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The Effects of Question-Present Versus Item Present Conditions on Acquisition of Mands

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THE EFFECTS OF QUESTION-PRESENT VERSUS

ITEM-PRESENT CONDITIONS ON ACQUISITION OF MANDS

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A Thesis

Presented to

The Graduate Faculty

Central Washington University

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Applied Behavior Analysis

_____

by

Paige M. Thornton

May 2016

CENTRAL WASHINGTON UNIVERSITY

Graduate Studies

We hereby approve the thesis of

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ABSTRACT

THE EFFECTS OF QUESTION-PRESENT VERSUS

ITEM-PRESENT CONDITIONS ON ACQUISITION OF MANDS

by

Paige M. Thornton

May 2016

A mand, often referred to as a request in lay terms, is a verbal operant that is under the control of an establishing operation and maintained by a specific reinforcer. Children with autism spectrum disorder often have difficulty learning mands and need supplemental training to learn this skill. The purpose of the present study was to extend the study by Bowen, Shillingsburg, and Carr (2012) and compare two mand training procedures to determine if a question-only or item-present condition would result in more rapid acquisition of mands. A multiple baseline design across participants, with an embedded alternating treatment design, was used to evaluate mand acquisition in two preschool children with autism. Results of the study showed that the item-present condition resulted in more rapid acquisition of mands than the question-only condition.

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CHAPTER I

INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disorder characterized by impairment in an individual's ability to communicate and interact with others (Block, Block, & Halliday, 2006). Currently, 1 out of 68 children are diagnosed with ASD (Baio, 2014). This disorder affects individuals in many different ways and some more severely than others. ASD is an umbrella term for a variety of different symptoms that affect an individual's behavior. The DSM-5 outlines three levels of severity of an ASD diagnosis. Level one includes individuals who require support in social communication or daily tasks, level two includes individuals that require substantial support, and level three includes individuals that require very substantial support. Symptoms of ASD usually manifest between 18 months to two years of age (American Psychiatric Association, 2013).

The first criterion of the DSM-5 diagnosis for ASD is persistent deficits in social communication and interaction across contexts (American Psychiatric Association, 2013). An impairment in an individual's social skills, one of the most distinct characteristics in individuals with ASD, may include the inability to make eye contact, lack of parallel play, or inability to understand jokes and sarcasm. In social situations, a child may use his or her peripheral vision to look at people or complete tasks instead of making direct eye contact (Block, et al. 2006). Children with ASD often do not understand social cues (American Psychiatric Association, 2013), such as when they are invading someone's personal space or when someone is annoyed.

The second criterion necessary in an ASD diagnosis is restricted, repetitive behavior, which can include repetitive speech or repetitive motor movements (American Psychiatric Association, 2013). Examples of repetitive speech include repeating certain words, mumbling sounds, or repeating extensive songs. Repetitive motor movements can be described in many forms, such as arm flapping or bouncing. Other common behaviors, though not required for a diagnosis of ASD, are excessive adherences to routines and obsessive behaviors (American Psychiatric Association, 2013).

One of the most prevalent signs of ASD is impairment in an individual's communication skills, language ability, and receptive skills. Children with deficits in receptive language often do not understand what others are saying to them, and they may even react as if someone is not talking to them (Block, et al. 2006). Deficits in expressive language ability can range in severity. A child may be mute, or in less severe cases may be able to speak only one or two words to communicate to others. In less severe cases, a child may even have a full vocabulary. Often times, children that have limited vocal ability will learn to point to wanted objects, pull people to the items of interest, or learn to use pictures to communicate their needs (American Psychiatric Association, 2013).

One expressive language deficit often targeted for intervention in children with ASD is requesting, or engaging in communicative behavior to have a need or want fulfilled. The technical term for the skill of requesting is manding (Skinner, 1957). Manding is an important skill to acquire because it directly benefits the learner by providing opportunity for reinforcement for his or her communicative behavior (Sundberg & Partington, 2008). Manding is often targeted early in the intervention process, and tends to be acquired faster than other types of verbal responses (Sundberg &

Partington, 2008). The purpose of the current study is to evaluate a specific component of

mand training and determine if asking a child, "What do you want?" when the target item

is not present, can elicit a mand more promptly than having the item present without the

question prompt.

CHAPTER II

LITERATURE REVIEW

Skinner's Verbal Behavior

Skinner's *Verbal Behavior* (1957) was the first attempt to provide a behavioral analysis of human language. He chose the term "verbal," because the term refers to all forms of language, such as speech, sign language, or written language (Sundberg & Partington, 1998). Skinner's analysis of verbal behavior included two distinct roles: the listener and the speaker. The speaker is the person who emits the verbal behavior, whereas the listener is the person who provides a consequence for the speaker's verbal response. Skinner (1957) defines a mand as a verbal request that is reinforced with a specific consequence. An example of this is someone asking, "Can I have a snack?" The reinforcement of receiving a snack is what maintains the behavior of manding for a snack in the future. As Skinner (1957) points out, a mand is a verbal operant that directly benefits the speaker. The interest the participant has in the specific item is considered an establishing operation. An establishing operation (EO) is a momentary variable that establishes the effectiveness of a reinforcer (Michael, 1988). Deprivation and aversive stimuli are often identified as two stimuli that work as EOs. An example of an EO is food deprivation. If someone is deprived of food, food is momentarily established as a reinforcer, and a specific behavior that has previously produced food is more likely to occur.

Being able to mand is important because it is how we express to the listener what it is that we desire. Sundberg & Partington (1998) agree with Skinner on the importance of mand training due to the fact that it gives a child more control over his or

her environment, and will increase the value of language to them as a form of social behavior. For example, a child that is not old or big enough to get things for themselves may mand for milk; whereas, a child that does not have this ability, has no way to request for the item.

Verbal Behavior Interventions

Discrete trial training (DTT) and natural environment training (NET) are two arrangements used for early behavioral intervention for children with ASD. DTT is a structured instructional arrangement that is typically conducted in a specific location, such as a classroom (Sundberg & Partington, 1998). DTT includes trials with four basic components including instruction/stimulus, prompt, response, and consequence. The stimulus that is presented to the child is selected specifically for its relation to the target skill. If the child responds correctly, reinforcement is delivered immediately. Incorrect responses are corrected, and training is continued until the child masters the skill. Prompts, an action or movement that is used to direct someone to engage in a particular response, are used initially until the child is able to respond independently. Prompts include, among many things, the use of supplemental questions. The question, "What do you want?" is a popular prompt that is used in mand training. Another example of a prompt, is a child saying, "coo" when manding for a cookie An instructor using DTT may respond by using an echoic prompt to teach the child to say to whole word, "cookie".

