EVALUATION OF THE EFFECTS OF A GENERIC ICON-BASED SPEECH-GEENRATING DEVICE AND AN INDIVIDUALIZED ICON-BASED SPEECH-GENERATING DEVICE ON INDEPENDENCE OF MANDS

by

ROSE MICHELE MORLINO

(Under the Direction of Joel Ringdahl)

ABSTRACT

The purpose of this study was to evaluate the effects of generic icons and individualized icons on a speech generating device (SGD) on the independence of mands and assess preference for icon type. The researcher used a single-subject alternating treatment design to compare icon types with one participant with a limited mand repertoire. Two preference assessments were conducted to determine edibles for mand training. The intervention consisted of mand training with physical prompting and alternating icon types. Results showed that there was no difference in independence of mands based on icon-type. After mand training sessions, the researcher conducted a concurrent operant preference assessment to determine if one icon-type was more preferred. Results demonstrated a clear preference for one icon-type.

INDEX WORDS: SGD; generic icons; individualized icons; icon type; preference; communication training

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ROSE MICHELE MORLINO

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ROSE MICHELE MORLINO

Major Professor:	Joel Ringdahl
Committee:	Kevin Ayres
	Alicia Davis

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
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CHAPTER 1

INTRODUCTION

Augmentative and alternative communication (AAC) is a useful tool for individuals with limited to no vocal repertoire and helps compensate for impairments in communication by providing communication tools and strategies (Allen, Schlosser, Brock, & Shane, 2017). These strategies are useful for individuals with poor receptive and expressive language skills, as well as individuals with good receptive language skills but poor expressive language skills. Alternative communication uses unaided strategies or aided strategies (Lorah, Tincani, & Parnell, 2018). Unaided AAC strategies do not require the use of equipment and include sign language and gestures. Aided AAC strategies require the use of equipment, such as speech-generating devices (SGDs) and picture cards. The most common AAC strategies include sign language, SGDs, and picture cards (Allen et al., 2017).

An SGD is an electronic device, such as an iPad or tablet, with specialized software to create speech from pictures or text (Lorah et al., 2018). Many SGDs us icons-based software that consists of pictures and/or words. The individual using the SGD communicates by selecting an icon, or a combination of icons, to produce an audible output. Many different software programs for SGDs exist, and range from inexpensive or free with little customization to expensive with high customization (Lorah et al., 2018).

Van der Meer and Rispoli (2010) reviewed the AAC literature on SGD. The review included 51 participants with autism spectrum disorder (ASD) across 23 studies from 1980 to 2009. Across the studies, a total of 14 different SGDs were used, with the most common being

Tech/Talk, BigMack, GoTalk, and Clicker 3. A variety of communicative responses (e.g., requesting preferred items/activities, social communication, and responding to academic questions) were targeted across the reviewed studies, with different mand training strategies (i.e., discrete trial format and naturalistic setting format). Seven studies included maintenance sessions and 10 studies included generalization sessions. Van der Meer and Rispoli found that all experiments resulted in increased verbal behavior and those that assessed preference found that individuals demonstrated a clear preference for an AAC strategy, that varied across participants. This review shows support for the use of an SGD as an AAC strategy.

In addition to the review by Van der Meer and Rispoli (2010), Lorah, Parnell, Whitby, and Hantula (2015) reviewed the recent AAC literature on SGDs. They identified 17 studies, with a total of 57 participants, published between 2010 to 2014. Studies utilized various instructional strategies to train participants to use SGDs. The various instructional strategies included least-to-most prompting, 5-s constant time delay with full physical prompting, and 10-s constant time delay with least-to-most prompting. Although different instructional strategies were utilized across studies, researchers found that most participants (53 of 57) acquired the communicative response and increased their verbal behavior. Preference for a specific AAC topography was evaluated for 28 of the 57 participants across the studies. This preference assessment revealed a clear preference for handheld SGDs over picture cards or sign language for 82% participants (Lorah et al., 2015). This review of recent literature further supports the use of SGD has an AAC strategy.

The increase in published studies (23 over a 30-year period to 17 over a 5-year period) suggests that SGDs are increasing in use as an AAC strategy. Due to this increase, identifying effective procedures for teaching communication on a SGD is necessary. Sigafoos et al. (2013)

trained two boys diagnosed with ASD to us an iPad-based SGD. Proloquo2go® software was downloaded on the iPad and set up with one icon for training. Researchers used least-to-most prompting to train the communicative response (manding for a toy item). After intervention training sessions, maintenance and generalization sessions were conducted. In maintenance, physical prompting was removed from the prompting sequence and researchers waited until a response occurred to provide the item. In generalization, the same procedures as maintenance were used with a new set of toys to choose from. Researchers found that the least-to-most prompting strategy with one icon on the screen was adequate to teach the communicative response to both participants. This new communicative response also generalized to the new toy set.

