TEACHING CHILDREN WITH AUTISM TO MAND FOR INFORMATION USING “WHY?” AS A FUNCTION OF DENIED ACCESS

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Megan Leigh Pyles

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Abstract

of

TEACHING CHILDREN WITH AUTISM TO MAND FOR INFORMATION USING "WHY?" AS A FUNCTION OF DENIED ACCESS

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Children with autism spectrum disorder (ASD) often have difficulty developing complex verbal behavior, including question-asking. The purpose of this study was to evaluate a procedure to teach two children with ASD to ask "Why?" Typically, Why-questions are followed by causal information that describes the reason an event occurs. For this reason, we established causal information as a reinforcer by denying access to items without providing a reason. Participants were prompted to ask "Why?" and were provided information that led to access of preferred items. To ensure that "Why?" only occurred when information was valuable, we included a condition where access to items was restricted, but a reason for denied access was provided. Both participants learned to ask "Why?" when information was needed and refrained from asking "Why?" when information was not needed. Results from this study suggest that this procedure was successful in teaching children with ASD to ask "Why?"

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Date

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Chapter 1

INTRODUCTION

Children diagnosed with autism spectrum disorder (ASD) usually experience delays in the development of a functional verbal repertoire (e.g., failure of normal back and forth conversation and failure to initiate or respond to social interaction; American Psychiatric Association, 2013), which can lead to problem behaviors and inhibit social interactions (LaFrance & Miguel, 2014). Children who demonstrate problem behaviors may be ostracized by their peers, thereby diminishing the value of social interactions as reinforcers (Heithaus, Twyman, & Braddock, 2017). A functional verbal repertoire can replace problem behavior that serves a communicative function (Carr & Durand, 1985), and thus predicts positive lifelong outcomes (LaFrance & Miguel, 2014). A functional verbal repertoire may also serve to establish social interactions as reinforcing. For instance, when a child asks for candy (an already established reinforcer), and is provided candy by a communication partner, the social interaction may eventually become a conditioned reinforcer. Individuals whose behavior is sensitive to social reinforcers often experience a decreased need of direct teaching of communication skills, and therefore can learn more naturalistically (Sundberg & Michael, 2001). As such, interventions targeting verbal behavior should attempt to establish social interactions as reinforcers (Greer & Keohane, 2009).

Skinner (1957) suggested that verbal behavior should be analyzed by looking at the environmental variables that evoke and maintain it. For example, the vocalization “apple” may occur as a function of being asked what one is eating, of not having had an apple in a while (i.e., wanting one), or upon hearing someone say, "Tell me a type of fruit." Skinner referred to these distinct functional relations between verbal behavior and the environment as *verbal operants*. The analysis and manipulation of these functional relations have been used to develop effective and efficient language programming for individuals with developmental disabilities (Greer & Ross, 2004).

The first verbal operant acquired by children is the mand, which is also the most frequently studied (Miguel, 2017). Skinner (1957) defined the mand as "a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under functional control of relevant conditions of deprivation or aversive stimulation" (p. 35). In other words, mands directly benefit the speaker because the reinforcer consists of the object specified by the verbal response. For example, when a child has not played with dolls for a period of time, she may pull her mother's hand toward a doll and whine. Her mother may provide the vocal prompt, "I want dolls." After the girl imitates this vocalization the mother would likely provide the child with dolls which would increase the likelihood of the girl saying, "I want dolls," again in similar situations. Mands allow a speaker to contact a specific reinforcer through the mediation of a social partner. That is, when a social partner reinforces a child's mand, the child is controlling his social, and indirectly, his nonsocial environment through the use of language (Sundberg & Michael, 2001). Through repeated pairings of verbal responses and reinforcers, it is likely that language will increase in value as a conditioned reinforcer and that the child's own vocalizations will become automatically reinforcing (Greer, Pistojevic, Cahill, & Du, 2011). When one's own vocalizations function as reinforcers, the speaker may become his or her own listener, which is an important prerequisite to advanced problem-solving behaviors (Greer & Keohane, 2009). For children whose own vocalizations do not function as reinforcers, manding may be an essential skill that leads to the emergence of a variety of other vocal behaviors (LaFrance & Miguel, 2014).

Michael (1988) noted that Skinner's definition of the mand addresses the history of specific reinforcement, but does not account for all variables responsible for its occurrence. For example, salt consumption and excessive sweating would increase the effectiveness of water as a reinforcer; however, these variables cannot be easily classified as deprivation or satiation. Michael (1993) introduced the term "establishing operation" (EO) to describe all variables that establish the effectiveness of a stimulus as a reinforcer and increase the frequency of all behaviors that have produced that reinforcer in the past. Thus, Michael (1988) defined the mand, "as a type of verbal operant where the response is determined by a prior EO, as contrasted with other verbal operants where it is determined by a prior S^D," (p. 6). Laraway, Snycerski, Michael, and Poling (2003) proposed the term motivating operation (MO) to emphasize the fact that EOs not only establish, but also abolish the value of stimuli as reinforcers. For example, drinking water as an MO would decrease the effectiveness of water as a reinforcer (abolishing effect) and decrease all responses previously reinforced by water (abative effect), whereas consuming salt as an MO would increase the effectiveness of water as a reinforcer (establishing effect) and increase the frequency of any response historically reinforced by water (evocative effect). Laraway and colleagues suggested the terminology abolishing operation (AO) for MOs that abolish the value of a stimulus and a reinforcer and abate responding, and suggested the term establishing operation (EO) be used only for operations with a reinforcer establishing effect that evoke responding.

Early mands taught to children with autism are established through manipulations of unconditioned establishing operations (UEOs), such as food and water deprivation (Michael, 1982; Sundberg & Hall, 1987). For example, a therapist may restrict access to fruit snacks for a period of time, which would contrive a UEO that increases the value of fruit snacks as a reinforcer. The therapist may then prompt the child to say, "I want a fruit snack," and provide a fruit snack after the child echoes the vocalization. After establishing mands based on UEOs, clinicians may begin contriving conditioned motivating operations (CEOs) to establish more complex mands, such as mands for information (Carbone, 2013). Teaching children with ASD to mand for information requires manipulation of MOs to establish question-asking under appropriate motivational conditions (Sundberg & Michael, 2001). Mands for information are reinforced by the information provided by a partner's verbal behavior. However, if social interactions have not been strongly established as reinforcers, a partner's verbal behavior may not serve to establish this type of mand for children with ASD (Sundberg & Michael, 2001). Therefore, it may be necessary to pair information with stimuli that already function as reinforcers to establish the stimuli produced by a partner's verbal response as a conditioned reinforcer. For example, if a clinician plans to teach a child to ask wh-questions, such as "Where?", it would be beneficial to begin by teaching him or her to request the location of a preferred item rather than a nonpreferred item. If the client prefers vehicles, the clinician may manipulate the environment to contrive a mand for cars, such as setting up a racetrack, but withholding cars. The clinician could then prompt, “Where is my car?” and provide the information, “In the toy chest.” This information should become a conditioned reinforcer after being paired with a preferred item.

Several studies have taught participants with ASD to ask “Where?” and “Who?” questions (e.g., Endicott & Higbee, 2007; Howlett, Sidener, Progar, & Sidener, 2011; Lechago, Carr, Grow, Love, & Almason, 2010; Shillingsburg, Valentino, Bowen, Bradley, & Zavatkay, 2011; Shillingsburg, Bowen, Valentino, & Pierce, 2014; Shillingsburg, Gayman, & Walton, 2016; Somers, Sidener, DeBar, & Sidener, 2014; Sundberg, Loeb, Hale, & Eigenheer, 2002). This line of research has demonstrated that it is necessary to manipulate MOs to momentarily alter the value of information when beginning to teach mands (Sundberg et al., 2002). Although early research on mands for information produced positive results, Howlett, Sidener, Progar, and Sidener (2011) suggested that in some studies, question-asking may have been under discriminative control of environmental variables related to experimental conditions. In other words, participants may have asked questions because variables in the environment functioned as S^Ds that had been correlated with the availability of reinforcement. To address this, researchers included a condition that abolished the value of information as a reinforcer. For example, to contrive an EO a toy would be missing from its typical location, and to contrive an AO for question-asking, the toy would be in its typical location to abolish the value of information about the item’s location as a reinforcer. Some researchers have used the terms ‘EO-present’ and ‘EO-absent’ to refer to motivational conditions (e.g., Landa, Hansen, & Shillingsburg, 2017; Shillingsburg, Bowen, & Valentino, 2014). However, since the EO-absent condition seems to include variables that serve to decrease the value of information as a reinforcer, and abate question-asking behaviors, the AO terminology may be more descriptive of this condition (Shillingsburg et al., 2014).

In previous research to teach children with autism to mand for information, two conditions are included: an EO condition to evoke question-asking under conditions where information is established as a reinforcer, and an AO condition where question-asking is abated because the value of information as a reinforcer is abolished. That is, the EO condition establishes information as a reinforcer and in turn evokes mands, whereas an AO condition abates question-asking when information would not function as a reinforcer. By including the AO conditions, clinicians can evaluate whether question-asking is under the control of motivational variables rather than other features of the environment. If participants ask questions during the AO condition, these responses may be under the control of extraneous variables (i.e., responding may be under faulty stimulus control), such as stimuli that are present during experimental conditions.

