

*THE ROLE OF SPECIFIC CONSEQUENCES IN
THE MAINTENANCE OF THREE TYPES OF QUESTIONS*

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This research replicated and extended a study by Williams, Donley, and Keller (2000). In that study, children with autism received a box with an object inside and learned to ask “What’s that?,” “Can I see it?,” and “Can I have it?” to have the name of the object, to see the object, and to get the object, respectively. The purpose of the present research was to determine if the three questions (a) were three independent repertoires of behavior, (b) constituted three instances of a single functional response class, or (c) belonged to a chain of behavior. The 3 boys with autism who participated responded independently to each question when the consequences for each question were altered. This indicates that the three target responses were three independent repertoires of behavior, each one reinforced and maintained with its specific consequences. Thus, this procedure serves to teach children with autism to ask questions with flexibility according to a variable context.

DESCRIPTORS: question asking, verbalizations, autism, language acquisition, verbal behavior, establishing operations

Asking questions is a complex verbal behavior that for most children with autism does not emerge until it is explicitly taught. Many researchers have been successful at teaching these children to ask questions such as “What’s that?,” “What’s inside the box?,”

“Where is it?,” and “Can I see it?” (Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998; Shabani et al., 2002; Sundberg, 2000; Taylor & Harris, 1995; Williams, Donley, & Keller, 2000). Williams et al. taught 2 children with autism to ask three questions, in a stepwise fashion, about a closed box with a toy inside. The experimenter first showed the closed box to the child. When the child asked the first question (“What is that?”), the experimenter said the name of the hidden object. When the child asked the second question (“Can I see it?”), the experimenter showed it to him. When the child asked the third question (“Can I have it?”), the experimenter gave the object to the child.

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The study by Williams et al. (2000) raised an important question: Did these three types of questions have the same functions as they have in everyday interactions? In a typically

developing person, question asking has consequences that vary according to the situation. Therefore, it is important to know if this type of teaching leads to establishing a repertoire of three mands, each one maintained by its proper functions in a varied context.

The results of Williams *et al.* (2000) may have been due to three possible factors: First, it is possible that the responses to the three questions were independent of the other responses, each one maintained by its specific consequence. That is what presumably occurs in everyday life, because typically developing children may ask only one of these questions according to the situation. Second, each response could have been established because initially each one produced access to the item. In fact, during the initial stages of teaching, the object followed each question at the moment of teaching it. According to this hypothesis, any of the three responses would produce the final item and, therefore, would be equivalent to each other: They would have formed three response forms of a single operant response class (e.g., Donahoe & Palmer, 1994). Third, it is possible that this type of teaching led to a sequence of responses in which each question was maintained by the onset of the next question or the terminal reinforcer (the object). The object, thus, would ultimately reinforce the entire sequence. Therefore, the teacher's responses to the first and second questions would reinforce each question by presenting the opportunity to ask the following question, as in a response chain (Skinner, 1934). If that happens, the interruption of the sequence by removing the consequence could result in the absence of any further behavior.

These hypotheses have programmatic implications: Due to the lack of spontaneity and language production shown by children with autism, it is important to know the degree of variability and flexibility these questions have. Moreover, it is important to de-

velop strategies to teach these children to produce each type of question with enough variability, according to the specific states of deprivation, and according to the particular consequences those responses have for typically developing individuals.

The main purpose of the present research was to study further the variables that influence question asking. We initially taught children the three questions used by Williams *et al.* (2000). Once the children began to ask the three questions, we manipulated two variables: First, we provided no consequences for the second question ("Can I see it?"). Second, we introduced unpleasant objects. Children's performance should indicate whether each question serves a distinct operant function, whether the three responses formed a single response class, or whether the three operants formed a response sequence.

METHOD

Participants

The participants were 3 boys who had been diagnosed with autism by several independent professionals and officials of the educational system. Jim, 2 years 9 months old, received intensive behavioral in-home teaching. Erik, 4 years 5 months old, attended a special needs behavioral program. Jim and Erik were U.S. residents and thus received instruction in English. Dario, 9 years 4 months old, attended a special needs behavioral program in Spain and thus his instruction was given in Spanish. All the children displayed mands (e.g., "I want to eat candy") and tacts (e.g., "This is a cat"; they could tact at least 100 objects); repeated statements of at least four words (e.g., "It is cold today"); responded to basic social questions such as "What is your name?"; and selected objects and pictures, without errors, to the instruction "Give me the [name of the object]." All 3 students could say "No!"

and rejected items they disliked by pushing them away with their hands or feet, or by turning away or covering their faces. None of them, however, asked questions prior to the onset of this study.

