITERATURE REVIEW

The student researcher developed a list of search terms to seek out research conducted on technology, academic skills, and children with disabilities (particularly, children with autism). Search terms included: *autism, disabilities, verb identification, expressive, discrete trial teaching, academic teaching, tablet, iPad, actions, technology, labeling,* and *tacting*. The author utilized EBSCOhost (via Academic Search Premier, Education Full Text (H.W. Wilson), Education Source, ERIC, Professional Development Collection, Psychology and Behavioral Sciences Collection, and PsychINFO) and GoogleScholar to search combinations of the above terms to find articles. The author also reviewed articles recommended by doctoral students. Articles were selected based on experimental research using technology to teach academic tasks to individuals with ASD. Articles were excluded if they did not include teaching students with autism academic tasks, such as research articles that discussed using video modeling to teach social skills and articles that involved using technology as augmentative and alternative communication devices to label different stimuli. These types of articles were excluded because, although they involved different technological components, they it did not involve the use of technology to teach academic skills. Other articles were excluded because only one individual participated in the study. The author included five studies that investigated the use of technological devices to teach children with autism academic tasks: Colby (1973), Lorah and Karnes (2015), Moore and Calvert (2000), Pellegrino, Higbee, Gerencser, and Becerra (2016), and Shepley, Lane, and Shepley (2016).

Colby (1973) completed one of the first studies that examined the use of technology to teach children with autism academic skills. Seventeen non-vocal children with autism participated in this study. Researchers created a machine that connected a screen, similar to a television, to a keyboard, similar to a typewriter. On this machine, researchers created several games intended for the participant to interact with in an audio-visual-tactile format. If participant pressed the letter H, in one of the games, an H would appear on the screen and a voice said, "H." In a different game, if the participant pressed an H, a running hose appeared on the screen. These games were designed to operate at varying levels of complexity, specifically organized to follow how children learn English developmentally. However, there were many limitations with this study. Researchers did not include the age nor the gender of any of their participants. Colby also did not include any description of the experimental design in the study nor descriptions of the length of session or for how long the study was conducted. Researchers reported that 13 out of the 17 participants showed some linguistic improvement, although it was not reported by what measure that they showed improvement. By being one of the initial studies to investigate using technology to teach children with autism, this study laid some of the groundwork for future studies.

More recently, Moore and Calvert (2000) examined the acquisition of vocabulary to 14 schoolchildren with autism (12 boys and 2 girls), ages 3-6, when taught by either a teacher or a computer software program. Participants included in the study could sit in a chair for at least 10 min at a time and reliably attend to teacher instructions, such as "look," or "look at." Researchers tried to determine which method resulted in gains in vocabulary, retained the child’s attention, and in which condition the child would stay more motivated. Each of the children were randomly assigned to treatment conditions.

In the behavioral conditions, students were instructed by teachers to “touch (object)” or “give me (object).” For correct responses, teachers praised the student and delivered brief access to a desired object. For incorrect responses, teachers prompted the correct response and did not deliver praise or preferred objects. The computer condition replicated the behavioral instructions. However, following correct responses, the computer delivered brief visual stimulation and interesting sounds. Researchers conducted a pretest and posttest where they presented the participant with a flashcard with the targeted stimuli on it. Researchers asked the participant to label the stimuli. Researchers did not provide any feedback to the participant’s response during the pretest or posttest.

In addition to vocabulary acquisition, researchers also measured the percentage of time that the participant attended to the behavioral and computer conditions. Researchers videotaped each of the sessions and independent observers collected data on the percentage of “on” or “off” attention for all of the students. Researchers defined “on” looks by the duration of time that the participant directed visual attention to either the teacher or materials, during the behavioral conditions or to the computer screen for the computer conditions. Researchers defined “off” looks by the duration of time that the participant directed visual attention anywhere other than the teacher, computer, or teaching materials in either condition. Researchers also measured motivation for each of the participants. After the final session in each of the conditions, researchers asked the participants if they wanted to continue working or go play. Participants responded by either verbally stating their choice, or pointing to the teaching materials, or to a play activity. If participants chose the teaching materials, researchers scored the teaching session as being motivating. If the participants chose the play materials, researchers scored the teaching materials as not being motivating.

Moore and Calvert (2000) found that participants acquired 74% of targeted nouns in the computer condition acquired and 41% of targeted nouns in the behavioral condition. Researchers saw that participants maintained vocabulary better in the computer condition than in the behavioral condition. Researchers also found that participants attended better to the computer condition than to the instructions in the behavioral condition. Finally, researchers also found that participants were more motivated during the computer condition than during the behavioral conditions. This study demonstrated that technology may be an effective tool to teach young children with autism. This study also demonstrated that for some children, it may be more motivating to use technology as a teaching tool and that it may maintain their attention better than traditional teaching materials. While this study demonstrated that computers can be effective at teaching academic tasks to children with autism, computers are not as transportable or as versatile as iPads or related tablets. This study was included because it used technology to teach children with ASD vocabulary.

Similar to Moore and Calvert (2000), Lorah and Karnes (2015) used technology to teach receptive identification to children with ASD. Rather than using a computer, Lorah and Karnes used an application, *Language Builder,* to teach two children with autism to receptively identify objects on an iPad. A girl (aged 3) and a boy (aged 4) with autism diagnoses participated in this study from a 12-week preschool treatment group held at a university setting. Both participants both scored in the Level 1 range for the listener responding domain on the Verbal Behavior-Milestones Assessment and Placement Program (VB-MAPP, Sundberg, 2008). This score indicated that though the students could follow some simple directions, the students were unable to select a specified item within an array of multiple exemplars. Lorah and Karnes sought to use *Language Builder* to teach object identification and test for generalization following teaching sessions using two dimensional pictures printed on flashcards. Lorah and Karnes used a multiple baseline design across labels, as described by Gast and Ledford (2014). Researchers measured the percent of correct responses per opportunity as the dependent variable. A correct response was scored if the participant selected the correct picture, within an array of five stimuli, following the instruction, “Touch the (stimulus)” within 5 s. Incorrect responses were scored if the participant selected the incorrect stimulus or if the participant did not respond within 5 s of the instruction.

During baseline sessions researchers presented an array of five pictures in front of the participant. The participant was instructed to, “Touch the (stimulus).” After each of the instructions, the researcher moved the location of the pictures within the array. Each of the stimuli were presented three times and researchers did not provide any prompts during baseline sessions. During training sessions, the participant was handed the iPad with *Language Builder* open and instructed to “play the labels game.” The application was programed to present the stimulus in an array of five and instructed the participant to, "Touch the (stimulus)." After each correct response, the application provided praise and automatically rotated the presented stimuli. Following three consecutive correct responses, the application produced fireworks and balloons and cheering sounds. After incorrect responses, the application began prompted trial sequences where the distractor pictures were faded to make the target stimuli more salient. Contingent upon correct responding, the prompt was then systematically faded until the pictures on the screen were returned to its typical state. Researchers did not provide any outside reinforcement while the participant was interacting with the application.