Sundberg & Partington (1998) define NET as a training procedure that focuses on the participant's immediate interests and activities as a guide for instruction. NET is different from DTT in a few different ways. NET is conducted in the participant's natural

environment and allows for the instructor and the participant to both engage with the target item. There are also less structured contingencies, meaning that attempts to respond are reinforced (Sundberg & Partington, 1998). Both training procedures have been shown to be effective, though Sundberg & Partington (1998) state that according to results from various studies, natural training procedures (NET) should be preferred over discrete trials when working with children with ASD because children are more likely to generalize the skills they acquire (pg. 201).

Mand Training

Along with different training arrangements, there are also many different response topography options a person can use when teaching mands. Response topography is the physical form of a behavior or what the behavior looks like (Cooper, Heron, and Heward, 2007). This is different from the function, as the function of a response is the specific consequence it produces. The most common topography when teaching language is vocal speech. Although, if a person is not currently producing vocal speech, other options that may be better suited, are the use of sign language or pictures to communicate.

Manding with Pictures. The Picture Exchange Communication System (PECS) is one way to teach manding. PECS is a communication system that was developed for children with social-communication deficits and is used frequently with children with ASD (Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet, 2002). To use PECS the individual selects a picture of a preferred item and hands it to the listener in order to request that item. PECS is a good language device for children that are not extremely mobile, and do not find it aversive to carry around their communication device. A major advantage to using PECS is that the listener does not need to be trained in order to

communicate with the speaker, as compared to sign language (Sundberg & Partington, 1998).

Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002), aimed to assess acquisition of the PECS system, as well as the effects of PECS training on speech during play and school, with three male children diagnosed with ASD. Following a preference assessment to identify reinforcing stimuli, the participants were exposed to PECS training. Each child participated in two 15 min training sessions per week. During the first phase, the children learned to hand a picture of a preferred item to an adult, who then provided reinforcement by delivering the item that was on the picture. Charlop-Christy et al. (2002) found that, while learning to communicate using PECS, all three participants either increased or began to use spontaneous speech as well as imitative speech.

Manding with Sign Language. Another form of communication individuals can use to mand is sign language. Many studies have found that sign language is a functional way to build a language repertoire (Carbone, Sweeney-Kerwin, Attanasio, and Kasper, 2010). For a child who is unable to produce sound vocally, but is able to imitate fine or gross motor movements, sign language is a good alternative to vocal speech. In addition, sign language is arguably the best alternative to vocal speech because it is a complete language and there is a large community of people to engage with (Sundberg & Partington, 1998). According to Carbone, Sweeney-Kerwin, Attanasio, and Kasper, (2010), studies have suggested that sign language can assist in the development of vocal speech.

Carbone et al. (2010) sought to determine if learning signed mands could aid in the development of vocal responses along with prompt delay and vocal prompting. This

study included three participants between the age of 4 and 6-years-old who attended a private school that served developmentally disabled children. Two of the children had been diagnosed with ASD, and the third participant was diagnosed with Down syndrome. A multiple baseline design across participants was used. During baseline, the instructor held a preferred item at the eye level of the child. If the child made a movement toward the item, and emitted the appropriate sign to mand for the item within 5 s of its presentation, the instructor delivered the preferred item while simultaneously stating the name of the item. If the child did not make a movement toward the item or did not appropriately mand for the item, the item was not delivered to the child and a new item was presented. The intervention was similar to baseline except when the child made movement toward the item and manded for the item appropriately, the instructor waited 5 s. If, during the delay, the child made a vocal response independently, the item was delivered immediately. If the child did not emit a vocal response independently, the instructor gave a vocal prompt, labeled the item, and waited another 2 s. If the child emitted a vocal response following the vocal prompt, the item was delivered immediately. If the child still did not emit a vocal response, the instructor re-presented the vocal response two more times before moving to the next item. All participants increased their number of vocal responses that supplemented the appropriate mand signs. These results indicate that prompt delay and vocal prompting, when accompanied with sign language, can increase vocal responding for children with developmental disabilities (Carbone et al., 2010).

Vocal Mands. Vocal mands are the primary goal for children who are able to produce vocal sounds. The most significant advantage of vocal speech is the large

population of individuals that you are able to interact and communicate with when using this language (Sundberg & Partington, 1998). The use of pictures and sign language can often be difficult to use when the targeted listener has no training or experience with that form of communication. The use of shaping, stimulus prompt fading, and/or response prompt fading can be used to teach the use of vocal language to individuals.

A study by Drash, High, and Tudor (1999), used shaping to form a mand repertoire in three nonverbal participants. The participants for this study were three boys diagnosed with ASD between the ages of two and four years old. All three boys were considered nonverbal and were outpatients at a clinic that specialized in teaching language. The researchers held a preferred item out of reach and asked the participant what he or she wanted. Since the participants were nonverbal, any initial verbal sound was reinforced. Once the participant was consistently making verbal sounds, only approximations closer to the specific response were reinforced. Since the target items were visible to the participant, and the sounds were prompted, they were not under the control of pure mand training.

Bourret, Vollmer, and Rapp (2004) conducted two studies to evaluate a mand assessment and instructional procedures based on that assessment. The first study examined an assessment to identify the participants' deficits in vocal manding. This was followed by a second study in which the researchers aimed to test specific mand training procedures based on the results of the assessment. The participants included three individuals between the ages of 6-18 years old who had been diagnosed with either ASD or mental retardation. The researchers used a multiple baseline design across behaviors to show experimental control. One of the participants engaged in spontaneous independent

mands during the assessment, which suggested that his vocal manding abilities could be enhanced. Mand training for this participant consisted of the presentation of preferred items identified in a preference assessment followed by nonspecific prompting (e.g., "If you want this, ask me for it"). The treatment was effective for the participant. At the end of the study, he was able to correctly mand for "music" and "radio," without the use of prompts or reinforcement. Another participant uttered word approximations during the assessment, and this suggested that prompt fading would be a useful method for him because he was dependent on the prompts and could not emit independent mands. The researcher began the prompting by stating, "Nick, if you want this say," and then faded to "Nick," then to "Ni." During this prompt-fading procedure the researchers only provided the participant with one prompt at the beginning of each trial. The results of the second study found that this participant learned to mand for objects without a prompt. For the third participant, shaping and stimulus fading was used because the results of the assessment found that he could imitate a significant portion of a target mand but not the entire topography. By using these two training procedures, this participant was able to produce a novel mand, though prompts were never fully eliminated (Bourret et al., 2004).

