

# Using Textual Prompts to Teach Mand for Information Using “Who?”

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**Abstract** Recent research on teaching mands for information to children with language deficits has focused on manipulating establishing operations (EOs). However, only a few of those studies have programmed both EO conditions (in which information is needed) and abolishing operation (AO) conditions (in which information has already been provided) to ensure functional use of the mand for information. Shillingsburg, Bowen, Valentino, and Pierce (*Journal of Applied Behavior Analysis*, 47, 136–150, 2014) provided a successful demonstration of differential responding between EO and AO conditions demonstrating control of the response by the relevant EO. Echoic prompts resulted in successful mands for information “Who?” One limitation of this study was that the participants did not re-issue the initial mand upon approaching the named adult to retrieve the item. This may be problematic in the natural environment as it is unlikely that the named adult would know what the child was looking for. The current study sought to replicate and expand previous research by using textual prompts to teach the mand “Who?” in four children diagnosed with autism (Phase 1) and by requiring the mand for the item be re-issued upon approaching the named adult (Phase 2). Textual prompts resulted in differential use of the mand for information during EO and AO conditions for all of the participants. Additionally, three of the four participants who did not re-issue the mand to the named adult during the Phase 2 baseline did so following the intervention. Overall, results support the use of textual prompts to teach mands for information to children with autism.

**Keywords** Abolishing operation · Establishing operation · Mand · Mand for information · Textual prompt

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Mands are observed in a variety of forms and are not limited to requesting tangible items and activities. For example, “Wh” questions are often used to gain access to information. A critical component of social interaction in typically developing children is the ability to mand for information. Typically, developing children emit high rates of questions without direct teaching (Brown, 1968).

In recent years, there have been several studies that have sought to increase the value of information as a reinforcer by manipulating antecedent variables to contrive an establishing operation (EO) in order to teach mands for information (e.g., Lechago, Carr, Grow, Love, & Almason, 2010; Shillingsburg, Valentino, Bowen, Bradley, & Zavatkay, 2011; Sundberg, Loeb, Hale, & Eigenheer, 2002). For example, Endicott and Higbee (2007) successfully taught four preschoolers to mand for information involving the location of an item. Participants were given access to a preferred item in a container, then the container was given back without the item, thus contriving the EO for the mand “where?” This served as the basis for then teaching the mand for information.

Several recent studies have begun to include specific abolishing operation (AO) trials to demonstrate appropriate EO control of mands for information. For example, using echoic prompts, Ingvarsson and Hollobaugh (2010) taught four boys with autism to mand for answers to questions they could not answer by emitting the phrase “I don’t know please tell me.” The authors also included questions the boys could answer (the AO trials) to demonstrate that asking for information only occurred when the information was needed. Similarly, previous studies investigating mands for information using “Who?,” “Which?,” and “How?” have also included EO and AO conditions (e.g., Lechago, Howell, Caccavale, & Peterson, 2013; Shillingsburg, Bowen, & Valentino, 2014a; Shillingsburg, Bowen, Valentino, & Pierce, 2014b).

As researchers demonstrate improved methods to teach mands for information, it is important to expand existing procedures and address limitations of prior studies. The majority of the studies teaching mands for information have utilized echoic prompting. However, research supports the use of a variety of other prompts to teach verbal behavior. For example, Vedora, Makay, and Meunier (2009) successfully used textual prompts to teach two children with autism to answer intraverbal “Wh” questions. Results from this study found that using textual prompts was a more efficient method of teaching intraverbal behavior than using echoic prompts with these participants. Thus, it may be useful to examine the efficacy of a variety of prompt types when teaching mands for information.

Shillingsburg et al. (2014b) provided a successful demonstration of differential responding between conditions in which information was needed versus when it was already provided. In this study, all the participants successfully acquired the mand “Who?” However, one limitation to the study was that the participants did not re-issue the mand for the item when approaching the named adult. For example, the child would successfully request “Who has the \_\_\_?,” approach the therapist who had their preferred item, and then wait for the named adult to provide the item. In the natural environment, the named adult (the person who is approached) may not know what the child is coming to retrieve. Requesting the item from the approached individual is, therefore, a more functional response.

The primary purpose of the current study was to replicate and extend the methods employed by Shillingsburg and colleagues (2014b) to teach mands for information using “Who?” to four children diagnosed with autism. The original procedures were

replicated with two modifications. First, textual prompts were used with all the participants to train “Who?” responses (Phase 1). Second, once the participant learned to mand for information using “Who?” and subsequently approach the named adult, the participant was taught to re-issue the initial mand for the item (Phase 2).