In one example, Somers, Sidener, DeBar, and Sidener (2014) removed a toy from the bin where it was typically kept and instructed participants to retrieve the toy. During EO trials, experimenters prompted participants to ask, “Where is it?” and provided information so the child could find the toy (e.g., “Your toy is on the counter.”). During AO trials, the toy was missing from the bin, but experimenter held the toy in view of participants. Since participants could see where the item was located, information about the item’s location would not be reinforcing. Both participants in this study learned to differentially mand across conditions, requesting information in the EO condition and requesting the item itself during AO trials.

In a recent study, Landa and colleagues (2017) evaluated a method to teach three children with autism to ask “When?” During EO trials, when participants requested a preferred item, experimenters said, “Not right now.” Using a prompt delay procedure, experimenters prompted participants to ask “When?” and then provided a contingency-specifying statement such as “After you put your toys away.” During AO trials, after participants manded for the item, experimenters immediately provided a contingency-specifying statement like, “You can have it after you put your toys away.” Providing the contingency-specifying statement immediately after participants manded for the item decreased the value of information that would have been provided after asking “When?” In both EO and AO conditions, after participants completed the contingency-specified task, experimenters provided the item that that participant had requested. Following training, all participants manded for information only during EO trials, and did not mand for information during AO trials.

Other questions, such as “How?” can be more challenging to teach. Teaching mands for information using “How?” poses a unique challenge because once the information is provided, there is no longer an EO for that particular mand in similar stimulus conditions (Shillingsburg & Valentino, 2011). For example, if a child asks how to spell the word “cat,” once she is given the information and demonstrates independence with this task, an EO would no longer be present for the mand “How do I spell cat?” because that information would no longer be needed.

Several studies have sought to teach children with ASD to ask how-questions (Lechago, Howell, Caccavale, & Peterson, 2013; Shillingsburg, Bowen, & Valentino, 2013; Shillingsburg & Valentino, 2011). For example, Shillingsburg et al. (2013) evaluated a method to teach two young boys diagnosed with ASD to ask “How?” in the presence of tasks that they could not complete independently, and refrain from asking “How?” in the presence of known tasks. Because participants had different repertoires upon entering the study, different tasks were used for each participant. A task used for one participant in this study was unlocking a cabinet. At the beginning of a trial, experimenters asked a participant if he wanted an item that was in a locked cabinet. If the participant did not independently unlock the cabinet, information about how to unlock it was assumed to function as a reinforcer because he needed this information to complete the task. Experimenters then prompted the participant to ask, “How do I unlock the cabinet?” and provided information about how to unlock it. If the participant independently unlocked the cabinet, information about how to unlock the cabinet would not be valuable because the participant presumably had the information required to retrieve the item from the locked cabinet. Because information was not valuable for tasks that participants independently completed, how-questions were considered incorrect responses in the presence of known tasks. For example, if a participant had previously been observed unlocking the cabinet independently, asking “How do I unlock the cabinet?” was an incorrect response because the participant did not need that information to open the cabinet. Following training both participants asked “How?” in the presence of unknown tasks and refrained from manding for information in the presence of known tasks.

Perhaps due to the complexity of controlling motivational variables, researchers have only recently begun to evaluate methods to teach children to ask “Why?” Developmental psychologists suggest that children ask why-questions because they are searching for causal information (Frazier, Gelman, & Wellman, 2009). Causal information relates to causes and effects of events that occur in the environment. Therefore, to teach children to ask why, an MO that establishes causal information as a reinforcer must be present.

A recent study sought to teach children with ASD to ask “Why?” using six different scenarios. Experimenters presented situations that were unusual to participants to contrive the EO to ask questions about the reasons that each situation occurred (Valentino, Fu, & Padover, in preparation). These scenarios included an experimenter putting a funny object (e.g., hat) on her body, placing items in odd locations, doing unusual activities (e.g., wheelbarrow across the room), altering a room in some way (e.g., turning off the lights), and giving participants nonpreferred items that he or she did not typically interact with (e.g., car keys). After setting up one of the aforementioned scenarios, experimenters used a prompt delay with a vocal model to teach participants to ask “Why?” and subsequently provided a rationale (e.g., “Because I thought it would make you laugh!”). All participants in this study learned to ask “Why?” However, generalization was variable across the scenarios, with two out of three participants failing to ask “Why?” in the context of a novel scenario in which they were handed an object.

The authors suggested that the EO in that scenario might not have been as strong because it closely resembled experiences common to the participants. In other words, the participants included in this study had a history of adults handing them objects, which may have functioned to abolish the reinforcing value of information about the reason the adult was giving them an object. These results suggest that when “Why?” is only taught in the presence of unfamiliar scenarios, children may not demonstrate mands for causal information in familiar situations where information may be useful. For example, if you tell a child to put on their backpack before school, it is unlikely that they will mand for information about the reason they need to put on their backpack because it is a common, rather than unusual activity.

One common scenario where children may request causal information is when they are denied access to preferred items and activities (Landa et al., 2017). Denying access may increase the value of causal information as a reinforcer and potentially evoke why-questions. For example, a young boy may ask his mother for crayons. If she tells him that he cannot have crayons at that moment, he might ask her “Why?” She may tell him that somebody else has them. The boy could further request information about who has the crayons and retrieve them based upon this information. Thus, by requesting and actively responding to information, children can alter their behavior in ways that increase access to a variety of reinforcers.

The purpose of the current study was to teach children with ASD to mand for information using “Why?” when access to preferred items was denied. Participants were presented with a task, but an item necessary to complete the task was missing. During EO trials, participants were not provided information about the reason for denied access. After asking “Why?” participants were provided with vague information about the reason they could not have the item. For instance, the experimenter told participants that the item was somewhere else or that somebody else had the item. This functioned as an EO for participants to ask a question about the location or the person who had the item. During AO trials, participants were denied access to preferred items and were immediately provided vague information about the reason that they could not access the item. After participants requested this information, experimenters provided information needed to find the item, and allowed participants to retrieve it.

Chapter 2

METHOD

Participants, Setting, and Materials

Participants were two boys diagnosed with Autism Spectrum Disorder (ASD). Ivan and Tony were five- and six-years old, respectively. Ivan had received applied behavior analytic services for three and a half years prior to participation in the study, and Tony had received services for four and a half years. All participants demonstrated low rates of behavior excesses (e.g., crying, screaming, aggression), could mand for information using “Who?” and “Where?” in the presence a task in which an item is missing for its completion (e.g., instructing a child to draw while providing them paper, but withholding crayons; Hall & Sundberg, 1987), responded to instructions as listeners (e.g., finding an item after being provided information about its location), and scored at Level 2 or above in the Mand section of the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008). Skills assessed in Level 2 of the VB-MAPP include: manding for missing items without prompts, manding for others to emit actions, emitting mands that contain two or more words, spontaneously emitting mands, and emitting new mands without training. The aforementioned skills were prerequisites required for inclusion, and were evaluated by the primary experimenter through direct observation and testing one week prior to baseline sessions.

Sessions were held in a room in each participant’s house that was designated for behavioral treatment sessions, at least three times per week, with no more than three consecutive days without sessions. For Ivan, the room included a couch, a chair, and a table. For Tony, the room included a small work table, a play kitchen set, a play tool set, and various toys. Missing items for each trial were placed throughout each participant's house and with varied family members across trials. Each session consisted of six trials, with three trials conducted under the EO condition and three trials under the AO condition. Three tasks (e.g., Gooey Louie, Pop the Pig, and coloring) were alternated across trials. EO trials, AO trials, tasks, and who/where questions were counterbalanced across trials and sessions to reduce carryover effects (see description below). A trial began when the experimenter presented an instruction and ended when participants obtained the missing item and completed the task. Materials included items necessary to complete the tasks selected based on participants' preferences, as determined by an MSWO preference assessment (i.e., Gooey Louie, racecar tracks and cars, Pop the Pig, Pop the Pirate, There's a Yeti in my Spaghetti, Jumping Jack, and Shark Bite).

Dependent Measures and Experimental Design

Dependent measures included the percentage of correct responses for the following responses: asking why-questions, asking follow-up questions, retrieving missing items, and behavior excesses. Why-questions were defined as the child making a vocal response initiated with "Why" (e.g., "Why?", "Why not?", or "Why can't I have it?"). Follow-up questions consisted of asking, "Who has it?" after the experimenter provided the statement, "Somebody else has (the item), or "Where is it?" in the context of the experimenter providing the statement, "It is somewhere else." Correct listener behaviors included approaching the person named after the experimenter answered, "Who has it?" or approaching the location provided after the experimenter answered, “Where is it?”. Behavior excesses for Ivan were crying, falling to the floor, and screaming, and for Tony were saying curse words, screaming, and crying. We monitored behavior excesses because they could occur when access was restricted to preferred items. It was expected that excesses would decrease after participants acquired the mand “Why?”, however neither participant engaged in behavior excesses during any phase of the experiment.

We collected trial-by-trial data on independent responses (baseline and posttraining), as well as prompted responses (training). Additionally, we collected data on mands after an interrupted chain procedure (e.g., requesting crayons when presented with paper), the vocal response “Why?”, the vocal responses “Who?” and “Where?”, listener behavior, and behavior excess data. Mands emitted within 5-s of a vocal prompt were recorded as prompted. An incorrect mand was scored when no response or a response other than the target mand, was emitted within 5-s of an indicating response. Examples of incorrect responses included making eye contact with the experimenter, pulling the experimenters hand, or persisting with a mand other than the target mand (e.g., “Give me the cars, come on!”) (Appendix B).