Materials

The experimenters provided about 80 small boxes varying in shape, color, and texture, with attractive objects hidden inside (e.g., a sparkling spinning wheel, a shiny red race car). The objects were novel for each child but were similar to other objects previously used as reinforcers to teach other skills. The unpleasant objects were selected based on information from the child's mother, who in some instances provided some unpleasant objects from home (e.g., a used cucurbitiform sponge from the bathroom, a slimy jelly-like form toy). We also used live insects obtained outdoors (a worm, a spider, a snail) in some trials with all children.

Procedure

Overview. The treatment package, a replication with an extension of Williams et al. (2000), was evaluated with a multiple baseline design across the three response forms. When all of the children acquired the questions, we varied the consequences to the questions in several phases. The child sat across from the experimenter in the classroom or in the child's teaching room. One trial consisted of presenting one box with a hidden object for 20 s. The presentation of one box and the eventual production of one, two, or three questions constituted one trial. One session consisted of 10 trials, that is, the presentation of 10 boxes, one at a time. Usually, we conducted one session per day. We recorded data on each question in each trial. The prompted and self-initiated responses were recorded separately, and only the self-initiated responses were considered correct. After the child had met criterion on each specific question, that question was

never again prompted, even if the child never said it again. If the child asked "Can I see it?" before asking "What's in the box?" the experimenter said "Sure, you can see it," and showed the object in the box to the child but did not give it to him. Or if the child asked "Can I have it?" before asking the first two questions, the experimenter said "Sure" and gave him the box with the object inside.

Baseline. The experimenter presented one box at a time, 10 times, for 20 s. The experimenter did not explicitly prompt any behavior, but opened the box with an object inside and made a comment about the object (e.g., "Oh, this one is great!" or "I really like this one."). The experimenter did not show the object to the child. She changed to a new box if 20 s passed with no response from the child.

Teaching the first response form ("What's in the box?"). The experimenter held the box and made a comment about the object inside the box. She then prompted the child to repeat the question "What's in the box?" by modeling the question in a firm tone of voice. When the child repeated the question, the experimenter told the child what was inside the box and gave the box with the object inside to the child. The child could play with the toy for approximately 20 s; then, a new box was presented. When the child repeated the question correctly for two consecutive trials, the experimenter faded the echoic prompt by providing a partial prompt for two more consecutive trials. For example, the experimenter provided the word "What's" instead of providing the whole question. The prompt was gradually reduced until the child asked "What's in the box?" without any prompt. If the child produced three consecutive errors (saying the question incorrectly or saying nothing within 20 s of presenting the box), the experimenter provided the full echoic prompt again. This procedure was repeated until transfer of control from the echoic prompt to the box itself

was accomplished. That is, the echoic prompt was eliminated when the child initiated the question without any prompt each time a box was presented. Criterion consisted of 90% or better correct unprompted responses in two consecutive sessions. At this point, the teaching of the second response form began, and no more prompts were provided for the first question.

Teaching the second response form ("Can I see it?"). This procedure started the same way as the first response form. However, when the child self-initiated "What's in the box?," the experimenter told him the name of the object inside the box but neither showed it nor gave it to him. The experimenter then prompted the child to repeat "Can I see it?" When the child repeated the question correctly, the experimenter said "Sure, I can show it to you," and gave the box to the child. The procedure to fade and eliminate the echoic prompt and the criterion to move on to teach the next response form were the same as in the teaching of the first response form. During this phase, the echoic prompt was presented only after the child emitted the first response ("What's in the box?"). But once the second question reached criterion, the child's second question resulted in the experimenter saying "Sure, I can show it to you" and giving the box to the child, even if the child skipped the first question (this happened only on two occasions with 1 child).