Waddington et al. (2014) extended the findings of Sigafoos et al. (2013) by training three individuals with ASD to complete a three-step communicative response using an iPad-based SGD. Researchers used a similar least-to-most prompting procedure with two additions: time delay and error correction. Time delay was utilized during practice sessions prior to the discrete trials. If the participant made an error during the discrete trials (i.e., pressing the wrong icon or reaching for the wrong item), researchers physically prompted the correct response. During generalization sessions, reinforcement was provided only for independent mands (mands without prompting or cues). The results showed an increase in communicative responses for all participants. Researchers found that complicated communicative response (two- and three-step responses) can be taught using a combination of prompting strategies and error correction.

Along with one-step mand training, it is important to train discrimination among icons. Carnett and Tullis (2017) incorporated discrimination training in SGD mand training. Three preschool-aged individuals with no prior exposure to SGDs participated in the study. Mand

training consisted of four phases conducted in a natural play environment. During all phases, participants were taught to press the icon using a constant time delay of 5 s and physical prompting for non-response or errors. Phase I had a single icon that corresponded to the preferred item. Phase II had four icons: three blank icons and one icon that corresponded to the preferred item. Phase III had four icons: two blank icons and two icons that corresponded to two preferred items. Phase IV had four icons that corresponded to four preferred items. Participants moved to the next phase after two consecutive sessions with 80% accuracy. All participants learned to mand using the SGD and all discriminated between four preferred items.

The success of the discrimination program in Carnett and Tullis (2017) was replicated by Lorah (2018). Preschool-aged students with a diagnosis of autism were taught to use Proloquo2Go® in a play environment. An in-vivo preference assessment was conducted at the start of each session. During intervention, full physical prompting was used after 5 s of no response or pressing the wrong icon. The four phases used for training were identical to Carnett and Tullis (2017). Phase I consisted of one preferred item icon, Phase II consisted of one preferred item icon and three blank icons, Phase III consisted of two preferred item icons and two blank icons, and Phase IV consisted of four preferred item icons. All participants acquired the skill to mand for and discriminate preferred items. The intervention promoted a rapid acquisition of discrimination and a mand repertoire. These results are consistent with previous research on SGD mand training.

Along with training the use of SGD, it is important to compare SGD to other successful AAC strategies. Lorah et al. (2013) conducted a study comparing the use of picture exchange and an iPad-based SGD as an AAC. Five elementary-aged children with no previous experience with mand training were taught to use both picture exchange and SGD to mand for preferred

items. Researchers conducted an in-vivo preference assessment prior to each session. Researchers used constant time delay of 5 s and physical prompting to teach the communicative response. If no response after 5 s of item removal occurred or an incorrect response occurred, researchers physically prompted the individual to either exchange the picture or press the icon on the SGD. An alternating treatment design was used to compare the two AAC topographies. Results revealed differential acquisition of mands. Four participants acquired communicative skill faster on the SGD and one participant acquired the communicative response faster on the picture exchange.

Torelli et al. (2016) assessed mand acquisition across three AAC topographies for a 4-year-old boy with ASD. The individual had prior exposure to picture exchange, GoTalk®, or ProLoQuo2Go®, so these strategies were used for the study. Progressive time delay and physical prompting was used to train manding on all three AAC strategies. The individual acquired the skill to mand using all three strategies and aggression decreased after training for each strategy.

Following the comparison of AAC topographies, Lorah et al. (2013) and Torelli et al. (2016) conduct device preference assessments. In both studies, a concurrent operant arrangement was set up to determine preference. In Lorah et al. (2013), three to four 10-min sessions were conducted for each participant. Location of the device was randomized to control for any side bias. All participants demonstrated a clear preference for an AAC topography and this preference aligned with the topography the participant acquired first. This finding suggests a relation between order of acquisition and preference. In Torelli et al. (2016), two phases to the concurrent operant were conducted. Phase I consisted of all three topographies available. Location of each device was randomly ordered each session to control for any side bias. Phase I sessions continued until a clear preference for one topography occurred. Phase II removed the

highest-preferred topography to create a rank order between devices. Phase II was conducted with two devices with the same procedures as Phase I. The individual demonstrated a clear hierarchy of preference. Following the participant preference assessment, Torelli et al. (2016) conducted a parent preference assessment to determine which topography would most likely be used after treatment. Parent preference and individual preference aligned.