We used an alternating treatments design to compare frequency of asking “Why?” during EO and AO conditions (Kazdin, 2011). We also employed a nonconcurrent multiple-baseline across participants design to demonstrate the effects of training on the emission of mands (Watson & Workman, 1981). The EO condition contrived a situation where causal information obtained after asking “Why?” would function as a reinforcer. Asking “Why?” should have been evoked by this motivational condition rather than other features in the environment that were correlated with the availability of reinforcement. In other words, participants should ask “Why?” due to an EO where information functioned as a reinforcer rather than S^Ds correlated with reinforcement availability (Michael, 1982, 1993). During EO trials, information was withheld so that the information functioned as a reinforcer within that trial, and during AO trials, information was provided to abolish its effectiveness as a reinforcer.

Participants were exposed to the following conditions: pretraining assessment, baseline probes, mand training, posttraining probes, and generalization probes.

Pretraining Assessment

The primary experimenter evaluated participants’ current repertoires through direct observation and by probing skills specified in Level 2 of the Mand section of the VB-MAPP. Participants needed to independently demonstrate all skills in Level 2 of the Mand section of the VB-MAPP to be included in this study. Next, the primary experimenter conducted a brief Multiple Stimulus Without Replacement (MSWO) preference assessment for each participant (Carr, Nicolson, & Higbee, 2000) to identify six highly preferred activities and three less preferred activities that could be manipulated to conduct an interrupted chain procedure (Hall & Sundberg, 1987). These items were ranked by dividing the number of opportunities each item was selected by the number of opportunities it was presented, and converting it to a percentage. Items selected the highest percentage of opportunities were identified as preferred and items selected the lowest percentage of opportunities were identified as nonpreferred.

The experimenter conducted probes to assess whether participants independently engaged in the last two steps of activities identified by the MSWO. For instance, if racecar tracks were identified as a preferred activity, the experimenter instructed participants to play with the racecar track, and evaluated whether participants: 1) independently placed a car on the track and 2) pressed a button to launch the car. Experimenters completed all steps of the task except for the last two steps. Only the last two steps of each task were taught to participants to control for response effort associated with each task, as well to maintain the proximity to final reinforcer constant without limiting the preference assessment to tasks that only include the same number of steps (Bell & Williams, 2013; Friman & Poling, 1995). If participants did not complete the task independently, the experimenter used a backward chaining procedure, using a least-to-most prompt hierarchy (e.g., vocal prompt, model prompt, physical prompt), to teach participants to engage in the last two responses of the task (e.g., placing the car on the track, and pressing the launch button). Mastery was achieved when participants independently completed the last two steps of the chain in two consecutive opportunities.

After teaching participants to engage in the tasks, the experimenter assessed whether they manded for a missing item that was necessary to complete it (e.g., car). If participants did not independently mand for the missing item, the experimenter taught participants to mand for the missing item using vocal prompts (e.g., "Can I have the car?"). Correct responses for mands for missing items included "Can I have the (item)?", "Do you have the (item)?", "I want the (item)," or other similar phrases that specified the missing item. Questions about items' locations (e.g., "Where is the [item]?" or "Who has the [item)]?”) were considered incorrect. This criterion was established to ensure that mands for items (e.g., “I want the car”) and mands for information about items’ locations (e.g., “Where is the car?”) were under control of different antecedents (Somers, et al., 2014). Somers and colleagues (2014) noted that the distinction between mands for items and mands for information about items’ locations is important because failing to maintain these distinct mand topographies may result in overgeneralization of mands for information. For instance, if the mand for information “Where is the (item)?” is taught, but mands for missing items (i.e., “I want the [item],”) are not maintained, the absence of an item may establish control over “Where?” questions. In this case, mands for information may occur when an item is not in view even if the child knows the location of the item. For example, if a child saw his parent put toy cars in a drawer that is out of reach, he should not ask “Where are the cars?” because he already has information about the location of the cars. In this context, the child should mand for the item itself (i.e., “Can I have the cars?”) because the item, and not information about the item’s location would function as a reinforcer. If participants manded for information using “Where?” instead of “I want-,” after being instructed to complete the task, experimenters provided an error correction (e.g., “You should ask me for car,”) and used a vocal model to prompt a mand for the missing item (e.g., “I need the car.”). Mastery criterion for mands for missing items consisted of participants independently requesting the missing item (e.g., “I need the car,”) in two consecutive opportunities.

Baseline and Posttraining Probes

Experimenters presented EO and AO conditions, preferred tasks, and information provided after questions (i.e., another person has the item or the item is in a different location) in a pre-determined counterbalanced order across trials (see

APPENDIX C). Trials were counterbalanced to control for carryover effects between tasks presented, EO and AO conditions, and vague information provided after participants asked “Why?” (i.e., “Someone else has it” or “It is somewhere else”). For example, presenting the same task several trials in a row may decrease motivation to engage with that specific task. Additionally, if the vocal S^Ds (i.e., “I can’t give it to you,” “I can’t give it to you because it is somewhere else,” or “I can’t give it to you because someone else has it,”) were presented in the same order during each session, this may increase the likelihood of “rote responding” (i.e., demonstrating faulty stimulus control by responding incorrectly to the vocal S^D; Eikeseth & Smith. 2013). To teach correct intraverbal responding to conditional discriminations, it has been suggested to teach children to respond differentially to several different vocal responses that function as S^Ds for certain intraverbal responses and S^Δ for other intraverbal responses (Eikeseth & Smith, 2013). Therefore, we promoted differential responding by requiring participants to make conditional discriminations based on the information that was withheld in each trial (i.e., the reason for denied access, the person who had the item, or the location of the missing item). In other words, participants were taught to ask “Why?” only when presented with the statement “I can’t give it to you,” and not to ask “Why?” when given then reason that they could not access the item (i.e., “Somebody else has it,” or “It is somewhere else,"), to ask "Where?" only when presented with the statement "It is somewhere else," and not the two other statements, and to ask "Who?" only when presented with the statement "Somebody else has it." Finally, counterbalancing was intended to decrease the likelihood of practice effects influencing responding. For instance, if participants were presented with the same trial sequence across consecutive sessions, they may have responded to the order in which trials were presented instead of the vocal S^D presented in the trial. In other words, randomizing the trial order made it necessary for participants to respond to the experimenter's vocal behavior.

To ensure that an EO was present to engage with a task, the experimenter provided participants with a choice between engaging in a highly preferred and a nonpreferred activity, as identified by the preference assessment. If participants selected the highly preferred activity, the experimenter initiated a trial. If participants selected the nonpreferred activity as previously identified in the preference assessment, they were allowed to engage with the activity for 1-5 min, and a trial was not conducted. After completion of the nonpreferred activity, the experimenter immediately provided another choice with the same two activities, to ensure that activities were counterbalanced across trials. If participants did not select the highly preferred item across three consecutive opportunities, the session would have not been conducted, however this never happened. Ivan never chose the nonpreferred item, and Tony chose the nonpreferred item no more than two times in a row (see Table 1 and Table 2).

Table 1.
Number of opportunities Ivan selected preferred and nonpreferred activities across all experimental conditions

Activity	Opportunities Preferred Selected	Opportunities Nonpreferred Selected	Total Opportunities
Racecar Track	36	0	36
Pop the Pig	36	0	36
Jumping Jack	36	0	36
Pop Up Pirate	4	0	4
Gooey Louie	4	0	4
There's a Yeti in my Spaghetti	4	0	4

Notes. Participants were allowed to choose nonpreferred activities more than one time in a row.

Table 2.
Number of opportunities Tony selected preferred and nonpreferred activities across all experimental conditions

Activity	Opportunities Selected	Opportunities Nonpreferred Selected	Total Opportunities
There's a Yeti in my Spaghetti	22	4	26
Jumping Jack	22	5	27
Racecar Track	22	6	28
Pop the Pig	4	2	6
Gooey Louie	4	1	5
Shark Bite	4	1	5

Notes. Participants were allowed to choose nonpreferred activities more than one time in a row.

A trial began when participants vocally affirmed interest in the activity or exhibited approach behaviors (i.e., interacting with the items, walking to the items, or picking up the items). The experimenter presented an instruction to complete a task (e.g., "Come race cars with me,"), and presented materials needed to complete the task, while withholding one necessary item (e.g., a car to put on the race track). After participants manded for the missing item, the experimenter said either, "No, you can't have it," or "I'm sorry, I can't give that to you right now." If participants asked, "Why?" the experimenter provided information regarding the reason for restricted access (i.e., "You can't have it because it is somewhere else," or "I can't give it to you because somebody else has it") which served to create an EO that would evoke another question already mastered by participants (i.e., "Where is it?" or "Who has it?"). The experimenter provided information regarding the item's location (e.g., "It is in the drawer,"), which evoked participants' behavior of retrieving the item. If participants used that information to retrieve the item, he or she was allowed to engage with the item for 1-5 min. On the other hand, if participants asked a contextually incorrect question (e.g., asking "Who has it?" when told "The item is somewhere else") the experimenter returned to the previous vocal S^D, and prompted the correct response at a 0-s delay. If participants did not respond the experimenter looked away from participants for 5-s, and terminated the trial (Figure 1).