Following each of the training sessions, researchers conducted generalization test probes. Researchers presented the participant with an array of five pictures and instructed the participants to, "Touch the stimulus." These probe sessions were conducted identically to baseline sessions, so researchers did not provide any prompts following incorrect responses or provide any feedback for correct responding. Training sessions continued until the participant reached 100% correct responding, for two consecutive sessions, for each target. Maintenance probe sessions were conducted identically to baseline sessions.

Researchers found that the use of the iPad application, *Language Builder*, can be used to increase receptive identification skills in young children with autism. Both participants rapidly acquired the skill to receptively identify the three targets that were put into training. The targets that were taught on the application generalized to targets on flashcards for both participants. This study adds to the literature by demonstrating that the use of technology, as an application on an iPad, can teach students with autism to receptively identify stimuli as pictures, and those skills can generalize to flashcards. This study was included because it used DTT, taught children with autism academic tasks, and delivered stimuli through an iPad.

Like Lorah and Karnes (2015), Pellegrino et al. (2016) used a tablet to teach receptive object labeling. However, Pellegrino et al. compared the use of a tablet and traditional flashcard stimulus presentation methods to teach academic tasks to three young boys (4-5 years old) with autism who attend a university-based clinic. Each of the participants were able to discriminate audio-visuals, as demonstrated by the Assessment of Basic Learning Abilities (Kerr, Myerson, & Flora, 1977). Pellegrino et al. sought to determine which method (tablet vs. flashcards) was more effective as measured by the acquisition rate of each target. Pellegrino et al. used an adapted alternating treatments design (Sindelar, Rosenberg, & Wilson, 1985) to compare the acquisition rate of the different targets in each condition. Researchers conducted each session in participant cubicles at the university-based clinic. To control for previous history with the stimuli used in the teaching sessions, researchers used pictures of unknown country flags.

During the tablet condition, the researcher presented the participant with a tablet that displayed an array of three different flags. In the flashcard condition, the researcher laid out three different flashcards in front of the participant. In both conditions, the researcher instructed the student to, “Touch (country).” If the participant responded with an independent, correct response, the researcher provided brief praise (“Great job”) and a small edible item. If the participant responded incorrectly, the researcher provided brief feedback (“Try again”), cleared the materials, represented the array in a different order, and prompted the correct response. All instructional, reinforcement, and prompting procedures were identical across the two stimulus delivery types. At the conclusion of the study, each participant had reached the mastery criteria, for both flashcard and tablet conditions within 15-31 sessions.

This study also examined client preference of which condition was preferred. Researchers placed the tablet and flashcards equal distances apart from each other on the table in front of the participant and instructed the child to, “Choose the one you want to work with.” One of the participants preferred the flashcards, while the other two preferred the tablet.

Pellegrino et al. (2016) concluded that clinically, there was little to no difference in teaching receptive labeling with stimuli delivered by tablet or flashcards. However, two of the participants did prefer using the tablet over traditional methods for receptively identifying stimuli. This study adds to the literature by showing that the use of technology, in the form of a tablet, is equally effective as traditional teaching methods to teach receptive labeling to preschoolers to autism. This study also shows that though there is little to no difference in which teaching materials were used, there was some evidence to suggest that for some young children with autism, the use of technology in the form of a tablet, may be more preferable to traditional teaching methods. However, there were some methodological limitations with this study. The use of an adapted alternating treatment design in Pellegrino et al.’s study may not have sufficiently demonstrated experimental control for all participants. Next, researchers did not ensure that all stimuli were equivalent, beyond the number of syllables for each target and the size of the targets. Finally, researchers did not include a baseline before implementing treatment. This study was included because it involved the use of DTT, delivered stimuli through an iPad, and taught academic tasks to children with autism.

Shepley et al. (2016) also used technology, in the form of an iPad, to teach individuals with autism to label action verbs using a progressive time delay prompting procedure. Three preschool-aged students participated in this study (one girl and two boys, 3-4 years old). Researchers selected these participants because each participant (a) had IEP goals related to expressive language, (b) sat and attended to an activity for 5 min, (c) imitated a verbal model for 80% of presented opportunities, and (d) receptively identified at least one item associated with the targeted actions. Each of the participants attended a public preschool in a self-contained classroom. Researchers examined the effects of a progressive time delay prompt on the acquisition of action verbs when they were delivered as video clips on an iPad. Researchers also examined whether mastered actions would generalize to static stimuli. Sessions occurred in the participants' classroom. Researchers conducted the following four conditions: (a) baseline, (b) progressive time delay, (c) maintenance, and (d) generalization.

During the progressive time delay sessions, researchers presented a video clip via the iPad and delivered the instruction, "What is he/she doing?" and either immediately delivered a prompt to verbally identify the action or waited up to 4 s to deliver the prompt. If the participant scored 100% correct for the entire session, the prompt delay was increased by 1 s until a maximum delay of 4 s was reached. Following a correct response, the researcher provided a token and delivered language expansion. Language expansion occurred when the researcher added one to two additional words (e.g. “fixing” to “fixing car” to “girl fixing car”) following a participant independently including the word expansion in their response for at least 50% of the session within the progressive time delay condition. Following an incorrect response, the researcher removed the iPad, waited either 0–4 s (according to the progressive time delay step) to prompt the correct response, and then represented the video clip and asked, “What is she/he doing?” Mastery criteria was set for each target having been scored at 90% correct responding by the participant for one session, followed by two more additional session on a schedule of reinforcement at variable ratio 3.

Researchers also conducted generalization pretests and posttests to determine if participants would be able to label mastered actions in novel video clips and novel pictures. Both video clips and pictures were presented by the researcher to the participant on an iPad. Researchers used the same procedures as the progressive time delay sessions. However, following correct responses, researchers provided both verbal praise and a token. Following incorrect responses, the researcher removed the iPad and ignored the response, and began the next trial.

Each of the participants reached the mastery criterion in 6 to 10 sessions and each of the participants maintained at least 75% correct responding for the first action set using the progressive time delay. For the second action set, each of the participants met the mastery criterion in five to seven sessions and maintained for at least 50% of correct responding. With one participant, responses generalized 100% across all of the pictures and videos and another participant’s responses generalized across 50% of the picture generalization posttests and 100% across other videos. Additionally, during the generalization posttests, these two participants also included language expansion with their responses. The last participant's responses did not generalize to actions, although he did label other features of the pictures and videos.

Results of this study indicate that a progressive time delay can be used to teach children to autism to expressively identify action verbs as video clips displayed on an iPad. Also, this study showed that some participant responses may have generalized to labeling action verbs when they are presented as novel videos and pictures. Student responses also generalized to language expansion targets without being directly taught. This study was included because it used an iPad to teach expressive academic tasks to children with autism. However, Shepley et al. (2016) did not compare the dynamic stimuli presented on the iPad to static stimuli. More research needs to be done to see if presenting dynamic stimuli on the iPad is superior to traditional static methods.