## Method

### Participants, Setting, and Materials

Four children who attended an intensive behavioral intervention clinic to address language impairments and social deficits participated in this study. Three of the participants (Sarah, Brian, and Zack) attended a dyadic instruction program in which the primary focus was to address social deficits. Danny received 1:1 intervention. Sarah was a 6-year, 1-month-old female diagnosed with autism. Sarah’s verbal repertoire consisted of over 100 tacts for items, people, and actions and use of carrier phrases such as “it’s a...” or “I see a...” She emitted at least 300 different intraverbal responses, including intraverbal responses to fill-ins and “what” and “where” questions. She vocally emitted multiple-word mands and consistently responded as a listener to verbal instructions. In addition, she was able to phonetically read a variety of words when they were presented as individual words or sentences. Zack was a 6-year-old male diagnosed with autism. His verbal repertoire consisted of frequent vocal mands in 2–3 word phrases, consistent listener responding to verbal instructions, approximately 100 tacts, intraverbal fill-ins, and responding to several personal information and “What?” questions. Although Zach did not demonstrate phonetic reading, he learned sight words readily, and textual prompts were periodically used in his regular programming. He learned to respond appropriately to the sight words used in the textual prompts within three teaching trials. Danny was a 3-year, 7-month-old male diagnosed with autism. Danny emitted at least 50 tacts for common items, intraverbal behavior in the form of answering “Wh” questions, multiple-word vocal mands, and consistently responded as a listener. Despite his age, Danny was able to sight read a variety of words when presented as individual words or sentences. Brian was a 6-year, 2-month-old male diagnosed with autism. Brian responded consistently as a listener to verbal instructions and emitted at least 100 tacts of items, people, and actions. He emitted multiple-word mands and intraverbal behavior, including intraverbal responses to fill-ins and “What” and “Where” questions. Brian was able to phonetically read a variety of words when presented as individual words or sentences. None of the participants emitted mands for information using “Who?” Informed consent was obtained from caregivers for participation, and the study was approved by an institutional review board. The requirement for assent was waived.

All trials were conducted in a classroom with at least three therapists present and contained chairs, tables, shelves, and other teaching materials typically found in a classroom setting. Additional children and instructors were present in the room. Preferred edible and leisure items were also included and varied according to each participant’s preferences. Preferred items were selected based on the participant’s mands for items and informal assessments including observation

and presenting choices of items to the participant. Textual prompts were presented on  $10.2 \times 15.2$ -cm index cards and consisted of either hand-printed or typed words.

## Measurement

Trained observers collected trial-by-trial data using paper and pen. Observers scored responses as either an independent “Who?” response, a prompted “Who?” response, another (non-trained) response, or a nonresponse. Independent “Who?” responses were scored if the participants said either “Who?,” “Who has it?,” or “Who has (the name of the item)?” on EO and AO trials prior to the prompt; whereas, prompted “Who?” responses occurred after the prompt. Correct, incorrect, or nonresponses for the participant’s approach to the named adult were also scored. The approach to the named adult was scored as correct if the participant approached the correct individual within 5 s of the information being provided. Correct re-issued mands for the initial item were scored if the participant approached the correct person and emitted the mand for the item within 5 s. Correct independent mands were those emitted before the textual prompt was presented. Correct prompted mands were those emitted within 5 s of the presentation of the textual prompt.

During Phase 1, in which “Who?” mands for information were taught, the primary dependent variable was the cumulative number of “Who?” responses during EO and AO conditions. Mastery criteria was met when the participant emitted correct independent mands for “Who?” on nine out of ten EO trials and emitted no “Who?” responses on the three most recent AO trials. During Phase 2, in which re-issued mands for the initial item were assessed and taught, the primary dependent variable was the cumulative number of correct independent re-statements of the initial mand for the item once the correct adult was approached. The mastery criterion was a minimum of four out of the five consecutive trials correct.

## Interobserver Agreement and Treatment Integrity

A second observer collected data on the target mand “Who?” and the re-issued mand for the item simultaneously with, but independently of, the experimenter during baseline, mand training, and posttraining probe trials. Trial-by-trial interobserver agreement was calculated by dividing the number of agreements by the number of agreements and disagreements and converting the ratio to a percentage. An agreement was defined as both the primary and secondary observers recording a response as correct, incorrect, or a nonresponse within a trial. Interobserver agreement for Sarah, Danny, Zack, and Brandon was 100, 96, 97, and 100 % respectively, and was calculated for 38, 34, 97, and 28 % of trials, respectively.