Teaching the third response form ("Can I have it?"). The procedure started the same way as the first and second response forms. When the child self-initiated "What's in the box?," the experimenter told him the name of the object inside but neither showed it nor gave it to him. When the child self-initiated "Can I see it?," the experimenter showed him the object inside the box but did not give it to him. The experimenter then prompted the child to repeat "Can I have it?" When the child repeated the ques-

tion correctly, the experimenter said, "Of course, I can give this toy to you," and gave the box to the child. The echoic prompt was presented only after the child emitted the second response ("Can I see it?"). The procedure to fade and finally eliminate the echoic prompt was the same as for the first and second response forms. Once this third question reached criterion, the experimenter gave the child the object after the child asked this question, even if the child skipped the other two questions. The child could emit any of the three questions during the 20-s trials. After criterion had been obtained for the third response, all the prompts were eliminated for the rest of the study. This phase was extended several more sessions to ensure stability.

"No!" to the question "Can I see it?" The purpose of this phase was to see if the other two operants would be maintained if one of the operants ("Can I see it?") was eliminated. Immediately after the child asked "Can I see it?" the experimenter said "No!" and did not show the object to the child. When the child asked "Can I have it?" the experimenter gave him the box. No prompts were provided in this phase, and the contingencies of reinforcement were the same as in the previous phases (except that for the second question the experimenter said "No!") even if the child skipped one or two questions. If the child did not ask any question, the experimenter changed to a new box after 20 s. If the three questions were a response chain, the two responses emitted before removing the reinforcer (in this case, the questions "What's in the box?" and "Can I see it?") should be extinguished and the question emitted after the reinforcer should remain (e.g., Skinner, 1934). If, alternatively, all three response forms decreased or were maintained together, this would indicate that the three responses are instances of a single response class. If the children respond-

ed with an alternative pattern, that would indicate alternative sources of control.

"No!" to the question "Can I see it?" and hiding the box contingently. Hiding the box was introduced when the response "No!" to the question "Can I see it?" did not decrease that question. After the child asked "Can I see it?" the experimenter said "No!" and hid the box behind her back. No prompts were given in this phase, and the contingencies of reinforcement remained the same for "What's in the box?" and "Can I have it?"

Return to original contingencies of reinforcement. Conditions returned to the same contingencies of reinforcement as in the phase of teaching the third question, but no prompts were provided. The child's responses were reinforced accordingly, even if he skipped questions. For example if the child said "Can I have it?" before asking "What's in the box?" the experimenter told him "Sure, you can have it" and gave him the box. If the child did not emit any question during the 20-s period, the experimenter changed the box and started a new trial. This phase was repeated intermittently throughout this investigation because we wanted to know if the questions would recover under the initial conditions of teaching.

Some unpleasant objects. Conditions remained the same as in the previous phase, with the exception that the experimenter presented, in a random fashion, five trials with unpleasant objects in one session (10 trials). This phase was introduced to explore further the conditions that maintained responding to the three questions.

All unpleasant objects. The experimenter presented all 10 trials with unpleasant objects to show the child. The purpose of this phase was to see clearly the effects intended in the previous phase. The contingencies of reinforcement for each question were the same as in the phase of teaching the third

response, even if the child skipped any question; no prompts were provided.

"No!" to the question "Can I have it?" This phase was introduced to study further the role of this consequence on the recovery of the question "Can I see it?" When the child asked "Can I have it?," the instructor said "No!" and waited to see if the response "Can I see it?" reemerged within the remaining time. When the child asked "Can I see it?" the experimenter said "Sure!" and gave the box with the object inside to the child. These contingencies of reinforcement, slightly different from previous phases, were applied even if the child skipped the first question ("What's in the box?"). No prompts of any kind were given in this phase, and no additional time was given.

Measurement and Interobserver Agreement

The first self-initiated question of each response form constituted the behavior for that particular trial. The child, however, had the opportunity to ask three questions per trial. The experimenter did not count the subsequent questions that sometimes followed each response form (repetitions such as "Can I see it? Can I see it?"). The data on each of the questions were recorded separately by the experimenter and an observer. An agreement was scored when both recorded the same response or responses in all conditions within the 20-s trial. A disagreement was scored when the experimenter and the observer recorded one or more different responses. The observer was present on 31% of the sessions for Jim, 31% of the sessions for Erik, and 45% of the sessions for Dario. Interobserver agreement was 100%.

RESULTS

The 3 children learned to ask the three questions. Although the various conditions did not always produce the same effects in each child, all of them recovered and main-

tained the three questions throughout the study. This finding replicates that of Williams *et al.* (2000).

