PROGRAMMING COMMON STIMULI TO PROMOTE GENERALIZED
QUESTION-ASKING IN A CHILD WITH AUTISM

THESIS

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

Prudence Hagen, B.S.
Denton, Texas
August, 1997

A 5-year-old child with autism was taught to: (a) ask “What is that?” in the presence of unknown objects and (b) name the objects he did know. In the training task, the experimenter held each item in front of the child and asked, “What is this?” Generalization in the presence of the experimenter was probed across four new tasks: (a) with 4 items on the table, the experimenter instructed the child, “Tell me what you see on the table;” (b) the experimenter held 10 cards face down and fanned out in front of the child and instructed the child, “Pick one;” (c) while pointing to the location of an item, the experimenter said, “Look, [name of subject];” and (d) the experimenter handed the child an item and instructed the child to either give an object to another person or to place an object in another location (i.e., “Give this to [name of third person]” or “Put this on the table/ counter/ bed.”). The child’s performance generalized to the first 3 tasks without additional training. The fourth task required programming of common stimuli before generalization occurred. Generalization was also assessed with the caregiver across these same four tasks. Results for the generalization probes involving the caregiver were similar except for the last task.
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INTRODUCTION

A common behavioral deficit of children with autism is their failure to engage in unsolicited language interactions (Charlop, Schreibman, & Thibodeau, 1985; Hung, 1977; Rutter, 1978). Although some children with autism become quite skillful at answering questions, they rarely initiate unprompted verbal interactions (Hung, 1977; Schreibman, 1988). For example, according to Taylor and Harris (1996), children with autism rarely ask questions about the objects, events, persons, and places around them. This deficit is significant because question-asking is thought both to facilitate language development (Nelson, 1973; Parnell & Amerman, 1984; Secan, Egel, & Tilley, 1989) and to serve as a means of gaining information about the world (Wilcox & Leonard, 1978). Question-asking also can enable children to recruit information from others without depending exclusively on a teacher or parent to direct what is learned. Likewise, question-asking can allow the child to initiate and actively participate in conversations about unfamiliar topics (i.e., Child: “What is that?” Father: “It’s a car.” Child: “It’s a blue car.” Father: “The blue car is going fast.”).

Thus, question-asking can enhance the child’s social interactions, but also can allow for incidental teaching with respect to new information.

Although the importance of question-asking in everyday functioning seems obvious for both normal and developmentally-challenged population, only two published studies (Hung, 1977; Taylor & Harris, 1995) have addressed this language
deficit in autistic populations. The training of question-asking has been more prominent, however, in studies with the language delayed and the mentally retarded populations (e.g., Chadsey-Rusch, Karlan, Riva, & Rusch, 1984; O'Reilly & Chadsey-Rusch, 1992; Twardosz & Baer, 1973; Wilcox & Leonard, 1978; Zimmerman & Pike, 1972). While the training procedures described in those studies have been successful in training question-asking, they have not produced the expected generalized independent question-asking in learners, particularly those with autism. Further, when question-asking was trained, it “remained under the control of the verbal behavior of others, rather than under the control of other nonverbal referents in the environment (Charlop, Schreibman, & Thibodeau, 1985, p. 155).

In one of the reported studies on training question-asking using an autistic population, Hung (1977) taught 4 children with autism to ask the questions, “What is __ for?” and “What is/are __ doing?” The training technique involved presenting pictures, objects, and actions involving another person and then delivering tokens contingently upon children's question asking. Question-asking, however, did not generalize to other settings until generalization training occurred in each setting. After this behavior occurred in those different settings, question-asking still remained at a low rate. Hung (1977) then raised the value of the tokens and, consequently, the children's rate of question-asking increased. An 11-month follow-up demonstrated that in the absence of tokens question-asking ceased to occur. Hung's data indicated that question-asking was maintained by token reinforcement rather than by the answers resulting from question-asking.
The other example of training question-asking in autistic populations was reported by Taylor and Harris (1995). In a series of studies, these authors taught children to ask questions in a classroom setting when presented with pictures of unknown items and then demonstrated generalized question-asking to objects, with a different person in a different room in the school. Their research also indicated that the children were using question-asking to learn the labels of the items. Further, they demonstrated that these children learned to ask questions in a less structured context (i.e., on a walk in the school building). In Experiment 3, they placed unknown items around the school building in places where these objects were normally not found (e.g., a gumball machine in the bathroom). Then the child was invited to go for a walk. The experimenter led the child within 1 m of the item and paused for 1 s during which the child was required to point to the item and ask, “What is that?” If the child did not point and ask the question, the experimenter prompted the child to do so. Two out of three children exhibited low rates of question-asking during baseline, with only one subject asking, “What is that?” at a high rate. All of the subjects acquired mastery of question-asking after training; however, there was no test for generalization across persons. Taylor and Harris (1995) stated that the brief pause and prompt to point may have served as discriminative stimuli for the children's question-asking behavior.