One of the more common ways of teaching manding is by using vocal prompting. Bowen, Shilllingsburg, and Carr (2012) assessed the effects of using the question, "What do you want?" on the acquisition and maintenance of mands when the vocal prompt was no longer present for children with ASD. Participants consisted of two children with a diagnosis of ASD, ages 3 and 11. An alternating treatments design was used to evaluate the participants' response to each type of instruction. The two conditions used for this study were question-absent and question-present. During the question-present condition,

the target item was placed in front of the participant and he or she was asked, "What do you want?" The question-absent condition was similar, though without the supplemental question. The two treatments alternated rapidly within each session.

Following a preference assessment to identify preferred items for each child, baseline data were collected to assess whether either participant possessed prior skills in manding for an item. Once it was established that neither participant maintained the ability to mand for desired items in either the question-present or question-absent condition, the authors presented the mand training procedures. For the question-present condition, the researchers presented the item to the participant, and paired it with the vocal prompt, "What do you want?" The trials began with a 0 s prompt delay, meaning they would provide the prompt for the child immediately following the question. If the child could echo the correct response during the final three trials, the researchers would then move on to a 2 s prompt delay to give the child the opportunity to mand for the item independently. This process continued until a 6 s delay was reached. The trial was considered complete when the child had been exposed to the item for 20 s or when the item had been consumed. During the question-absent condition, the target item was still placed in front of the participant, but the researcher did not present the question "What do you want?" to the child. The same prompting strategy was used as the question-present condition, though a different edible item was used than during the question-present phase. After the phases were complete, posttraining probes were conducted. This phase was similar to the pre-training probes in which neither the question, nor the prompts were provided (Bowen et al., 2012).

Bowen et al. (2012) found no meaningful difference in acquisition of mands between the two conditions. These researchers also found that the use of a supplemental question did not deter learning of an independent mand. The results of Bowen et al. (2012) also refute the idea of undesirable stimulus control as a result of inclusion of the question "What do you want?" during training. However, Bowen et al. (2012) report that there is a limitation to their study. During the question-present condition presentation of the target items could have acquired stimulus control over the response and blocked the question from acquiring stimulus control. In order to determine if this was the case, an evaluation of a question-only versus an item-only condition would need to be conducted (Bowen et al., 2012).

Proposal and Current Hypothesis

This study proposed to extend the findings of Bowen et al. (2012) and conduct a comparison of two instructional conditions for mand training. The two conditions that were used were a question-present condition and an item-present condition. The question-present condition was similar to Bowen et al. (2012), but without the target item being present. The item-present condition had the target item present, but did not include the supplemental question, "What do you want?" Based on the results of the Bowen et al. (2012) study, when comparing an item-present condition to a question-present condition, it was predicted that there would be no difference in the children's ability to emit a mand following instruction.

CHAPTER III

METHOD

Participants

Two children who attended an early intervention classroom for young children

with Autism Spectrum Disorder (ASD) participated in this study. Sam was a 4-year-old

boy who had an autism diagnosis. He was mildly impaired and was at a level 2 Learner

(18-30 months), per his Verbal Behavior Milestones Assessment and Placement Program

(VB-MAPP) results. Sam was verbal and echoed the vocalization of others. Dean was

also a 4-year-old boy who had an autism diagnosis. He was mildly impaired by his

disorder and required level 2 supports in the areas of social interaction and restricted

repetitive behavior, per his diagnostic results. Dean was at a level 2 Learner (18-30

months), per his VB-MAPP results and was unable to consistently mand for desired

stimuli. Both participants were selected based on their manding abilities, as assessed by

the VB-MAPP. The VB-MAPP is an assessment of an individual's social, language, and

other related skills that are used to determine a child's developmental level in these areas.

Participants were selected based on the recommendation of the classroom supervisor and

a VB-MAPP score that showed the children did not independently mand consistently.

Prior to beginning the study, written permission to run the study was obtained from the

program supervisor, and informed consent was obtained from the parent or guardian of

each participant.

Setting and Materials

All trials were conducted during snack time in the participant's classroom. Trials

were conducted four days per week with one session per day. Four children received

instruction in the classroom simultaneously. Instruction occurred both individually and in small groups, and there was a 1:1 staff-child ratio. Typically, the children sat together at a large table during snack time. For this study, the participant and primary investigator sat slightly apart from the other children to prevent distractions from classmates. Sessions were held during snack time because there was a clear establishing operation involving food deprivation at that time. This time period was also chosen because it did not disrupt the participant's routine in the classroom. The snack options were selected from a list of potential reinforcers that were generated from a preference assessment (described below).

Dependent Measures

Two main dependent variables were examined in this study: independent responses and prompted responses. These responses were categorized in one of the following ways: (a) correct, (b) incorrect, or (c) a nonresponse. A diagram of these categories can be seen below in Figure 1. The cumulative number of responses were used to show the rate of acquisition within each condition over time. By showing the cumulative number of responses for each trial, the data illustrate the difference in rate of acquisition of mands using the two intervention procedures.

Independent Responses: Emitted a mand in the absence of a prompt	**Correct** (Manded within 20 s)
	Incorrect (Manded for incorrect item)
	Nonresponse No mand was emitted
Prompted Responses: A prompt was required to evoke the mand	**Correct** (Responded within 20 s with prompt)
	Incorrect (Manded for incorrect item with prompt)

Figure 1. The two main dependent variables, independent and prompted responses, along with the three ways they can be categorized are shown.

A response was marked independent if the participant emitted a mand in the absence of a prompt. A response was marked as prompted if prompting was required to evoke the mand. If the participant emitted a mand, the primary investigator recorded whether the mand was correct or incorrect. A correct mand was a verbal request for the target snack item within 20 s of the trial presentation. Verbal approximations to the correct target were also considered and recorded as correct mands (e.g. gu, um, gum, mmy, etc. when asking for gummy). An incorrect mand was a verbal request for an item that was not the current target snack item. If the participant did not emit a mand within 20 s, the primary investigator marked it as a nonresponse. A copy of the data sheet that was used is provided in Appendix A.