In conclusion, two of the studies found that technology was equally effective at teaching students with autism academic tasks compared to traditional teaching methods. Moore and Calvert (2000) and Pellegrino et al. (2016) both found that there was little to no difference in the mastery of academic tasks delivered by iPad or computer to traditional methods. Shepley et al. (2016) demonstrated that children with autism learned how to identify action verbs via video clip (and time delay prompts), though it did not compare teaching static or dynamic verbs to determine which was more effective. Moore and Calvert determined that computer-based instructions both generalized better to other tasks and found that students attended better and stayed more motivated in the computer condition. Each of these studies demonstrated that technology was an important component when teaching academic tasks to children with autism. If research continues to find that using technology as a teaching tool for young children with autism is equally effective compared to traditional methods, then these other benefits of technology use in teaching academic tasks need to be considered.

With research demonstrating that the use of technological devices may promote children with autism to acquire academic skills, attend, and maintain learned skills at higher rates, when compared to traditional teaching methods, and some children showing a preference for using technological devices, it is important to now consider what types of teaching techniques could be facilitated by technology. Currently, there is a lack of research comparing different technology-based teaching techniques. Thus, more research needs to be conducted investigating the use of different teaching methods within technology-based approaches.

One type of teaching, where different variations on technology-based instruction could be investigated, is the teaching of verbs to children with autism. Verbs are an important part of language development and everyday speech (Conti-Ramsden & Jones, 1997); they are what combine words into sentences. Due to the prevalence of verbs in speech, we can try to ensure that by teaching verbs, that there is a broad range of utility and possibly, generality. Traditionally, verbs are often taught on 2-dimensional picture cards depicting a certain action. However, this method may prove to be lacking as verbs are actions and dynamic and as such, that movement may be difficult to portray on 2-dimensional picture cards. However, verbs displayed as a dynamic video may capture what a 2-dimensional picture cannot: the action part of a verb. Teaching the labeling of action verbs using dynamic videos may also facilitate generalization to in vivo situations where action verbs are always dynamic.

In order to determine whether action verbs should be taught dynamically (i.e., as a video clip) or statically (as a picture) more research needs to be conducted. Given that technology-based approaches have been shown to be effective at teaching labeling skills in previous studies (e.g., Pellegrino et al., 2016), comparing the use of static pictures vs. dynamic videos with both formats delivered via technology to control for delivery format (e.g., tablet-based vs. flashcards), seems like an interesting next step in this research line. Therefore, the purpose of this study was to compare the effectiveness of using video clips and static pictures displayed on an iPad to teach labeling action verbs to preschoolers with autism who receive early intensive behavioral interventions at a university-based clinic.

Three research questions included: (a) will preschoolers with autism learn to expressively identify verbs on an iPad more rapidly when the verbs are presented as a static stimulus or as a dynamic stimulus as measured by the number of sessions to reach criterion in each condition, (b) which delivery method produces better generalization of mastered action verbs to novel static picture and video clip stimuli as measured by the percentage correct of stimuli in each condition, (c) which method produces better skill maintenance after 2 weeks as measured by the percentage correct of each stimulus in each condition, and (d) which stimulus delivery method did the participants in the study prefer as measured by a choice assessment?

CHAPTER III

METHOD

Participants

Five participants diagnosed with ASD participated in this study: Harvey (3), James (4), Drew (3), Bruce (3), and Joey (5). All of these participants attended a university-based center for preschoolers with autism. Participants in this study were selected based on the following criteria: (a) previously diagnosed with ASD, (b) between the ages of 3-5, (c) ability to sit and attend to an activity for at least 5 min, (d) ability to imitate a verbal model of 2-syllable words for 80% of opportunities. The therapist assessed each of the participant's ability to imitate a verbal model by saying a target word from a list of 20 2-syllable words (see Appendix A). If the participant imitated the target word, then the therapist scored it as correct and moved onto the next target word. If the participant did not imitate the target word within 5 s or imitated the word incorrectly, the therapist re-presented the target word. If the participant did not imitate the word correctly or within 5 s, the therapist scored the target word as incorrect and moved onto the next target word. Throughout these probes, the therapist did not provide any feedback, though the therapist delivered edibles noncontingently every 15 s. Drew scored 80% correct, Joey scored 80%, James scored 100%, Bruce scored 90%, and Harvey scored 95% during verbal model probes.

The student researcher provided a consent form to the parents, who gave their permission for their child to participate in the research study. The university's

Institutional Review Board approved the consent form. Parents provided informed consent with the understanding that there would be no consequence for choosing not to participate.

Setting and Materials

Staff members who worked regularly with the participants served as therapists for each session. Therapists conducted sessions at the university-based center in the individual work areas (3 m by 3 m). In each of the work areas, there were two chairs, a small table, and materials for the session. Session materials included: an iPad (generation 2), a data sheet, pencil, and the participant’s edible items. Two iPads were used in this study. Each iPad was used to display either action verbs to participants as static or as dynamic stimuli. Each iPad had a different colored case to promote discrimination between the different conditions of static and dynamic stimuli. The stimuli used in the study were created by the student researcher. The same model was used for all stimuli. The color of the model’s shirt matched the color of the iPad in order to aide in discrimination between the two conditions. The static and dynamic stimuli displayed on the iPad were equal in size. Edible items were used for reinforcement purposes. Each of the participants had a selection of five edibles, each edible was chosen by staff and parent report. Participants selected an edible from an array of five during a brief preference assessment (Carr, Nicolson, & Higbee, 2000). A staff member read a pre-written script (see Appendix D) and recorded each of the sessions with a hand-held camcorder for the purpose of collecting IOA data.

Static Condition

The stimuli in this condition were static pictures displayed on an iPad.

Dynamic Condition

The stimuli in this condition were short, looping video clips representing different action verbs displayed on an iPad.

Dependent Variables and Response Measurement

Therapists collected data on the primary dependent variable, which was the number of stimuli that a participant accurately labeled during probe sessions in either the static or dynamic condition, as measured by the percentage correct for each session. Probe sessions were run prior to each set of teaching sessions. During probe sessions, therapists presented all of the stimuli for each condition and provided reinforcement for correct responses and no feedback for incorrect responses. Participants needed to independently and expressively identify action verbs, following the instruction, to be considered correct. Once the participant reached 90% or better in consecutive static and dynamic probe sessions, researchers stopped conducting probe and teaching sessions and moved onto the next steps of the study. Participants who did not meet this criterion did not receive maintenance or generalization probes.

The secondary dependent variable was the cumulative number of action verbs the participants mastered in each condition during teaching sessions as measured by the total number of stimuli mastered. The participants had to correctly identify the action verb at least four out of five trials for two consecutive sessions to be considered mastered.

Expressively identifying the stimuli was defined as the participant correctly verbally labeling the stimuli displayed on the iPad, after the therapist gave the instruction of "what is she doing?"

In addition, the therapist collected data on the accuracy of labeling each stimulus in generalization probes, as measured by the percentage correct in each condition following a participant scoring 90% or better in the dynamic and static probe sessions.

