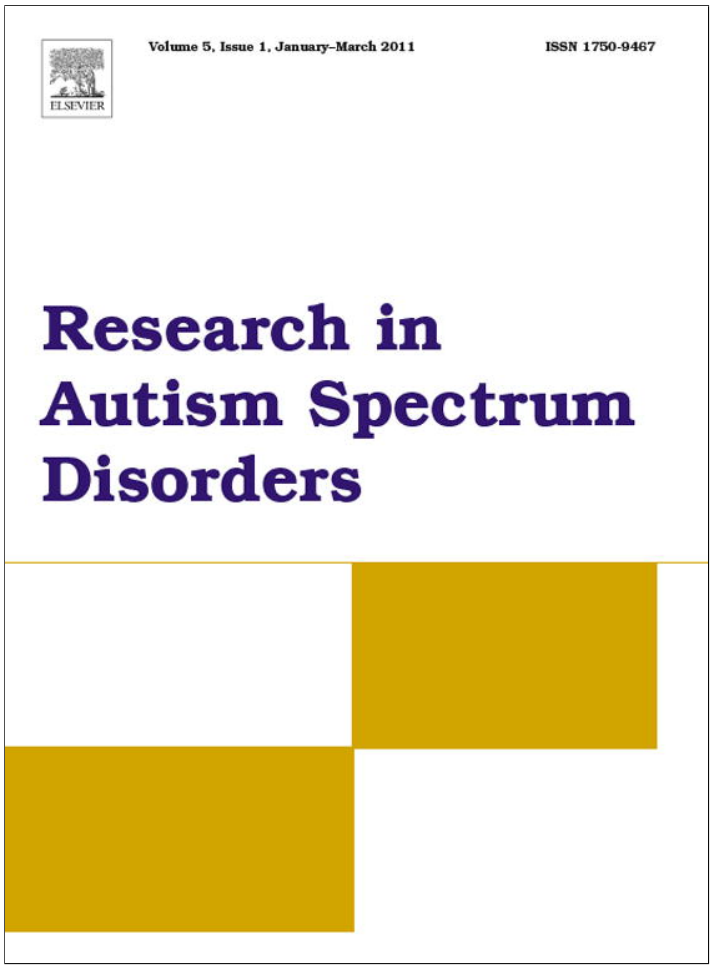

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Teaching children with autism to request information

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ABSTRACT

Question asking behavior, or requesting information, is often deficient in children with autism and can prove challenging to teach. Currently, there exists a paucity of research regarding the types of teaching strategies that are effective in teaching children with autism this crucial skill. The purpose of the present study was to examine strategies to teach two children with autism to request information using "when?," "who?," "where?," and "which?" Results indicated successful acquisition and maintenance of all 'wh' questions. Generalization to untaught scenarios within the same request form was observed more quickly when a general response topography was taught than when a specific response topography was taught. The applied value of the current findings is discussed as well as areas for future research.

Question asking behavior often takes the form of requesting information such as who?, what?, when?, where?, why?, or which? Requesting information is useful because it allows an individual to obtain important, unknown information from the environment, which may result in correct completion of tasks, increased social interaction, and expansion of the individual's overall verbal repertoire. For example, in a typical learning environment, if a teacher instructs a child to pick up an unfamiliar object, the child with a strong repertoire of requests for information may ask "which one is it?" to gather information to complete the task. Additionally, the information provided (i.e., the name of an unknown item) may increase language development and expand the child's verbal repertoire. Requesting information may also increase social interactions because they involve initiation of interaction with another person.

Although typically developing children emit high rates of requesting information (Brown, 1968), children with autism and other language delays often demonstrate difficulty establishing a well developed question asking repertoire without specific teaching (Endicott & Higbee, 2007). In one of the first studies to examine teaching requests for information to individuals with disabilities, Twardosz and Baer (1973) taught two children with mental retardation to ask "what?" in response to unknown items. Prompting, fading, chaining, and differential reinforcement were used to increase appropriate responding. Other researchers (Bondy & Erickson, 1976; Hung, 1977) have assessed the effects of token reinforcement systems and found its use with or without modeling to be effective in increasing the rate of question asking. The effectiveness of videotaped rehearsal and feedback has also been examined in teaching children with learning disabilities to ask questions in a general education setting and an increase in requesting information was found (Knapczyk, 1989).

Requesting information has also been classified as "manding for information" if the behavior is under the control of an establishing operation (EO) and results in reinforcement that is specific to the EO (Michael, 1988). For example, if a student requests to play outside and an adult responds "not right now," this may evoke the mand for information "when?"

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Reinforcement for this mand would come in the form of the information to answer this question (e.g., "after your work"). More recent research has focused on language programming that teaches requesting information in the presence of the relevant EO. When the EO was manipulated, researchers have effectively taught mands for information (Endicott & Higbee, 2007; Lechago, Carr, Grow, Love, & Almason, in press; Sundberg, Loeb, Hale, & Eigenheer, 2002; Williams, Donley, & Keller, 2000).