In both the Hung (1977) and Taylor and Harris (1995) studies, unsolicited question-asking was trained and maintained with tokens and praise, and generalization was programmed by prompting and reinforcing question-asking in new settings and
tasks. Question-asking, however, appeared to be under the control of idiosyncratic task dimensions or verbal cues. In neither study did question-asking maintain in the absence of specific discriminative stimuli or tangible contingent consequences.

Given that previous research on training question-asking in autistic populations has met with only marginal success with respect to the generalization of question-asking to non-training situations, the present study addressed both the maintaining consequences of question-asking and its generalization to other tasks, another person and setting. That is, would a teaching procedure that arranges answers as the only consequence for asking questions be successful in teaching and maintaining question asking? Also, would the presentation of stimuli from the training task to the generalization task promote the generalization of question-asking to the generalization task (see Stokes & Baer, 1977; programming common stimuli)?

METHOD

Participant and Setting

The child was a 5-year-old male who met the DSM-IV diagnostic criteria for autism under the category of Pervasive Developmental Disorder with speech impairment. At the time of this research project the child was receiving 10 hours of weekly in-home behavioral training and was also attending a special education class in a public school. He could label objects upon request, initiate social greetings, play simple games with peers, give and receive affectionate gestures, answer personal information questions, and imitate verbal models. He often asked the question,
“Where is ____?” when looking for a relative. On several occasions he asked, “Do you see that?” when pointing to unknown stimuli in multiple contexts. Also, he asked, “What you doing?” when he saw person engaged in an activity and “What happened?” when he saw water on the bathroom counter. On five occasions, two times in the presence of known stimuli and three times in the presence of unknown stimuli, he asked, “What is that?” On multiple occasions, he asked, “What is this?” in the presence of known stimuli but rarely in the presence of unknown stimuli. These questions (“What is this?” and “What is that?”) were first observed during the stimulus selection phase of this research when he was repeatedly asked, “What is this?” This suggested that these questions were under imitative control rather than under the control of known or unknown stimuli. When asked to label an unknown stimulus, the child usually invented a name.

This study was conducted in the child’s home. Training sessions were carried out primarily in the child’s bedroom, which was furnished with a table, chairs, and educational materials needed for therapy sessions. Generalization tests were conducted both in the child’s bedroom and the kitchen.

**Stimulus Materials**

Stimuli consisted of 114 items including: flashcards containing pictures of animals, numerals, letters, colors, time, characters and shapes, and 3-dimensional items such as kitchen utensils, food, toys, apparel, school supplies, and other items. Prior to training, it was established that the child could label 51 of these items correctly and could not label 63 of these items (see Table 1 in Appendix).
The experimenter identified known and unknown items by presenting the stimuli one at a time and asking the child, “What is this?” Correct labels were praised and the item presented was scored as known. If the child did not respond within 5 s or provided an incorrect label, the item was scored as unknown and the next trial was presented. Edible reinforcers were given at the end of a block of 10 trials and were contingent on his attending to and complying with approximately 80% of the task demands.

**Independent Variables**

The independent variables included: (a) a procedure that used answers as the consequence to teach and maintain question-asking and (b) programming stimuli from the training task during the generalization tasks.

