

THE USE OF VIDEO PROMPTING TO TEACH FUNCTIONAL PLAY SKILLS TO
CHILDREN WITH AUTISM SPECTRUM DISORDER

by

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ABSTRACT

Play skills are a crucial developmental component for children because they lead to further the development of social skills. Children with autism spectrum disorder (ASD) often struggle to display functional play skills both when playing alone and with peers and must be explicitly taught the skills needed to demonstrate play. This study evaluated the effects of video prompting as a tool to teach two nine-year old students with ASD three ten-step toy designs using Lego blocks. Due to variable responding with one participant and minimal increases in responding above baseline for another, the researcher added additional procedures including an attentional cue, reinforcement, and stabilization. The results suggest that video prompting is an effective instructional approach to teach functional play skills and decrease problem behavior. Limitations and recommendations for practice and future research are presented.

INDEX WORDS: Autism Spectrum Disorder, Play Skills, Video Prompting

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BS, University of Georgia, 2020

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment
of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2022

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December 2022

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CHAPTER 1

INTRODUCTION

Social communication and interaction and restrictive and repetitive patterns of behaviors are the two overarching diagnostic criteria defined in the American Psychiatric Association's Diagnostic and Statistical Manual; Fifth Edition (DSM-5). Deficits in the two areas must be persistently present for a diagnosis of autism spectrum disorders (ASD) to be considered for an individual (American Psychiatric Association, 2013). These diagnostic symptoms can make it difficult for children with ASD to engage in appropriate play skills both alone and with peers. Play is an important aspect of the early development of children with ASD as it promotes peer interactions, increased communication skills, and may reduce the engagement of challenging behaviors (Jung, 2013).

Play

Ledford et al. (2019) describe play as children “engaging in increasingly complex pretend play behaviors with objects; playing functionally with toys; playing near and then with peers; playing games with rules; and using increasingly complex language to describe play”. Functional play involves the child engaging with a toy in the same way the toy was intended to be played (Lang et al., 2009). For example, functional play with a car would involve the child rolling a car or placing it on a ramp. Non-functional play would involve the child throwing the car or shaking it in a basket. Children with ASD often engage in repetitive behaviors with toys such as lining up objects, mouthing toys, or flipping and spinning toys (Boudreau, 2010). Systematic instruction on how to engage in functional play may be necessary for children with ASD.

Video Prompting

Teachers and practitioners implement a range of intervention strategies for teaching social behaviors, such as play skills. Some intervention strategies include activity schedules (Morrison,2002), prompting strategies (Coe et al.,1990), pivotal response training (Stahmer, 1995), social stories (Barry,2004), and video modeling (VM; Jung, 2013). Wong et al. (2015) identified VM as an evidence-based practice to teach social skills (Kouo, 2019), play skills (MacDonald, 2005), functional living skills (Hong, 2016), and academic skills (Yakubova, 2020). VM is a form of video-based instruction (VBI). VBI involves a recorded video of a targeted skill to model a target behavior (Syriopoulou-Delli, 2021). The increased use of VBI as an intervention tool is likely due to the further development and availability of technology. VBI is a beneficial teaching tool for practitioners because it is easily accessible through online platforms, such as YouTube which can reduce cost of instruction. VBI can also benefit learners as it promotes independence and decreases stigmatization common when a direct instructor is present. Independent navigation of VBI software can serve as a pivotal skill because it allows learners to access instruction on new targets through the same technology (Ayres et al. 2016).

Video prompting (VP) is another approach to VBI. When using VM, a full video of a complete task analysis is shown to the learner and then the learner is expected to imitate all scripted behaviors of the video. Different from VM, VP, uses single video clips breaking down each step of a task analysis. The goal of using VBI, whether VM or VP, is that a learner becomes independent with the target skill and the skill generalizes to the natural environment.

Boudreau (2010) evaluated the effects of VM on play skills, using a veterinary and construction toy set with two preschool boys. Both participants spoke in two-to-three-word utterances and one of the participants used Picture Exchange Communication System (PECS) at

the time of the study. Baseline procedures included the participants being given a direction of, “go play” with no VM instruction available. During the VM phase, the participants watched the video model and the researcher provided 10 min with the corresponding toy set. Three sessions included an additional reinforcement package of verbal praise, physical contact, or token systems for correct scripted responses in combination with the VM. Following the reinforcement package with VM, the VM was removed and only reinforcement was provided for scripted actions. Unscripted actions and vocalizations decreased at the introduction of VM, but scripted actions and scripted verbalizations increased after introduction of VM. Similarly, MacDonald (2005) evaluated the effects of VM on play skills for two young boys ages four and seven across three types of play toy sets (e, g., town, ship, and house). Each script had approximately 16 verbalizations and 14 actions included. The results of this study concluded that VM increased the play repertoires of the two participants across three play sets. Few unscripted play actions occurred for both participants, but both exhibited rapid acquisition of modeled actions and scripted verbalizations. Additional research is necessary to determine if VP may lead to similar acquisition of scripted verbalizations.