During AO trials, the experimenter provided information about the reason for denied access (i.e., "I can't give it to you because it is somewhere else," or "No, because someone else has it.") to decrease the value of information as a reinforcer. If participants asked "Why?", the experimenter ignored the response, looked away from participants for 5-s, and terminated the trial so that incorrect responses did not contact reinforcement. If participants asked an incorrect question (e.g., asking "Where?" when presented with the statement "Somebody else has it,"), the experimenter returned to the previous vocal S^D and prompted the correct response at a 0-s prompt delay (Figure 2). For both conditions, after participants accessed the item, the trial was terminated and the experimenter initiated the next trial. Baseline probes were terminated after participants correctly responded in 100% of AO trials (i.e., asked "Who?" or "Where?") across a minimum of three sessions. Posttraining probes were conducted two weeks after mastery criterion during mand training was met. Posttraining probes were terminated after participants responded correctly to 80-100% of trials across EO and AO conditions across two sessions.

Mand Training

Three EO and three AO trials were conducted per session. Three tasks were varied across trials. Activities identified as first, third, and fifth highly preferred were used during mand training to control for preference effects when evaluating performance between mand training and generalization probes (see Table 3). In other words, we did not utilize the three most preferred activities during training because we wanted to ensure that any difference in responding in generalization trials was not due to the effectiveness of activities as reinforcers. Therefore, we utilized the first, third, and fifth most preferred activities for mand training and the second, fourth, and sixth most preferred activities for generalization probes. The experimenter contrived EOs for asking three "Who?" and three "Where?" questions after denying access to items. EO/AO trials, task order, and who/where questions were counterbalanced across trials and sessions as described above. We contrived EOs for participants to ask two follow-up questions, "Who?" and "Where?" to ensure that there was always an EO to ask "Why?" If we contrived an EO to ask the same question after each instance of asking "Why?" information acquired after asking "Why?" would not function as a reinforcer because that information had already been provided on a previous trial. For example, if participants could not access the item because a different person had it every trial, it would be appropriate for them to start by asking "Who?" and never "Why?" because the reason for denied access would have been the same in every trial, creating an AO to mand for information about the reason that access was denied.

Table 3.
Tasks used in each experimental phase

Participants	Training Tasks	Generalization	Nonpreferred
Ivan	Racecar Track	Pop up Pirate	Fine motor tasks
	Pop the Pig	Gooey Louie	Coloring
	Jumping Jack	There's a Yeti in my Spaghetti	String beads
Tony	There's a Yeti in my Spaghetti	Pop the Pig	Coloring
	Jumping Jack	Gooey Louie	Fine motor tasks
	Racecar Track	Shark	

During EO trials, we employed an initial 0-s prompt delay (i.e., the experimenter immediately prompted "Why?"; Clark & Green, 2004). For each trial, the experimenter presented a task while an item needed to complete the task was out of sight. When the child manded for the missing item, the experimenter withheld access to the item and said either "No, you can't have it," or "I can't give it to you,". Next, the experimenter vocally prompted the response "Why?" at a series of five progressive delays (0-s, 1-s, 2-s, 3-s, 4-s, and no prompt). We progressed through the prescribed delays when at least six trials of each condition (i.e., two sessions) had been conducted at that delay and participants asked "Why?" for three consecutive trials. The experimenter did not provide differential reinforcement for independent versus prompted responses because information should have functioned as the reinforcer for question-asking. For instance, if a child asked, “Where is my car?” the reinforcer for that question would have been information about the car’s location rather than praise for asking the question. After asking “Why?” experimenters provided participants with vague information (e.g., “It is somewhere else,” or “Someone else has it,”), which contrived an EO for participants to ask “Who?” or “Where?”, which were previously mastered by participants. If participants did not respond with a mastered question (e.g., “Who?” and “Where?”) after being provided vague information (e.g., “Somebody has your crayons,”), experimenters provided a vocal model for the mastered question at a 5-s delay. Mastery criterion consisted of manding prior to the prompt for 11 out of 12 consecutive trials. Incorrect responses resulted in an error correction. Experimenters implemented error corrections by returning to the vocal S^D that was presented immediately prior to the error (e.g., “I’m sorry, I can’t give that to you,”) and prompted the correct response at a 0-s prompt delay.

Generalization

After posttraining trials, generalization trials were conducted to assess the generalization of mands across MOs (Miguel, 2017). The experimenter presented three tasks that were not used for mand training during generalization probes. These probes can be conceptualized as mands across MOs because the items presented in generalization probes did not differentially correlate with the likelihood that information would be provided (which would be the case with generalizing across S^Ds), but rather contrived a motivating operation that increased the value for the reason behind deprived access to that specific item. We selected activities used in generalization trials using preference assessments as described in the *Pretraining Assessment* section above. The activities ranked as second, fourth, and sixth most preferred as identified in the MSWO were used during generalization trials to ensure that preference did not influence responding across training and generalization trials. These trials were identical to baseline trials as described above. Mastery criterion consisted of independent mands in 11 out of 12 consecutive trials.

Interobserver Agreement and Treatment Integrity

We calculated point-by-point interobserver agreement (IOA) by dividing the number of agreements per trial by the number of agreements plus disagreements and converting it to a percentage (Kazdin, 2011). We scored an agreement when both observers recorded the same response on the same trial. Both observers collected data on whether the following participant behaviors occured: asking for the missing item, why-questions, who- or where- questions, approach behaviors toward the location or person who has the item, and behavior excesses (e.g., tantrum or noncompliance). A second independent observer collected data for all dependent variables. Agreement on data was collected for all trials. IOA for baseline was observed at 98% (range 95-100%) and 88% (range 82-100%) for Ivan and Tony respectively. During training, IOA for Ivan 98% (range 93-100%) and 99.5% (range 97-100%) for Tony. IOA was 100% for both participants during posttraining and generalization.

We measured treatment integrity via a 13-item checklist for EO trials, and a 13-item checklist for AO trials (see Appendix A). Integrity was assessed by dividing the number of correct responses over the total number of possible responses and converting it to a percentage. The EO checklist included the following experimenter behaviors: 1)

Assess motivation to engage with the item (e.g., “Do you want to color?”), 2) discontinue trial and move to nonpreferred activity if no demonstration of motivation to engage with item, 3) present items utilized during the interrupted chain, 4) present an instruction to complete the chain, 5) wait 5-s for participants to mand for the missing item, 6) provide a varied “no” response, 7) prompt “Why?”, 8) provide a rationale for restricted access, 9) wait 5-s for the child to request information with “Who?” or “Where?”, 10) provide the information, 11) wait 5-s for the child to exhibit a listener response, 12) allow the child to access the terminal reinforcer, and 13) implement an error correction at any point in which the child makes an incorrect response.

The AO checklist included the following experimenter behaviors: 1) Assess motivation to engage with the item, 2) discontinue trial and move to nonpreferred activity if no demonstration of motivation to engage with item, 3) present items utilized during the interrupted chain, 4) present an instruction to complete the chain, 5) wait 5-s for the child to mand for the missing item, 6) provide a varied “no” response, 7) provide information about the reason the child cannot access the item, 8) refrain from prompting “Why?” 9) waiting 5-s for the child to ask “Who?” or “Where?”, 10) provide information, 11) wait 5-s for the listener response, 12) allow the child to access the terminal reinforcer, and 13) implement an error correction at any point in which the child makes an incorrect response. An error correction was implemented by returning to the SD that was presented before the error, and prompting the correct response using a vocal model at a 0-s prompt delay. For example, if participants asked, “Who has my car?” after the experimenter stated, “Your car is somewhere else,” the experimenter again stated, "Your car is somewhere else," and used a 0-s prompt delay to prompt the response, "Where is my car?" We measured treatment integrity during 100% of trials for all children by an independent, secondary observer. During baseline, treatment integrity for both participants occurred at 100%. For Ivan, treatment integrity during training was observed at 99.5% (range, 98-100%), and at 99% (range, 97-100%) for Tony. In posttraining probes, treatment integrity for Ivan was 99% (range 98-100%) and 100% for Tony. Treatment integrity was scored at 100% for both participants during generalization probes.

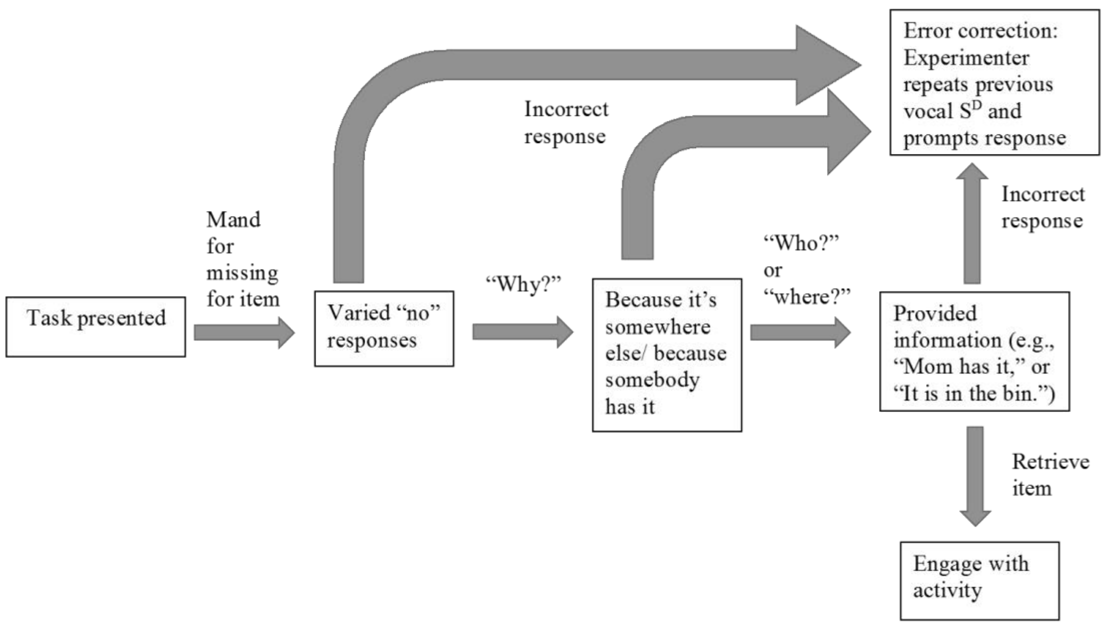

Figure 1. This flowchart represents the sequence of responses that participants and the experimenter engaged in during EO trials. Experimenter responses are in the boxes, and participant responses are on top of or next to the arrows.