Figure 1 shows the results for Jim. During baseline, Jim asked no questions in any of the three forms. During the intervention to teach the first question, he asked five to 10 questions in three sessions and maintained the 10 questions (the maximum he could ask in a given session) for seven more sessions. He met acquisition criterion for the second question rather fast, in that he went from one to 10 in two sessions. He acquired the third question in two sessions. Thereafter, he continued asking these three questions at very high levels (nine or 10 questions per session). During the phase of "No!" to the question "Can I see it?," the question decreased gradually to zero in the fourth session, while the other two questions remained at high levels (near 10). A return to the original contingencies brought back the second question to previous levels (near 10 questions per session) and maintained the other two questions at similar levels. In the next phase, with some unpleasant objects, Jim decreased the questions "Can I see it?" and "Can I have it?," but he asked the first question ("What's in the box?") on all trials. In the next phase, the experimenter presented only unpleasant objects. Jim almost stopped asking the second and third questions at the same time that he maintained the first one in a consistent manner. A return to normal conditions brought back all three questions to 10.

Figure 2 shows results for Erik. Erik did not ask any questions during baseline, but he learned to ask the three questions to reach levels of 10. He met acquisition criteria for the first question in eight sessions, the second question in three sessions, and the third question in four sessions. The three question forms were maintained for two more sessions at levels of 10 (or near 10). In the phase of "No!" to the question "Can I see it?" Erik

stopped asking the question ("Can I see it?") in two sessions, whereas he continued to ask the other two questions. A return to the original contingencies did not recover the second question ("Can I see it?"). Then, the experimenters introduced a new phase to study whether the child would ask this question again. When the child asked "Can I have it?," the experimenter said "No!" and did not give the object to the child. If he asked "Can I see it?" the experimenter told him "Sure, you can see it," and gave him the object. In this phase, Erik again asked the second question (immediately reached the maximum level of 10 questions per session); moreover, he continued asking the third question ("Can I have it?"). In the phase with some unpleasant objects, Erik asked fewer questions for "Can I have it?" (six per session) and also fewer questions for "Can I see it?" (from zero to four). He continued to ask the first question ("What's in the box?") in every trial. The next phase consisted of showing only unpleasant objects. Erik continued to ask the second question ("Can I see it?") at a low frequency, and he almost stopped asking the third question ("Can I have it?"). In the return to the phase with the original contingencies, Erik did not ask the second question, but he asked the third question again, as he did in the previous phase with the original contingencies. For this reason, we again introduced the same phase of "No!" to the question "Can I have it?" In only one session in this phase, Erik acquired the second question again. He asked the first question ("What's in the box?") consistently throughout all the phases.

Figure 3 shows Dario's results. During baseline, Dario asked no questions in any of the three forms. Some difficulty was noted with Dario's intelligibility; for this reason, we taught him to say "What's that?" instead of "What's in the box?" During the intervention, he met acquisition criterion for