The primary investigator collected data during all sessions. In order to ensure reliability of the data collected, a second observer, the program supervisor, collected data during at least 20% of both the baseline and treatment phases for each participant (Kennedy, 2005). The supervisor was selected as the secondary observer because she was regularly present in the classroom and was unlikely to cause reactivity to measurement. Sessions were video recorded so that if the secondary observer was unable to be present during the time of the session, she could review the video at a later time to conduct interobserver agreement (IOA). Prior to observation, the secondary observer was provided with a copy of the operational definitions and data sheet, and the primary investigator explained how to use it correctly. The primary investigator role-played example behaviors so the secondary observer could practice using the data sheet. In order for the secondary observer to be prepared to conduct real data, she had to reach an 80% agreement with the primary investigator during training. A video of a child engaging in

manding behavior was used for the purpose of this training in order to provide an example for practice.

IOA was calculated using total agreement. Total agreement is found by dividing the smaller of the two observers' counts, by the larger count and multiplying by 100. IOA reached 98% agreement between the primary and secondary researcher. The range for IOA was 92-100%, with a mean of 96% total agreement.

Experimental Design

A concurrent multiple baseline design across participants with an embedded alternating treatments design was used to assess the effects of item-present and question-present mand training. A multiple baseline design was used to demonstrate experimental control, and consisted of baseline conditions for each participant, followed by the systematically delayed introduction of the treatment conditions (Cooper et al., 2007). Both participants began baseline simultaneously, and once responding was stable, the first participant began the treatment phase. The second participant remained in baseline until there was stable responding by the first participant. This type of design uses time series and replication logic that is based on prediction, verification, and replication to rule out extraneous variables. A prediction is made that responding would continue at baseline levels if no changes were made. Following introduction of the intervention for the first participant, the second participant remains in baseline to verify this prediction. Replication of the treatment is then shown when the second participant enters the treatment phase. Replication is successful when changes in the behavior of the second participant are similar to those observed in the first participant (Cooper, et al., pg. 201-

203). An illustration of this design using hypothetical data can be observed in figure 2

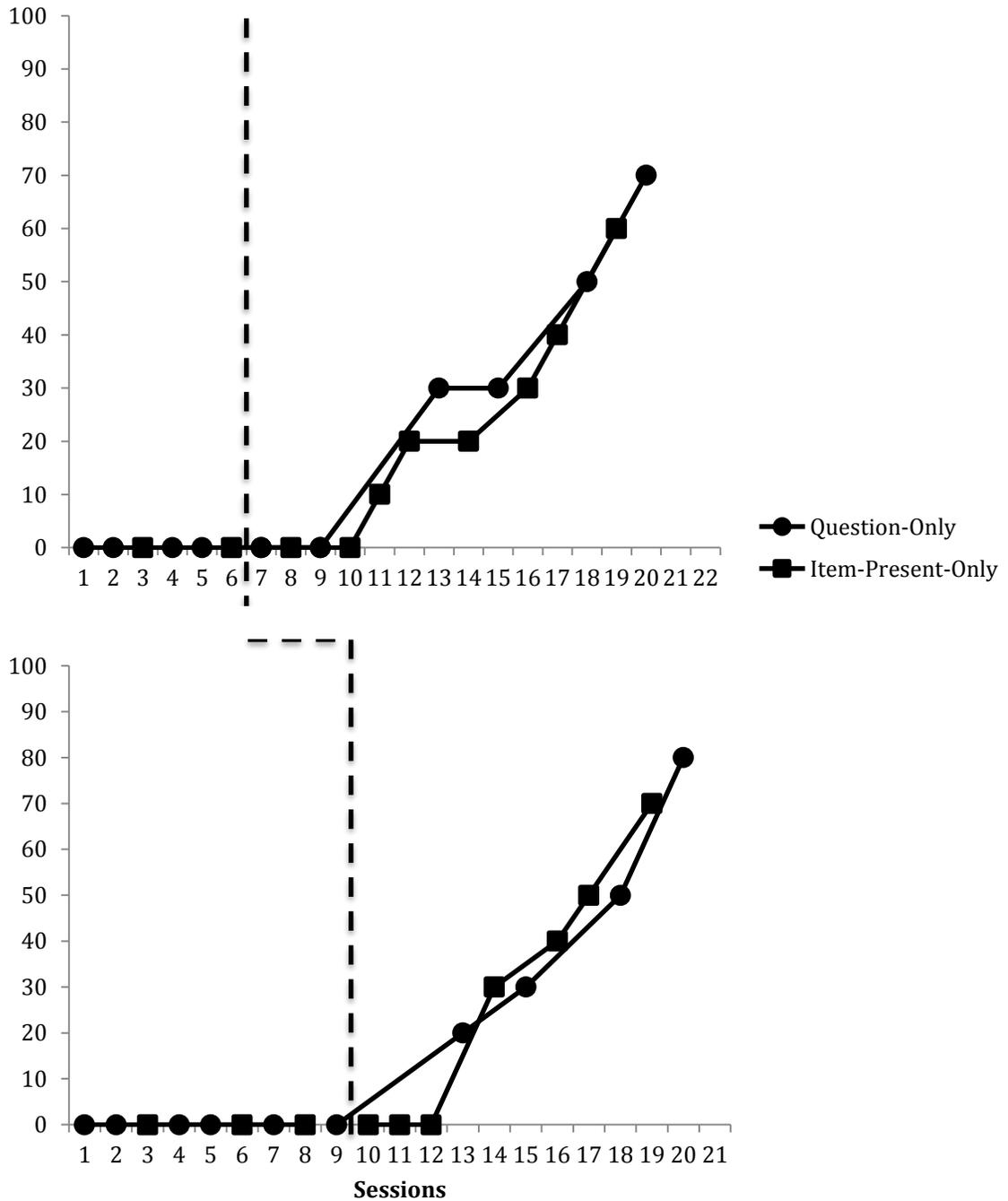below. Only correct *independent* and *prompted* responses were graphed.

Figure 2. This graph shows the cumulative number of independent responses observed
across phases and treatment conditions.

The multiple baseline design was combined with an alternating treatments design in order to further strengthen the research design. In an alternating treatment design, two or more experimental conditions are rapidly alternated. In this study, the two treatments (item-present and question-present) alternate rapidly throughout the sessions. Although the two conditions were being interchanged within the session, they were presented the same number of times. This type of design uses prediction of future response levels, verification of the previous prediction of performance, and the opportunity for replication of effects of treatment to rule out extraneous variables (Cooper et al., 2007). Prediction is made using a single data point in a particular treatment condition. Then the next data point in that specific condition provides the opportunity for verification of the prediction, as well as replication of treatment effect. Due to the quick alternation of treatment conditions, extraneous variables would be distributed across all conditions. A separation of data paths, after the treatment conditions have been introduced, indicate a stronger treatment effect.