The difficulty that children with autism have in developing requests for information without specifically being taught may be due to the lack of reinforcing value of the information (Sundberg et al., 2002). This was addressed in more recent studies as the researchers ensured that the information given in response to the participant's question lead to a reinforcer. Presumably, the information was conditioned as a reinforcer in that the child used the information to access a preferred item. Therefore, a critical part of intervention is identifying information that is reinforcing, contriving the relevant EOs, prompting the correct request for information, and subsequently fading those prompts. Previous research has focused on the effectiveness of these procedures to teach requests for information in the form of "what?," "where?," and "who?" Strategies for teaching other forms of requests for information (e.g., "when" and "which") to children with autism have not yet been studied.

It is also critical to identify teaching procedures that will best lead to generalization of requests for information once taught. Generalization of requests for information will allow the individual to continue to obtain information without having to be taught to do so in every situation in which motivation is present. Previous research involving generalization of mands for information has focused on generalization of taught mands to other settings (Knapczyk, 1989; Williams et al., 2000), to other contexts (Endicott & Higbee, 2007; Secan, Egel, & Tilley, 1989; Taylor & Harris, 1995), to novel people (Esbenshade & Rosales-Ruiz, 2000; Taylor & Harris, 1995), and to novel items and response topographies (Sundberg et al., 2002; Williams et al., 2000). Recently, Betz, Higbee, and Pollard (2010) examined generalization of mands for information when teaching sessions included verbal cues and generalization sessions did not. Results indicated mands did not completely generalize in the absence of specific verbal cues.

The primary purpose of the current study was to expand the literature on the use of teaching procedures to teach requests for information, specifically "when?" and "which?" in addition to other previously examined request forms (i.e., "who?," "what?," and "where?").

Due to the importance of generalization, the second purpose of this study was to examine teaching general versus specific topographical responses to assess generalization to untreated scenarios. Specifically, we sought to compare generalization to other scenarios within the same 'wh' form with manipulations across two teaching strategies: teaching a specific topography (where is *my blanket*?) versus teaching a general topography (where *is it*?).

1. Method

1.1. Participants

Two males, John and Cameron, participated in the present study. Both participants were selected for the study based on report from their parents and teachers that each exhibited limited to no requests for information in the home or school setting.

John was 7 years, 9 months of age and was diagnosed with cerebral palsy and autism. John was enrolled in a program specializing in the treatment of severe problem behavior, with the latter part of his admission focused on improving specific communication skill deficits. John emitted a high rate of multiple word vocal mands for preferred items and activities. He responded consistently to basic one and two component receptive instructions, emitted approximately 50 tacts for common items and emitted some basic early intraverbal language (i.e., responded to questions such as "What is your name?", "How old are you?", and "What is your phone number?"). He asked questions using "where?" when two to three highly preferred items were missing. However, he did not ask questions using any other topography of request (e.g., "when?," "which?," "who?," etc.) under relevant conditions.

Cameron was 11 years, 11 months of age and was diagnosed with autism. Cameron was enrolled in a program specializing in intensive behavioral intervention aimed at improving adaptive and communication skill deficits. Cameron responded to basic and advanced receptive identification of objects (e.g., identifying pictures by feature, function and class), receptive instructions and motor imitation skills. He emitted one word vocal mands, a variety of echoic sounds and words, tacts of basic objects, and early intraverbal language. He requested information using "what?" in a variety of situations. Cameron did not request information using any other topography of request under relevant conditions.

1.2. Setting and materials

John and Cameron were taught in a one-on-one format using discrete trial instruction. Training sessions were conducted in a classroom (Cameron) or individual therapy room (John) that consisted of chairs, tables, and the relevant reinforcer(s). For Cameron, other children and instructors were present but did not interact with him during sessions.

1.3. Pre-teaching preference assessment

Prior to baseline and teaching sessions, preferences for items to be included in the study were assessed. A paired-choice preference assessment was conducted for Cameron (Fisher et al., 1992) and a multiple stimulus without replacement preference assessment for John (DeLeon & Iwata, 1996) for most items (data available upon request). However, there were a

few scenarios and relevant items that did not lend themselves to presentation in a formal preference assessment. For example, in one scenario for Cameron, his chair was missing when he returned to his desk and was told to sit down. In this case, the chair was not included as an item in the preference assessment. Instead, preference was presumed due to a history of pairing sitting in the chair and access to other preferred items at his desk, such as his CD player and favorite videos. Additionally, going for a walk and going to the playroom were not included in a preference assessment but were presumed preferred based on a history of requesting to engage in those activities in the past.

1.4. General procedures overview

For both participants, requests using three different "wh" questions were selected for treatment. Within each "wh" question, four different scenarios designed to evoke the request for information were chosen. Thus, a total of 12 requests for information were selected for each participant.

For each "wh" question, caution was taken to ensure motivation for the item was present. Therefore, trials consisted of presenting both verbal and nonverbal stimuli, if relevant, during each trial. For example, the therapist gives the child a portable CD player without headphones and says, "let's listen to Alicia Keys." In this scenario the antecedent included a nonverbal stimulus (i.e., CD player without headphones) and a verbal stimulus (i.e., let's listen to Alicia Keys) to evoke the request for information, "where are my headphones?" Following emission of the request for information, the information regarding the location of the headphones was provided and the participant was permitted to access the reinforcer (e.g., music). In order to maintain the value of the information provided, the information (i.e., answer to the question) was changed after each trial. In the example of the missing headphones, the location of the headphones was changed for every trial to ensure the information was still needed to access the preferred item. Additionally, the headphones were out of sight so that the participant was not able to locate them on his own.