Finally, the therapist conducted maintenance probes, as measured by the percentage correct in each condition after 2 weeks following a participant scoring 90% or better in both conditions during the probe sessions.

The accuracy of labeling the stimuli for all sessions was defined as the participant independently, vocally, and correctly identifying the presented stimulus.

Data Collection

During baseline and probe sessions (see Appendix E), the therapist recorded correct and incorrect participant responses to the various stimuli presented during the study on a data sheet designed for this purpose. The therapist scored correct responses following the participant vocally and accurately labeling the stimulus after the instruction. The therapist scored an incorrect response if the participant responded to the stimulus with an incorrect label or if the participant did not respond within 5 s.

During the teaching sessions (see Appendix F), the therapist immediately scored responses to the stimuli as correct, prompted, and incorrect dependent on the responses provided by the participant. The therapist scored a correct response if the student independently and vocally labeled the action verb following the instruction. The therapist scored a prompted response if the student vocally labeled the action verb but required a prompt from the therapist to do so. If the student erroneously labeled the action verb, the therapist scored an incorrect response. The therapist also scored an incorrect response if the student did not respond within 5 s of the therapist's instruction.

Interobserver Agreement

Independent observers were trained by the student researcher. The student researcher and an independent observer reviewed a completed session and score responses by the participant as correct or incorrect for the probing sessions and correct, prompted, or incorrect for the teaching sessions. Point-by-point interobserver agreement (IOA; Cooper, Heron, & Heward, 2007) was calculated by dividing the number of agreements by the number of agreements and disagreements and then converting the ratio into a percentage. The student researcher and observer compared their scored responses against the responses scored by the therapist running the session using the video the staff member filmed during the session using a hand-held camcorder. Each agreement was calculated by adding up all responses that were scored the same (e.g., both the therapist and observer score a response as incorrect). Each disagreement was calculated by totaling all the responses that did not match (e.g., the therapist scored a prompt, and the observer scored an independent response). Once the student researcher and independent observer reached 95% IOA on their data collection, the independent observer was considered trained. The independent observers collected IOA data for at least 35% of conducted sessions equally distributed across all phases of the study (see Appendix H).

The independent observer collected data in 36.23%, 35.71%, 39.23%, 36.71%, and 39% of sessions for Drew, Joey, Bruce, James, and Harvey, respectively. Average interobserver agreement for Drew was 99.51% (range, 83.3-100%), 98.9% for Joey (range, 91.7-100%), 98.3% for Bruce (range, 91.7-100%), 99.84% for James (range, 80-100%), 99.23% for Harvey (range, 86.7-100%).

Treatment Fidelity

Independent observers also used a checklist to record whether the researcher: (a) conducted the correct condition according to the predetermined randomly assigned order, (b) conducted a one-trial preference assessment (for baseline and probe sessions), (c) used the correct materials, (d) provided noncontingent reinforcement during baseline sessions (and specified probe sessions), (e) provided appropriate consequence for correct responses, (f) provided appropriate consequences for incorrect responses, (g) used the appropriate prompting procedure, if needed. Treatment fidelity data were recorded by an independent observer for at least 35% of completed sessions selected at random (see Appendix I).

The independent observer collected data in 36.23%, 35.71%, 39.23%, 36.71%, and 39% of sessions for Drew, Joey, Bruce, James, and Harvey, respectively. Average treatment fidelity scores for Drew was 98.53% (range, 60-100%), 90.92% for Joey (range, 60-100), 97.27% for Bruce (range, 80-100%), 99.84% for James (range, 66.7-100%), 99.17% for Harvey (range, 80-100%). The low treatment integrity scores for

Drew and Joey each occurred during one teaching session when the therapist during those sessions did not provide the appropriate prompting procedure or the appropriate consequence for correct responses. The low treatment integrity score for James occurred when the therapist for his session did not provide the appropriate prompting procedure or the appropriate consequence for an incorrect response. The student researcher immediately provided feedback and retraining to the therapists for those sessions with low treatment integrity.

Experimental Design

The student researcher evaluated the relative effects of static vs dynamic stimuli on teaching action verbs by using an adapted alternating treatments design embedded within a multiple baseline design as described by Sindelar et al. (1985). The student researcher used the adapted alternating treatments design to compare the learning acquisition of expressive labeling of dynamic and static stimuli delivered via an iPad during probe sessions. The student researcher used this design to easily compare the learning acquisition of different stimuli across conditions, while also allowing control in the event that the two conditions were equivalent. The five participants made up the three legs of the alternating treatments design. We grouped the participants into groups in order to prevent participants from remaining in baseline for too long and prevent fatigue. Two participants, Drew and Bruce, were the first leg. Joey and James were in the second leg. Harry, the last participant, made up the final leg.

Procedures

Pre-Experimental Procedures

Therapists assessed each participants' existing repertoire for labeling action verbs by presenting a collection of 62 action verb stimuli to each participant during 5 min probe trials to select stimuli that would be used in sessions. The therapist presented each of the stimuli, in both static and dynamic forms, to the participants. The therapist presented the stimuli three times and asked, "What is she doing?" During these probes, the therapist delivered small edibles every 15 s noncontingent on the participant's response. The stimuli that participants did not expressively identify, in either form, during the probe trials were randomly assigned by the student researcher to either the static or dynamic conditions.

Stimuli depicted 2-syllable verbs. Researchers chose common verbs for this study based on their utility. Researchers sought to make stimuli as equivalent as possible. Stimuli in both conditions were the same size and oriented the same direction. Each of the stimuli depicted an individual against a plain background. The same individual performed the same action verb in both the dynamic and static conditions. A still image was captured from the video of the individual completing the verb to produce each static stimulus. Finally, an object was used for each of the targeted verbs (e.g., an individual on a trampoline to depict jumping). The stimuli were randomly assigned using a random assignment generator. Each condition contained a total of 12 stimuli, while only three stimuli were in teaching at one time (see Appendix B). Once the participant mastered one of the action verbs during the teaching conditions, the student researcher added a new stimulus until the participant reached 90% during the probe sessions for both the static and dynamic conditions.

General Procedures

Prior to any session being completed, the student researcher randomly assigned the order of conditions (see Appendix C), in which either all static or dynamic stimuli were presented for each of the sessions, by using a random assignment generator. The student researcher pre-filled out data sheets specifying the order of conditions.

Baseline Sessions

At the beginning of each baseline session, the therapist presented an array of five edibles and the participant selected a preferred edible from the array (Carr et al., 2000). The therapist used this edible for noncontingent reinforcement during the baseline sessions. Following this brief preference assessment, the therapist presented each of the 12 action verbs in the specified condition. The therapist instructed the participant to expressively label the action verb in two consecutive trials. The therapist would present the stimuli on the iPad and ask, “What is she doing?” The therapist did not provide any feedback, however the therapist did deliver a small edible every 30 s.