Treatment integrity during the baseline and treatment conditions was measured via a 6–8-item checklist of therapist behaviors required to complete a trial. Generally, behaviors included providing appropriate antecedent conditions, implementing appropriate prompts, and delivering appropriate consequences. Treatment integrity for Sarah, Danny, Zack, and Brian was 100, 100, 100, and 99 %, respectively, and was calculated for 26, 30, 91, and 61 % of trials, respectively.

## Experimental Design

In Phase 1, an adapted alternating treatments design (Sindelar, Rosenberg, & Wilson, 1985) embedded within a nonconcurrent multiple-baseline design across the participants was used to compare the effects of mand training on manding for information in the presence of an EO and AO. The noncurrent multiple-baseline design across the participants was used to demonstrate replication of the treatment effects of mand training. In Phase 2, a multiple-baseline design across the participants was used.

## Pre-Assessment

The pre-assessment was conducted to ensure that each participant could follow instructions to approach a particular person when named. During the pre-assessment, at least three additional therapists were present in addition to the primary therapist. The primary therapist provided a preferred item to one of the additional therapists when the participant's attention was diverted and instructed the participant to "go to [individual's name]." After the instruction was provided, the participant was allotted 5 s to respond. Reinforcement was provided if the participant approached the correct individual. No reinforcement was provided if the participant approached the incorrect individual, and the trial was then terminated. Intervention began after the participants successfully approached three additional therapists correctly. Only therapists who the participant had correctly identified and approached in the pre-assessment were included when teaching "Who?" In addition, a pre-assessment of sight word reading was conducted with all the participants. During the sight word pre-assessment, the participants were shown hand-written or typed words contained in the sentences to be used throughout the textual prompting procedures (e.g., "who," "has," and "it" printed on cards). All the participants were able to read aloud the sight words presented during pre-assessment.

## Phase 1 Procedure

**"Who?" Scenario Conditions** During the intervention, at least three additional therapists stood or sat near the participant (i.e., 1.5–4.6 m away). A highly preferred item was given to one of the participating therapists to hold out of sight when the participant was not looking. The target therapist was randomized from trial to trial. For three of the participants, preferences were fairly stable. Therefore, items for which they were likely to mand were selected and given to one of the additional therapists. For two of the participants, a candy wrapper or empty bag was placed on the table to signal the availability of the item (Danny and Zack). Leisure items (e.g., puzzle) were used during Sarah's intervention. Trials consisted of giving a piece or part of the leisure item to one of the therapists. Due to constantly changing preferences, Brian's procedures differed slightly from the other participants. Given the difficulty in predicting what item Brian preferred from moment to moment, the primary therapist waited for him to engage with a preferred item then removed the item and instructed Brian to close his eyes or look away. While his attention was diverted, the therapist gave the item to another therapist in the room, and Brian was told, "You can look now." For all the participants, a trial began when a mand was emitted for the item. Following the mand during EO trials, to

contrive an EO for the information “Who?,” the primary therapist stated that someone had the preferred item but did not specify who (e.g., “Someone in the room has your toy”). During AO trials, to contrive an AO for the information “Who?,” the primary therapist stated that someone had the preferred item and named the adult (e.g., “John has your toy”). Given that trials did not start until the participant manded for the missing item, the number of trials conducted per day ranged from 2 to 15.

**Baseline and Posttraining Probes: Who? Scenario** During the baseline probes, EO and AO condition trials were randomized. If the participant emitted the correct mand “Who?” on an EO trial, the therapist immediately provided the necessary information. Following an incorrect mand (i.e., saying “Who?” on an AO trial) or no response, no information was provided to the participant, and the therapist moved on to the next trial. Following provision of the information on AO trials or after the “Who?” on EO trials, the participant was provided access to the hidden item if he or she approached the correct named therapist. Treatment was initiated if mands were not observed in baseline.

**Treatment: Who? Scenario** A constant time delay prompt (Schuster, Gast, Wolery, & Gultinan, 1988) was implemented to teach the mand “Who?” during EO trials. Similar to baseline, EO and AO trials were randomized. For the first eight EO trials, after the experimenter said “Someone has your [missing item],” the textual prompt “Who has it?” was immediately presented (0-s delay). The textual prompt was removed after 5 s or after the participant responded to the textual prompt, whichever came first. Correct prompted and unprompted responses were reinforced with the information needed to retrieve the item (i.e., the name of therapist with the item). Though this never occurred, incorrect responses to the textual prompt would have resulted in termination of the trial. During AO trials, the response “Who?” was ignored. Once participants completed at least eight trials and responded correctly for three consecutive trials at the 0-s time delay, a 2-s prompt delay was incorporated to allow an opportunity for an independent response. The mastery criterion was met when the participant emitted correct independent mands for “Who?” on nine out of ten EO trials and did not emit mands for “Who?” on the three most recent AO trials.