Ezrine et al. (2018) compared teacher model and peer model VM to teach a predetermined building block sequence to a child with ASD. They found VM was not effective in increasing functional play using block building and the intervention led to increases in disruptive behaviors with the blocks. However, after Ezrine and colleagues (2018) switched from VM to VP, an increase in functional play and a decrease in disruption occurred. Although an increase in correct steps completed during block building was recorded, there are no replications of those findings due to only having one participant. Additional research is necessary to further

evaluate the efficacy of VP as an intervention for teaching play skills (scripted actions) for learners with ASD.

Even though literature supports the use of VM to teach a range of social communication and play skills to children with ASD, a gap in the literature exists in examining the effects of VP to teach functional play actions and narrations to elementary children with complex communication needs (CCN). The purpose of this study was to examine the effects of VP on functional play skills and scripted actions of elementary aged students with ASD. The research questions were: (1) What are the effects of video prompting on scripted actions in the context of functional play skills among elementary students with ASD? and (2) What are the effects of video prompting on scripted narrations, unscripted actions, unscripted narrations in the context of functional play skills among elementary students with ASD?

CHAPTER 2

METHOD

Participants and Research Team

Two African American elementary aged boys were recruited for this project. Both students had an ASD special education eligibility and attend a local elementary school staffed by university graduate students. To be included in the study, participants needed the following prerequisite skills: (a) ability to see and hear video, (b) fine motor skills to manipulate toys, (c) generalized imitation ability (d) ability of following verbal directions, and (e) ability to remain seated for instruction. Students were excluded from the study if severe problem behavior such as aggression or elopement was reported or if the student already presented fluent play skills when given the opportunity to play with toys. The researcher chose these participants because they met the inclusion and exclusion criteria.

The first participant, Jonah, is a 9-year-old who communicated vocally often in echoics and scripts. When given the opportunity, Jonah would choose to play with bubbles, toy cars, or sensory toys (e.g., pop fidgets, gel bead bags). His teacher reported that when given a toy, Jonah would throw the toy into the air or spin the item repeatedly. Jonah did not display pretend play skills, and when given the opportunity, he did not play with peers. Jonah demonstrated generalized imitation such as clapping hands, touching head, or stacking blocks.

The second participant, Drake, is a 9-year-old who communicated with a speech-generating device (SGD). The specific device he used was a tablet with Language Acquisition and Motor Planning (LAMP) software. Drake demonstrated fluency in using the SGD to request

items, such as food and toys. Drake requested Paw Patrol, Play-Doh, Peppa Pig, and Bluey figurines during non-instructional time. At times, he would request to play with foam blocks, but would usually grab a teacher's hand to build for him. When he had access to those toys, he demonstrated few pretend play skills and usually mouthed figurines or placed them in Play-Doh. Drake did not play with peers when given the opportunity. Drake demonstrated generalized imitation such as clapping hands, touching head, and tapping legs.

A third participant was recruited and enrolled in this project. However, due to increases in challenging behavior across the student's school day outside of the context of this study, the participant was removed from the study following three intervention data points for one toy set.

The primary investigator and first author was a university graduate student pursuing a master's degree in applied behavior analysis. Additionally, she held a special education bachelor's degree and Registered Behavior Technician certification. Secondary data collectors were also university graduate students pursuing master's degrees in applied behavior analysis and/or special education. This study took place under direction of doctoral students and an Assistant Professor from the nearby university.

Settings and Arrangements

All sessions were conducted in the participants' classroom. The classroom was in a Title 1 public school in the southeast United States. The classroom was staffed by graduate students pursuing degrees in special education and applied behavior analysis. University faculty oversaw the classroom in collaboration with the local school system. The students in the classroom had intellectual and developmental disabilities and received specialized services for communication, functional skills such as toileting, hand washing, or brushing teeth, adapted general curriculum, and behavior interventions. The classroom was equipped with tables and chairs in the corners of

the room where other students of the class and their 1:1 teacher or support staff sat. Other students and teachers were in the room during sessions, however, a great amount of distance existed between the other students and the participants' workspace.

The first participant's sessions took place at a rectangle table facing a bookshelf with three chairs present for the participant, primary experimenter, and secondary data collector. The second participant's sessions took place in the same classroom at their table adjacent to participant one's table; however, a divider was pulled before each session to block the view of the other participant.