Probe Sessions

Before every probe session, the therapist presented an array of five edibles and instructed to participant select a preferred edible from the array. The therapist delivered the preferred edible for each correct, independent response during the probe sessions.

Originally, these sessions matched baseline sessions in that the therapist did not provide feedback for correct or incorrect responses. Therapists only provided noncontingent reinforcement every 30 s. However, we noticed that participants seemed to be sensitive to the contingencies in the different conditions. During the probe sessions, participants displayed low levels of responding while during the teaching sessions, the participants responded more frequently to the therapist's instruction. In response, we had the therapists provide reinforcement to the participants contingent on their responses. This change is denoted by an asterisk on the graph. This occurred for Drew at session 33, Joey at session 37, Bruce at session 35, and James at session 35. Harvey was the only participant who received contingent reinforcement during every one of his probe sessions.

During the probe sessions with contingent reinforcement, the therapist asked, "What is she doing?" If the participant correctly identified the action verb, the therapist provided brief praise (e.g., "Good work!"), an edible, and moved on to the next target. If the participant did not correctly identify the action verb, the therapist turned, cleared the stimuli, represented the iPad, and asked, "What is she doing?" If the participant at that time correctly identified the action verb, the therapist delivered brief praise, an edible, then moved onto the next target. If the participant failed to identify the action verb again, the therapist moved onto the next target action verb. The therapist continued this process until all 12 action verbs for that condition were presented.

Teaching Sessions

The therapist did not conduct a preference assessment before the teaching sessions, therapists continued to use the edible the participant indicated during the preceding probe session, as teaching sessions occurred approximately 1 min after the conclusion of the probe sessions. The stimuli in the following teaching session matched the stimuli of the preceding probing session (i.e., dynamic or static stimuli). During the teaching session, the therapist presented three action verbs in a discrete trial instruction format. During each teaching session, the therapist presented the action verbs five times each using a data sheet specifying the order of trial presentation. The student researcher filled out the data sheet prior to the session being conducted. The therapist presented the action verb via an iPad and give the instruction, "What is she doing?" Following each independent correct response, the therapist delivered brief praise (e.g., "Nice job!"), an edible item, then moved onto the next target. Following an incorrect response, the therapist provided brief feedback, (e.g., "Try again"), re-presented the action verb, and vocally prompted the correct response (e.g. "Catching.") The therapist re-presented the action verb again. If the student did not respond within 5 s following the S^D, the therapist said, "Try again," cleared the materials, represented the stimulus, and provided a vocal prompt. Following a prompted, correct response, the therapist delivered brief praise (e.g., "That's right") and no edible item.

The participants needed to independently and correctly score at least four out of five responses to each action verb presented for two consecutive sessions to be considered mastered. After mastering an action verb, the student researcher replaced it with a new action verb until every action verb in each condition was mastered, or until the participant scored 90% or better during two consecutive probe sessions, whichever came first. Therapists conducted up to four teaching sessions a day, 3-5 days per week. Each of the sessions was recorded to collect IOA data and for treatment integrity purposes. Teaching sessions were terminated after each of the three stimuli had been presented five times.

Static Teaching Condition

The therapist first began with a probe session. The therapist manually selected the targeted static stimuli on the iPad, and randomly alternated between the static stimuli by selecting one of the three targets in teaching. The therapist rotated between the three stimuli, after the presentation of the stimuli for each trial. Therapists displayed the static stimuli on the iPad for approximately 5 s.

Dynamic Teaching Condition

The therapist randomly rotated the presentation of the dynamic stimuli for each trial. The therapist manually selected the dynamic stimuli on the iPad and rotated between the three stimuli in teaching and presented each stimulus to the participant for approximately 5 s.

Generalization

Therapists only conducted generalization sessions with two participants who reached criterion during the probe sessions, Joey and Harvey. During the generalization probe sessions, therapists presented the mastered action verb to the participant using the opposite delivery method from the condition in which it was mastered. For example, action verbs that were previously mastered as static stimuli during treatment were presented as dynamic stimuli to the participant on the iPad, and vice versa. The therapist instructed the participant to expressively label the action verb in two consecutive trials. The therapist provided brief feedback and an edible for correct responses, and did not provide any feedback for incorrect responses. The therapist cleared the iPad and either represented the iPad again or moved onto the next target. The number of correct responses during the generalization probes were expressed as percentage correct.

Maintenance

Therapists conducted maintenance probe sessions 2 weeks after participant met criterion. Therapists only conducted maintenance sessions with the two participants who reached criterion during the probe sessions at the time of this writing, Joey and Harvey. During the maintenance probe sessions, therapists presented an action verb to the participant using the same delivery conditions that was used during the teaching sessions. The therapist instructed the participant to expressively label the previously mastered action verb in two consecutive trials. The therapist provided an edible and brief praise for all correct responses. The therapist did not provide any feedback for incorrect responses during the probe trials. If the participant labeled expressively the action verb correctly, the action verb was considered to be maintained. The number of correct responses during the maintenance probes were expressed as percentage correct.

Choice Assessment

Therapists assessed the participant’s preference for static or dynamic stimuli presented on the iPad. The participant first selected a preferred edible from an array of five presented by the therapist. The therapists then placed the two iPads, in the different colored cases, equidistant from the participant and delivered the instruction, “Choose the one you want to work with.” Participants selected the preferred iPad by touching the iPad or labeling the color of the iPad (see Appendix G). After the participant selected the stimulus condition and edible, the therapist completed the remainder of the session with a teaching session, as specified by the condition teaching procedures. The therapist randomly rotated the placement of the different colored iPads for each of the choice assessments. The iPad used for the dynamic condition displayed an action verb video looping on the screen, while the iPad used for the static condition displayed a static picture of the same action verb to help differentiate between the two iPads, in addition to the different colored cases. We completed up to 10 choice assessments with each participant. In the case when a participant chose the same condition five times in a row, therapists discontinued running choice assessment sessions with that participant.

CHAPTER IV

RESULTS

Probe Sessions

Figure 1 displays the data from the probe sessions for each of the participants. The graph displays the acquisition rates between the static and dynamic conditions across the five participants. Figure 1 also displays the data from the generalization and maintenance probe sessions for Joey and Harvey. The five participants were separated in