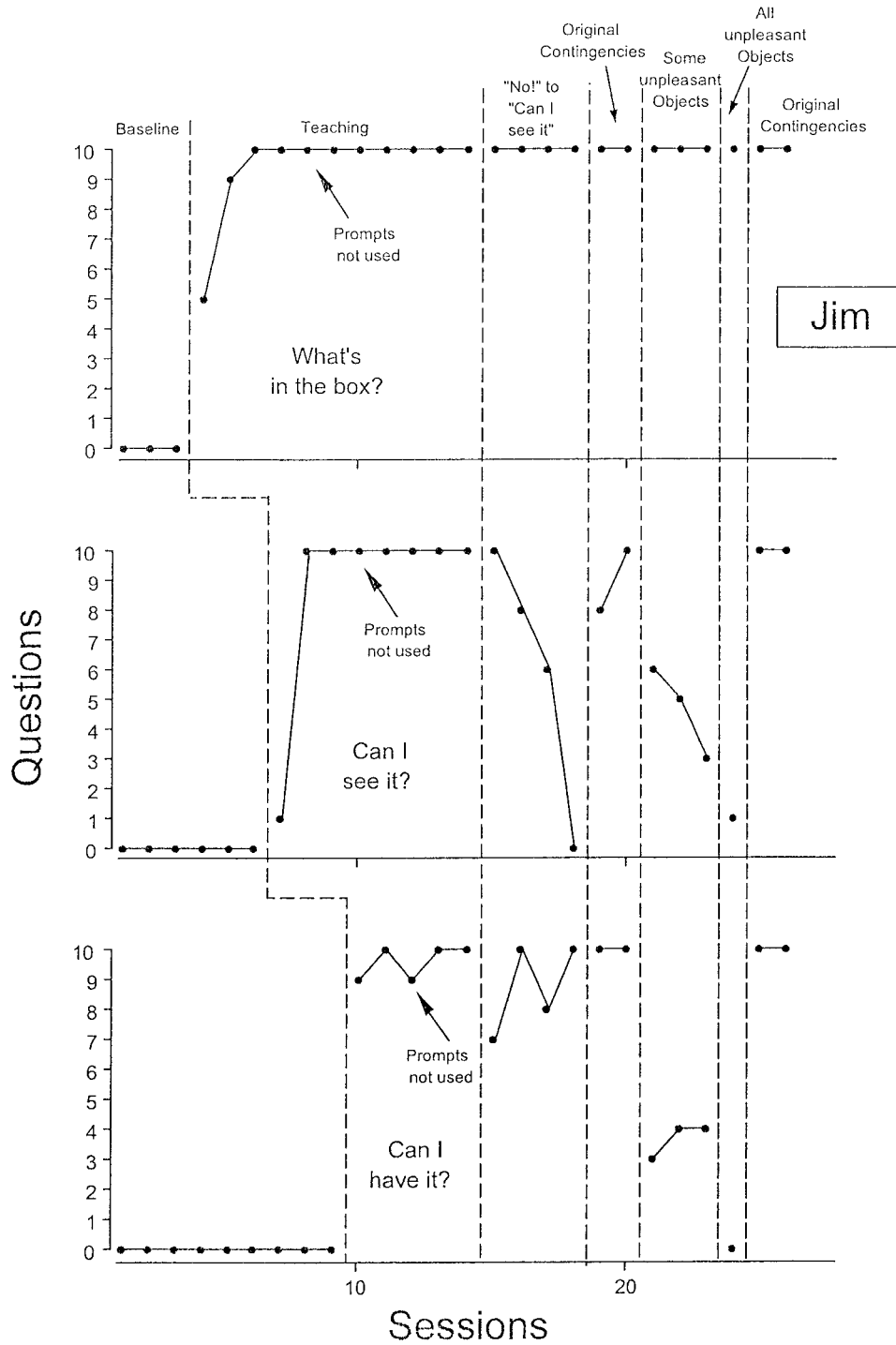


Figure 1. Frequency of questions asked by Jim during the presentation of 10 boxes with hidden objects inside during baseline, teaching of the three response forms, maintenance, removal of consequences for asking "Can I see it?," and the introduction of unpleasant objects (see text for details).