Both participants were taught to request information using "when." Instead of requiring the participants to wait for a specified period of time, the information provided to the request "when" indicated that the participant must complete an action after which he could then access the reinforcer. For example, if the participant requested the information "when can I go to the playroom" response given indicated he could go after completing a task (e.g., "after you give me a high five"). This decreased the challenges associated with teaching the request "when" because the participant did not need to have access to a visual or auditory aid indicating the length of a wait interval.

For the purpose of the current study, the behavior under investigation will be labeled "requests for information" instead of "mands for information" since the behaviors may have been under control of multiple stimuli in addition to the EO.

"Wh" question scenarios. Who, which, and when questions were targeted for John. The four "who" scenarios included (1) stating that someone has his favorite Thomas the train in the presence of 3 of his therapists, (2) attempting to play the computer with the mouse missing and stating, "someone took your mouse," (3) hiding 1 of 4 favorite Thomas the train characters under a tunnel and stating, "someone is under here," and (4) stating that someone has a surprise for him in the presence of 3 of his therapists. The four "which" scenarios including (1) presenting two closed fists in front of him and stating "one of my hands has a surprise for you," (2) presenting 3 opaque containers and stating, "one of these cups has a surprise under it," (3) stating, "there is a surprise in the closet but you need one of these keys to open it," and (4) while playing trains stating, "one of the engines is coming through the tunnel." The four "when" scenarios included (1) stating "we are going to play on the computer, but not right now," (2) stating "let's play trains but not right now," (3) presenting a bowl with a small amount of snack and when it was empty stating "you can have some more but not right now," and (4) stating "we are going to watch a show but not right now."

Who, where, and when questions were targeted for Cameron. The four "who" scenarios included (1) presenting 3 containers each with a picture of a favorite pop singer on it and stating "someone has a surprise for you," (2) presenting 3 containers each with a picture of one of his classmates on it and stating "one of your friends has a surprise for you," (3) stating "one of your teachers has a treat for you" in the presence of 3 of his teachers, and (4) presenting 3 containers each with a different dollhouse family member on it and stating "one of these people has a treat for you." The four "where" scenarios included (1) presenting him with a box two times in a row with a snack in the box and then on the third time presenting the box without a snack, (2) instructing him to sit in his chair but his chair is missing, (3) instructing him to listen to Alicia Keys but the CD player is missing the headphones, and (4) instructing him to read his magazine but the pages are missing. The four "when" scenarios included (1) stating "we are going for a walk but not right now," (2) stating "let's go to the playroom but not right now," (3) stating "we are going to color but not right now," and (4) stating "we are going to eat a treat but not right now."

For both John and Cameron, the information provided in response to the correct "wh" question lead the participant to access the preferred item. For "which," "who," and "where" questions the response indicated the correct person, container, or location where the preferred item was hidden. For "when" questions the response indicated that the participant had to complete a short and easy task, after which, the preferred activity could begin.

1.5. Training procedures

1.5.1. Baseline

During baseline, each scenario for each form of "wh" question was presented followed by a 5 s response interval. A scenario was defined as each different EO manipulation within a "wh" question (i.e., "where?," "when?," "who?," "which?").

Each "wh" question consisted of four pre-identified scenarios. If the participant emitted an incorrect response or no response within 5 s, no information or reinforcement was provided and the next trial was initiated. Had the participant emitted a correct response within 5 s, no information or reinforcement would have been presented, however the response would have been acknowledged (e.g., "I'm not sure where."). All sessions consisted of 5 trials.

1.5.2. Treatment

Similar to baseline, sessions consisted of 5 trials. During this phase, one scenario for one "wh" question was chosen to begin treatment while all others remained in baseline. For example, for John, the "wh" question "who?" and the scenario "someone has a surprise for you" was introduced first. Treatment consisted of presenting the nonverbal and verbal stimuli as the antecedent manipulation (i.e., three therapists were present and he was told "someone has a surprise for you") followed by a 3 s delay. If the child emitted no response or an incorrect response during the 3 s delay the verbal stimulus, "someone has a surprise for you" was represented and a vocal prompt with the correct request ("who?") was provided. Once the child echoed the response, information was provided that led to access to the preferred item and activity. For example, when John was told "someone has a surprise for you" and he echoed "who?" the therapist provided the name of a person in the room and the child used that information to then gain access to the preferred item from the named person. If the participant emitted the correct request independently, the information and subsequent reinforcement were provided immediately and no prompts were given. If the participant did not echo or gave an incorrect response to the vocal prompt, the trial was terminated. All information provided led to the relevant reinforcer that was quickly delivered. Each request for information was considered mastered following three consecutive sessions with correct, independent responses during 80% or more of trials.