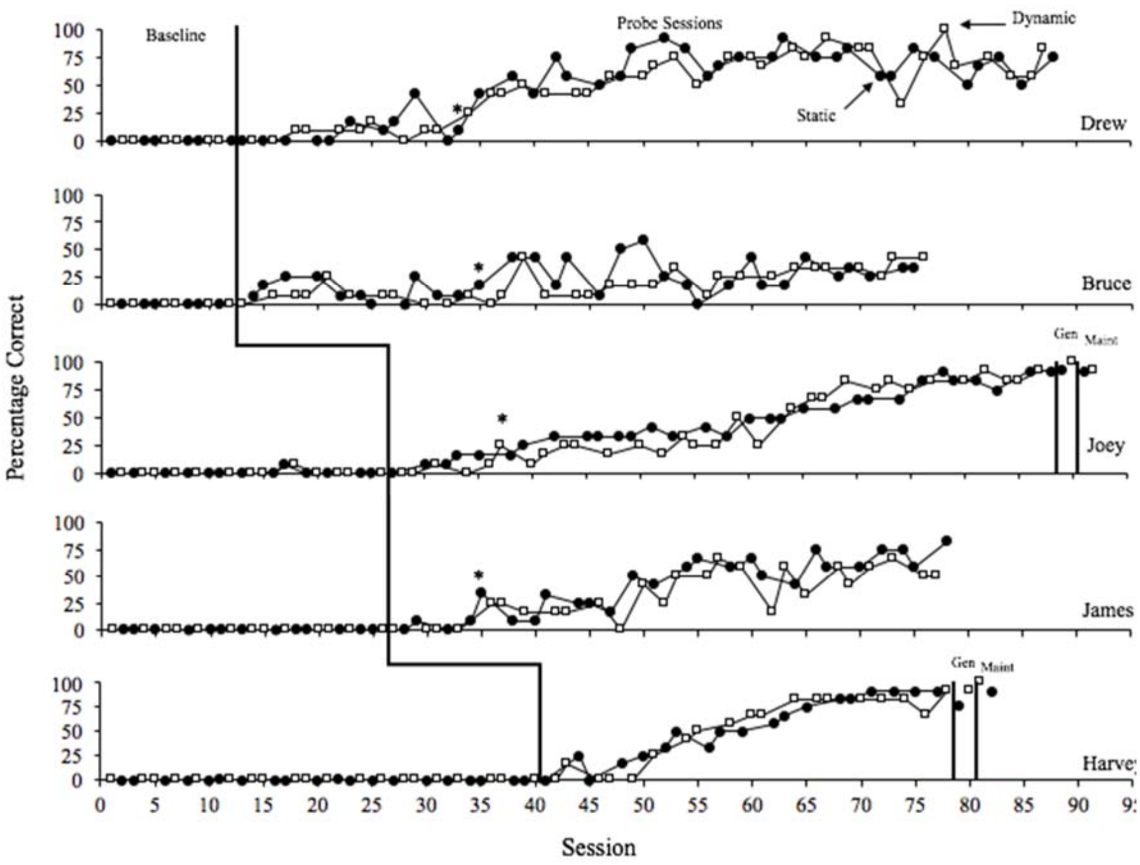

Figure 1. Percentage of correctly labeled action verbs mastered in dynamic and static conditions for all participants across baseline, probe, generalization, and maintenance sessions. The sessions marked with an asterisk denote when therapists began providing contingent reinforcement in the probe sessions.

three legs. Leg 1 was Drew and Bruce. Joey and James were in leg 2, with Harvey in leg 3.

Consistent with research question 1, Figure 1 shows the number of sessions required for participants to reach 90% correct or above during the probe sessions. Only two participants met that criteria at the time of this writing. Joey received 62 probe sessions (31 static and 31 dynamic sessions) before reaching this criterion. Harvey received 38 probe sessions (19 static and 19 dynamic sessions) before reaching this criterion.

In panel 1 of Figure 1, the graph shows that Drew received 12 (six static and six dynamic) baseline sessions before probe sessions started. Each of his baseline sessions remained at zero. We ran a total of 88 sessions with Drew. Though there was some variability in his responding, acquisition rates of action verbs remained very similar between the static and dynamic conditions. Interestingly, though Drew only received training on eight static action verbs and nine dynamic verbs (out of 12), he responded correctly to 100% and 91.7% of the presented action verbs in the dynamic condition in sessions 67 and 78 respectively. Drew also responded correctly to 91.7% of presented action verbs in the static condition in sessions 52 and 63.

In panel 2, we see that Bruce also received 12 baseline sessions before beginning the probe sessions. Bruce did not make significant progress throughout the course of the study. Bruce received a total of 76 baseline and probe sessions during this study. Like Drew, there was little difference in the acquisition rates of action verbs between the two conditions. Bruce responded correctly to 58.3% of presented action verbs in the static condition in session 50. In session 39, Bruce responded correctly to 41.7% of action verbs in the dynamic condition.

Figure 1, panel 3 shows the results from Joey's sessions. Joey received a total of 88 baseline and probe sessions. During baseline, Joey responded correctly to 8.3% of the presented action verbs in two different sessions (one of each condition). However, responding dropped back to zero for the following baseline sessions. The results in panel 3 display a steady acquisition rate of action verbs during the probe sessions, though no separation between the different conditions. Joey met criterion in sessions 87 and 88, in the dynamic and static conditions respectively.

Panel 4, displays the results from the probe sessions with James. James received a total of 78 baseline and probe sessions. The results from the probing sessions with James show an increasing acquisition rate of action verbs during the probe sessions. Looking at the data, there appears to be no difference in the acquisition of action verbs between the two conditions. In sessions 57 and 73, James responded to 66.7% of presented action verbs in the dynamic condition. James responded correctly to 83.3% of static stimuli in session 78.

Finally, the results from Harvey's probe sessions are displayed in panel 5 of Figure 1. Harvey remained in baseline the longest (40 sessions) with 0% of correct responses. However, he was the quickest to reach criterion to move onto generalization and maintenance probes. Harvey participated in a total of 78 baseline and probing sessions. Similar to all of the preceding participants, Harvey did not demonstrate a significant, consistent separation between the two conditions in the acquisition of action verbs. Harvey met criterion in sessions 77 and 78, in the static and dynamic conditions respectively.

Generalization

In line with research question 2, therapists conducted generalization probes for the participants who met criteria at the time of this writing. Joey correctly identified 91.7% of the dynamic stimuli that were originally taught in the static condition. Joey correctly identified 100% of the static stimuli that were originally taught in the dynamic condition. Harvey correctly identified 75% of the dynamic stimuli that were originally taught in the static condition. Harvey correctly identified 91.7% of the static stimuli that were originally taught in the dynamic condition. These data are reflected in Figure 1.

Maintenance

Figure 1 also displays data for the maintenance probes that therapists conducted for the participants who met criteria at the time of this writing. Joey correctly identified 91.7% of the static and dynamic stimuli the therapists delivered via the iPad during the maintenance probes. Harvey correctly identified 91.7% of the static stimuli and 100% of the dynamic stimuli.