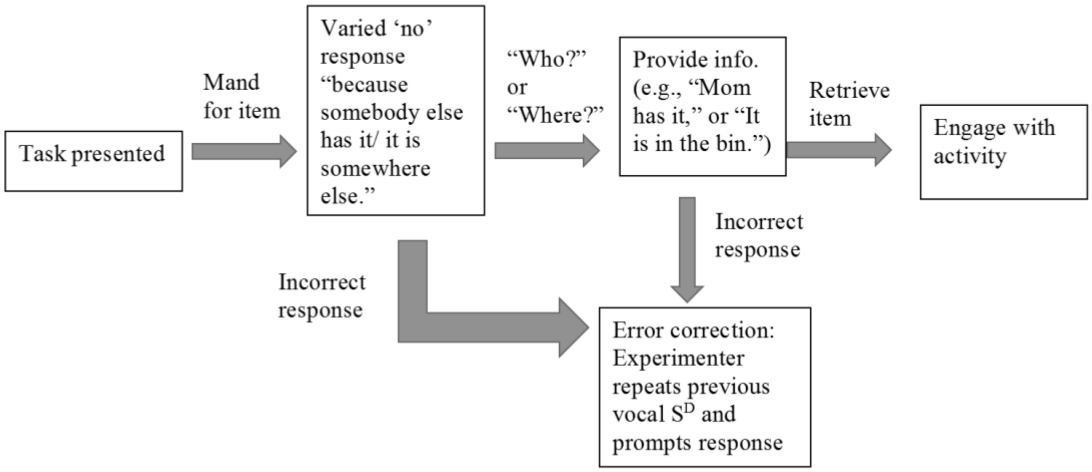

Figure 2. This flowchart represents the sequence of responses that participants and the experimenter engaged in during AO trials. Experimenter responses are in the boxes, and participant responses are on top of or next to the arrows.

Chapter 3

RESULTS

Results for the MSWO preference assessment for each participant can be seen in Figures 3 and 4. Ivan's preferred items were: 1) Racecar track, 2) Pop up Pirate, 3) Jumping Jack, 4) Gooey Louie, 5) Pop the Pig, and 6) There's a Yeti in my Spaghetti (Figure 3). The racecar track, Jumping Jack, and Pop the Pig were used for baseline and mand training. Pop up Pirate, Gooey Louie, and There's a Yeti in my Spaghetti were used for generalization probes. His nonpreferred items were fine motor tasks, a coloring book, and string beads. Tony's preferred items were: 1) There's a Yeti in my Spaghetti, 2) Pop the Pig, 3) Jumping Jack, 4) Gooey Louie, 5) Racecar Track, and 6) Shark Bite (Figure 4). There's a Yeti in my Spaghetti, Jumping Jack, and the racecar track were used for baseline and mand training. Pop the Pig, Gooey Louie, and Shark Bite were used for generalization probes. His nonpreferred items were a coloring book and fine motor tasks.

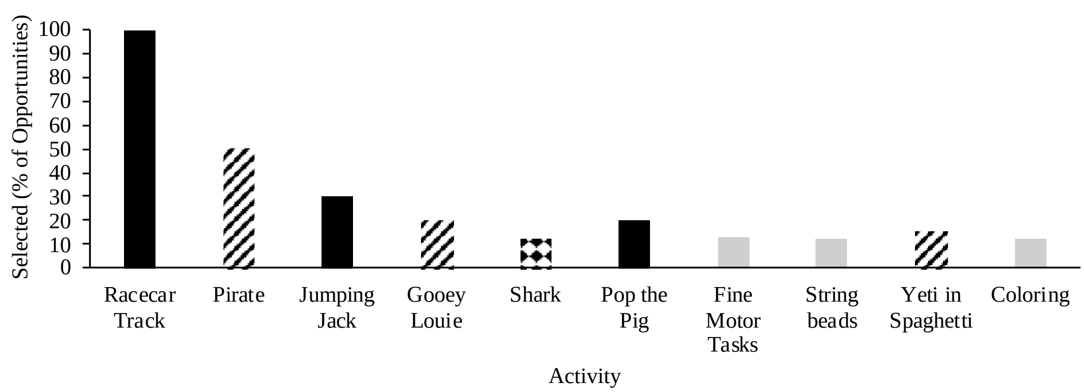

Figure 3. MSWO results for Ivan. Black bars represent tasks used during baseline and mand training, diagonal stripes represent tasks used during generalization, gray bars represent nonpreferred tasks, and checkered bars represent tasks excluded from all experimental conditions.

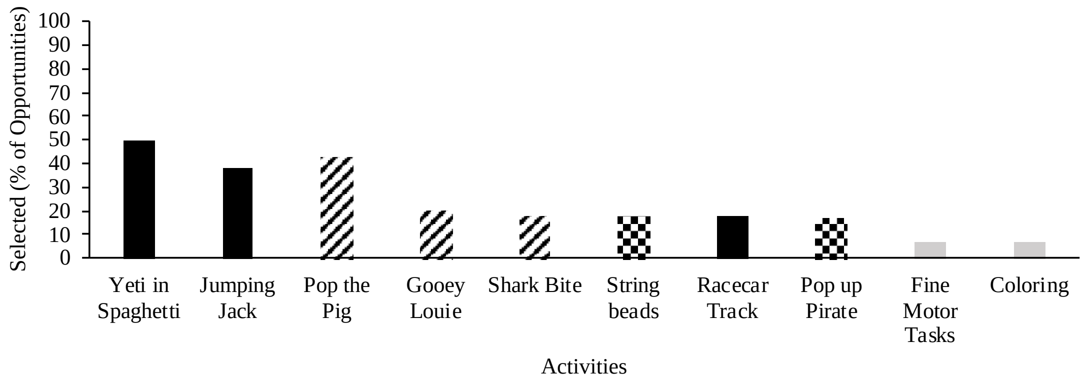

Figure 4. MSWO results for Tony. Black bars represent tasks used during baseline and mand training, diagonal stripes represent tasks used during generalization, gray bars represent nonpreferred tasks, and checkered bars represent tasks excluded from all experimental conditions.

During baseline, neither participant asked “Why?” during EO or AO trials (Figure 5). For AO trials, Ivan manded correctly by asking “Who?” or “Where?” during 67% of trials during both the first and second sessions (Figure 6). All incorrect responses for previously mastered questions were corrected (see above). During the third through sixth sessions of baseline, Ivan correctly asked “Who?” and “Where?”. Tony correctly asked “Who?” and “Where?” during all AO trials (Figure 6). Ivan manded for the missing item in 100% trials by stating “Can I have the (item)?” or “I want the (item),”. Tony manded for missing items in 89% (16 out of 18) baseline trials (Figure 7). Ivan correctly located the missing item in 94% of trials during baseline. Tony retrieved the item in the correct location during all baseline trials (Figure 8). Neither participant demonstrated behavior excesses during baseline.