1.5.3. Generalization probes

Once mastery for one scenario was met, the other scenarios within that "wh" question form were probed once for generalization. Generalization probe sessions consisted of 5 trials. If correct responding during the generalization probe in any of the scenarios did not occur at 80–100%, the probes were discontinued. If the participant emitted 80–100% correct responding in one scenario when probed for generalization, that same scenario was probed two more times to check for mastery.

1.5.4. Maintenance

Maintenance probes were conducted to measure maintenance of each request for information in each scenario as well as to ensure continued appropriate responding as new "wh" questions were taught. Maintenance probe sessions consisted of 5 trials. For John, maintenance probes for the "who?" scenarios were not conducted until after all scenarios for "which?" were mastered. Maintenance probes for the "which" and "when" scenarios were not conducted until after all scenarios for "when?" were mastered. Maintenance probe sessions for Cameron were not conducted until after all scenarios for all "wh" questions were mastered.

1.6. Response topography

The responses taught to each participant were classified as either a general response topography or a specific response topography. A general response topography was defined as a "wh" question that does not specify a particular item or activity. General response topographies included teaching a broad response that could be used for multiple scenarios, such as "who has it?" or "where is it?" In these examples the specific item is not specified and the same response can be used in multiple situations. A specific response topography was defined as a "wh" question that does specify a particular item or activity, such as "who has my train?" or "where are my headphones?" For John, 8 scenarios were taught using the same response for every scenario (i.e., a general topography) and 4 were taught using a different response for each scenario (i.e., a specific topography). For Cameron 4 scenarios were taught using the same response for every scenario (i.e., a general response topography) and 8 were taught using a different response for each scenario (i.e., a specific response topography).

1.7. Response measurement and interobserver agreement (IOA)

For both participants a correct response was defined as emitting the appropriate form of the request for information within 3 s of the antecedent nonverbal stimuli and verbal stimuli, if relevant. An incorrect response was defined as emitting any other vocal response or no response following the antecedent stimuli. During sessions for which a specific topography was taught, a correct response was scored only if the specific request for information was given. If a general request for information was given when a specific request was taught, the response was scored as incorrect and the prompt procedure was implemented. During sessions for which a general topography was taught, a correct response was scored if the general response was given. If a more specific response was given, that would also be scored as correct. Neither of the participants gave a specific request for information when a general request was taught and neither participant gave a general request when a specific response was taught. Most errors consisted of the participant emitting no response, emitting an incorrect request for information, or echoing the verbal stimuli presented in the antecedent manipulation.

Data were collected in vivo using paper and pencil recording by a primary data collector who was not involved in conducting sessions. Data were collected for each trial of the 5-trial sessions on independent and prompted responses. A

second independent observer also collected data simultaneously to provide interobserver agreement (IOA). IOA was calculated for each session by dividing the number of agreements by the number of agreements and disagreements and multiplying by 100%. Agreements were defined as both the primary and secondary observer recording that a correct response occurred for a specific trial or an incorrect response occurred for a specific trial. Disagreements were defined as one observer recording a correct response and one observer recording an incorrect response for a specific trial. Mean IOA for John was 100% and was collected during 67.9% of sessions. Mean IOA for Cameron was 98% (range 80–100%) and was collected during 30% of sessions.

1.8. Experimental design

A multiple probe across "wh" questions design was used to assess the effects of teaching. Following baseline, the therapist implemented teaching sessions for one scenario within one "wh" question form. The other scenarios within that "wh" question form and all scenarios within the other two "wh" question forms remained in baseline. Scenarios within the other request forms (i.e., other "wh" questions) were probed to demonstrate experimental control. The untaught scenarios within the targeted "wh" question form *were not* probed until the mastery criterion was met for the first targeted scenario. Following mastery of the first targeted response, the remaining scenarios within that "wh" question form were probed for generalization. Therefore, for each participant, one scenario for one "wh" question was in treatment at a time. Other "wh" question scenarios were probed in baseline but the other three scenarios for the same "wh" question currently in treatment were not probed until after the targeted scenario was mastered. For example, with John, once "someone has a surprise for you" was targeted, the other three scenarios ("someone has the mouse for your computer," guess who is hiding under here, and "someone has a train for you") were not probed but the other "wh" questions ("when?" and "which?") and all scenarios within those "wh" questions were probed to demonstrate experimental control.

Once a scenario was mastered, if the untreated scenarios within the same "wh" question form did not generalize across baselines, a second scenario within that "wh" question form was taught and generalization probes were conducted as previously described until all scenarios within the first targeted "wh" question form were mastered either through direct teaching or generalization. A new "wh" question form was then targeted for treatment.

2. Results

John's results to teaching request for information "who?," "which?," and "when?" are depicted in Fig. 1. During the baseline phase for each scenario within the request for information "who?," John did not emit the correct response (Panels 1 and 2). During treatment, the general response topography, "who?," was taught. Following implementation of treatment of the first "who?" scenario, John met mastery criterion (Panel 1) in five sessions. Scenarios within the other requests ("which?" and "when?") remained in baseline during teaching of the first "who?" response and John did not emit the correct request during baseline in any of these scenarios (Panels 3–9). Following mastery of the first "who?" scenario, the other untaught scenarios for the "wh" question "who?" were probed for generalization (Panel 2). Results of the generalization probes show that once the first "who?" scenario was mastered, John's responding in all three other scenarios met mastery criterion although they were never specifically taught.