## Phase 2 Procedure

**Baseline and Posttraining Probes: Follow-up Mand** Upon mastery of the mand “Who?,” baseline for the follow-up mand was conducted. Randomized EO and AO trials described in the “Who?” scenario were continued in the follow-up mand scenarios. Upon successful approach to the named adult, the participants were allotted 5 s to emit the follow-up mand for the item. If the mand for the item was emitted, the item was delivered. If an incorrect mand or no response was observed, the trial was terminated, and the participant was directed back to the primary therapist.

**Treatment: Follow-up Mand** Treatment for the follow-up mand for three of the four participants began with a textual prompt provided on a 0-s time delay. Similar to procedures for the mand “Who?,” the textual prompts were presented on 10.2 × 15.2-

cm index cards and consisted of the written or typed item name. Decisions to increase the prompt delay were made individually based on each participant's history of responding to the textual prompts. Generally, for a minimum of four trials, an immediate textual prompt was provided (0-s delay) once the participant approached the named adult. Correct prompted responses (i.e., within 5 s of the provided textual prompt) were reinforced with the item. Prompt delays were then faded by intervals that varied across participants (see [Results](#)). The mastery criterion was met when the participant independently re-issued the follow-up mand for the item on at least 9 out of 11 trials.

## Results

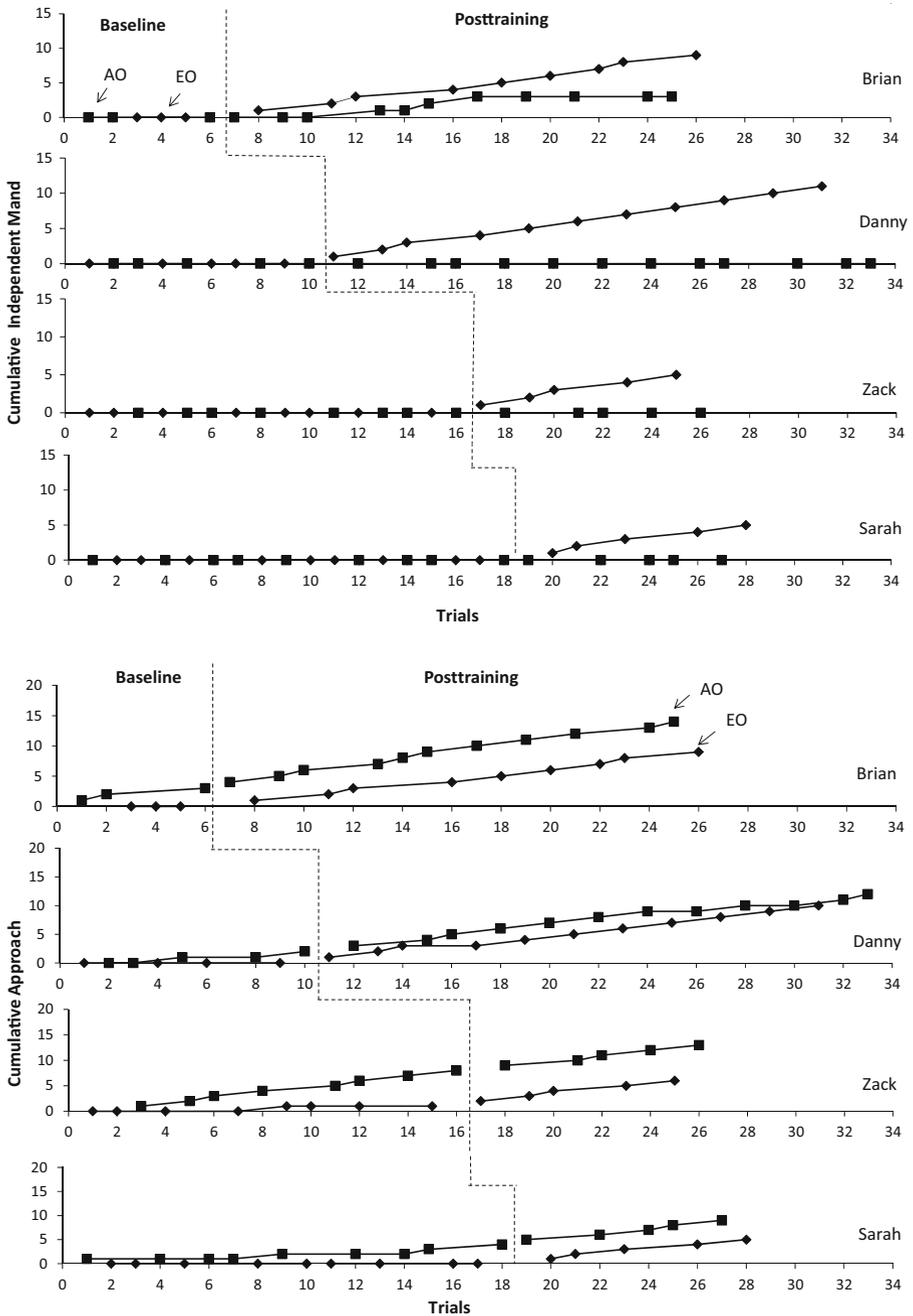
### Phase 1

Figure 1 (top) displays the cumulative frequency of mands for information using “Who?” in baseline and posttraining for all the four participants. In baseline, none of the participants emitted the mand “Who?” in either condition (EO or AO), and they consistently approached the correct individual when the information was provided in AO trials. Following mastery of the mand “Who?” during training trials (see Fig. 2), posttraining probes were conducted. During posttraining, all the participants emitted the mand “Who?” under EO conditions and three out of the four participants (Zack, Sarah, and Danny) did not emit the mand under AO conditions. Brian began to emit the mand “Who?” during the AO condition for a few trials. However, differential responding and stability was achieved beginning at trial 17. Figure 1 (bottom) shows the cumulative frequency of approach responses (i.e., listener responses) to the correct named adult in baseline and posttraining. All four participants were observed to consistently approach the correct therapist in posttraining in both conditions after the information was provided.

Figure 2 (top) shows teaching trials for “Who?” for all four participants. During treatment, Brian met the criterion to fade to a 2-s delay after 18 alternating EO and AO trials and met the mastery criterion after 43 trials. Danny met the criterion to fade to a 2-s delay after 29 alternating EO and AO trials and the mastery criterion after 159 trials. Sarah met the criterion to fade to a 2-s delay after 17 alternating EO and AO trials and met the mastery criterion after 50 trials. Zack met the criterion to fade to a 2-s delay after 16 alternating EO and AO trials and met the mastery criterion after 36 trials. Some responding in the AO condition was observed during teaching trials for Brian, Danny, and Sarah (Fig. 2, top). Correct approach responses (Fig. 2, bottom) when the information was provided during teaching trials occurred during 100 % of EO trials and 100 % of AO trials for Brian, 89 % of EO trials and 70 % of AO trials for Danny, 100 % of EO trials and 100 % of AO trials for Sarah, and 100 % of EO trials and 100 % of AO trials for Zack.

### Phase 2

Figure 3 (top) displays the baseline and posttraining of follow-up mands for the item following the mastery of the mand “Who?” Three of the participants (Danny, Zack, and



**Fig. 1** Cumulative records of independent “Who” mands (*top*) and approach behavior (*bottom*) during baseline and posttraining probes for Brian, Danny, Zack, and Sarah

Sarah) did not emit the follow-up mand for items in baseline. Brian emitted the follow-up mand in baseline and did not require any additional training. Figure 3 (bottom)