Materials

During baseline sessions for all participants, a toy set manual booklet and the corresponding Lego set were present. During intervention sessions, a laptop was placed in front of the participant on the table and the toy manual was removed. The laptop had PowerPoint slides displayed with the video prompts for the corresponding toy set. For both participants, an AAC device with LAMP software and relevant vocabulary to the activity was placed on the table. For Jonah, the AAC device was the university's iPad equipped with the LAMP software and Drake's personal AAC remained on the desk during his sessions. The videos displayed a 9-year-old boy's hands completing each individual step. In each video the device with LAMP software was present but the peer model remains silent during each VP of the steps. In the last video of the video prompting sequence, the peer model demonstrated for 30s how to play with the completed Lego model and narrated his play with three-to-four-word vocalizations and by activating buttons on a SGD of relevant vocabulary. Toy materials included three Lego toy sets: airplane, vet ambulance, and helicopter. The original toy sets included between 53 and 59 pieces and a manual that consisted of about 50 different steps. The primary researcher consolidated

each toy set to 10 steps by gluing small pieces together prior to beginning baseline. Each toy set was adapted to include steps that were similar in difficulty level. The primary researcher also created a new toy manual that included pictures of each of the 10 steps (i.e., refer to appendix). The new toy manual was made using construction paper, glue, and staples to create a booklet with pictures of each step on one page. Data collection materials included data sheets for both the experimenter and IOA collector, as well as writing utensils. The primary data collector used a cell phone to track time using a multi-timer application.

Response Definitions and Measurement

The participant's responses were classified as *scripted actions*, *scripted narrations*, *unscripted actions*, and *unscripted narrations*. The primary dependent variable was *scripted actions*. Scripted actions were the dependent variable that was used to make design decisions. The researcher also collected data on *scripted verbalizations*, *unscripted verbalizations*, and *unscripted actions*. The researcher collected data on challenging behavior to ensure the intervention did not lead to increases in challenging behavior above baseline.

Scripted Actions

Scripted actions were defined as the participant demonstrating motor responses that matched those performed in the video prompt that resulted in the same changes in the environment. To be scored as a correct scripted action, the outcome of the participants' design had to mimic that of the model design (e.g., The helicopter overhead rotor was placed on top, while the small rotor was placed on the side of the helicopter). If an action could be performed in more than one way but still served the purpose intended and the Lego piece fit appropriately, the action was counted as correct (e.g., the small rotor on the back of the helicopter set could be turned right, left, or straight and could still fit in the designated spot and serve the same "purpose" for play).

Unscripted Actions

Unscripted actions involved any action performed by the participants that did not directly mirror those of the VP but that were appropriate given the set of toys.

Scripted Narrations

Scripted narrations were defined as statements made by the participant using either an AAC or vocal behavior that matched statements made during the VP. Data were collected during each session for whether participants echoed the narrations stated in the model.

Unscripted Narrations

Unscripted narrations were defined as statements made by the participant using either an AAC or vocal behavior that did not match the statements made in the VP. Unscripted narrations were anything stated by the participant other than what was stated in the video, even if these narrations appeared to be unrelated. The researcher chose to include unscripted narrations to examine whether the participants would include any additional narrations when playing with the toys. Space was left on the same data sheet to mark for unscripted narrations.

Challenging Behavior

Challenging behavior was defined using definitions that the classroom teachers had already determined for both participants as frequently seen problem behavior. For both participants, elopement and disruption behavior data were collected. Elopement was defined as any instance in which the student moved an arm's length away from their designated area. Disruption was defined as any instance in which the student held an item in one or both hands and released the item through the air a distance of 3 inches or greater so that it landed more than 12 inches from another person or removed work materials from a reachable position of the teacher (each item is one instance), outside of appropriate toy play. Elopement was not observed

during any session throughout the study, however problem behavior displayed in figures 1 and 2 are disruptive behaviors.

Measurement System

Each instance of the target behavior (i.e., modeled actions) were counted with a plus or a minus on a data sheet. The occurrence of scripted or unscripted narrations were marked in an additional space on the same data sheet. Researchers collected frequency data on challenging behavior.

Reliability and Fidelity

An independent observer from the research team collected data in addition to the primary data collector for 30% of sessions across all participants and conditions. The independent observers were trained graduate students and all observations were completed in person. The primary researcher trained observers through demonstration and feedback. Interobserver agreement data were calculated by dividing the smaller number of responses by the larger number of responses and multiplying by 100. The mean agreement was 100%. Procedural fidelity was collected for 30% of the sessions across all conditions to ensure that all intervention procedures implemented were conducted consistently. The average calculated fidelity across baseline and intervention was 100%.

Experimental Design

A multiple probe design across three Lego sets replicated across two participants was used to demonstrate the effect of VP on occurrence of play actions and scripted narrations. The toy set order was randomized for each participant. For Jonah the order was airplane, ambulance, helicopter. For Drake the toy set order was helicopter, airplane, and ambulance. Baseline sessions in Tier 1 were concluded and intervention sessions began after 3 stable data points. In

Tier 2 and 3, intervention began when the previous tier had three nonconsecutive sessions at 80% or higher. Probes continued prior to the teaching of each new toy set. Mastery criteria included the child independently completing 80% of scripted actions for that toy set across three nonconsecutive sessions. After mastery criteria was met and intervention began for a new toy set, intervention continued for the previous toy set in attempt to obtain 100% correct steps.