Procedure

Pre-experimental procedures. Permission to conduct this study was obtained from the supervisor in charge of the early autism classroom. Also, informed consent was obtained from the parent or legal guardian of each participant.

Stimulus preference assessment. A multiple stimulus without replacement (MSWO) preference assessment was conducted during a regular snack time to identify preferred snack items that were then used as reinforcers for each participant (Cooper et al., 2007). This assessment was performed by placing eight snack items on a paper towel, with an equal distance between each item, and the items were then presented to the

participant, and he was asked to "choose one". The selection was recorded, and the remaining items were arranged in a different order while the participant consumed the selected item. This process was repeated until all items were selected and consumed. After the eight items were consumed, the process was then repeated two more times. Once the assessment was completed a total of three times, the average rankings were determined for each item. This provided the primary investigator with a list ranking the highest preferred items to the least preferred items for each participant. A copy of the data sheet for this assessment is located in Appendix B. The results of this assessment showed that participant Sam preferred apples and Cheetos, and participant Dean preferred M&M's and popcorn.

Baseline. For each participant, 10-15 trials were conducted during one 10 min session. Two conditions were alternated for each participant, an item-present condition and a question-present condition. The two highest preferred items identified in the preference assessment were assigned to one of the two conditions and alternated with that condition throughout the entire study. If the participant emitted 5 mands or less during a session, a snack was offered to the participant at a later time so that he did not have his daily snack withheld.

Item-present baseline condition. The primary investigator placed a preferred item on the table in front of the participant. The item was placed slightly out of the participant's reach, and when the participant reached for, or looked at, the item, the trial began. The primary investigator left the item on the table in front of the participant for 20 s. If the participant emitted a mand within 20 s of the item being placed on the table, then

the item was delivered to the participant. If the participant did not emit a mand within 20 s, the next trial began with no reinforcement delivered.

Question-present baseline condition. The primary investigator began the trial by asking the participant, "What do you want?" If the participant emitted a mand within 20 s, the item was delivered. If the participant did not emit a mand within 20 s, the next trial began.

Mand training. The same reinforcers were used during mand training conditions as baseline. Item-present and question-present conditions alternated. Again, if the participant did not emit any mands during a session, a snack was offered to the participant later in the day so that the participant did not have his daily snack withheld.

Question-present condition. This condition was similar to the question-present baseline condition with the addition of a prompting procedure to instruct the participant. The trial began when the primary investigator asked the participant, "What do you want?" The primary investigator then provided an immediate prompt with a 0 s delay from the question. This occurred over the first 6 question-present trials. If the participant correctly imitated the prompt, the reinforcer was delivered. If the participant did not correctly imitate over the last three trials, the 0 s prompt delay was continued until the participant correctly imitated across three consecutive trials. If the participant correctly imitated the response over the last three trials, the primary investigator increased the delay to 2 s, to allow the participant the opportunity to mand independently for the item. If the participant emitted three consecutive, independent, mands with a 2 s delay, the delay was increased to 4 s, and then 6 s. If the participant was able to emit three consecutive independent responses at the 6 s delay, the manding skill was considered

mastered. During these trials, if the participant did not mand for the item, the next trial

began without delivery of the reinforcer. If the participant did mand for the item, the

reinforcer was delivered.

Item-present condition. This condition was similar to the item-present baseline

condition with the addition of a prompting procedure to instruct the participant. During

this condition, the item was placed on the table in front of the participant, though still out

of the participant's reach. When the participant reached for, or looked at the item, the trial

began. The primary investigator prompted the response with a 0 s delay from the trial

beginning. This occurred over the first 6 trials. If the participant did not correctly imitate

over the last three trials, the 0 s prompt delay was continued until the participant correctly

imitated across three consecutive trials. If the participant correctly imitated the response

over the last three trials, the primary investigator increased the delay to 2 s, to allow the

participant the opportunity to mand independently for the item. If the participant emitted

three consecutive independent mands with a 2 s delay, the delay increased to 4 s, and

continued to increase until the participant could emit three consecutive, independent,

responses at a 6 s delay. During these trials, if the participant did not mand for the item,

the next trial began without delivery of the reinforcer. If the participant did mand for the

item, the reinforcer was delivered.

Posttraining probes. Probes were conducted following completion of three

consecutive independent mands with a 6 s prompt delay. This condition was identical to

the baseline procedures. Item-present and question-present conditions alternated and only

correct mands emitted within 20 s were reinforced. Three independent mands were

required to determine that the skill has been acquired.

Procedural Fidelity

The same observer that collected IOA assessed the fidelity with which the

primary investigator implemented the intervention. The secondary observer used a

checklist to assess whether all steps of the experimental procedure were followed during

each phase of this study (see Appendix C). Procedural fidelity by calculated by dividing

the number of steps performed correctly by the number of steps possible and multiplied

by 100. Procedural fidelity resulted in 100% throughout the study for 20% of total

sessions.

Data Analysis

To thoroughly analyze the data collected, the primary investigator used visual

analysis of the graphed data. This analysis includes an examination of variability, trend,

level, and immediacy of change (Cooper et al., 2007). Variability is used to assess the

range between the highest recorded data point and the lowest recorded data point within

each experimental condition. The most common method to analyze variability is to

calculate the range. The trend in the data is the direction the data are going including

increasing, decreasing, or stable trends. The level of the data is used to assess the change

from baseline to treatment in order to observe if the treatment has resulted in a change.

The mean level of responding in each condition was assessed to determine the level. The

immediacy of change was used to demonstrate a functional relationship between

treatment and the change in behavior. The more immediate the change is in the behavior

following treatment, the more certain it is that the independent variable is what caused

the change.