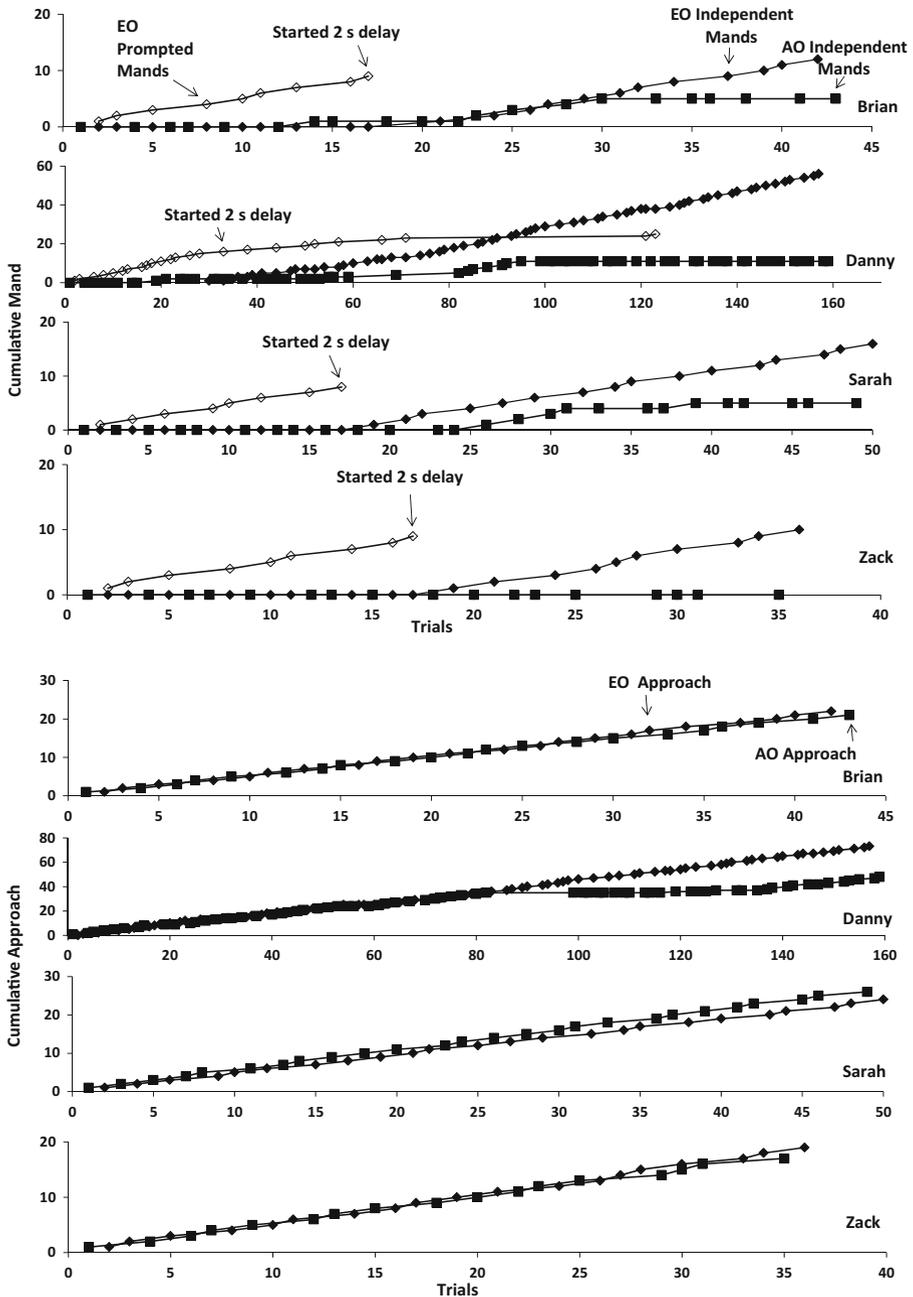