Procedures

General Procedures

All sessions were held in the student's designated area in their special education classroom with the primary experimenter and IOA collector present. Each session consisted of 10 trials (i.e., 10 design steps for each toy set) and ended after the last 30s elapsed that allowed for play with the completed toy design. The general procedures were baseline sessions and intervention sessions. Across all conditions, the researcher provided behavior specific praise when a step was completed correctly.

Baseline

During probe sessions, the participants were provided Lego pieces and the redesigned Lego manual book. The researcher stated, "Build it" and provided 30s for the participant to initiate responding. If no response was made by the participant, the primary researcher stated, "I'll try" and removed the Lego pieces from the participants view and completed the current step under the table or behind their back. The researcher then flipped the page of the Lego book and represented Legos in front of the participant. At the end of the ten steps, the researcher allowed an additional 30s to account for play with the Lego set.

Data were collected on scripted and unscripted actions and scripted and unscripted narrations. Inappropriate behavior with the Legos (i.e., mouthing Legos and or swiping Legos

from table) was ignored and if Legos were removed from the table (i.e., throwing Legos) by the participant, they were placed back on the table by the experimenter with no other consequence present.

Intervention

During intervention sessions, the researcher placed the laptop and Lego pieces in front of the participant and stated, “Build it”. The researcher played the VP for each step on loop for 30s or until the step was completed by the participant. The experimenter controlled the laptop for each viewing and no additional prompts or instructions were given to the participant. If the participant completed the step before 30s elapsed, the researcher advanced to the next slide with the corresponding step’s video prompt and the participant could continue building. As in baseline sessions, if the participant did not complete the toy design step within the allotted time, the experimenter removed the toys and completed the step without the participant observing (i.e., behind their back, under the table). This component was included to ensure that no additional prompt or model became available to the participant throughout the session. The completed step by the experimenter was represented on the table and the next video prompt was shown to the participant. The researcher repeated these steps until the Lego design was complete. Upon completion of the design, an additional 30s was given to allow for unscripted actions or narrations to occur. At the end of the 30s, the toys and laptop were removed, and the session concluded. Sessions continued until the child demonstrated mastery criterion of 80% or higher accuracy on modeled actions across three non-consecutive sessions for that toy set. The participant then moved to training for a new design set. New design sets were not taught until the previously taught design met mastery criteria. Previous designs continued intervention sessions even after mastery criteria was met to obtain 100% steps correct.

Procedural Modifications

Attentional cue, reinforcement, and stabilization of the toy components were added in addition to the VP for both participants due to variable responding with one participant and minimal increases in responding above baseline for the other. Attentional cues consisted of the researcher stating, “look at the video” every time that the student looked away from the video and did not appear to be actively attempting to complete the current step (i.e., looking at pieces in their hand, scanning the table for the correct piece). If the participant looked away from the video to look down at the toy set to complete the step, the researcher did not provide the attentional cue. Programmed reinforcement consisted of the researcher providing an edible and specific praise statement to the participant at the completion of each correct step when completed independently. Specific praise statements consisted of the primary researcher stating a variation of “Nice job.”, “That’s right.”, “Good job, putting the ____ on”. Stabilization consisted of the primary researcher stabilizing the toy set in one hand so that the participant could complete the next step without the previous completed step coming undone. The stabilization component was added due to the Lego designs becoming fragile following the condensing of the steps using glue. By stabilizing the design, the participants were given more opportunity to focus on only completing the current step, rather than attempting to complete the current step and the previous ones that may have come undone during building.

CHAPTER 3

RESULTS

Scripted actions and problem behavior for Jonah are shown in Figure 1. Jonah demonstrated low levels of scripted actions during baseline across all three toy design sets. Following VP intervention sessions, Jonah demonstrated 80% - 100% of scripted actions for all three toy sets. During baseline Jonah demonstrated some problem behavior but after the intervention package was implemented problem behavior dropped off to a level of zero across all toy sets. Jonah did not demonstrate any scripted or unscripted narrations during baseline and intervention; therefore, these data were not displayed in the graph. He did not comment on the play, or echo the narrations made in the VP. Unscripted play actions for Jonah occurred once during the helicopter toy design but no other unscripted actions were recorded for the other toy sets. Jonah used his fingers to spin both the small and large rotor blades on the helicopter which was not an action demonstrated in the VP.