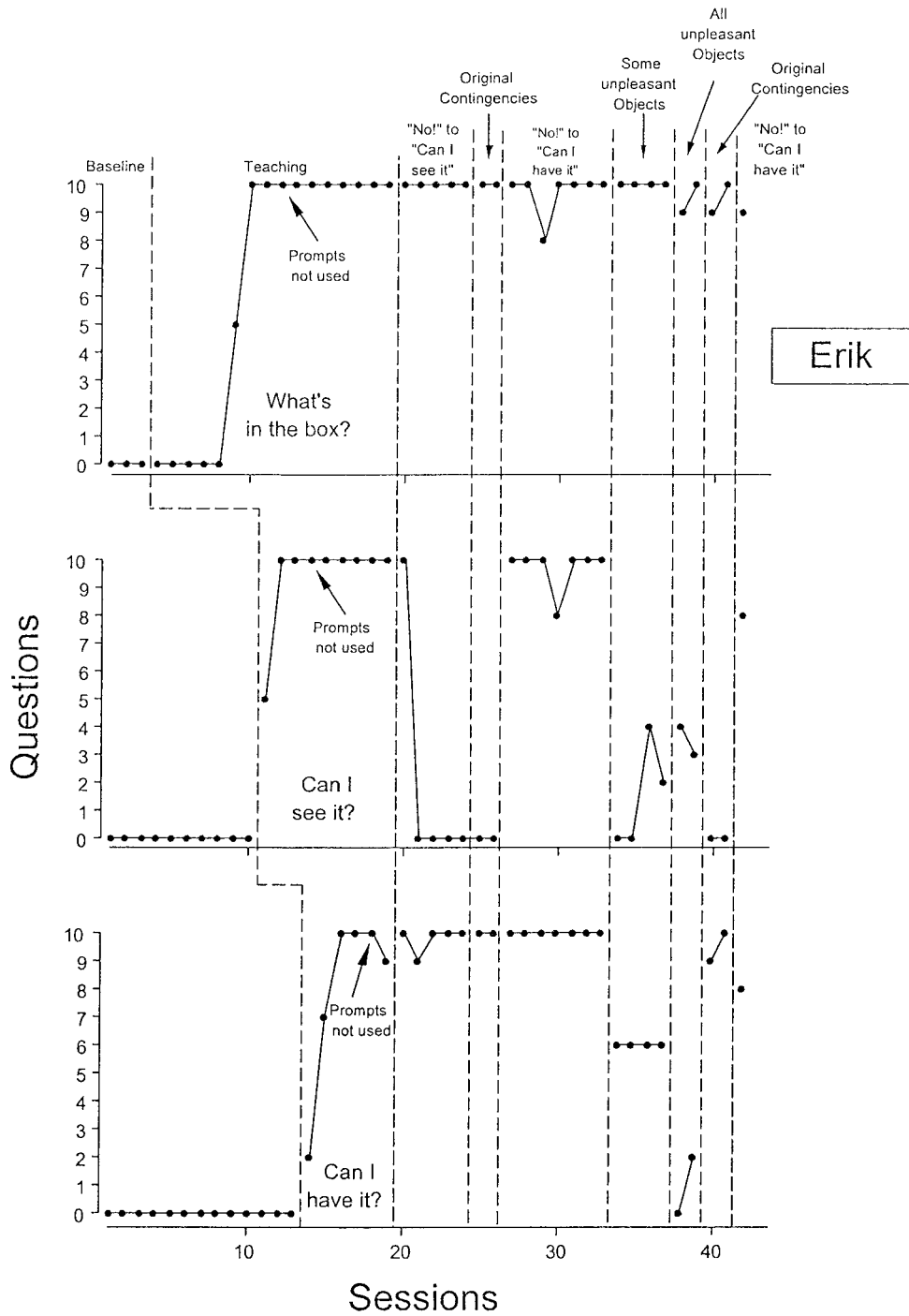


Figure 2. Frequency of questions asked by Erik during the presentation of 10 boxes with hidden objects inside during baseline, teaching of the three response forms, maintenance, removal of consequences for asking "Can I see it?" and the introduction of unpleasant objects (see text for details).