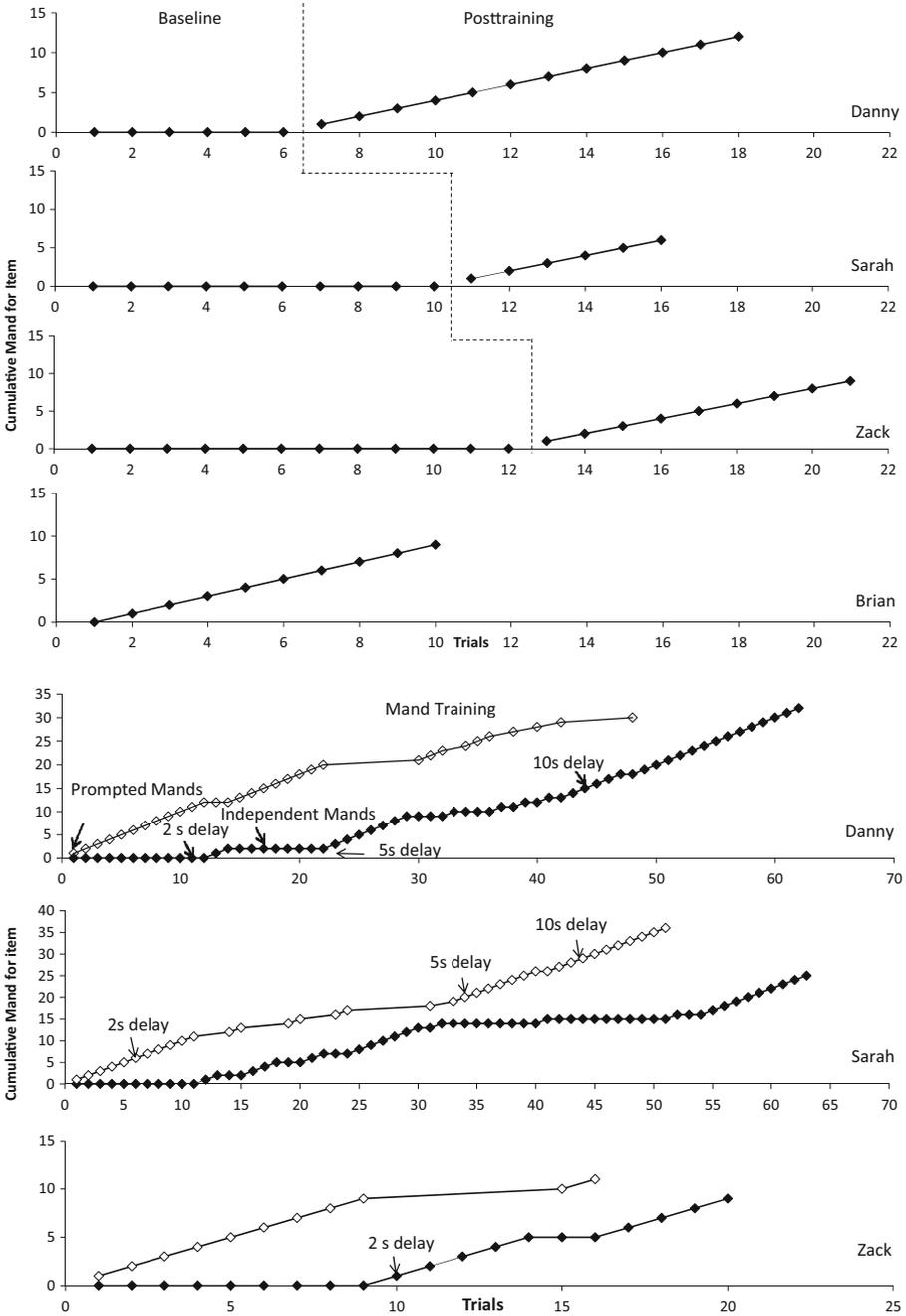