For Jonah, tier 1, intervention began following three stable baseline data points at zero percent correct responding. Following the introduction of VP there was an immediacy of effect observed where responding increases from 0% to 20%. However, the data remained at 20% and no increase in responding occurred after four sessions of VP alone. The decision to add an attentional cue was made after observations that Jonah was not attending to the video. After introduction of an attentional cue with the VP, responding increased to 30% but did not accelerate higher than that. Reinforcement was added in conjunction with the VP and attentional cue to increase motivation to build the steps but no change in level was demonstrated after this

change. The data remained stable and not accelerating from sessions 4 to 15, therefore the decision to implement all procedural modifications (i.e., VP, attentional cue, SR+, and stabilization) was made. By the researcher stabilizing the toy set, the potential for the previous steps to come undone was minimized. This component ensured that the participant did not have to attempt to rebuild previous steps from memory when steps became undone due to structural integrity fault of the Legos. After introducing the procedural modification package an immediate change in level was demonstrated from 40% to 90% correct responding. After six sessions, responding reached 100%. Tier 2 intervention with ambulance toy set began following three stable data points of tier 1, airplane, at 90%. Baseline probes in tier 2 were stable at 0% correct responding. Intervention was introduced using all procedural modifications and an immediate change in level from 0% to 90% is demonstrated. Tier 3 baseline with helicopter toy set was stable at 10% to 0% and intervention began using the procedural modification package. After the introduction of the intervention, responding immediately increased to 70% and continued in an accelerating trend before reaching 100% in six sessions.

Scripted actions and problem behavior for Drake are shown in Figure 2. Drake demonstrated low levels of scripted actions during baseline across all three toy design sets. Following VP intervention sessions, Drake demonstrated 80% - 100% of scripted actions for all three toy sets. There were low levels of problem behavior across baseline and intervention aside from one session during the ambulance probe in which the session was conducted early in the morning outside of his normal work time intervals. Drake did not demonstrate any scripted or unscripted narrations during baseline and intervention; therefore, these data were not displayed in the graph. Unscripted play actions for Drake occurred in two instances during the airplane design but no other unscripted actions were recorded for the other toy sets. Drake held the

airplane by its wings to flip it around in the air which was not seen in the VP. On another occasion, Drake reached for his own figurine (Dora the Explorer) toy that was on the opposite side of the table and placed the figurine into the airplane before closing the windshield.

Tier 1 intervention with the helicopter design began following three stable baseline data points between 0% and 40% correct responding. Following the introduction of VP there was an immediacy of effect demonstrating the increase in responding from 40% to 50%. The data remained variable but in an accelerating trend, reaching 80% for two sessions and 90% for one session. Intervention began for tier 2, airplane, following stable baseline points between 0% and 10%. After the introduction of VP, responding increased to 30% but remained stable. Like participant one, observations determined that Drake was failing to attend to the video so the decision to add an attentional cue was made. Following the introduction of the attentional cue, responding remained variable between 40% and 60%. Following eight sessions of variable responding with little increase in responding, the procedural modification package was introduced. After the first intervention session with procedural modifications, responding immediately increased to 90%. Tier 3 intervention with the ambulance design began using all procedural modifications and an immediate change is seen between baseline responding and intervention. Data in tier 3 remained stable at 20% and after intervention was introduced responding increased immediately to 80%. After three sessions, responding reached 100%.

CHAPTER 4

DISCUSSION

The purpose of this study was to evaluate the effects of VP on functional play skills of children with ASD. This study extended previous research on the effectiveness of VP on increasing scripted play actions (Ezrine et. al, 2018). The current study showed that VP increased scripted sequences of actions by the participants who prior to the study had few play action skills. The results show that VP was an effective tool for increasing performance of play actions for two participants, across three toy sets. Additionally, the results show that at the introduction of VP, problem behavior decreased. A decrease in problem behavior is likely due to the participant having the necessary tools to be successful with the task. For instance, during baseline Jonah engaged in disruptive behaviors but once the VP was introduced, rather than throwing a toy piece, Jonah would refer to the VP to learn how to correctly use the piece to build the intended design. The participants exhibited rapid acquisition of play actions. The acquired chains of play included up to 10 play actions with narrations occurring throughout the 30s play clip at the end of the video sequence.

This research is important because it provides teachers and service providers an empirical tool for teaching children how to functionally play with toys. Play is an important component of the development of social communication skills and promotes social facilitation between peers (Jung, 2013). The evidence from the current study supports the framework that VP can be used to teach play skills and further social communication development.

Although procedural modifications (i.e., attentional cue, reinforcement, and stabilization) were applied, the VP served as the only model for correct responding. No additional model or prompt was given to the participants during intervention sessions, supporting the claim that the VP itself served as the reason for increase in correct responding. Praise statements were given by the experimenter when the participant demonstrated independent correct actions. For Drake, when edibles were presented for correct responding, he would push the edible out of the way and continue building the set, usually eating all earned edibles at the end of the session.