During baseline for the "wh" question "which?," John did not emit the correct request for information (Panels 3–5). During treatment, the general response topography, "which one?," was taught. Following implementation of treatment, John met mastery criterion for the first targeted request for information (Panel 3) in six sessions. Scenarios within the untargeted request ("when?") remained in baseline during teaching of the first "which?" response and John did not emit the correct request during baseline in any of these scenarios (Panels 6–9). Following mastery of the first "which?" scenario, the other untaught scenarios for the "wh" question "which?" were probed for generalization (Panels 4 and 5). Results of the generalization probes show that once the first "which?" scenario was mastered, John's responding in 2 of the 3 untaught scenarios met mastery criterion (Panel 4) although never specifically taught. One scenario did not show generalization but was mastered once specifically targeted for treatment (Panel 5).

During baseline for the "wh" question "when?," John did not emit the correct request for information (Panels 6–9). During treatment, a specific response topography was targeted for each scenario. Following implementation of treatment, John met mastery criterion for the first targeted request for information (Panel 6) in four sessions. Following mastery of the first scenario, the other untaught scenarios for the "wh" question "when?" were probed for generalization (Panels 7–9). The results of the generalization probe show that none of the untaught specific responses were emitted. That is, teaching one scenario did not result in generalization to other scenarios. Therefore, the next scenario was targeted for treatment (Panel 7). Following mastery of the second scenario, the remaining two scenarios were again probed for generalization. The second generalization probe again showed that the untaught specific responses did not emerge. Following treatment and mastery of the third scenario (Panel 8), the last untaught response did not generalize, but was acquired after targeted for treatment (Panel 9). For the request for information form "when?", each specific "wh" question for each scenario required separate teaching for mastery to occur.

Maintenance data are shown following the solid phase line for each request for information. "Who?" scenarios were probed for maintenance 18 days after mastery/generalization of all "who?" scenarios, "which?" scenarios were probed for maintenance 6 days after mastery/generalization of all "which?" scenarios, and "when?" scenarios were probed for