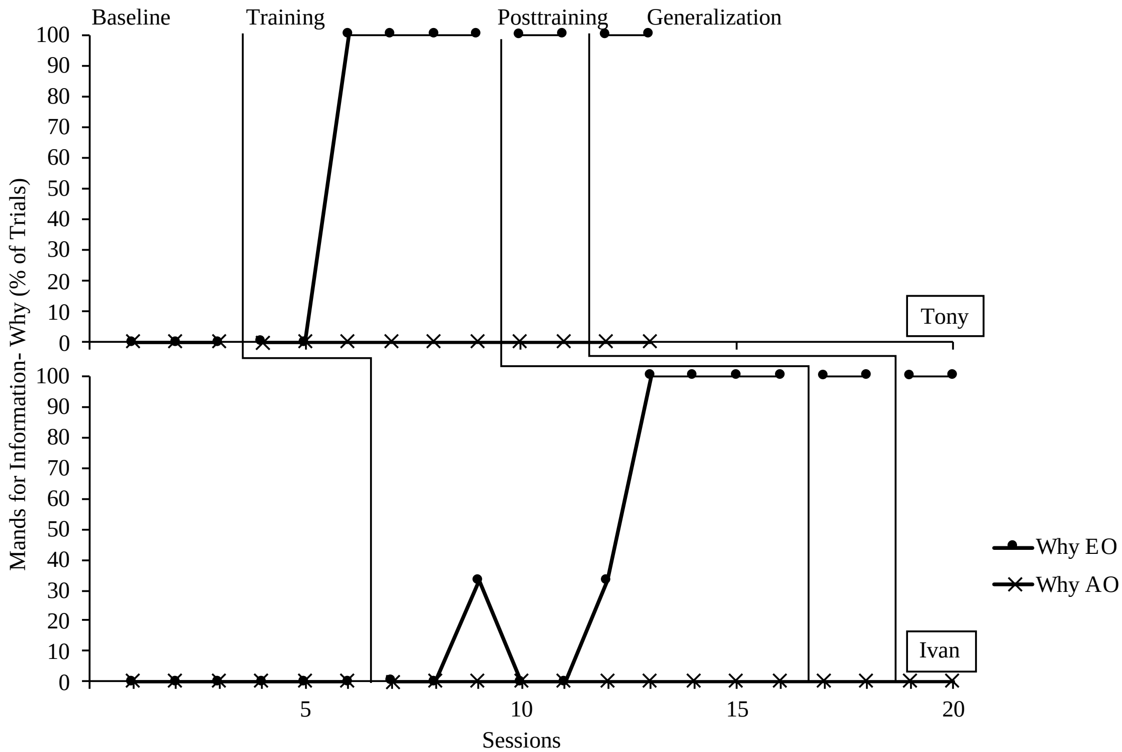

Figure 5. Percent of trials where participants asked "Why?" during baseline, training, maintenance, and generalization trials. Closed circles represent EO trials and X's represent AO trials. Because EO and AO trials were interspersed rather than conducted in blocks, data points in this graph represent percentage per session rather than blocks of EO and AO conditions as is typically the case with alternating treatments design.

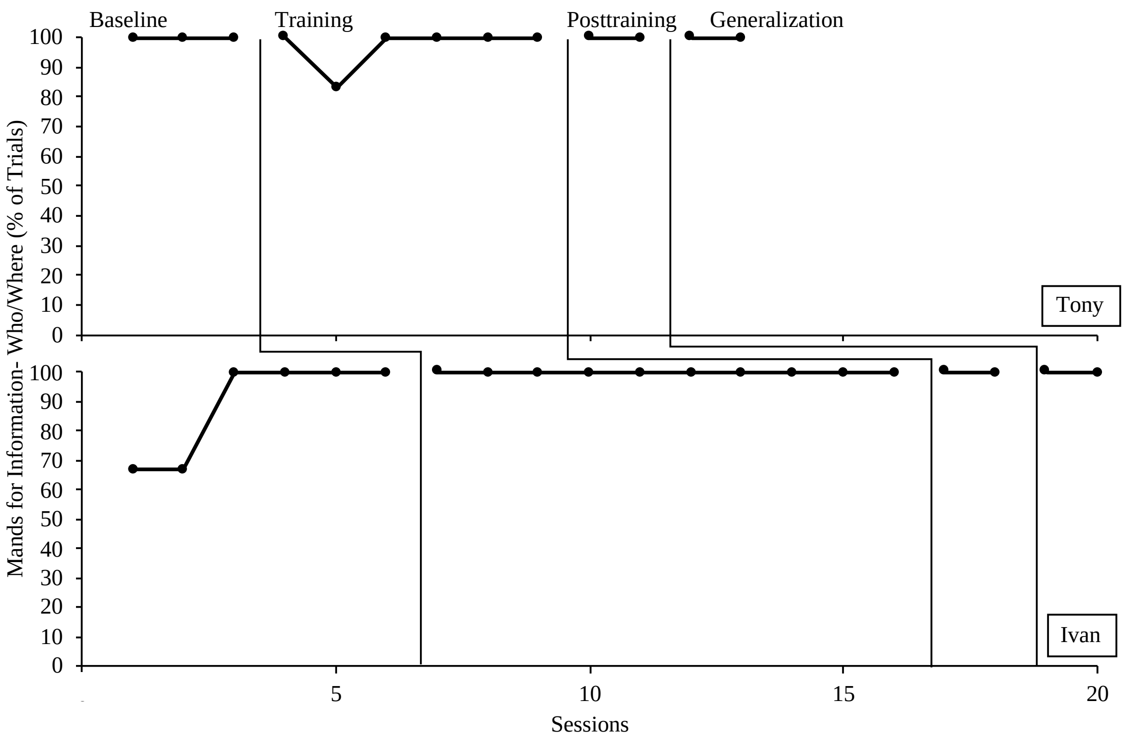

Figure 6. Percent of trials participants asked “Who?” and “Where?” across baseline, training, posttraining, and generalization.

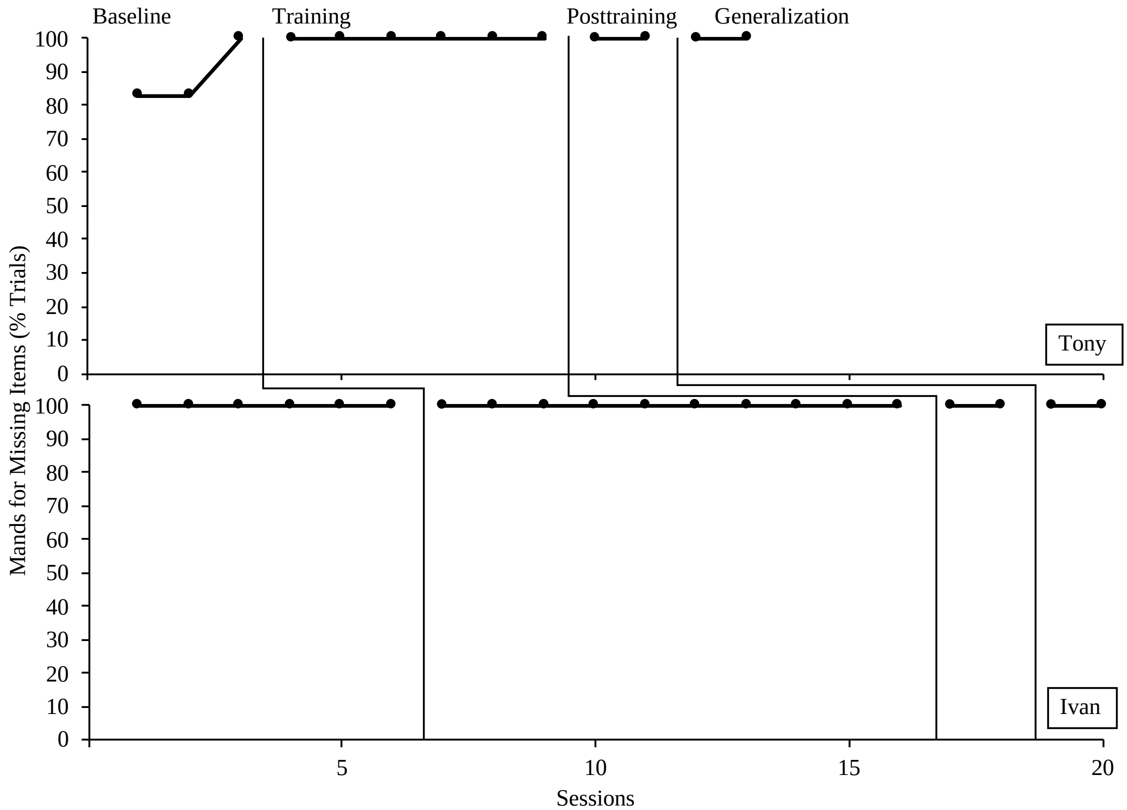

Figure 7. Percent of independent mands for missing items for baseline, training, posttraining, and generalization.

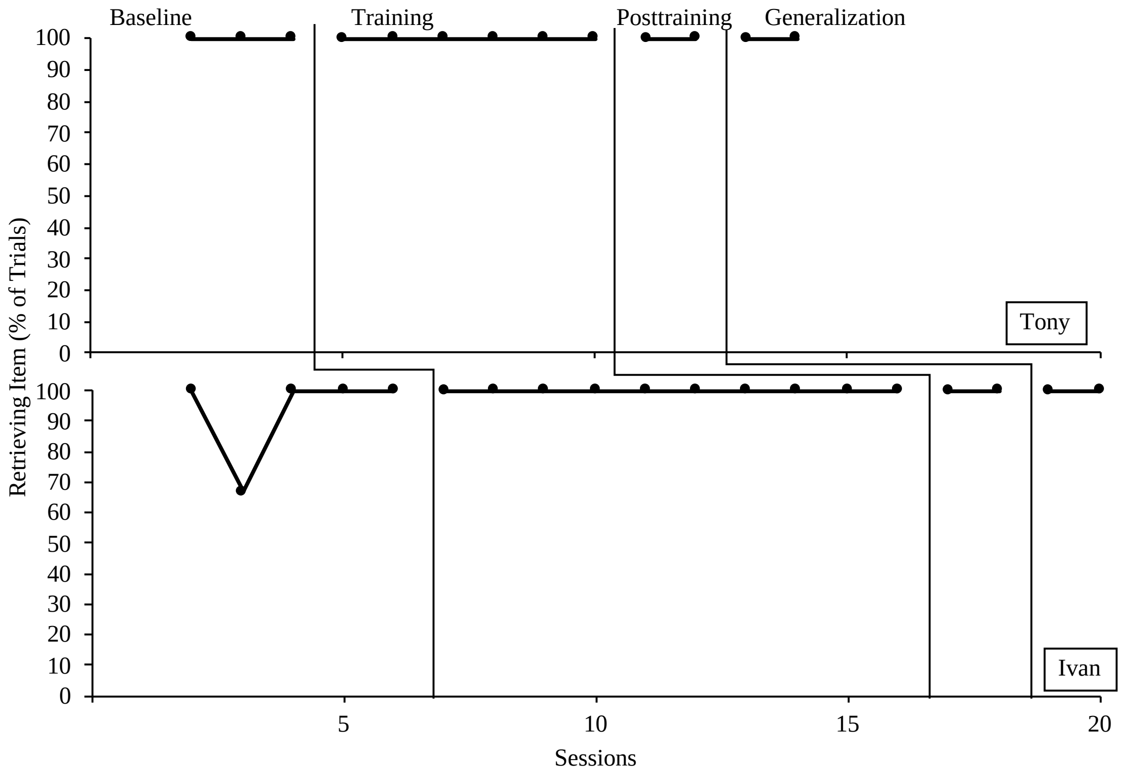

Figure 8. Percent of trials in which participants correctly retrieved the item from its specified location.