**Dependent Variables**

The dependent variables were: (a) the number of questions asked in the presence of unknown items, (b) the number of questions asked in the presence of known items, (c) the number of correct labels given in the presence of known items, and (d) the number of newly learned labels. Responses were scored as correct when the child independently labeled known items and independently asked, “What is that?” when presented with unknown items. Failure to respond within 5 s, mislabeling an item, and asking, “What is that?” in the presence of a known item were scored as incorrect.
Interobserver Agreement (IOA)

IOA percentages for all dependent variables were computed for approximately 50% of the sessions throughout this study. A second observer (one of four different persons) independently recorded the child's responses according to a prescribed response code. IOA percentages between the experimenter and the independent observers was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100.

IOA measures for the entire study ranged from 90% to 100% with a mean of 97.4%. IOA across all the sessions conducted by the experimenter ranged from 90% to 100% with a mean of 96.7%. IOA measures for the sessions conducted by the caregiver ranged from 90% to 100% with a mean of 98.8%.

Experimental Tasks

Five tasks were used in this experiment: one task to train the target behaviors and four tasks to probe for generalization of the target behaviors. All the tasks required the child to correctly label the items he could label and ask, "What is that?" in the presence of the items he could not label correctly. In the training task, the experimenter held each item, one at a time, in front of the child and asked, "What is this?" Generalization task 1 (GT1) consisted of placing 4 items on the table in front of the child and giving the instruction, "Tell me what you see on the table.". In generalization task 2 (GT2), the experimenter fanned out 10 cards face down in front of the child and gave the instruction, "Pick one." Generalization task 3 (GT3) consisted of the experimenter holding or pointing to the location of an item within
5 cm and saying, "Look, (name of subject)." In generalization task 4 (GT4), the experimenter handed the child an item and gave an instruction to either, "Give this to (name of third person)" or "Put this on the table/counter/bed." GT1 and GT2 shared common elements with the training task (e.g., labeling), while GT3 and GT4 were situations in which the child was required to perform behaviors other than labeling.

Because the child was not familiar with the format of GT1, the child was trained to point to and name the known items presented on the table after the experimenter instructed, "Tell me what you see on the table" (see Appendix) before baseline measures were collected. The child was familiar with GTs 2, 3 and 4 as they were often used during his in-home behavior therapy.

**PROCEDURES**

**Experimental Design**

The experiment consisted of 6 phases. In Phase 1, the child was presented with 114 items in order to determine which items he could and could not label. In Phase 2, the child was trained on a task format he had not formerly encountered. After this preliminary assessment and training, the experimental phases began. In the first experimental phase (Phase 3), baseline measures were collected on all the tasks and in two different settings. Then the child was trained to label known stimuli and to ask, "What is that?" when presented with unknown stimuli in Phase 4. Phase 5 consisted of generalization probes across all the training and generalization tasks with
both the experimenter and the caregiver, while Phase 6 consisted of generalization
training.

Baseline

Baseline measures were taken across all training and generalization tasks for all
persons and settings. During baseline, correct labeling was praised and question-
asking was answered to avoid extinguishing question-asking and to maintain correct
labeling.

Approximately 5 sessions were conducted 4 days/week. Each session consisted
of 10 trials containing 5 known and 5 unknown stimuli. Each session lasted
approximately 7 min, and between each session, the child was given a break for at
least 5 min. The tasks during the sessions were presented in a different order each
day. Baseline sessions for all tasks were carried out by the principal investigator in
the child's bedroom and by the caregiver in the kitchen.

Training Task

The training task was designed to teach the child to ask the question, “What is
that?” in the presence of novel stimuli and to maintain correct labeling in the presence
of known stimuli. The experimenter sat adjacent to the child in front of a table. On
each trial, the experimenter held a stimulus (i.e., an object or flashcard) in front of the
child and asked, “What is this?” If the child answered with the correct label, the
experimenter praised the response and presented the next trial. If the child asked,
“What is that?” when presented with an unknown stimulus (e.g., a pencil), the
experimenter answered, “This is a pencil” and immediately asked, “What is this?” If
the child answered, "Pencil," the experimenter praised the response and presented the next trial. If the child incorrectly named the item or did not respond within 5 s of the question, the experimenter repeated the training model (e.g., "This is a pencil." "What is this?"). This correction procedure continued until the child provided the correct label (i.e., "Pencil"). If the child incorrectly asked the question, "What is this?" when presented with a known stimulus, the experimenter repeated the question. If the child answered incorrectly in the presence of an unknown item when first asked, "What is this?" the experimenter instructed the child to say, "What is that?" If the child repeated the experimenter's question (imitated the verbal model), the experimenter answered, "This is a (name of item)" and immediately asked, "What is this?" If the child did not respond, the experimenter prompted the correct label. If the child did not imitate the model, "What is that?" the experimenter repeated the model until the child correctly imitated the model. Once the child asked, "What is that?" the experimenter provided the answer (e.g., "This is a pencil") and immediately asked, "What is this?" The experimenter followed the procedures outlined above to prompt the correct label (see Figure 1 in Appendix).