Along with this research on individual preference during mand training, Winborn-Kemmer, Ringdahl, Wacker, and Kitsukawa, (2009) assessed preference for mand topography during functional communication training (FCT). Two participants were trained on a picture card and a microswitch. Researchers used three-step prompting with verbal, model, and physical prompts to teach mands. Mand training on the devices were complete after three sessions without problem behavior and stable responding. Both individuals acquired the communicative response using both AAC devices. After the training, a concurrent operant arrangement for mand topographies was set up. Both topographies were reinforced on a fixed-ratio (FR) 1 schedule. Location of topographies were alternated each session to control for any side bias. Researchers attempted to block participants from selecting both topographies on the same trial, but were unsuccessful on a few occasions with one participant. Both participants demonstrated a clear preference for a mand topography. This preference occurred even though both topographies were equated on reinforcer quality and response effort.

Ringdahl et al. (2016) conducted a study similar to Winborn-Kemmer et al. (2009) to evaluate mand topography preference using a concurrent operant arrangement. The 18 individuals that participated in this study had a communication deficit or communication delay. Researches conducted a mand modality assessment to determine two topographies that required similar prompt levels. These topographies were used during FCT and the concurrent operant

assessment. FCT sessions began with researchers contriving the situation similar to a functional analysis. Researchers removed a preferred item, removed attention, or placed demands. Problem behavior was put on extinction and only appropriate communicative responses were reinforced. Three-step prompting with verbal, model, and physical prompts were used to teach participants to mand using both topographies. Once an increase in communicative responses occurred and problem behavior decreased by 80% across five session, the concurrent operant assessment was conducted. Both topographies were available during this assessment and they were reinforced on identical FR-1 schedules. All participants demonstrated a clear preference for a mand topography. This result suggests that responses with similar proficiency and response effort may not be of equal preference.

Ringdahl et al. (2018) furthered the research on preference for mand topographies. Two experiments were conducted: Experiment 1 assessed individuals without problem behavior and Experiment 2 assessed individuals with severe problem behavior. Three individuals with ASD and/or intellectual disability (ID) participated in Experiment 1 and four individuals with ASD and/or ID participated in Experiment 2. In both experiments, researchers conducted mand modality assessments to determine levels of proficiency with different mand topographies. In both experiments, researchers conducted FCT in four phases. Phase I included two mand topographies identified in the mand modality assessment. Topographies were placed on a multiple schedule that included a unique stimulus as a discriminative stimulus for the topography available. Phase II was a mand preference assessment. Both mand topographies were placed equal distances from the participant. Once the participant made a communicative response using one of the topographies, the reinforcer was delivered. Phase III was similar to Phase I with the additional control for rate of reinforcement. Researchers switched from time-based sessions to

trial-based sessions to ensure both topographies had an equal rate of reinforcement. Phase IV placed both topographies on extinction to evaluate persistence in the absence of reinforcement. Conditions were set up similar to Phase I and III with discriminative stimuli for each topography. Results from experiment 1 show that all participants acquired the communicative response, and all demonstrated a clear preference for a mand topography. During extinction, participants' persistence to mand was higher for the more preferred topography. The results of Experiment 2 were similar. All participants acquired the communicative response and demonstrated a clear preference for a mand topography. Problem behavior decrease for all participants in Experiment 2. During extinction, three of the four individuals persisted at large rates with the more preferred mand topography. The results of this study extend the research on preference for specific mand topographies and reveal that preference might be a contributing factor to the maintenance of treatment effect.

Although research comparing SGD to other AAC strategies, such as picture exchange, and research on preference for AAC topographies exists, there is little to no research on comparing the type of icon used with SGDs. Shane et al. (2012) describes the visual supports used in AAC technology. Regardless of the strategy (i.e., picture exchange or SGD), the current technology utilizes cartoon-like pictures for communication icons. While these cartoon icons can be paired with real life items for discrimination purpose, they may not be the best icon for all individuals who use AAC. Kozleski found that more instruction is needed on the symbolism of the cartoon icon. (as cited in Shane et al. 2012, p. 1232). For this reason, personalized icons or icons that closely appear what they represent may increase communicative independence for individuals (Shane et al., 2012). More research on which individuals would benefit from personalized icons is needed.

Due to the relatively minimal amount of research on the effects of icon type on the independence of mands and preference of icon type, the purpose of the current study was to evaluate the effects of generic icon-based SGD and individualized icon-based SGD on independence of mands and to evaluate a preference for icon type. Three research questions were addressed in the current study.

1. What is the effect of icon type on the independence of mand?
2. Does the individual demonstrate a preference for icon type?
3. What is the impact of icon type with a successful communication training program on problem behavior?