Limitations

For the purpose of this research project, the primary researcher consolidated the steps of forming the Lego structures ranging from 50 to 56 steps to 10 steps across all three toy sets for consistency across tiers of the multiple probe design. To consolidate steps, the primary research glued pieces together before baseline. The glue interfered with the structural integrity of the toy set, making some steps harder to complete. Additionally, the size of some of the pieces were extremely small and required advanced fine motor skills to manipulate them into their designated spot on the design. Although fine motor skills were required to become a participant in the study, no assessment was completed prior to the beginning of the study to ensure that the participants could demonstrate the fine motor skills of such tedious steps with small toys. Additionally, many of the actions required the participant to be able to use hand eye coordination to place a piece in a small specific area of the toy design. Prior to baseline, no assessment was given to evaluate hand eye coordination skills of the participants nor was that a component addressed as a prerequisite skill needed. For Drake, fine motor and hand eye coordination was an observed barrier that limited him from getting more steps correct sooner. For these reasons, as mentioned earlier, the intervention package with the stabilization component was added to aid in building

the design without providing additional prompts. Another limitation to the study is that participants did not receive history training, therefore participants were unable to demonstrate independence in operating the technology. By not including training on how to operate the technology, it is unclear whether the participants would be independent in building the toy design using the VP without someone preparing the slides for view and advancing to the next video sequence when appropriate.

A multiple probe design across toy sets was used to evaluate the effects of VP on the acquisition of play skills. Although the potential for threats to internal validity were present, several components ensured that threats were controlled for. First, to control for history and adaptation threats, conditions were not changed until data were stable. Next, to control for maturation, baseline data were collected at least once for every three to five school days. Because only one treatment was in place, multi-treatment interference was not a concern. To control for instrumentation threats, target behavior definitions were clearly defined, and observers were trained to criterion. Procedural fidelity was also collected to control for threats to treatment integrity.

Future Directions

Future research should evaluate across other types of toys and include a history training component to promote more independence in play. Although scripted and unscripted play actions occurred during the present study, scripted and unscripted narrations did not emerge. While VP is an effective and efficient tool for teaching play skills to children with ASD, future research should focus on ways to increase scripted narrations of those presented in the video and unscripted narrations that are equally as appropriate in context. The current study looked at VP with two, nine-year-olds independent of one another. Future research should expand on VP for

functional play to facilitate peer social interactions during play. Lastly, future research should implement VP with younger age groups to evaluate the effect in early childhood development of social and play skills.