Stimuli Mastered

Figure 2 shows the number of cumulative mastered targets for each participant. Drew mastered 5 static stimuli and 6 dynamic stimuli. Bruce mastered 3 static and

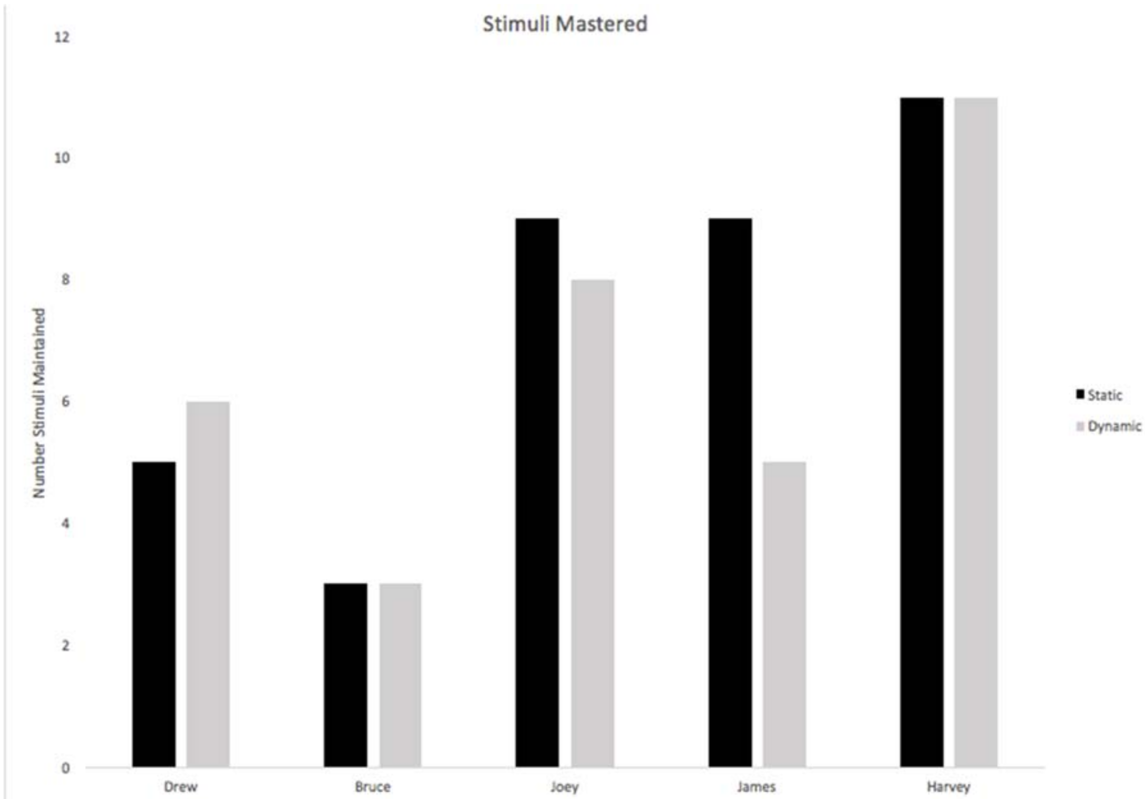

Figure 2. The number of mastered stimuli in the static and dynamic condition for all participants.

Choice Assessment

Figure 3 displays the results from the choice assessment for each participant. Drew chose the static iPad for four out of 10 presented opportunities, and the dynamic iPad for the other six opportunities. Bruce chose the dynamic iPad 100% of the time during the first five sessions, so we discontinued running the choice assessment with Bruce. Joey chose the static iPad for three out of the 10 presented opportunities, and the dynamic iPad for the other seven opportunities. James chose the static iPad three out of 10 times and the dynamic iPad the other six times. Harvey chose the static iPad three times and the dynamic iPad seven times.

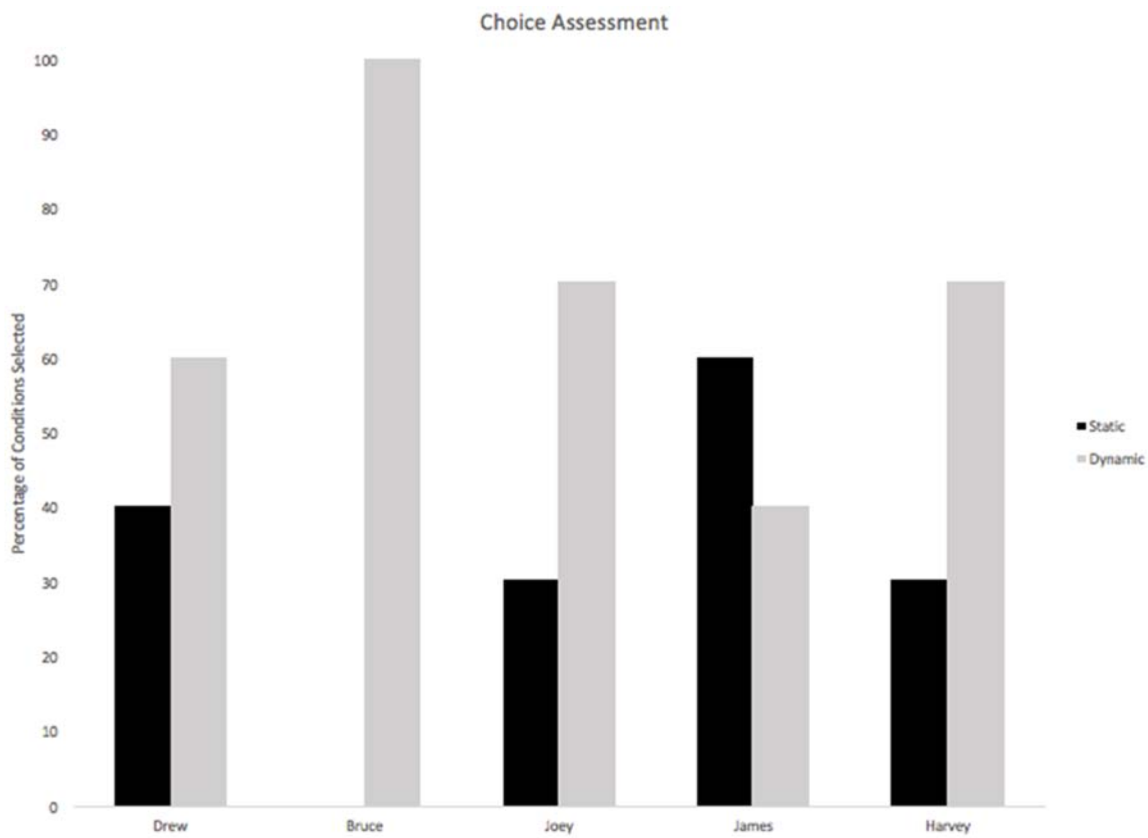

Figure 3. The percentage of times the static or dynamic iPad was selected for all participants.

CHAPTER V

DISCUSSION

We found no significant differences in percentage of acquisition in teaching action verbs with dynamic or static stimuli to preschoolers with ASD. Though these results did not demonstrate that static or dynamic stimuli were superior in teaching action verbs, the results are consistent with the results of other studies; technology can be used to teach children with autism academic tasks (Moore & Calvert, 2000; Pellegrino et al., 2016; Shepley et al., 2016; Voroshina, 2012). Teaching academic tasks on iPads, such as expressive verb identification, and may serve as valuable tools in applied settings to teach preschoolers with autism. The data suggest that action verbs can be taught to preschoolers with ASD when presented via an iPad, regardless of the static or dynamic nature of the stimuli. Creating stimuli on iPads may be potentially less cumbersome than making traditional stimuli where you need to create the stimuli, possibly by printing, cutting, and laminating the stimuli to last long periods of time. It is also quite easy to store and rearrange stimuli on iPads. As iPads, and other related technological devices, are becoming more prevalent in classrooms, teachers and para-professionals will be able to utilize iPads more efficiently as teaching devices, in addition to recreational purposes (Douglas et al., 2012).