During the first two sessions of mand training, “Why?” questions were prompted at a 0-sec delay, therefore no independent responses during EO trials were observed for either participant. Ivan’s first independent “Why?” question occurred in the third session of training, during which he asked “Why?” in 33% of opportunities. Differential reinforcement was not programmed for prompted and independent responses, which may have led to the decrease in independent question-asking after the first independent “Why?” Ivan did not independently ask why-questions during the fourth and fifth sessions, and independently asked “Why?” in 33% opportunities during the sixth session. In the seventh through tenth sessions, he responded correctly in 100% of opportunities

(Figure 5). Ivan reached mastery in ten sessions and did not demonstrate any errors in EO or AO conditions. Tony's first independent "Why?" occurred in training session 3, during which he asked "Why?" in 100% of opportunities, and independently asked "Why?" during EO trials in all subsequent trials, while refraining from asking "Why?" during AO trials. Tony reached mastery criterion in six sessions. Both participants asked "Why?" only during EO trials, and never asked "Why?" during AO trials.

Two weeks after reaching mastery criterion, both participants scored 100% across EO and AO trials across two sessions with the same tasks used during mand training, suggesting that participants maintained the skill after a period of time without contacting experimental conditions. During generalization probes, both participants scored 100% across EO and AO trials across two sessions with novel tasks that participants were not exposed to during mand training, suggesting that they demonstrated generalization of mands to activities that were not presented during mand training. Further, Ivan's mother provided anecdotal information that Ivan asked "Why?" across novel people, environments, and activities, suggesting that question-asking did not only generalized across different MOs as directly assessed, but also across different S^Ds (Miguel, 2017). He reportedly began asking questions like, "Why are you eating that?" and "Why did you do that?" to family members in the home and community environments. This suggests that asking "Why?" generalized to scenarios where causal information functioned as a reinforcer without tangible items as a back-up reinforcer. Anecdotal data on Tony's question-asking was not obtained.

Chapter 4

DISCUSSION

Results from the current study suggest that children with ASD can successfully be taught to ask “Why?” after access to preferred items had been denied and information about the reason (i.e., causal information) for its denial was withheld. Further, this study showed that asking “Why?” can come under control of appropriate motivational variables, in that participants only asked “Why?” during the EO condition when causal information was made to function as a reinforcer. Our study extends previous research on mands for information (Howlett, et al., 2011; Lechago, et al., 2010; Shillingsburg, et al., 2011; Shillingsburg, et al., 2014; Shillingsburg, et al., 2016; Somers, et al., 2014; Sundberg, et al., 2002, Valentino, et al., in preparation) by teaching children with autism a new topography (“Why?”) when access to a preferred item was denied. Similar to Landa et al. (2017), participants in this study were required to engage in a series of responses based on the information provided to access preferred items. Using information to obtain a terminal reinforcer (e.g., retrieving the item from its location) suggests that information functioned as a reinforcer for asking questions (Landa et al., 2017; Shillingsburg et al., 2014).

Although our procedures attempted to establish causal information as a reinforcer, question-asking could have been under control of the experimenter’s vocal response (i.e., “You cannot have it”) functioning as an S^D correlated with access to the preferred item (i.e, an intraverbal). However, there are two reasons that this is unlikely. First, the experimenter emitted a vocalization in both EO and AO conditions to deny access to the preferred item. For AO trials, the experimenter's vocalization included a reason that access was denied, whereas during EO trials, we withheld information from participants about the reason access was denied. One may suggest that the experimenter's vocalization that provided the reason for denied access during the AO condition (i.e., either that somebody else had the item or that it was in another location) could have functioned as an S^{Δ} correlated with unavailability of reinforcement. However, participants had access to the backup reinforcer (preferred item) in both conditions. The main difference was that during the EO condition the reason for denied access (the putative conditioned reinforcer) was provided contingent upon asking "Why?", while during the AO condition, the reason was provided when the experimenter denied access to the requested item. If participants asked "Why?" during AO trials, the experimenter would have still provided information about the reason for denied access. In other words, asking "Why?" would have been reinforced by the same information (i.e., the reason for denied access) in EO or AO trials. Therefore, the experimenter's vocalization during AO trials should have not functioned as an S^{Δ} because information about the reason for denied access was still available after asking "Why?". Thus, it would appear that withholding information increased the value of information as a reinforcer and evoked mands for information (i.e., asking questions) rather than serving a discriminative function. The presence or absence of information evoked differential responding across EO and AO conditions because it either established or abolished its value as a reinforcer (Laraway, 2003). In other words, withholding information during the EO condition increased the value of information and evoked question-asking, and providing information during the AO condition abolished the value of information and abated question-asking. Since participants responded differentially based on the value of information (i.e., asked “Why?” only when information was withheld) it is likely that question-asking was under motivational rather than discriminative control.

The second reason that participant responses were functioning as mands and not intraverbals is that participants had the opportunity to ask “Why?” during both EO and AO conditions. However, they only asked “Why?” when the information was withheld during the EO condition. If question-asking were not under motivational control, one would expect participants to ask “Why?” under both EO and AO conditions.

However, as with most verbal operants, question-asking (i.e., “Why?”, “Who?”, and “Where?”) was likely under control of multiple variables, such as the experimenter’s vocalizations functioning as an S^D along with motivational variables altering the value of information as a reinforcer (Miguel, 2017). In other words, the experimenter’s vocalizations likely exerted discriminative control over participants’ question-asking because vocalizations were correlated with the opportunity for reinforcement.

Although asking “Why?” may have been under both motivational and discriminative control, verbal behavior is usually the function of multiple variables (Michael, Sundberg, & Palmer, 2011; Skinner, 1957). Specifically, most verbal responses are controlled by both motivational and discriminative variables in the environment. For example, when a person who has not eaten in a while looks at a menu, the menu may determine the specific topography of a verbal response (i.e., what type of food he or she orders), while food deprivation (MO) increases the value of food as a reinforcer. That is to say, the menu functions as an S^D for ordering a specific food, but the MO determines whether or not they order food at all. In this case, the discriminative control of the menu and motivational control of food deprivation converge to determine the topography of the response (Miguel, 2017).

In the current study the experimenter served as an additional variable controlling the emission of mands, but never its topography since all response forms (i.e., "Why?", "Who?", and "Where?") were reinforced in the presence of the experimenter (listener). Although there may be multiple variables responsible for mands for information, the reinforcer provided was always specific to the mand (i.e., information was provided after participants asked questions), and never generalized social reinforcement. If generalized social reinforcement had been provided in addition to information, participants' question-asking may have functioned as mands for attention or intraverbals rather than mands for information. To ensure that question-asking is truly a mand for information, access to information should be the only consequence differentially correlated with question-asking.

Procedures used in this study did not incorporate programmed differential reinforcement for question-asking, which may be a variable to consider. Otherwise stated, both independent and prompted "Why?" responses were consequated identically. That is, after participants emitted either an independent or prompted mand, the experimenter provided only information as a reinforcer. This may have influenced Ivan's acquisition of "Why?" as he emitted his first independent "Why?" during the third training session, and did not independently ask "Why?" again until the sixth training session. It is likely that

Ivan had an extensive learning history in which generalized social reinforcement (e.g., praise) was used to differentially reinforce communicative responses. The absence of differential reinforcement in the form of praise may have decreased the rate of acquisition during mand training. In other words, asking “Why?” may have become dependent on prompts provided by the experimenter because additional reinforcement was not provided for independent responses. Providing supplementary reinforcement in addition to information after asking “Why?” may have decreased this prompt dependency. Despite this, Ivan independently asked “Why?” during 100% of EO trials beginning in the seventh session of training, demonstrating that acquisition was not significantly delayed. It is possible that Ivan’s learning history of contacting generalized social reinforcement for independent mands is similar to naturalistic learning situations. It is likely that children contact generalized social reinforcement in addition to the reinforcer specific to the mand, such as a teacher stating, “That is a good question,” before providing information. Future research should evaluate the functional control of motivational variables for mands that are reinforced with both generalized social reinforcement and information.