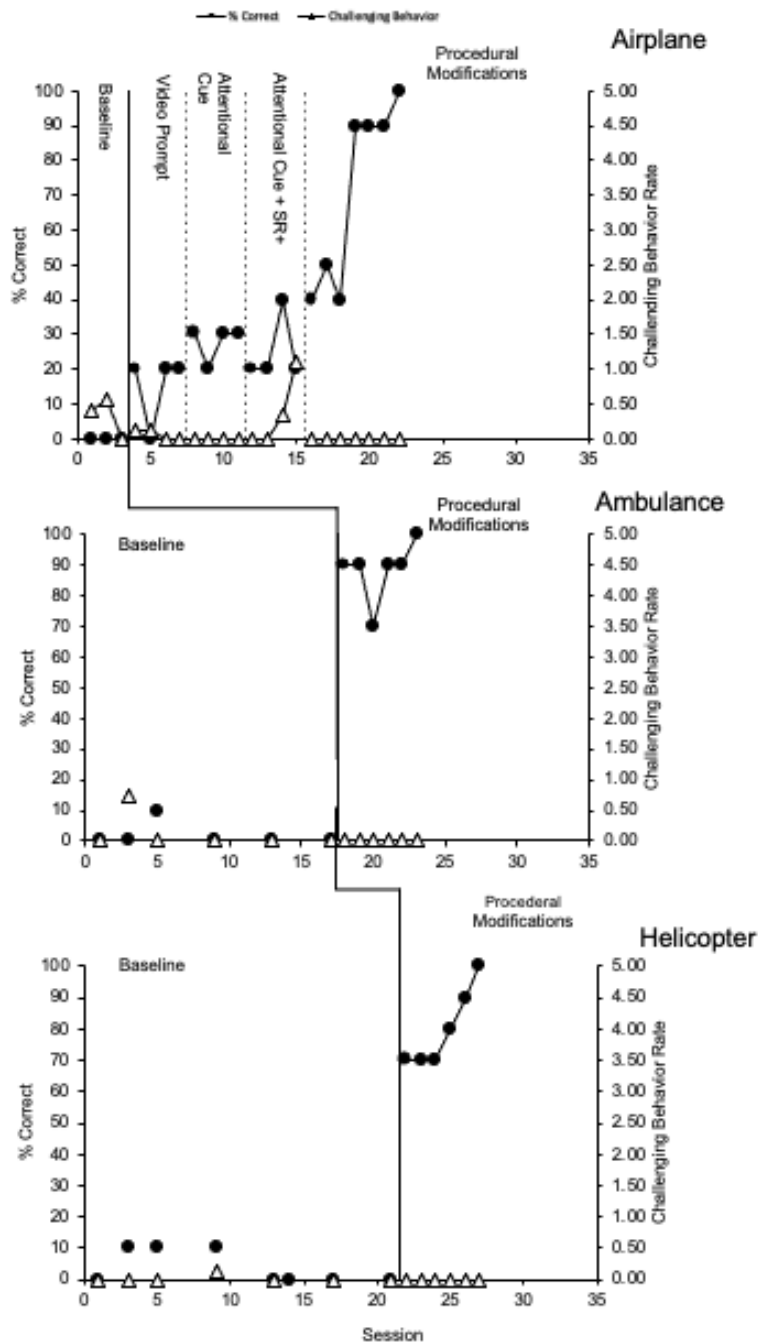


Figure 1. Percentage of correct scripted actions demonstrated by Jonah with the airplane, ambulance, and helicopter. Adjustments during intervention were marked with a dotted line in between sessions. Types of data points across all three tiers are noted in the legend at the top of the graph. The procedural modifications condition included all three modifications.

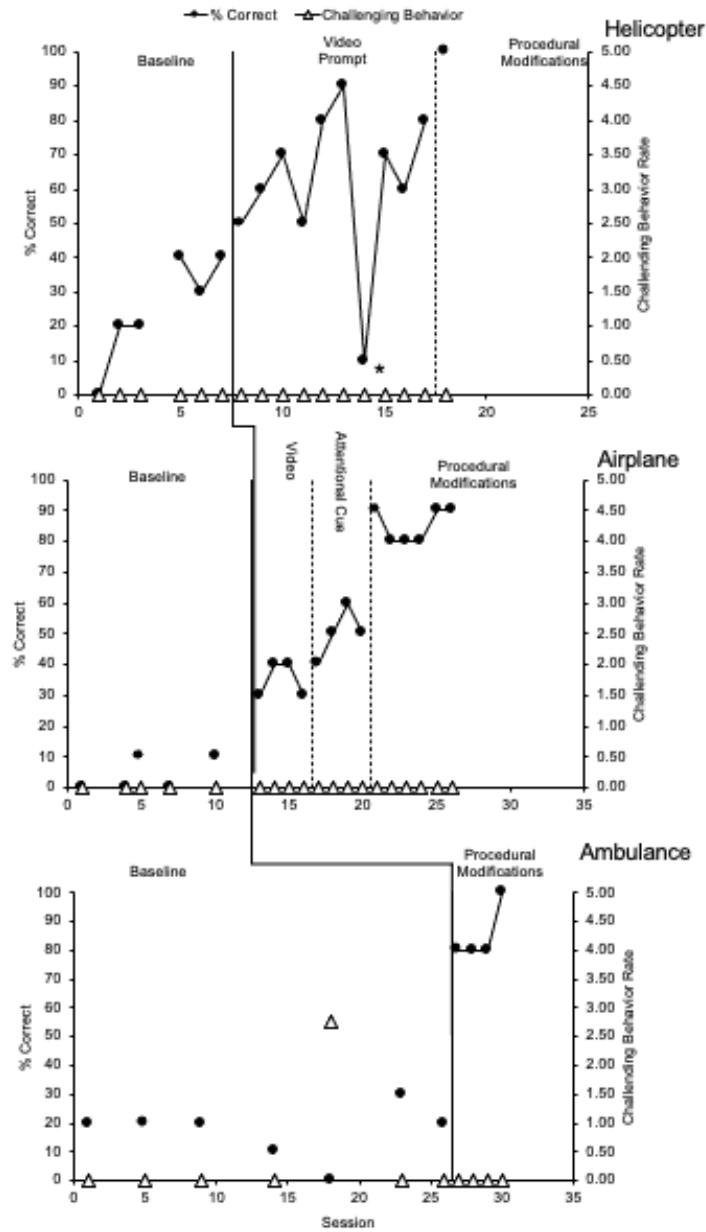


Figure 2. Percentage of correct scripted actions demonstrated by Drake with the helicopter, airplane, and ambulance. Adjustments during intervention were marked with dotted line in between sessions. The asterisk for session 14 during Helicopter intervention is due to the session being ran outside of normal work hours for the participant. Types of data points across all three tiers are noted in the legend at the top of the graph. The procedural modifications condition included all three modifications.