CHAPTER IV

RESULTS

Figure 3 below illustrates the cumulative number of correct independent responses emitted by each participant during baseline and posttraining trials. Neither participant emitted any correct mands during baseline. During posttraining, Sam emitted a total number of 12 correct responses for each condition and Dean emitted 10 correct responses for the question-present condition and 12 correct responses for the item-present condition.
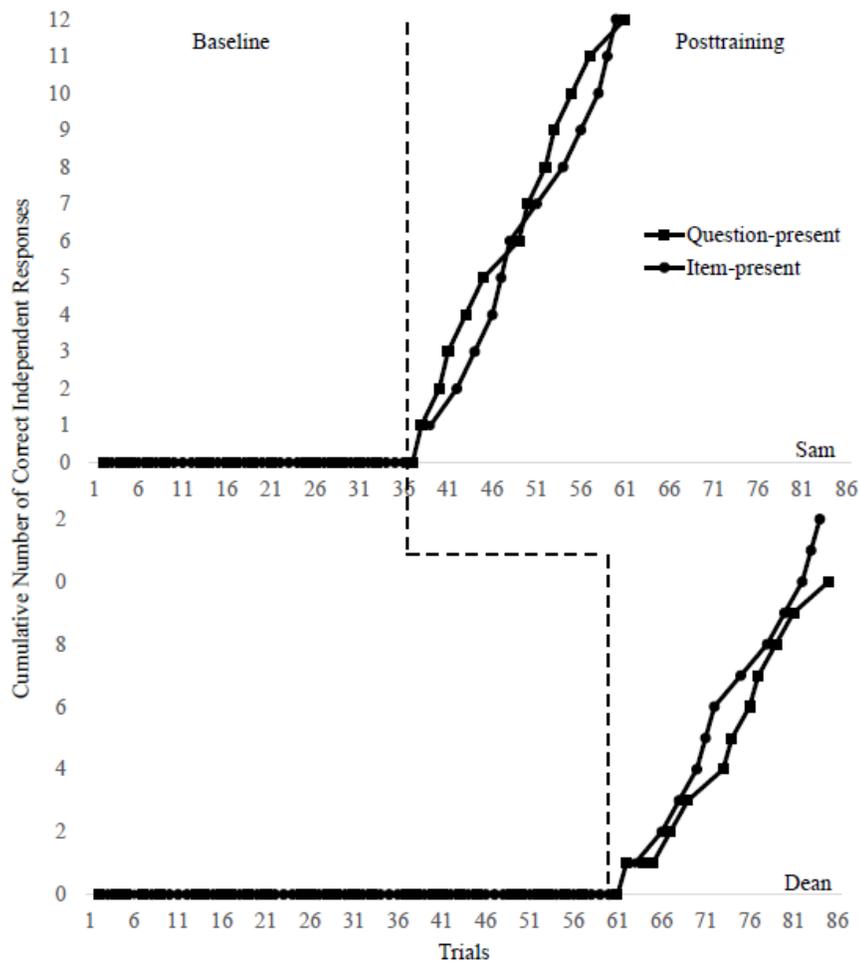

Figure 3. This graph shows the cumulative number of correct independent mands for baseline and posttraining trials across both participants.
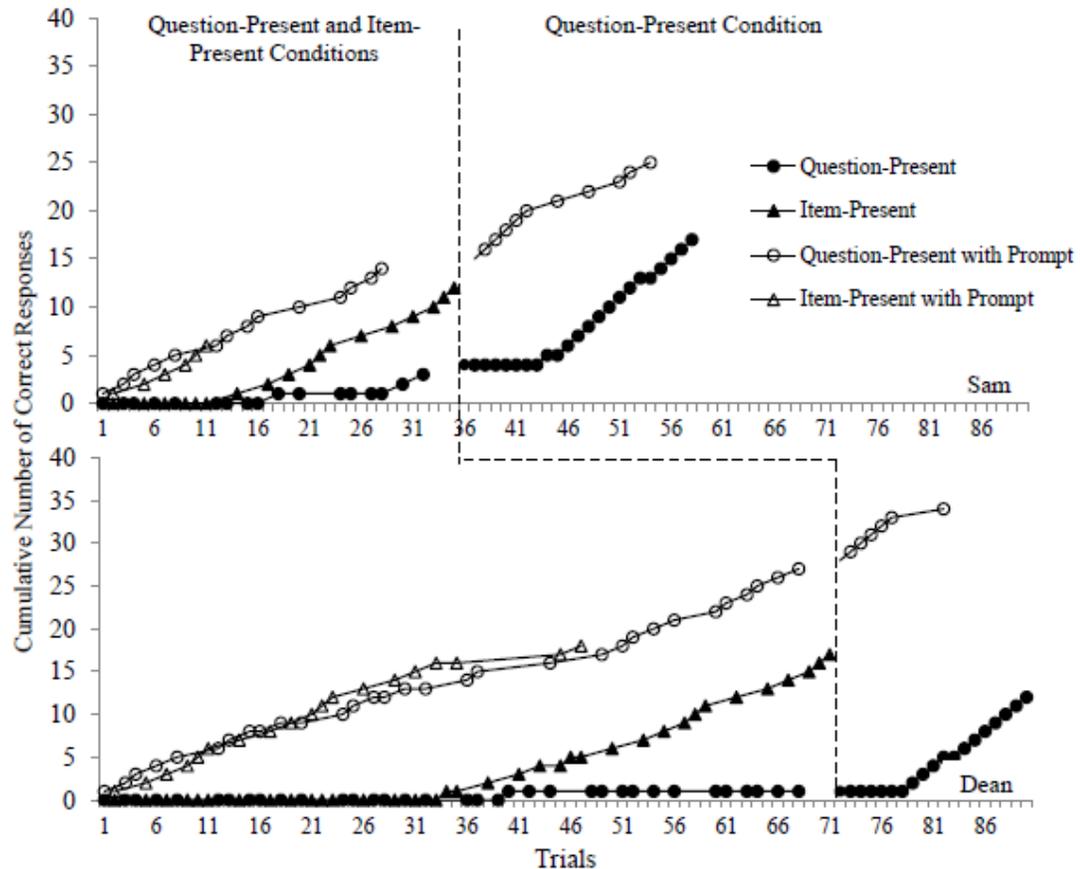
Figure 4. This graph shows the cumulative number of correct independent responses during treatment across both participants.