CHAPTER 2

METHODS

Participant

Kasey was a 10-year-old boy with moderate ID enrolled in a special education, 3rd through 5th grade classroom. In the classroom, he received speech and applied behavior analytic (ABA) services. He had a very low independent vocal repertoire (2-3 vocal mands). He vocally manded with prompts after using gestures (i.e. pointing) to show what he wanted. He receptively follows one-step instructions. Prior to intervention, he used a picture exchange choice board to communicate his wants. The choice board consisted of three edible pictures, an iPad picture, a smartboard picture, and an outside picture.

Materials and Settings

All sessions were conducted in Kasey's typical classroom setting during one on one instructional time. A windows tablet SGD with Vantage software provided by the school district was used for intervention. All sessions were conducted using preferred edibles, determined through forced-choice and multiple stimulus without replacement (MSWO) preference assessments. Each bag of edibles was present during the training sessions and concurrent operant sessions.

Dependent Measures and Definitions

The primary dependent measure for the study was percent of trials with independent manding using the SGD. An *independent mand* was defined as pressing the icon without a prompt. The secondary dependent measure was percent of trials with problem behavior. Kasey

engages in aggression, disruption, and elopement. *Aggression* was defined as biting; pinching; open- or closed-handed strike to another person from six inches or more; contact with any part of the leg or head from six inches or more; hair pulling; throwing an object within a three-foot radius of another person or any attempts. *Disruption* was defined as pushing, throwing or kicking an object more than six inches. *Elopement* was defined as being more than one foot away from the designated area.

Experimental Design

An alternating treatment design (ATD) as used to evaluate the effects of the training intervention. Independent manding was assessed in two conditions: generic icons and individualized icons. In the generic icon condition, the icons consisted of a preset graphic candy icon. The same candy icon was used for each candy choice because only one candy icon was programmed on the device. In the individualized icon condition, the icons consisted of pictures of the specific candy wrapper and a piece of the candy. Conditions were alternated with regulated randomization: a coin flip determined the condition, with no more than two consecutive sessions of the same condition. Three separate pages were created for each condition (a total of six pages) in order to move the icon each session. These randomizations of icon position ensure discrimination of the icons occurs rather than icon location. The starting condition each day was counterbalanced. Each session consisted of five trials.

Procedures

Edible Preference Assessment. Two forced-choice and two MSWO preference assessments were conducted prior to training to determine preferred edibles. During the forced-choice, six edibles (fruit snacks, snickers, sour gummy worms, M&Ms, starbursts, and gummy bears) were presented in randomized pairs, based on procedures described by Fisher et al.

(1992). During one session, each item was presented five times and paired with all other items once. Kasey was instructed to choose one of the items in the pair and was provided the selected edible. During the MSWO, the same six edibles were presented in an array, based on the procedures described by DeLeon and Iwata (1996). Kasey was instructed to choose one of the six items. Once an item was selected, the researcher provided the item to Kasey and removed it from the array. This was repeated until there were no items left.

Generic Icon Training. The SGD was put on the generic icon screen. One generic page was open with three graphic candy icons, a clear icon, and a go back icon. The therapist placed the SGD in front of Kasey along with three preferred edibles (determined by the preference assessments). At the beginning of the session, the therapist stated "Kasey, what do you want?" If Kasey pressed an edible-related icon on his device, he was provided the corresponding edible on a FR 1 schedule. If Kasey reached for an edible, he was physical prompted to press the candy icon corresponding with the edible for which he reached. Kasey was then provided the corresponding edible on a FR 1 schedule. No prompting was provided until a mand initiation occurred (pressing the device or reaching for the bag). Any problem behavior during the session was ignored but scored using the data sheet. One session was complete after 5 trials (1 mand = 1 trial).

Individualized Icon Training. The SGD was put on the individualized icon screen. One individualized page was open with three edible icons, a clear icon, and a go back icon. The therapist placed the SGD in front of Kasey along with three preferred edibles (determine by the preference assessments). At the beginning of the session, the therapist stated "Kasey, what do you want?" If Kasey pressed an edible-related icon on his device, he was provided the corresponding edible on a FR 1 schedule. If Kasey reached for an edible, he was physical

prompted to press the candy icon corresponding with the edible for which he reached. Kasey was then provided the corresponding edible on a FR 1 schedule. No prompting was provided until a mand initiation occurred (pressing the device or reaching for the bag). Any problem behavior during the session was ignored but recorded on the data sheet. One session was complete after 5 trials (1 mand = 1 trial).