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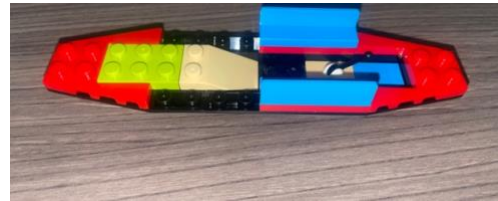
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APPENDICES

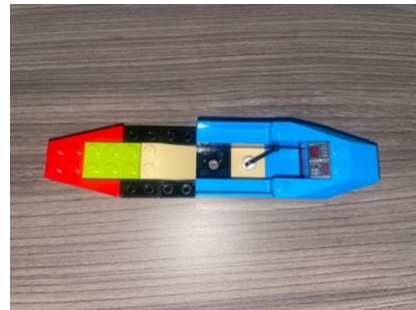
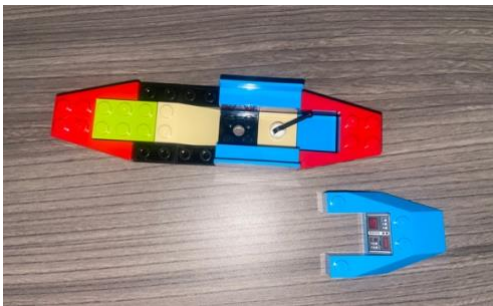
Appendix A

Airplane Toy Set Sequence

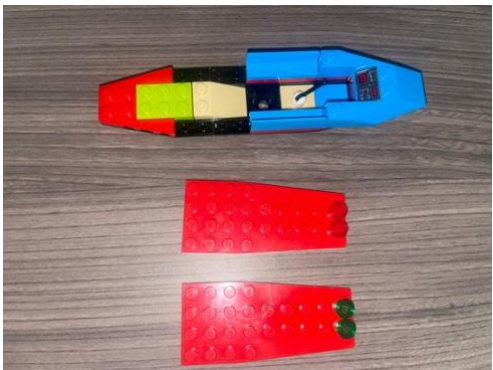
Step 1



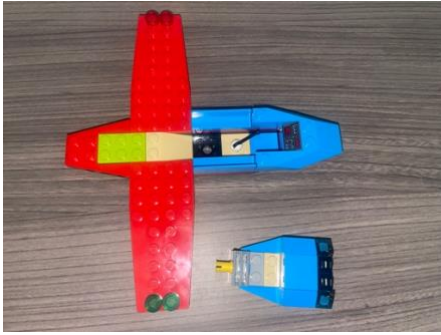
Step 2



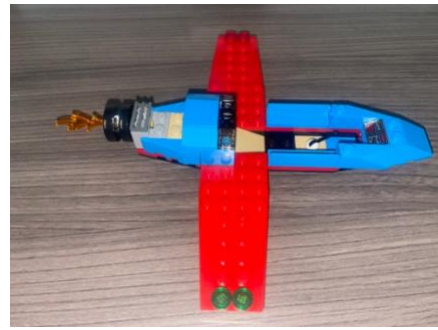
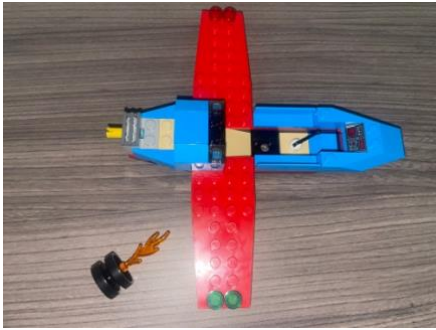
Step 3



Step 4



Step 5



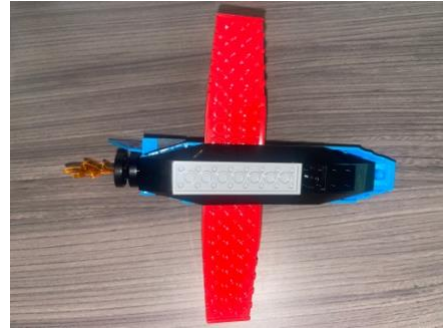
Step 6



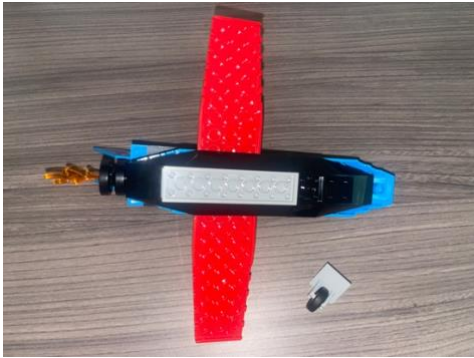
Step 7



Step 8



Step 9



Step 10



Airplane



Appendix B

Ambulance Toy Set Sequence

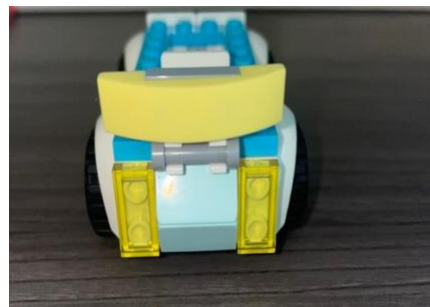
Step 1



Step 2



Step 3





Step 4



Step 5



Step 6





Step 7



Step 8



Step 9



Step 10



Ambulance



Appendix C

Helicopter Toy Set Sequence

Step 1



Step 2



Step 3



Step 4



Step 5



Step 6



Step 7



Step 8



Step 9



Step 10



Helicopter