Another feature of this study that may require further evaluation is that participants likely learned to ask “Why?” under much stricter motivational control than what is typically observed in children. For instance, children often ask questions even when they have already been provided information (e.g., asking “Are we there yet?” repeatedly on car rides). Researchers should examine other conditions under which children ask questions and develop procedures to evoke question-asking under these conditions. For example, a child may ask “Why do I have to do this?” to escape from a demand, or may ask “Why is the sky blue?” to gain access to an adult’s attention. Researchers may consider conducting functional analyses of question-asking with a variety of children to identify the possible functions of this behavior (Plavnick & Normand, 2013). The results of these functional analyses could be used to develop a normative comparison, which may increase social validity of procedures used to teach mands for information (Kazdin, 1977). In other words, researchers could teach children with ASD to ask questions in more naturalistic scenarios by identifying the variables that control question-asking in a peer group. This could greatly increase the social validity of procedures used to teach mands for information.

One limitation to the current study was that we did not evaluate the clinical significance of asking “Why?” or the acceptability of our procedures among parents and professionals. Future research should examine whether the procedures and outcomes of this study are socially acceptable and clinically significant (Kazdin, 1977). Evaluating generalization of question-asking across a variety of people could also further increase the social validity of the study. In other words, we should determine whether asking “Why?” would have occurred in the presence of individuals who did not implement mand training.

One further limitation of the current study is that we only targeted the one-word response “Why?” during training. It is likely that children typically use a variety of topographies to ask questions. For example, children may ask “Why can’t I have it?” or “Why not?” when denied access to preferred items. Because the experimenter only modeled the response “Why?”, participants only asked questions using a single topography. Increasing the variety of phrases used to ask questions may increase social validity by promoting responding that is more similar to a normative peer group (Kazdin, 1977). It should be noted, however, that Ivan’s mother provided anecdotal information that he started asking novel why-questions in the presence of family members who were not present during training, for example, asking his sister, “Why are you eating that cookie?” Although this suggests that novel topographies were occurring in the presence of new individuals, we did not observe this during any of our sessions. Future research should evaluate methods to increase the variability of topographies when teaching mands for information.

One final limitation of the current study is that we only incorporated an AO condition for asking “Why?” Therefore, we cannot be certain that asking “Who?” or “Where?” were under motivational control. It is likely, however, that “Who?” and “Where?” were under MO control because these topographies were previously mastered, and had been taught using procedures that were established as effective in previous research (Shillingsburg et al., 2014; Somers et al., 2014) Nonetheless, future research should replicate the current procedures while incorporating both an EO and AO condition for the follow-up questions (i.e., “Who?” and “Where?”). Responding correctly during EO and AO conditions across multiple questions, would suggest that the occurrence of mands for information were controlled by an MO and not by extraneous environmental variables (Howlett et al., 2011). For example, during AO conditions for both “Why?” and “Who?” participants would be denied access to a preferred item and immediately provided with the information about the reason for denied access and the name of the person who has the item (e.g., “I can’t give you the crayons because Mom has them,”). Under these circumstances, participants should refrain from asking “Why?” and “Who?” Providing opportunities to respond differentially to a greater number of motivational conditions would ensure that participants were responding to the value of information as a reinforcer for each condition (Eikeseth & Smith, 2013). Otherwise stated, by presenting scenarios in which information is and is not needed about the reason for denied access, location of the object, and person who has the object, we would demonstrate that “Who?” and “Where?” were primarily under motivational rather than discriminative control.

In summary, this study extended previous research on mands for information by describing an effective procedure for teaching children with ASD to ask “Why?” when access to preferred items is denied. Additionally, prior research on mands for information has not required participants to engage in a chain of verbal responses (i.e., manding for the missing item, asking “Why?”, and asking “Who?” or “Where?”) before accessing a preferred item. Because participants engaged in a series of verbal responses between requesting the missing item and accessing the item, it is likely that that the information provided in the first link of the chain functioned as a conditioned reinforcer.

As previously discussed, social interactions may not serve as effective reinforcers for verbal behavior in many children with autism. Therefore, establishing extended chains of verbal responses that ultimately lead to access to preferred items may be useful in conditioning social interactions as reinforcers. Persistent responding early in the behavior chain (in the case of this study, asking “Why?”) suggests that information provided after each verbal response functioned as a conditioned reinforcer (Williams, 1994). In other words, because participants consistently asked “Why?”, it seems that the information provided functioned as a conditioned reinforcer independent of the reinforcing value of the item provided at the end of each trial.

Future research should also examine the conditioned reinforcing effects of information on question-asking in children with ASD. One method to evaluate this would be to test the resistance to extinction when the terminal reinforcer is no longer provided at the end of the trial (Williams, 1994). For example, a future study could contrive mands for information and include an experimental phase in which information is provided after participants ask questions, but this information does not result in access to a terminal reinforcer. For instance, if a child asked “Where is my car?” the experimenter could tell her that it was in an unacessible location (e.g., “It is at work with your dad,”). If participants continued to ask questions even when information did not lead to access to preferred items, one could presume that information itself had acquired conditioned reinforcing effects.

The procedures used in this study may be beneficial in at least two ways. First, asking for the reason that an item is being denied may allow a child to access items that they otherwise would not have been able to obtain. In this instance, asking “Why?” increases a child’s access to reinforcement, which is a fundamental priority in behavior analytic treatment (Van Houten, Axelrod, Bailey, Favell, Foxx, Iwata, & Lovaas, 1988). Finally, and perhaps most importantly, the procedures used in this study established causal information as a reinforcer. Sundberg and Michael (2001) suggested that when children learn to ask questions, they acquire new verbal behavior and interact with their environment in ways that were not before possible. These new ways of interacting with the environment further condition verbal behavior and social interaction as a reinforcer (Skinner, 1957).

Skinner posited in an interview conducted by Richard Evans, “We shouldn’t teach great books; we should teach a love of reading. Knowing the content of a few works of literature is a trivial achievement. Being inclined to go on reading is a great achievement,” (Skinner, 1968). And I propose that we teach verbal behavior from the same perspective: we should not teach children to ask great questions, we should teach a love of information (i.e., condition information as a reinforcer). Knowing how to ask a few questions is a trivial achievement. Being inclined to go on manding for information is a great achievement.

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APPENDIX A

Treatment integrity data sheet

During sessions, a second observer collected treatment integrity data and interobserver agreement data.

Protocol Steps		Primary Data						Treatment Integrity						IOA					
Why?	P. delay	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. Assess MO (forced choice)																			
2. Allow engagement with nonpref., if chosen																			
3. Set up task																			
4. Instruction to engage																			
5. Mand for item																			
6. Varied "no response"																			
7. "Why?"																			
8. "Because…"																			
9. Who/where question																			
10. Provide information																			
11. Listener response																			
12. Engage w/ reinforcer																			
13. Error correct if needed																			
Why Control		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. Assess MO (forced choice)																			
2. Allow engagement with nonpref., if chosen																			
3. Set up task																			
4. Instruction to engage																			
5. Mand for item																			
6. Varied no response																			
7. Provide info																			
8. Refrain from "Why?"																			
9. Who/where question																			
10. Provide information																			
11. Listener response																			
12. Engage w/ reinforcer																			
13. Error correct if needed																			
TOTAL C/O:																			
TOTAL %:																			
Behavior Excess (Y/N)																			

APPENDIX B

Experimenter data sheet

The primary experimenter collected trial-by-trial data of participant performance.

Primary Experimenter:	**Date:**
Participant Number:	**Counterbalance:**
Session Number:	+=Independent – = Incorrect P= Prompted NR= No Response

Prompt delay	**Trial ▯** **Chain ▯**	**1**	**2**	**3**	**4**	**5**	**6**	**Total c/o**	**%**
	Why with who:								
	Mand for item								
	“Why?”								
	“Who?”								
	Listener response								
	Engage with item								
	Behavior excess? Y/N								
	Why with where:								
	Mand for item								
	“Why?”								
	“Where?”								
	Listener response								
	Engage with item								
	Behavior excess? Y/N								
	Control with who:								
	Mand for item								
	Refrain from “Why?”								
	“Who?”								
	Listener response								
	Engage with item								
	Behavior excess? Y/N								
	Control with where:								
	Mand for item								
	Refrain from “Why?”								
	“Where?”								
	Listener response								
	Engage with item								
	Behavior excess? Y/N								

APPENDIX C

Counterbalancing of trials

Between sessions, experimenters alternated between A and B trial orders, with the stipulation that no more than two 1 or 2 trials order be conducted in a row.

1A 1. Task 2 / EO / Where 2. Task 1 / EO / Who 3. Task 2 / AO / Where 4. Task 3 / AO / Where 5. Task 3 / EO / Who 6. Task 1 / AO / Who	**1B** 1. Task 2 / AO / Who 2. Task 1 / EO / Where 3. Task 1 / AO / Where 4. Task 2 / EO / Who 5. Task 3 / AO / Who 6. Task 3 / EO / Where
2A 1. Task 1 / EO / Who 2. Task 2 / AO / Where 3. Task 3 / AO / Where 4. Task 2 / EO / Where 5. Task 1 / AO / Who 6. Task 3 / EO / Who	**2B** 1. Task 3 / AO / Who 2. Task 1 / EO / Where 3. Task 2 / EO / Who 4. Task 1 / AO / Where 5. Task 3 / EO / Where 6. Task 2 / AO / Who