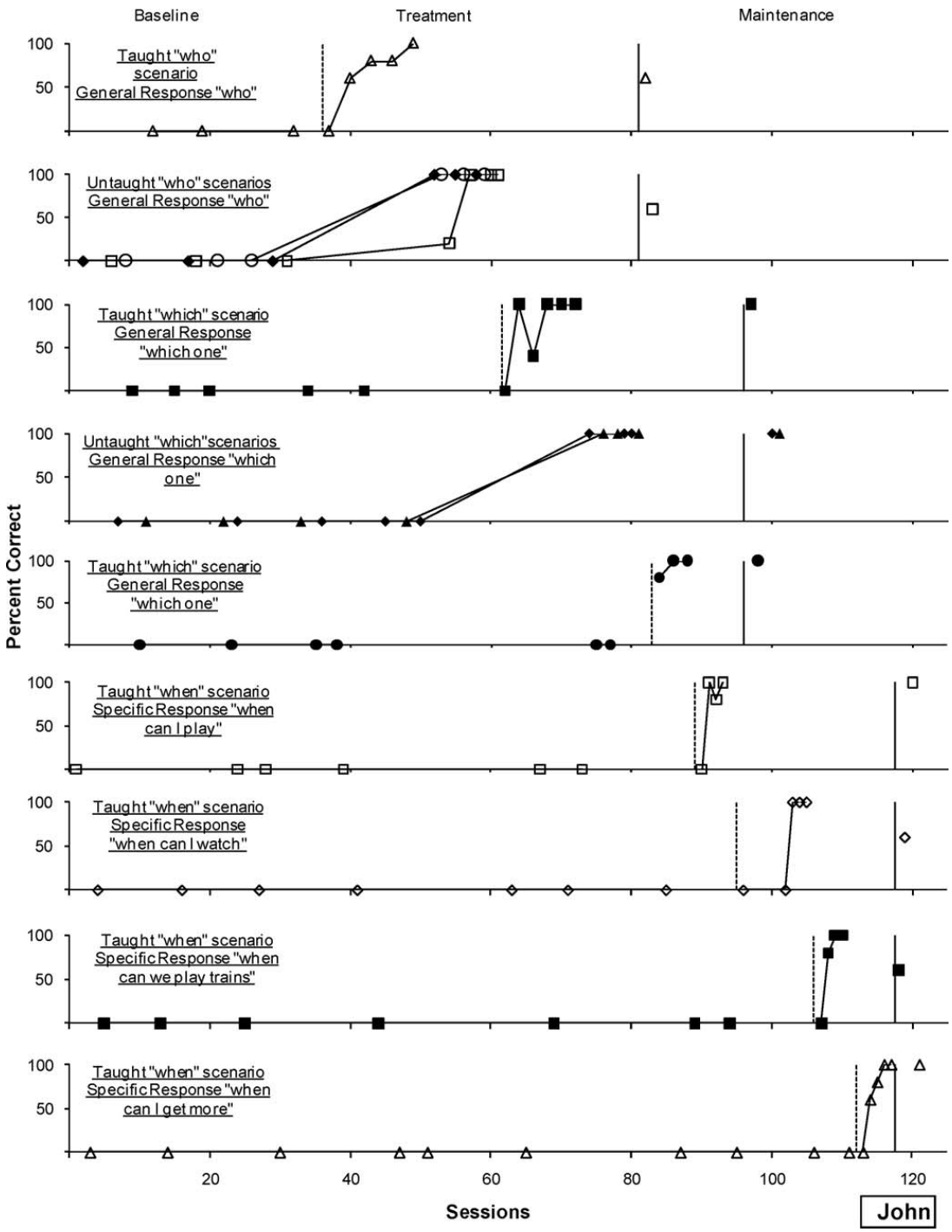

Fig. 1.. John's mands for information using "who," "which," and "when" are depicted. The dotted phase line indicates that treatment sessions were initiated. Solid phase lines indicate the maintenance phase.

maintenance 6 days after mastery of all "when?" scenarios. For John, all requests for information maintained at 60–100% correct responding during maintenance probes.

Data showing Cameron's performance when being taught the requests for information "who?," "where?," and "when?" are depicted in Fig. 2. During the baseline phase for the "wh" question "who?," Cameron did not emit the correct request for information (Panels 1 and 2). During treatment, the general response topography, "who?," was taught. Following implementation of treatment, Cameron met mastery criterion for the first targeted request for information (Panel 1) in four sessions. Scenarios within the other untargeted requests ("where?" and "when?") remained in baseline during teaching of the first "who?" response and John did not emit the correct request during baseline in any of these scenarios (Panels 3–10). Following mastery of the first scenario, the other untaught scenarios for the "wh" question "who?" were probed for generalization (Panel 2). Results of the generalization probes show that once the first "who?" scenario was mastered, Cameron's responding in all three other scenarios met mastery criterion although they were never specifically taught.

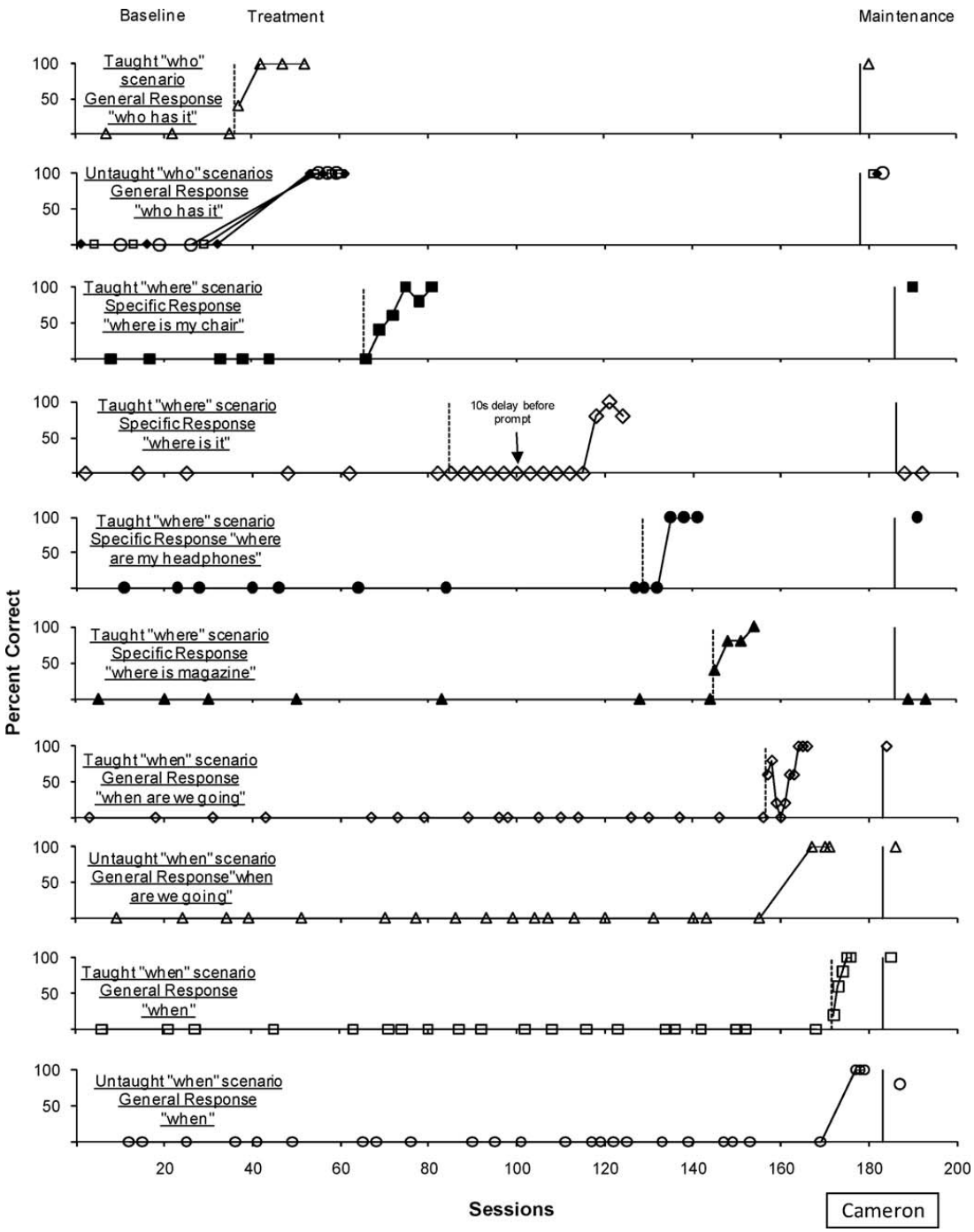

Fig. 2. . Cameron's mands for information using "who," "which," and "when" are depicted. The dotted phase line indicates that treatment sessions were initiated. Solid phase lines indicate the maintenance phase.