The 0 s prompt delay during the item-present condition was discontinued after trial 6 for Dean (Figure 4, bottom). Prompting was needed until trial 25 and he met mastery for this condition in 54 trials. The 0 s prompt delay was discontinued after trial 6 during the question-present condition, providing the opportunity for correct independent mands. Prompting was needed until trial 47 and the popcorn mand was acquired in 66 trials. At trial 71, it appeared that Dean also preferred the item-present snack item to the question-present item, and that it was affecting his ability to learn the question-present condition. Therefore, a paired stimulus assessment was conducted with Dean in order to show that was the case. During the paired stimulus assessment, Dean chose the item-

present snack item significantly more than the question present item (83% of the time), indicating that there was a stronger MO for the item-present snack item. The item-present condition was placed on hold in order to teach the question-present condition. It took 19 trials for Dean to acquire the question-present mand. Once he met mastery, the item-present condition was alternated again and posttraining trials were conducted. During posttraining trials (Figure 3) Dean emitted 12 correct mands for M&M (taught in the item-present condition) and 10 correct mands for Popcorn (taught in the question-present condition).
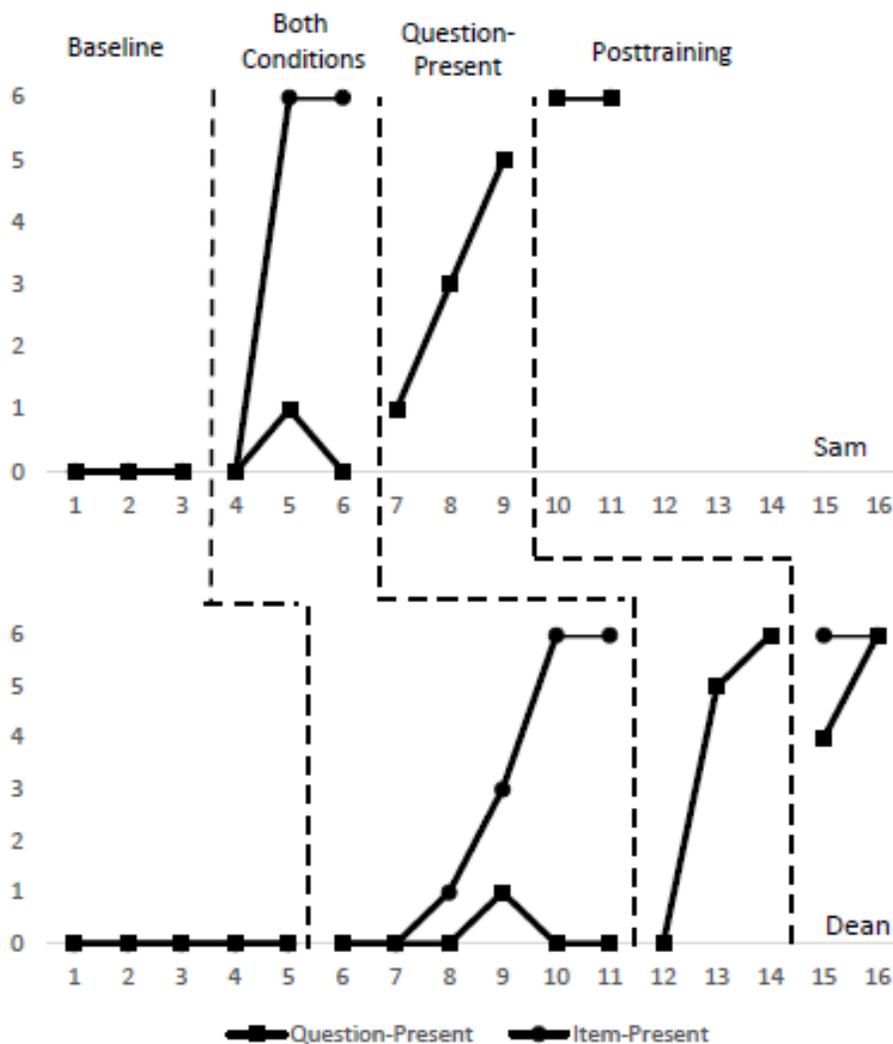

Figure 5. This graph shows the total count of correct independent mands for each session during treatment.

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These data show that the item-present condition was acquired faster that the question-present condition for both participants. Both participants acquired the mand in the item-present condition while remaining at a 2 s prompt delay for the question-present condition. During these trials it was suspected that both participants preferred the snack items paired with the item-present condition and that it was preventing the participants from learning the question-present mands. Therefore, a paired stimulus assessment was conducted. The results of the assessment supported this, and as a result the item-present condition was placed on hold until each participant acquired the question-present condition. Presentation of the question-present condition alone resulted in acquisition of the mand, for both participants, and correct responding was maintained when the item-present condition was again alternated with the question-present condition.

CHAPTER V

DISCUSSION

Overall, the results show that the item-present condition resulted in faster mand acquisition than the question-present condition. Both participants mastered the item-present condition while the question-present condition was still at a 2 s prompt delay. It was suspected that the question-present condition was competing with a stronger MO for the item-present snack item. Therefore, a paired stimulus assessment was conducted to determine if that was in fact occurring. Results of the assessment supported this, so the item-present condition was placed on hold while question-present trials continued until each participant mastered the condition. Once each participant acquired the mand in the question-present condition, the item-present condition was re-presented and posttraining sessions were conducted to determine that the participants could maintain the skills acquired in each condition. There are several factors that could have influenced the differences observed between mand acquisitions in the two conditions.

The most important factor to note is that, for both participants, there was a more potent MO for the item-present snack item. This became apparent when each participant mastered the item-present condition and would mand for that snack item during question-present trials as well. A paired stimulus assessment was conducted to determine that each participant did have a higher preference for the item-present snack item. Sam chose the Cheeto over the apple during 75% of the trials. The data from this assessment show that Sam preferred the Cheeto to the apple. Therefore, since the MO for the Cheeto was significantly higher than the MO for the apple, the item-present condition was placed on hold until he reached mastery with the question-present condition. When the sessions

containing only the question-present trials began, the condition was at a 2 s prompt delay. During the 2 s prompt delay trials, Sam continued to mand for the Cheeto between trials, though when the trial would begin, he would mand for the apple. When Sam reached the 4 s prompt delay he was independently manding for the apple consistently and reached mastery for the condition.

During the paired stimulus assessment, Dean chose the M&M over the popcorn during 83% of the trials. These data show that Dean preferred the M&M to the popcorn. Therefore the item-present condition was placed on hold for Dean as well, until he reached mastery with the question-present condition. When the question-present sessions began, the condition was at a 2 s prompt delay. Dean needed prompting for the first 6 trials, and then he began to independently mand for the popcorn consistently until he reached mastery.

Another element that could have contributed to the results obtained in this study is that the participants could have acquired the item-present condition more rapidly, due to the responses being under stimulus control. Stimulus control, as defined by Cooper et al., (2007), is said to occur when the rate, latency, duration, or amplitude of a response is altered in the presence of an antecedent stimulus. According to Bowen et al. (2012), a limitation of their study was having the item present during the question-present condition. The item itself could have acquired discriminative control over the mand and blocked the supplemental question from acquiring stimulus control. This means the participants may not have been responding to the contingency involving the question (discriminative stimulus) and receipt of the item (consequence of manding for the item), but, rather, the presence of the item could have become a discriminative stimulus instead.