Fig. 2 Cumulative independent and prompted “Who?” mands (top) and approach behavior (bottom) during mand training for Brian, Danny, Sarah, and Zack

displays the training to re-issue the follow-up mand for the item for Danny, Sarah, and Zack. For Danny, a 2-s delay was implemented after 10 trials, a 5-s delay after 22 trials, and a 10-s delay after 44 trials, and responding met the mastery criterion after 62 trials.



**Fig. 3** Cumulative independent responses for the follow-up mand during baseline and posttraining (*top*) and cumulative independent and prompted responses for the follow-up mand during mand training (*bottom*)

A 2-s prompt delay was implemented for Sarah after 8 trials, a 5-s delay after 37 trials, and a 10-s delay after 46 trials and responding met the mastery criterion after 63 trials.

After nine trials, a 2-s prompt delay was implemented for Zack. Zack consistently responded within the 2-s delay and did not require additional prompt delays. Zack's responding met the mastery criterion after 20 trials. Danny, Sarah, and Zach required 11, 7, and 3 days of teaching to master the follow-up mand for the item.

## Discussion

The current study is a successful demonstration of training mands for information "Who?" for four participants using textual prompts. In Phase 1, in posttraining probes, all four participants responded differentially between trials in which the information was needed (EO) and when it had already been presented (AO). The current study also included an assessment of participants' behavior once information regarding the location of the preferred item was provided (Phase 2) and showed that only one participant engaged in mands for the item from the named adult. Three of the participants required training to re-issue the follow-up mand and were observed to do so after training. This study represents a replication and extension to previous research teaching the mand for information "Who?" to children with autism.

Results of the current study highlight the importance of assessing mands for information in both EO and AO conditions. Previous research examining acquisition of mands for information (Shillingsburg et al., 2014b) has shown that some children with language delays begin emitting the "wh?" questions across both EO and AO conditions, and that a strategy to teach differentiated use is sometimes necessary. In the current study, three of the four participants emitted the "Who?" response on AO trials during teaching. Had mastery only required correct responding on EO trials, treatment would have been terminated prematurely. Presumably, had the intervention only included EO trials these errors would not have been detected.

Only Brian emitted the "Who?" response during AO trials after training. It was noted that during these probes, Brian sometimes emitted the mand so quickly that the information regarding who had the preferred item had not been fully stated yet. That is, as the therapist was providing the information, Brian would request "Who has it?" before the therapist was able to complete her sentence. When this occurred, the therapist completed the statement, and Brian used the information appropriately. Therefore, Brian's mand "Who?" was emitted prior to the information being provided, technically under EO conditions. Clinical application and replication of these procedures should consider factors such as how quickly information is provided and how delays may affect correct responding.