Concurrent Operant Preference Assessment. The procedures for the concurrent operant preference assessment (COPA) were based on procedures described by Brower-Breitwieser, Miltenberger, Gross, Fuqua, and Breitwieser (2008). The SGD was put on the concurrent operant screen. The page consisted of two icons: one green and one red. The green icon sequenced to the individualized icon screen and the red icon sequenced to the generic icon screen. Kasey was exposed to the contingencies for both options. Both icon-types consisted of equal response effort and equal amounts and quality of reinforcement. Ten forced exposure sessions were conducted, and the screen choice was alternated per session. After the 10 forced exposure, the COPA was conducted. At the beginning of each COPA session, three preferred edibles were placed on the table and the therapist stated, "Kasey, we are working on communication. What would you like?" Once Kasey chose a screen and an item, the therapist presented him with the requested item on an FR 1 schedule. Any problem behavior during the session was ignored but recorded on the data sheet. One session was complete after five trials (1 mand = 1 trial). Both page options were available for each trial, with a total of five opportunities to choose a page each session.

Interobserver Agreement (IOA) and Procedural Fidelity

An independent second observer collected data during 73.9% of all sessions (100% of edible preference assessments sessions, 33.3% of mand training sessions, and 100% of

concurrent operant assessment sessions). During preference assessments, IOA data were collected on Kasey's selection. IOA data for mand training were collected on the prompt level necessary for Kasey to engage in the communicative response and the occurrence or non-occurrence of problem behavior. Point-by-point IOA was calculated for all observations. An agreement for each point was scored if both observers marked the same prompt level and same occurrence or non-occurrence of problem behavior. IOA coefficients were calculated by dividing the number of agreements by agreements plus disagreements and multiplying by 100. The overall agreement across all sessions was 99.7% (98.3% for preference assessments, 100% for mand training, and 100% for the concurrent operant assessment).

Data related to procedural fidelity were collected by an independent observer to ensure the therapist followed all procedures and implemented the intervention properly. The independent observer used a procedural checklist to score the correct or incorrect implementation of procedures (see Appendix A). Procedural fidelity data were collected on (a) correct condition randomization, (b) correct edible array, (c) correct contingency statement, and (d) correct prompting. Data were collected during 73.9% of all sessions (100% of edible preference assessments sessions, 33.3% of mand training, and 100% of concurrent operant assessment sessions). Procedural fidelity was 100% across all sessions.

CHAPTER 3

RESULTS

Visual analysis was used to interpret all data. In the forced-choice, fruit snacks were selected during 100% of the pairings, starbursts were selected during 70% of the pairings, gummy bears were selected during 60% of the parings, sour gummy worms were selected during 50% of the parings, snickers were selected during 10% of the pairings and M&Ms were selected during 0% of all pairings across two sessions (see figure 1). The MSWO preference assessments revealed a preferred rank order of fruit snacks, starbursts, gummy bears, sour gummy worms, snickers, and M&Ms (see table 1). These results were consistent across both MSWO sessions. Both preference assessments revealed similar results, with fruit snacks, starburst, gummy bears, and sour gummy worms being most-preferred.

Figure 2 shows the results of the mand training sessions. Kasey averaged 100% independence of mands during generic icon sessions. He reached criterion of 80% independence for three consecutive sessions by the third generic icon session. Kasey had 0% of sessions with problem behavior during the generic icon session. Kasey averaged 96% independence of mands during individual icon sessions. He reached criterion of 80% independence for three consecutive sessions by the third individualized icon session. Kasey had 20% of sessions with problem behavior during the individual icon sessions.

Figure 3 shows the results of the concurrent operant preference assessment. Ten sessions of the concurrent operant were conducted. Kasey selected the generic icon screen during 100%

of sessions of the concurrent operant. There was no problem behavior during concurrent operant sessions.

CHAPTER 4

DISCUSSION

The purpose of the current study was to (a) compare the effects of SGD icon-type on the acquisition of mands, (b) compare the effects of SGD icon-type on problem behavior and (c) assess preference for icon-type. The study aimed to add to the literature base of assessing proficiency and preference among mand topographies. No studies to date have assessed the effect of different icons on a SGD on independence of mands.

During the mand training phase of the current study, an individual with moderate ID was taught to use a SGD to request preferred edible items. The SGD alternated between using a screen with generic candy icons and using a screen with individualized candy icons. The results of mand training revealed that Kasey was able to acquire the communicative response to mand using both generic icons and individualized icons. The generic icons resulted in a slightly higher percent of independent manding than individual icons (100% independent mands with generic-icons and 96% independent mands with individualized-icons). However, Kasey acquired the skill to mand with both icon types in three sessions across each condition. The results also revealed that more problem behavior was associated with individualized icons than generic icons. Problem behavior occurred in 20% of individualized sessions and 0% of generic sessions.