Training began by introducing 2 pairs of items. Each pair consisted of 1 known and 1 unknown item. Each item was presented either 2 or 3 times across 10 trials (5 trials for known stimuli and 5 trials for unknown stimuli). Five 10-trial sessions were carried out each day, 5 days/week. Once the child correctly labeled each unknown item three consecutive times, those 2 pairs were removed and 2 new pairs of stimuli were presented to the subject. If the child did not meet the accuracy
criterion during that session, then the same stimuli were used in the next 10 trials. This procedure continued until the child asked, "What is that?" on the first presentation of an unknown stimulus for 2 consecutive unknown stimuli. Then generalization probes began for this task with new stimulus pairs. The training in Phase 4 lasted 14 days and the total number of training sessions was 64.

**Generalization Probes**

The generalization probes assessed whether the child would ask the question, "What is that?" in the presence of novel stimuli within the training task context, as well as across generalization tasks (GT1-4) with the experimenter (in the child's bedroom) and the caregiver (in the kitchen setting). The contingencies during the probe trials were identical to those observed in baseline. That is, correct labeling was praised and the next trial presented; correct questions were answered and the next trial presented, and all incorrect responses were followed by the presentation of the next trial.

First, it was determined whether or not the question, "What is that?" had generalized within the original training task using 5 new pairs of stimuli. If generalization occurred, then the task was re-probed with 5 new pairs of stimuli to assess the maintenance of the response. If generalization continued in this second probe, the experimenter probed for the generalization of question-asking to other tasks in the original setting, and then with a different person in a different setting. If generalization did not occur within the training task, training continued until generalization occurred across two consecutive sessions.
Generalization Training

If question-asking did not occur during a generalization task, the experimenter introduced elements of the training task into that generalization task in two ways. First, generalization task stimuli (GTS) were replaced with the training task stimuli (TTS)—those stimuli which the child had labeled correctly or had asked, “What is that?” during the training task but had not learned the correct labels. The GTS were also probed in the training task. Second, the question, “What is that?” was introduced in the generalization task in two ways: (a) the experimenter presented the question before an instruction (QBI); that is, the experimenter handed the child an item, waited for about 2 s, and if he did not ask the question, the experimenter asked, “What's this?” before giving the instruction to perform the task; and (b) the experimenter presented the question after the instruction (QAI) to perform the task; that is, the experimenter handed the child the object and gave the instruction to perform the task. If the child didn't ask, “What's that? within 2 s, the experimenter asked the child, “What's this?” before the child could perform the task.

RESULTS

Figure 3 displays the acquisition and the within-task generalization of question-asking during the training task conducted by the experimenter. The top graph shows the number of times (out of 5 opportunities) the child labeled or asked “What is that?” in the presence of the known stimuli. These data show that the child consistently labeled the known stimuli correctly (89%) and did not ask the question, “What is
that?” during baseline, training and generalization probes. Of the 65 training sessions, 9 contained 2 errors, 24 contained 1 error and 32 were errorless. Some of these errors correspond to non-compliant behaviors, such as not responding within 5 s or engaging in some other type of behavior (e.g., saying “Can I have it, please?”, “I want Chris,” etc.). These types of non-compliant behaviors occurred at various times throughout the study.