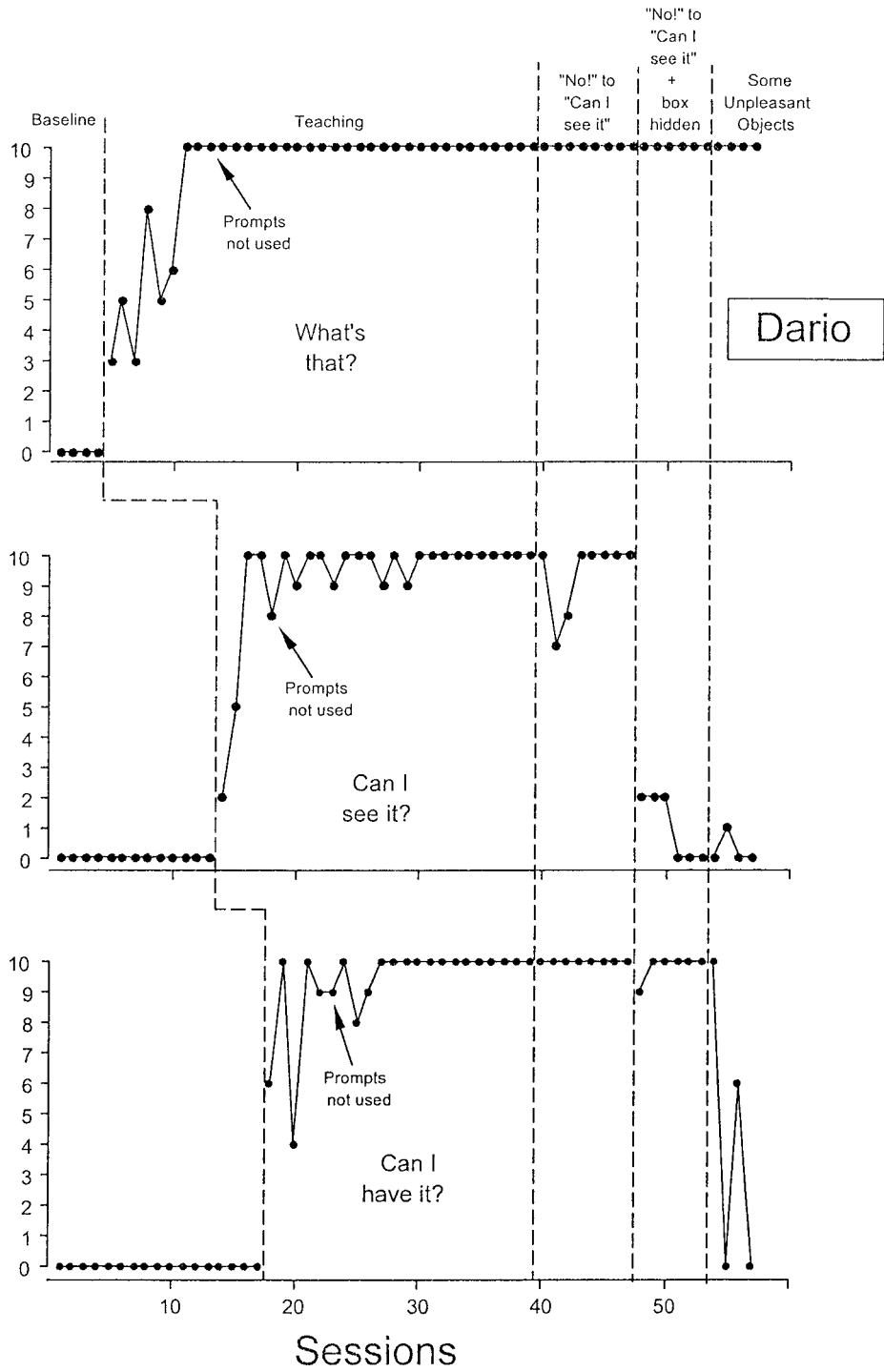


Figure 3. Frequency of questions asked by Dario during the presentation of 10 boxes with hidden objects inside during baseline, teaching of the three response forms, maintenance, removal of consequences for asking "Can I see it?," and the introduction of unpleasant objects (see text for details).

“What’s that?” in eight sessions, “Can I see it?” in four sessions, and “Can I have it?” in six sessions. Subsequently, he asked these three questions in almost every trial. During the subsequent condition (“No!” to the question “Can I see it?”), the response “Can I see it?” was not affected initially, as he continued asking this question. We introduced a new phase in which the experimenter said “No!” and hid the box immediately after he asked “Can I see it?” Asking this question decreased, and it did not occur in the last three sessions. He continued to ask the other two questions. In the subsequent phase (some unpleasant objects), the first question (“What’s that?”) was maintained (at the frequency of 10 questions in 10 trials). Meanwhile, he stopped asking the second (“Can I see it?”) and the third (“Can I have it?”) questions. The experiment was then discontinued for external reasons.

DISCUSSION

The 3 children learned to ask the three questions. These results replicate those of Williams *et al.* (2000). Once all the children acquired the three questions, we applied different consequences to two questions to see how the other questions were affected. When we responded “No!” to “Can I see it?,” 2 children gradually decreased asking this question, whereas they continued to ask the other two questions. The other child decreased this question after an additional procedure was implemented in a subsequent phase (the experimenter said “No!” and hid the box). He also continued to ask the other two questions.

The response pattern displayed when the experimenter said “No!” to the question “Can I see it?” weakens the hypothesis that the three question types constitute a response class. Had they constituted a response class, removing the consequence (the putative reinforcer) of a response should re-

sult in identical effects in the three classes, either maintenance or a reduction of the three responses at the same time. This effect did not occur. On the contrary, the second response form (“Can I see it?”) decreased (extinguished by the lack of the former consequence, punished by “No!,” or some combination), while the other two response forms were maintained. Thus, it indicates that this question was not in the same response class as the other two questions. This manipulation, however, did not tell us anything about whether the first and the third response forms (“What’s in the box?” and “Can I have it?”) are members of the same response class.