The findings were similar to the mand training results in Waddington et al. (2014), Carnett and Tullis (2017), and Lorah (2018). All studies used physical prompting as the only prompt strategy. The findings from the current study furthered the research on the use of

physical prompting to teach manding on an AAC device as opposed to using least-to-most or three-step prompting strategies.

During the concurrent operant phase of the current study, Kasey was presented the SGD with both mand topographies available. Forced exposure trials allowed Kasey to contact the contingencies associated with the green button, which led to the individualized icon screen and the contingencies associated with the red button, which led to the generic icon screen. After forced-exposure conditions, 10 sessions of the concurrent operant were conducted. Preference for an icon-type was assessed by response allocation in the concurrent operant arrangement. The results of the concurrent operant reveal a clear preference for the generic icon screen.

The findings of the COPA were similar to the preference assessment findings in Winborn-Kemmerer et al. (2009), Lorah et al. (2013), Ringdahl et al. (2016), Torelli et al. (2016) and Ringdahl et al. (2018). Previous research and the current study revealed clear preferences among all individuals, even though response effort among topographies was equated. The findings of the current study also extended the research on the use of concurrent operant arrangements to assess preference for mand topographies. The results of Winbron-Kemmer et al. (2009), Lorah et al. (2013), Ringdahl et al. (2016), Torelli et al. (2016), Ringdahl et al. (2018) and the current study demonstrated response allocation to a specific mand topography in a concurrent operant arrangement.

Limitations

One limitation of the current study is a history threat. During the study, Kasey received services from a speech language pathologist (SLP). The SLP exposed Kasey to a device program similar to the one used in this study. The SLP began teaching Kasey how to request fruit snacks on the device. Due to this threat, fruit snacks were excluded from the mand training

sessions. A second limitation is Kasey's prior exposure to the SGD. In his previous placement, Kasey was taught to request three items on his device: fruit snacks, fidget, and computer. This prior exposure to the device may have contributed to the rapid independence of mands in the current study as well as provided a reinforcement history for generic icons.

A third limitation is reinforcement rate was not controlled for prior to the concurrent operant assessment. Although all sessions include five trials, which allows for five reinforcement opportunities per session, latency was not assessed to calculate reinforcement rate. A fourth limitation is no generalization sessions were conducted. All trials for mand training were conducted in a discrete trial format outside of typical academic work sessions. A generalization component would assess the independence of mands while academic demands are placed.

A final limitation is the mand topographies remained in the same location during the COPA due to device programming issues. The location remaining constant for each session may be a confounding variable. The preference results may be a result of a true preference for generic icons or a result of a side bias. Future research should assess ways to get around the programming issue and randomize the location of each topography every session.

Implications for Practice and Future Research

Despite the limitations mentioned above, the findings from the current study have implications for practice. The findings show that a physical prompting procedure following an error was effective in teaching a communicative response. Future research should assess the components of this training package and possible additional components to find an optimal training package. The findings also show that an individual may prefer one mand topography

over another. Future research should empirically assess whether preference for one topography increases independence and/or decreases problem behavior.

Future research should compare the effects of icon type on independence of mands with individuals with no prior history with a SGD. Prior use of an SGD may skew the results of the mand training phase and the concurrent operant phase due to a history of reinforcement. Future research should also record reinforcement rate and latency to engage in a communicative response. Assessing latency to engage in a response may reveal a difference between the two icons not observed with only calculating percent of independence. Recording reinforcement rate will ensure that both icons are equated.

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Table 1
Multiple Stimulus Without Replacement (MSWO) Results

	MSWO 1	MSWO 2
1.	Fruit Snack	Fruit Snack
2.	Starburst	Starburst
3.	Gummy Bear	Gummy Bear
4.	Sour Gummy Worm	Sour Gummy Worm
5.	M&M/Snickers	Snickers
6.		M&M

Note. Kasey did not choose the M&M or Snickers in MSWO 1 so they were scored as an equal rank