The bottom graph in this figure also shows the number of times the child correctly asked “What is that?” when presented with an unknown stimulus. Since the child was learning to name previously unknown stimuli, the number of opportunities to ask questions did not equal 5. The dashed line represents the number of opportunities the child had to ask the question for each session. During the first two baseline sessions, the child correctly labeled one of the “unknown” stimuli, which was later replaced. The child began to ask questions on the third session. During the 64 training sessions, he did not ask any questions in 13 sessions. However, in the other 51 training sessions, the number of questions were very close to the opportunities to ask them. During the final phase (generalization probes), the child asked 14 questions out of 15 opportunities. In session 49 he asked, “What is that?” to the first presentation of the first unknown stimulus presented.

Figure 4 displays the results for three of the four generalization tasks (GT1-3) conducted by the experimenter. The graphs on the left show the child’s responses to known stimuli, and the graphs on the right show the child’s responses to unknown stimuli. Each graph shows the data for the initial baseline and the generalization
probes after acquisition of question-asking. During baseline sessions, the child labeled some known items in each generalization task and asked the question, “What is that?” only one time for an unknown item. During the probes conducted after training, the child’s labeling of known items increased and he incorrectly asked two questions for these known stimuli. Each time the child asked a question in the presence of a known item during these tasks, he corrected himself and labeled the item. These self-corrects were not counted as correct because the experimenter could not discriminate if these were actual self-corrects or if the child picked up on a cue (e.g., absence of praise) and, thus, responded differently.

In the generalization probes for the unknown stimuli, question-asking was demonstrated in GT1, GT2 and GT3. Failure to ask questions during session 5 for GT1 are cases in which non-compliant behaviors followed the presentation of the unknown stimuli. During the probes for GT2, the child did not respond within the time limit on 4 occasions and mislabeled the stimuli on 2 occasions.

Figure 5 displays the number of times the child labeled or asked “What is that?” in the presence of known stimuli (top graph) and in the presence of unknown stimuli (bottom graph) for the fourth generalization task (GT4). The child correctly labeled one known item and asked, “What’s that” one time during baseline. He did not label or ask, “What’s that?” during the generalization probes, nor did generalization occur when training task stimuli were introduced into the task. Interestingly, the child correctly labeled and asked questions about most of the generalization task stimuli when probed during the training task; however, when the task was probed again, no
generalization occurred. Further, during the QBI phase, the child correctly labeled known stimuli and asked, "What's that" in the presence of unknown stimuli. When the question was removed from the generalization probe, the child neither labeled nor asked questions in the presence of the stimuli. During the QAI phase, labeling and question-asking increased. The child maintained this performance of asking questions when the original GT4 task was presented; however, labeling known items did not generalize.

Figures 6 and 7 show the data for the training and generalization task probes conducted by the caregiver. The graphs on the left represent the child's responding to known stimuli and the graphs on the right show the child's responding to unknown stimuli. Each graph displays the data for baseline and generalization probes after the acquisition of question-asking with the experimenter. During the baseline sessions the child labeled some of the known stimuli in each task and asked the question, "What is that?" twice in the presence of unknown stimuli in GT1. The child labeled one known item in GT3 which was originally counted as incorrect; however, the caregiver mentioned that the "mislabel" had a history of being reinforced by the family. Since the caregiver was not training a response, the item was scored as a correct.

The generalization probes showed an increase in correct labeling of known stimuli for all tasks (except GT4) and question-asking in the presence of known stimuli remained at zero except GT3. In the presence of unknown stimuli, appropriate question-asking substantially increased in all the tasks except GT4. The delayed generalization in GT3 was due to the child's "mislabeling" the unknown
stimuli (i.e., the child would say "lunch" instead of "refrigerator" and "open door" instead of "cabinet"). Since training the labels of stimuli was not the purpose of the probe, these stimuli were replaced with other objects and flashcards. This modification resulted in the child asking four questions and correct labeling of one of the previously scored "unknown" stimulus. This stimulus was replaced for session 5.

The last generalization probe (fifth session) was conducted 3 days after the experimenter probed GT4 for the last time. Generalized question-asking did not occur with the caregiver.

Figure 8 presents the number of newly learned labels for each task conducted by the experimenter (left) and the caregiver (right). The child learned a total of 18 new labels during this study. During training, the child learned 10 labels, 3 labels during the generalization probes with the experimenter, and 5 labels during the generalization probes with the caregiver. Thus, the total number of items out of 114 that the child correctly labeled increased from 51 (44% correctly labeled) to 69 (60% correctly labeled) by the end of the study.