This performance also weakens the hypothesis that the three responses were a chain of responses. Had they constituted a response chain, the first response (“What’s in the box?”) would have decreased as a result of removing the reinforcer that maintained the subsequent responses in the chain. Thus, maintenance of that question suggests that the three questions were not members of a response chain.

The second manipulation consisted of introducing unpleasant objects on some or all trials. In those conditions, the children asked “Can I see it?” and “Can I have it?” less and less frequently. Still, they asked “What’s in the box?” when new boxes were presented. This response pattern rules out the possibility that the first and third questions formed a single response class, because one of them remained at a high frequency while the other dropped (for the same reasons as in the first manipulation). This response pattern also rules out the possibility that the three responses were members of a chain. Had they been members of a chain, the three responses would have been maintained by the final reinforcer (the object). Then, the removal of the object should have resulted in the extinction of the three responses. This did not occur. Thus, this response pattern in one

sense rules out the possibility that the three responses were members of a response chain.

Another way to interpret the results is that question asking served the function ascribed by the contingencies of reinforcement in any given condition. For example, it may be that saying "Can I see it?" originally was reinforced by gaining access to the item, but eventually it was reinforced by merely seeing the item. These differential contingencies were programmed and, hence, the operant function of the questions necessarily shifted in response to newly arranged contingencies of reinforcement.

The results observed after the teaching phases suggest that each question was maintained by its own consequence. The first question ("What's in the box?") was maintained by the answer the child received to that question. The experimenter's responses maintained the question independently of the fact that the experimenter said the name of a pleasant object (a potential reinforcer) or an unpleasant object. We may suppose that "What's in the box?" would have been extinguished if the experimenter discontinued responding to that question by not giving the name of an object (either pleasant or unpleasant). We did not manipulate this variable in the current study.

The second response form ("Can I see it?") could be maintained by the view of the object and the possibility of asking the third question. The view of the object played a role. In fact, when the consequence in that phase was not to have the opportunity to view the object, the question decreased. However, the children still had the opportunity to ask the third question ("Can I have it?"). The 3 children continued to ask this question, even though they did not ask the second one. This fact suggests that the consequence that maintained the second question was the view of the object. Also, it suggests that the opportunity to ask the third question was not the consequence that

maintained the second question. The third response form ("Can I have it?") was probably maintained by the access to the object.

The antecedent stimuli of the three questions also changed. The antecedent stimulus for the first question was the presentation of the box. The antecedent stimulus for the second question could have been the experimenter's response to the first question, which established the occasion to reinforce that response with the view of the object. The antecedent stimulus for the third question could have been the response to the second question. However, when the second question was no longer reinforced, the third response was emitted just after the experimenter responded to the first question. This fact indicates that the antecedent stimulus for the third response was not precise. Instead, it seems that the response to the first question established the conditions for the onset of the second and third questions.

In summary, these data show that each of the three questions ultimately was maintained by different consequences that changed over conditions according to changes in consequences. This fact indicates that the questions did not belong to a response class, because not all the questions were maintained by the same reinforcer—in this case, access to the object. The three questions were not a response chain because when one question decreased, regardless of which one, the other two were maintained at high levels. Given the flexibility of responding according to a variable environment, the teaching methods used here appear to be sufficiently versatile to teach children with autism question asking that matches the functions of question asking in everyday life.

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STUDY QUESTIONS

1. What explanations did the authors propose to account for the findings of the Williams et al. (2000) study, in which children asked a series of related questions about something?
2. Describe the general procedure used to train participants to use the initial questions.
3. What was the rationale for the condition in which the experimenter responded “No!” to the question “Can I see it?”
4. What was the rationale for the condition in which unpleasant items were placed in the boxes?
5. Describe the general effects observed on question asking during (a) the condition in which the therapist responded “No!” to the question “Can I see it?” and (b) the condition in which some unpleasant items were placed in the boxes.
6. Erik was the only participant exposed to the condition in which the experimenter said “No!” to “Can I have it?,” and he continued to ask this question. How would you account for these results?
7. What conclusions did the authors draw regarding maintaining variables for the three questions?
8. What implications do the test conditions and results of the current study have for clinical use?

Questions prepared by Carrie Dempsey and Stephen North, The University of Florida