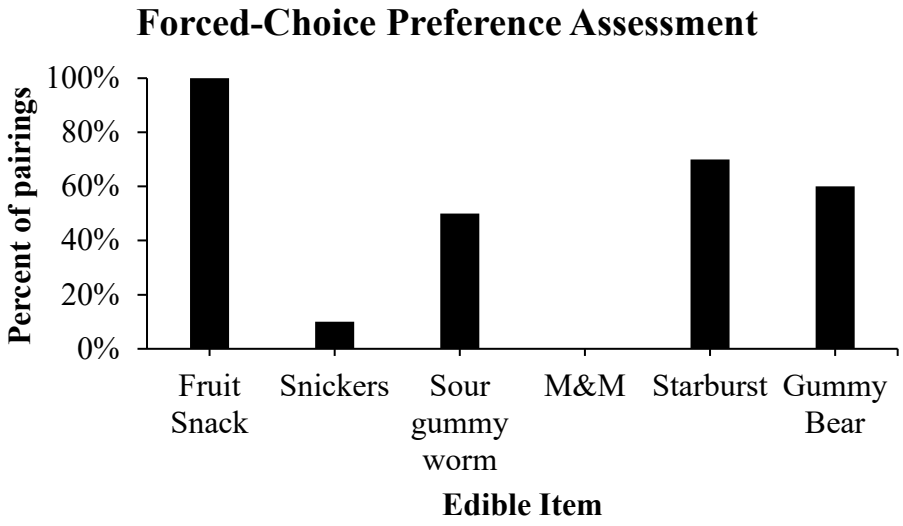

Figure 1. Percent of pairings edible item was selected

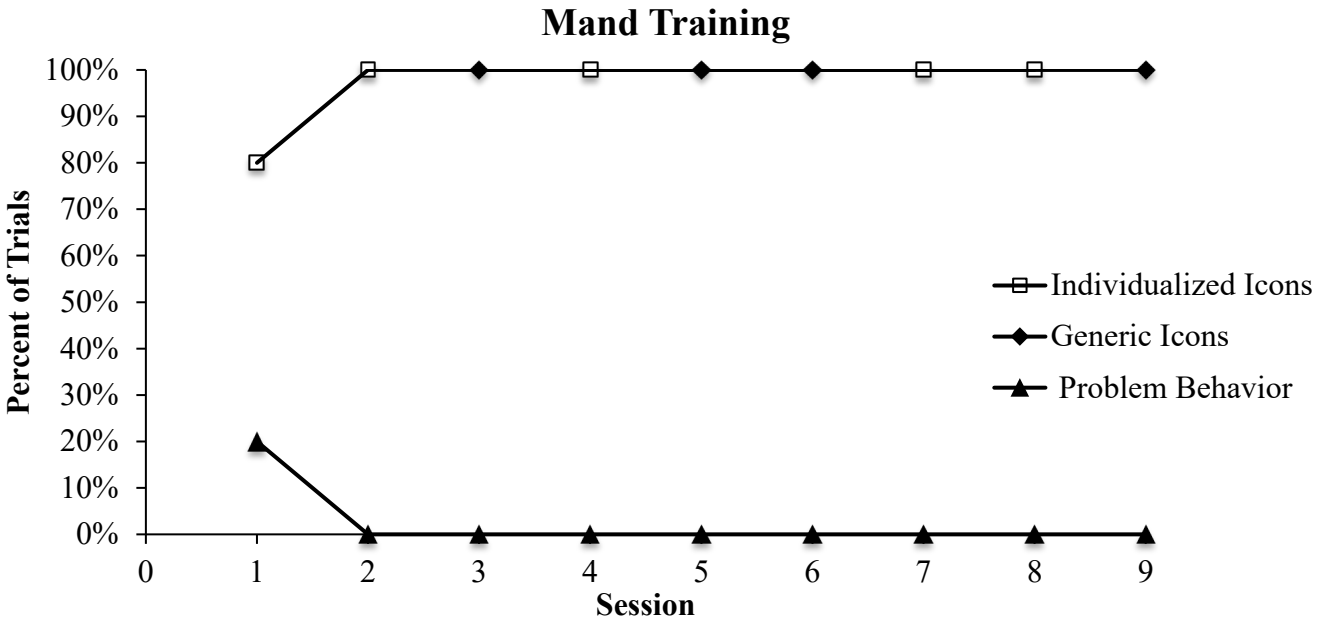

Figure 2. Percent of session with independent mands and percent of session with problem behavior.