Only two participants, Joey and Harvey, met criterion to move onto the generalization probes. Both participants correctly and expressively labeled slightly more stimuli that were presented with static stimuli (after first being taught with dynamic stimuli) than dynamic stimuli that were originally taught in the static condition. Joey labeled 100% and Harvey labeled 91.7% of the static stimuli that were first taught with dynamic stimuli. Joey labeled 91.7% of the dynamic stimuli that were originally taught in the static condition, while Harvey only labeled 75%. More research should be conducted to see if similar effects are demonstrated with other individuals.

Additionally, while all of the participants learned in either condition, four of the five participants preferred learning with the dynamic stimuli, as shown by the choice assessment. While the static and dynamic delivery methods appear to be equal in teaching action verbs, it is important to consider the student's preferred delivery method.

During the choice assessment teaching sessions, each of the participants mastered additional targets. Drew mastered an additional target in the dynamic condition. Bruce mastered two dynamic targets. Joey mastered four dynamic targets and two targets in the static condition. James mastered one dynamic and one static target. Harvey mastered one additional target in the dynamic condition.

One possible limitation of this study may be the reinforcement delivery following correct responses. Each of the participants in this study had a history of receiving varied reinforcement, often paired with social games or tangible items, for correct responding. The programmed praise and edible delivery may not have been motivating enough for some participants. Participants may have been sensitive to the reinforcement contingencies in this study compared to their general programming, and the general lack of varied reinforcement may have affected student performance in this study. To mitigate these sensitives to changes in reinforcement, future researchers may consider delivering reinforcement that the participant is accustomed to (e.g., delivering varied praise).

Given that only two participants received the generalization and maintenance probes, there are not enough data to suggest if one condition is superior than the other as we only have the results from Joey and Harvey.

An additional limitation is the limited number of trials for each target in the teaching sessions. During the teaching trials, the therapist only presented stimuli a total of five times each session. The limited number of trials may have slowed down the acquisition of targets for some participants, as the therapist only delivered each stimulus a total of five times during each session.

Given these results, future researchers might consider examining teaching action verbs as static and dynamic stimuli to compare which method generalizes best to in vivo actions. This could be done by running sessions similar to what was done in this study, but following the mastery of each of the stimuli, introduce each of the targets again. Next, therapists could present each of the action verbs as live actions by introducing an individual to perform each of the action verbs for the participants. This could be done as an extra generalization session or in teaching sessions, to see which stimulus delivery method produces better generalization.

In summary, this study demonstrates that participants can acquire action verbs delivered via instruction using an iPad. This iPad-based stimulus delivery system was effective at teaching action verbs, regardless if the stimuli were displayed statically or dynamically. Data from the study suggests that there was no advantage to teaching action verbs with static or dynamic stimuli. As there is no additive value of dynamic stimuli, these finding are ultimately optimistic for applied settings, particularly settings that are limited in terms of resources; not every classroom or provider has the means to purchase iPads or related devices. High quality instruction may be the most important variable in teaching young children with autism to label action verbs. Additional research will be necessary to confirm these findings.

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APPENDICES

Appendix A

2-Syllable Word Inclusion Assessment Data Sheet

2-Syllable Word Inclusion Assessment Data Sheet

Participant: _________ Date: _________ Therapist: _________

Word:	+/-
Cookie	
Mama	
Papa	
Baby	
Tiger	
Lemon	
Country	
Nighttime	
Always	
Football	
Dinner	
Hippo	
Over	
Glasses	
Feather	
Apple	
Basket	
Sweater	
Flower	
Tire	
TOTAL:	

/20 =	%

Appendix B

Targets in Each Condition Data Sheet

Targets in Each Condition Data Sheet

Participant:

Condition: Dyamic		Date Introduced:	Date Mastered:
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Condition: Static		Date Introduced:	Date Mastered:
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Appendix C

Condition Order Data Sheet

Condition Order Data Sheet

Participant:

Session	Date	Therapist	Condition	Verb	Verb	Verb	Uploaded?

Appendix D

Video Recorder Script

Video Recorder Script

Participant:_______________________

Date:____________________________

Session #:________________________

Condition (circle):   Static   Dynamic

Appendix E

Baseline and Probe Data Sheets

Baseline and Probe Data Sheets

James - D

Bouncing												
Jumping												
Drinking												
Pouring												
Knitting												
Flying												
Stringing												
Pullling												
Drawing												
Sliding												
Stirring												
Hitting												
Total												
Date												
Session												
Initials												

Brushing												
Kissing												
Twirling												
Dropping												
Spilling												
Wiping												
Splashing												
Pushing												
Golfing												
Taping												
Counting												
Zipping												
Total												
Date												

Appendix F

Teaching Data Sheets

Teaching Data Sheets

Participant:

Condition

Date																								
Session #																								
Initials																								

Date																								
Session #																								
Initials																								

Date																								
Session #																								
Initials																								

Appendix G

Choice Assessment Data Sheet

Choice Assessment Data Sheet

Participant:

Session	iPad Color	Date	Initials
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Appendix H

Interobserver Agreement Data Sheet

IOA Data Sheet

Participant

Date						Date						Date				
Session #						Session #						Session #				
Initials						Initials						Initials				

Date						Date						Date				
Session #						Session #						Session #				
Initials						Initials						Initials				

Date						Date						Date				
Session #						Session #						Session #				
Initials						Initials						Initials				

Date						Date						Date				
Session #						Session #						Session #				
Initials						Initials						Initials				

Appendix I

Treatment Integrity Data Sheet

Treatment Integrity Data Sheet

Date:	Therapist:	Participant:	
Session:	Condition:	Data Collector:	
Did the therapist...			
Run the correct session?	Y	N	
Use the correct materials?	Y	N	
Conduct a one-trial preference assessment?	Y	N	N/A
Provide non-contingenet reinforcment during baseline (And specified probing sessions)?	Y	N	N/A
Provide correct consequence for correct responses?	Y	N	N/A
Provide correct consequence for incorrect responses?	Y	N	N/A
Use the correct prompting procedure, if needed?	Y	N	N/A
Total:			

Date:	Therapist:	Participant:	
Session:	Condition:	Data Collector:	
Did the therapist...			
Run the correct session?	Y	N	
Use the correct materials?	Y	N	
Conduct a one-trial preference assessment?	Y	N	N/A
Provide non-contingenet reinforcment during baseline (And specified probing sessions)?	Y	N	N/A
Provide correct consequence for correct responses?	Y	N	N/A
Provide correct consequence for incorrect responses?	Y	N	N/A
Use the correct prompting procedure, if needed?	Y	N	N/A
Total:			