This limitation was addressed in the present study by not having the item visible during the question-present trials. The acquisition of the mand in the item-present condition may have been faster because the item-present snack item served as a clear discriminative stimulus, whereas the question, which does not clearly relate to the correct response, served as the discriminative stimulus for the question-present condition. Furthermore, though the item-present snack item was not visible to the participant during question-present trials, the session itself could have signaled the availability of the item-present snack items (Cheeto for Sam, M&M for Dean), resulting in undesired stimulus control.

Another potential explanation for the results obtained relates to the manding procedures used in the current study, which required skills in the areas of tacting (labeling) and intraverbal (responding to a verbal stimulus). A tact is a verbal operant evoked by a nonverbal discriminative stimulus and reinforced by a generalized conditioned reinforcer. An intraverbal a verbal operant evoked by a verbal discriminative stimulus, though does not have point-by-point correspondence (Cooper et al., 2007). Mands, tacts, and intraverbals are all verbal operants assessed in Sundberg's VB-MAPP (Sundberg, 2014). There are 3 levels of the VB-MAPP: Level 1 includes skills at the level of a typically developing 0-18 month old, Level 2 includes skills at the level of a typically developing 18-30 month old, and Level 3 includes skills at the level of a typically developing 30-48 month old. Both participants were early level 2 Learners (18-30 months) in intraverbal, and mid-level 2 Learners in tacting. This may have had an impact on acquisition of mands in the two conditions because the item-present condition includes tacting skills and the question-present condition includes intraverbal skills.

Past Research

The current study used procedures that were similar to that of Drash et al. (2009).

Drash et al. used a shaping procedure to teach children with autism to mand for specific

items. An item was presented to the participants, and the researcher asked the child

various questions such as "What do you want?" or "Do you want this?" If the participants

made a vocal attempt to mand for the item, the item would be delivered to the participant.

This procedure combined the two conditions used in the current study by presenting both

the question, and the item. Once the participants were manding for the correct item (with

prompting) they used a manding procedure to shape an echoic repertoire. The results

from this study show that the participants were able to learn the novel mands with the use

of a question present prompting procedure, similar to the current study.

Another study that used similar procedures is Bourret et al. (2004). These

researchers presented a specific reinforcer to each of their participants, and after 10 s if

the participant did not mand for the item, a verbal prompt was provided such as "if you

want this, ask me for it." If the participant did not mand for the item within 10 s of the

prompt, a model prompt was provided. After another 10 s, if the participant did not mand

for the item, a phoneme prompt was delivered. The phoneme prompt involved presenting

the verbal prompt again with an additional approximation for the correct mand, such as

"if you want this, say 'ch.' If the participant attempted to mand for the item, it would be

delivered. If the participant did not mand for the item, it would not be delivered. This

study related to the current study because it uses a similar procedure, though combines

the two conditions used in the current study. The item is visible throughout the trial, and a

verbal prompt is given. The study by Bourret et al. (2004), provided multiple

opportunities for the participant to mand for the item and delivered multiple verbal prompts. The researchers used a prompt fading procedure to teach the novel mands to their participant. The current study used a similar procedure, though only provided verbal prompting throughout the study. The results of their study show that using a prompt fading procedure was successful in teaching novel mands. These results are consistent with the results of the current study, as both participants learned the novel mands using the prompt fading procedure.

Limitations

There are a few limitations of the present study that are worth mentioning. Both participants preferred the snack items that were assigned to the item-present condition. This seemed to impact the participant's ability to acquire the question-present condition. Also, both participants were moderately impaired in regards to responding to a verbal stimulus, meaning that both participants needed verbal prompting in order to respond. This could have impacted their ability to learn the question-present condition. Another limitation is that the question-present condition needed to be taught independently from the item-present condition. This treatment condition was taught separately because the participants were not acquiring the mands assigned to the question-present condition. A final limitation of the current study is that it is impossible to parse out the influence of stimulus control versus the control of the motivating operation on the responding that was observed.

An important element of the study, that could be considered a limitation, is that the mands acquired in both conditions were impure mands. A mand, by definition, is a verbal operant under functional control of a motivating operation and a specific

reinforcer. The reinforcer that strengthens a mand has a direct relation to the relevant motivating operation (Cooper et al., 2007). The responses for both conditions were impure due to the fact that the participants were prompted to mand for the specific items.

Future Research

Future research could evaluate whether similar results would be found if researchers were to conduct a preference assessment before each session and used the stimuli that the participant was currently motivated for, rather than assigning stimuli to be used throughout the study. Alternatively, future research could conduct a supplementary preference assessment to determine if the items identified in the first preference assessment are of equal preference, before alternating the conditions. Future research could evaluate whether participants with more advanced intraverbal repertoire, would yield similar results. Likewise, mands taught in different response topographies should be evaluated as well.

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Appendix A

Researcher Data Sheet

Participant #: _____ Session #:_____ Date: _____ Observer: Primary   Secondary

Condition	Item	Did they mand?		Prompted or Independent		Was it correct?		Vocal mand?	
Question-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Question-only		Y	N	P	I	Y	N	Y	N
Question-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Question-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Question-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Item-only		Y	N	P	I	Y	N	Y	N
Question-only		Y	N	P	I	Y	N	Y	N
Item-only	**TOTALS:**								
Item-only	**TOTALS:**								

Appendix B

MSWO Data Sheet

Participant: _____ Date: _____ Observer: Primary   Secondary

Stimulus Item	1	2	3	Sum of 1-3	Overall Rank
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

Notes:

Appendix C

Procedural Fidelity Checklist

Observer: _____   Session #:_____ Date: _____

Relevant prompt time (circle one):   2 s   4 s   6 s

Item-present Condition	Performed correctly?
Had appropriate items for session (preferred snack item, 2 chairs, a table, cup of water, pencil/pen, and data sheet)	Y N
Placed item in front of participant to start trial	Y N
Item placed out of reach of participant	Y N
Waited appropriate time to prompt	Y N
Provided item if mand occurred	Y N
Question-present Condition	**Performed correctly?**
Had appropriate items for session (preferred snack item, 2 chairs, a table, cup of water, pencil/pen, and data sheet)	Y N
Item was out of sight of participant	Y N
Asked participant "What do you want?" to start trial	Y N
Waited appropriate time for prompt	Y N
Provided item if mand occurred	Y N
Procedural Fidelity:	**/10**