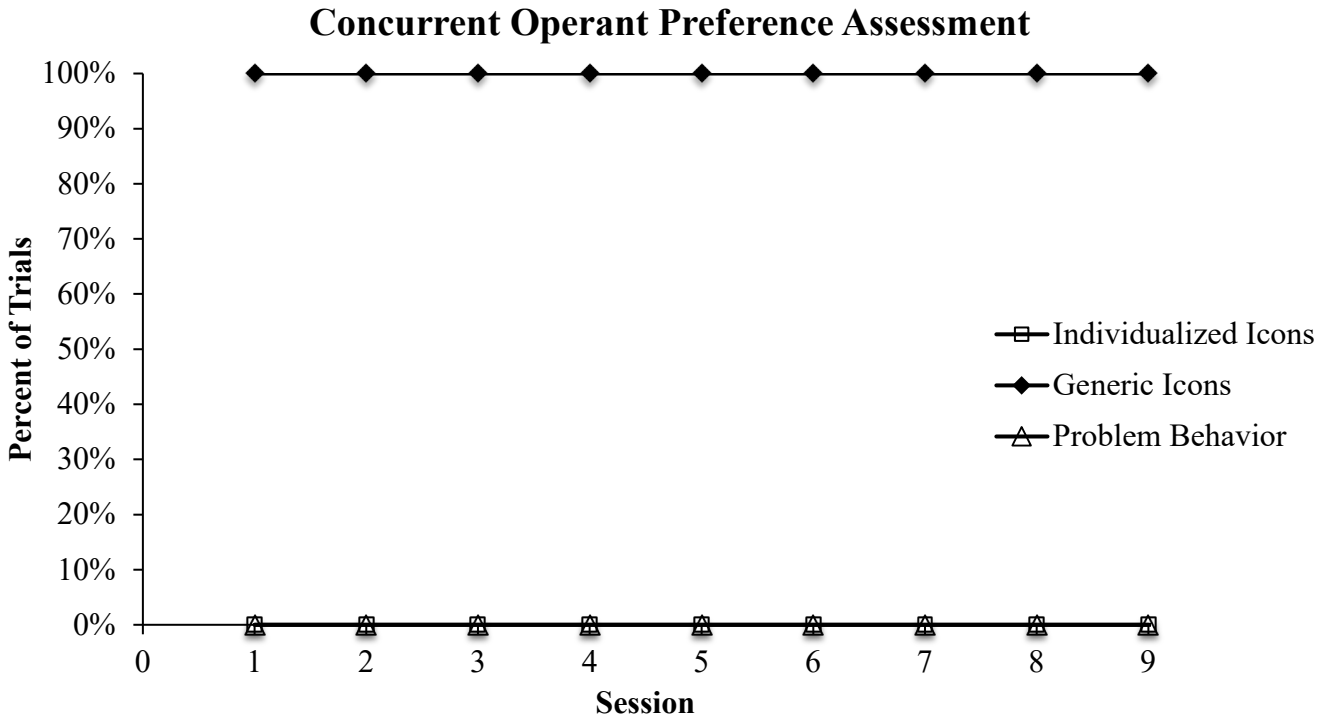

Figure 3. Percent of session the mand topography was selected and percent of session with problem behavior.

APPENDICES

APPENDIX A

Data Sheets

Participant:									
Mands: I = Independent P = physical prompt **Problem Behavior**: + is occurred and - is didn't occur	Therapist/Data Collector	Items	Trial #	1	2	3	4	5	% session independent and % PBx
Session #:									
Date:			Press edible						
Condition:			Problem Behavior						
Session #:									
Date:			Press edible						
Condition:			Problem Behavior						
Session #:									
Date:			Press edible						
Condition:			Problem Behavior						
Session #:									
Date:			Press edible						
Condition:			Problem Behavior						

Mand Training Procedural Fidelity Data Sheet			
Use + to indicate correct and - to indicate incorrect			
Date:	Session#:	Condition:	Researcher:
1. Researcher randomizes starting condition by flipping a coin			
2. Researcher randomizes mand page by drawing a number			
3. Researcher doesn't conduct same session more than twice in a row			
4. Researcher places 3 edibles on table and vocally states what is available			
5. Researcher waits for mand initiation (using device, reaching, or vocalizing)			
6. Researcher physically prompts if vocals or reaching occurs			
7. Researcher provides requested edible			

Concurrent Operant Preference Assessment Procedural Fidelity Data Sheet			
Use + to indicate correct and - to indicate incorrect			
Date:	Session#:	Condition:	Researcher:
1. Researcher states contingent "We are working on communication, which screen do you want?"			
2. Researcher places 3 edibles on table and vocally states what's available			
3. Researcher waits for mand initiation (using device, reaching, or vocalizing)			
4. Researcher physically prompts if vocals or reaching occurs			
5. Researcher provides requested edible			

Screen Selected: R= red; G=Green **Mands**: I = Independent; P = physical prompt **Problem Behavior**: + is occurred and - is didn't occur	Therapist/Data Collector	Items	Trial #	1	2	3	4	5	% session independent and % PBx
Session #:			Screen Selected						
Date:			Press Edible						
Condition:			Problem Behavior						
Session #:			Screen Selected						
Date:			Press Edible						
Condition:			Problem Behavior						
Session #:			Screen Selected						
Date:			Press Edible						
Condition:			Problem Behavior						