Another factor that might affect responding on AO trials is whether the information was heard by the participant. In other words, if the information regarding the location of an item is given but the individual did not hear it, that may result in the "Who?" response. In this case, although the trial was intended to be an AO trial, emission of the mand "Who?" may be appropriate because the information was not heard. Failure to teach and assess mands for information in both EO and AO conditions may result in inappropriate use of the "Wh?" question; however, careful observation of the conditions presented during trials can aid in understanding errors in responding.

It should be noted that providing different consequences on the EO and AO trials (i.e., reinforcing versus ignoring the response "Who has it?") is a limitation and raises

the possibility that the information provided by the adult may function as a discriminative stimulus rather than purely a motivating/abolishing operation. In other words, the statement “someone has it” may function as an  $S^D$  while the statement “Joe has it” may function as an  $S$ -delta for responding “Who?” Given that naturally occurring interactions that include mands for information likely involve a variety of discriminative and motivational stimuli, it is not unreasonable to include both in teaching sessions. However, careful examination of generalized use of the mand should be conducted to examine the effect on functional use. If the response is under tight stimulus control, then emission of the mand for information may not occur in other contexts without similar stimulus features. Previous research (e.g., Shillingsburg et al., 2014b) has shown that teaching the mand for information “Which?” using procedures similar to the present study did not impede generalization of the mand “Which?” to a variety of generalization probes under more naturalistic conditions. Similar generalization probes were not included in the present study. Future research may examine these issues by including a variety of generalization probes or by including similar consequences on both EO and AO trials.

The current study provides an extension to previous studies on mands for information that have predominately incorporated the use of echoic prompts. The results of this study show that textual prompts were used to successfully teach the mand for information “Who?” adding support to the growing body of research showing that textual prompts are a viable method of teaching children with autism spectrum disorder. However, similar results to textual prompts should not be expected for children who do not have sight reading or phonemic reading in their verbal repertoire. Since teaching the prerequisite skills necessary for these prompting procedures can be a lengthy process for some learners, clinicians should consider the variety of prompting strategies available in the literature before deciding which strategy to utilize when programming for this skill.

The current study also extends previous research by identifying an important step in the functional use of mands for information that has been overlooked in previous research. Specifically, once the mand “Who?” is emitted and information regarding the name of the person with the item is given, the individual then should approach the named person and ask again for the item. In previous research (Shillingsburg et al., 2014b) whether the individual actually re-issued the mand was not measured. In the current study, we assessed whether the participants re-issued the mand for the item to the named adult. Only one of the four participants did so. Without specific training to re-issue the mand for the item, many individuals learning to mand for information and subsequently use that information to access reinforcement may fail to do so. Therefore, assessing this step when teaching the mand for information “Who?” is an important component of teaching this skill.

One limitation of the current study is the contrived nature in which the trials were conducted. Generalization to novel adults and novel situations was not assessed. It may be beneficial, therefore, for future research to assess maintenance and generalization of mands for information and use naturally occurring stimuli if generalization and maintenance are not observed. This study also did not incorporate other mands for information such as “Which?” or “Where?” during training. It is possible that the mand “Who?” may be used in inappropriate contexts and interventions may need to focus on differentiated use of other mands for information. In addition, the assessment of the re-

issued mand in Phase 2 did not occur until after the mand for “Who?” was taught in Phase 1. It is possible that participants would have engaged in the follow-up mand for the item if they had been provided an opportunity to do so during Phase 1. Perhaps, the follow-up mand did not occur in Phase 2 because it was not required for reinforcement delivery throughout the Phase 1 intervention. Therefore, clinicians might consider incorporating assessment and treatment of the re-issued follow-up mand throughout intervention for the mand for information “Who?” Lastly, this study did not include a comparison of prompt types. Though textual prompts were successful in teaching mands for information relatively quickly for all four participants, it is possible that echoic prompts may have been more efficient. Textual prompts were chosen for these participants due to a history of successful programming using textual prompts. However, it may be beneficial to compare prompt modalities if it is unclear as to which prompt type will result in faster acquisition and better maintenance and generalization.

In conclusion, the current study provides a replication and extension of previous research on effective treatment procedures to teach mands for information using “Who?” Specifically, the use of textual prompts resulted in differentiated use of the mand “Who?” during EO and AO conditions, and led to the re-issuing the initial mand to the named adult.

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### Compliance with Ethical Standards

**Ethical Approval** All procedures performed in this study were in accordance with the ethical standards of the institutional review board and with the 1964 Helsinki Declaration and its later amendments.

**Conflict of Interest** The authors declare that they have no conflicts of interest.

**Informed Consent** Informed consent was obtained from all the individual participants included in the study.

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