During baseline for the "wh" question "where?," Cameron did not emit the correct request for information (Panels 3–6). During treatment, specific response topographies were targeted for each scenario. Following implementation of treatment, Cameron met mastery criterion for the first targeted "where" request for information (Panel 3) in six sessions. Scenarios within the other untargeted request ("when?") remained in baseline during teaching of the first "where?" response and Cameron did not emit the correct request during baseline in any of these scenarios (Panels 7–10). Following mastery of the first "where" scenario, the other untaught scenarios for the "wh" question "where?" were probed for generalization (Panels 4–6). The results of the generalization probe show that none of the untaught specific responses were emitted. That is, teaching one scenario did not result in generalization to other scenarios. Therefore, the next scenario was targeted in treatment (Panel 4). Following mastery of the second "where" scenario, the remaining two scenarios were again probed for generalization. The second generalization probe again showed that the untaught specific responses did not emerge (Panels 5 and 6). Following treatment and mastery of the third "where" scenario (Panel 5), the last untaught response did not generalize, but was

acquired after being targeted for treatment (Panel 6). For this request for information form ("where?"), each specific "wh" question for each scenario required separate teaching for mastery to occur.

During baseline for the "wh" question "when?," Cameron did not emit the correct request for information (Panels 7–10). During treatment, "when are we going?" was targeted for the first two scenarios and "when?" was targeted for the last two scenarios. Therefore, two different general response topographies were selected for intervention. However, "when are we going?" was also considered a specific response topography when generalization to the last two scenarios was examined. Following implementation of treatment, Cameron met mastery criterion for the first targeted "when" request for information (Panel 7) in 10 sessions. Following mastery of the first scenario, the other untaught scenarios for the "wh" question "when?" were probed for generalization (Panels 8–10). The results of the generalization probe show that the other untaught general response was emitted (untaught "when are we going?" scenario, Panel 8). That is, teaching one "when are we going" scenario did result in generalization to the other scenario. However, generalization to the other two scenarios (Panels 9 and 10, "when?" scenario) did not occur. Therefore, the third scenario was targeted in treatment (Panel 9). Cameron met mastery criterion for the third targeted "when" request for information (Panel 9) in five sessions. Following mastery of the third scenario, the remaining scenario was again probed for generalization (Panel 10). This generalization probe showed that the untaught general response was emitted in the final scenario (untaught "when?" scenario, Panel 10). Results of the generalization probes show that the response "when are we going?" generalized to the other "when are we going?" response but did not generalize to the "when?" response. The taught "when?" response generalized to the untaught "when?" response. For this request for information form ("when?"), two general responses generalized and one specific response did not.

Maintenance data are shown following the solid phase line for each form of request for information. For Cameron, all maintenance probes were conducted following mastery of all three "wh" questions forms. "Who?" scenarios were probed for maintenance approximately 10 weeks after mastery/generalization of all "who?" scenarios, "where?" scenarios were probed for maintenance 4–6 weeks after mastery of all "where?" scenarios, and "when?" scenarios were probed for maintenance 1 day–2 weeks after mastery/generalization of all "when?" scenarios. For Cameron, with the exception of two, all requests for information maintained at 80–100% correct responding during maintenance probes. The request, "where is my magazine?" and "where is it?" in response to the missing treat did not maintain. A second maintenance probe was conducted for these two scenarios.

3. Discussion

We examined acquisition, generalization, and maintenance of requests for information across scenarios within the same "wh" question and across different "wh" questions. For both participants the use of EO manipulations, prompts, and reinforcement was successful in producing independent requests for information using "who?," "where?," and "when?," (for Cameron) and "who?," "which?," and "when?" (for John). These results provide additional support for teaching strategies which include EO manipulations during teaching sessions.

The results of the present study add to the literature on teaching requests for information and offer information regarding generalization of specific versus general response forms. Although both specific and general response topographies were acquired by both participants, all specific response topographies required direct teaching. In contrast, when a general response topography was taught, correct use of that response emerged in almost all of the tested novel situations. Overall, 0 of 7 responses generalized when a specific response topography was targeted, whereas, 10 of 11 responses generalized when a general response topography was targeted. These results point to some important considerations when teaching functional use of requests for information.

Given that teaching a general response results in better generalization of requests for information one might consider targeting general requests for information as the preferred teaching approach. However, in considering functional use of requests for information in the real world, a specific response may be more useful to the speaker than a general response. For example, if the listener does not know what the speaker is looking for, emission of the request "where?" may be of less utility. Often when an item is missing the speaker asks another individual where it is, but unless the specific item is indicated, the listener would not have enough information to respond to the request for information. Thus, in this example, teaching a general response may result in better generalization but is useful only if the listener can discern what is missing. This impediment to functional use holds true for other "wh" questions as well. The request "when?" is only functional if the listener can discern the activity that is being inquired about and the request "who has it?" is only functional if the listener can determine what item has been taken. In contrast, teaching a specific request for information, though less likely to generalize, may be more functional in that the listener is given all of the information required to respond to the request. A disadvantage of teaching specific responses during request for information training may be that it requires more time to teach functional use of each specific request for information in a variety of situations. A logical next step would be to examine treatment conditions that teach specific requests for information in such a way as to improve generalization.

The current results also add to the available literature on acquisition of requests for information by including short- and long-term maintenance data. Both participants maintained the majority of the acquired requests for information in some cases up to 10 weeks following mastery without being exposed to any subsequent teaching sessions. For Cameron, two requests for information did not maintain. A closer examination of those scenarios provides some explanation for these results. Following two sessions in which Cameron did not emit the correct request for information in maintenance, a paired-choice preference assessment (Fisher et al., 1992) was conducted with the items that were missing in these two scenarios.

The first scenario involved presenting the magazine cover with the inside missing and instructing him to read his magazine. In previous paired-choice preference assessments, the magazine had been indicated as a preferred item. The subsequent preference assessment showed changes in relative preference for the magazine compared to the other items; the magazine was no longer indicated as a highly preferred item. The lack of preference for the item suggests that there was no longer an EO for the item and, therefore, no EO for information regarding its location.

The second scenario involved establishing that a treat is located in a box and then presenting the box without the treat inside. The subsequent preference assessment showed that preference for the treat was still high suggesting that the EO was still present. Thus, change in relative preference for this item does not seem to explain the lack of maintenance during this scenario. One potential explanation is that the scenario is not one that you would typically experience. In other words, Cameron has likely had more natural encounters with the materials in the other scenarios. For example, Cameron has listened to music through headphones on numerous occasions and has experienced that headphones plug into a portable CD player and are needed to listen to music. Similarly, he has always come to his classroom desk and experienced sitting in his chair. However, he has likely not been presented with a treat in a box in the past. Therefore, this scenario may have been a more novel scenario and may have resulted in a more difficult task. The data during the treatment sessions indicates that this request for information required several more sessions compared to others to achieve mastery and adds support to this explanation.

There are some limitations to the current study that warrant discussion. First, the procedures in the current study did not definitively demonstrate that the target responses were under the control of a relevant EO, and therefore classifying the responses as "mands" may be inaccurate. For instance, though the antecedents were manipulated to increase motivation for information that would lead to access to a reinforcer, trials in which the information was already given were not interspersed in order to demonstrate that requests for information did not occur when the information was provided. It is possible that the participants would continue to request information even when the information was not needed. Demonstrating that question asking only occurred during trials in which the information was withheld would bolster our confidence that questions were under EO control. In addition, it could be argued that the responses that were targeted in the current study were part request and part intraverbal due to the presence of the antecedent verbal stimulus. However, it is important to note that the reinforcer is still specific to the EO, which is not included in the definition of the intraverbal. Therefore, it could be argued that both the verbal and nonverbal stimuli that are present and evoke the response are considered the EO. More importantly, the present study is focused on teaching socially valid and functional skills to children with language delays and requests for information occur in the presence of both verbal and nonverbal antecedents in the real world. Therefore, the scenarios presented in this and previous studies (Endicott & Higbee, 2007; Sundberg et al., 2002) demonstrate that requests for information can be successfully taught using these and similar procedures. However, future research could look at the development of requests for information that occur in the absence of a verbal antecedent and any other possible controlling variables. One interesting line of research may be to systematically examine how requests for information emerge and are emitted in typically developing children. Information such as this may provide insight toward ways to teach requests for information that mimic this natural development. Future research may examine the inclusion of a condition with "information provided" to determine if participants emitted the requests when motivation for the information was not present.

A second limitation is that there were only four scenarios within each "wh" question investigated. Therefore, if generalization occurred to other scenarios in the natural environment or other contrived settings, no baseline data were collected to examine this. Next, it is unknown whether the skill generalized to settings outside of the teaching environment and whether the children emitted requests for information in other environments. Although anecdotal reports from Cameron's mother indicated he did emit requests for information in novel situations, no data were collected to assess this.

There are several other areas for future research in teaching children with autism request for information repertoires. To date, no studies have investigated teaching procedures with the request forms "how?" and "why?" Future research may look at the manipulation of the EO and prompting procedures to effectively teach these request forms as well as maintenance and generalization of these request forms. Examining these different forms is important because they involve different EOs. Also, although research has established effective teaching procedures for teaching requests for information in simple scenarios, the research has not gone beyond teaching discrete short responses. Future research may expand behavioral technology to extend the request for information repertoire to social skills (e.g., asking a peer what their favorite color is) or to increasing conversational skills (e.g., requesting for information within an ongoing conversation).

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