DISCUSSION

In the present experiment, a child with autism was taught to ask, "What is that?" when the experimenter presented a novel item and asked the question, "What is this?" Results indicated that question-asking generalized to unknown items presented in three subsequent instructional tasks: "Tell me what you see on the table," "Pick one" and "Look." These untrained performances occurred when items were presented
both by the experimenter and by the caregiver. Question-asking, however, did not occur in the presence of the experimenter or caregiver in the task which required the subject to do something with the unknown item (e.g., "Put this on the table" or "Give this to ... "). In order to promote generalization in this task, the experimenter introduced the question, "What is this?" within the task. Consequently, while question-asking maintained after the experimenter removed the question, it did not occur when the caregiver conducted the task. Another finding from this study was that the child not only asked questions in novel situations, but also learned to name some of the items presented in those situations.

Five months after the experiment ended, anecdotal reports by the caregiver, parents, and teachers indicated that the child continued to ask questions at home, in and outside of his therapy sessions, in the supermarket, in fast-food settings and in school. In addition, it was also reported that the child continued to learn new labels as a result of asking questions. These results have several implications for the analysis of both the effectiveness of training procedures to teach question-asking to children with autism and the effectiveness of programming common stimuli to promote the generalization of question-asking.

While the procedures employed in this study trained question-asking in a child with autism as quickly as those used by Taylor and Harris (1995) and Hung (1977), the procedures differed with respect to the contingencies established during training. Previous training procedures have reinforced question-asking with praise, tokens, food and other tangibles. In the present study, the only programmed consequence for
question-asking was a model of the correct label. Praise was contingent upon the child's providing correct labels. For instance, if the child did not produce the correct label or ask the question "What is this or that?" the experimenter modeled the question, gave the correct label of the item as a consequence for asking, and then immediately presented the question, "What is this?" a second time. Then correct labels were followed by praise. The programmed contingency better resembles the contingencies that occur in the natural environment, where questions produce answers not praise. This is not to say that praise, tokens and food should not be used during training. Initially, such reinforcers might be necessary; otherwise, it is quite possible that question-asking will encounter extinction in the natural environment (e.g., Hung, 1977). Therefore, continued use of such consequences may not be functional for maintaining question-asking in the natural environment. An ideal outcome of training would be that answers produced by asking questions would become conditioned reinforcers that maintain question-asking. And, in this study, answering the child's questions appeared to function as a conditioned reinforcer.

Another important and related feature of this study pertains to the generalization of answer-maintained question-asking. The present study extends the analysis of generalization of question-asking to several types of tasks other than those previously reported. For example, in Experiment 1 of the Taylor and Harris (1995) study, they restricted their assessment of generalization of question-asking to other materials and to another setting with another person conducting the experimental task. In Experiment 3, their assessment of generalization was expanded to include another
situation, the occurrence of question-asking while on a walk in the school building. They found that all three children immediately demonstrated generalization of question-asking in Experiment 1. However, only one of these children showed immediate generalization of this behavior in Experiment 3. The other two children required further prompting and reinforcement before showing generalization of question-asking.

Similarly, Hung (1977) needed to train question-asking in the generalization settings. The first generalization probe entailed the subjects standing at the door of the training setting and looking into a room full of back-up reinforcers. Question-asking did not generalize from the training situation. Question-asking was trained in this situation and in other settings around a camp area.

The present study assessed generalization across four tasks and across one person in a different setting. Two of these tasks were situations in which correct labeling of objects and pictures was formally reinforced: "Tell me what you see on the table" (similar to the Taylor and Harris training task) and "Pick one." The other two tasks were situations in which the child had not been required to label items: "Look," and "Give this to ..." or "Put this on the ..." Question-asking immediately generalized to the tasks requiring verbal labels for known and unknown objects. Question-asking, however, did not generalize to tasks that required performances unrelated to labeling items. Thus, these results suggest that question-asking is more likely to generalize to situations in which children have been required to label objects and pictures and is less
likely to occur in tasks in which children are required and reinforced for doing something else with the known and unknown objects.

Notwithstanding, there are several aspects of this study that raise questions that require additional analysis. First, generalization of question-asking to situations in which the child was required to "look" was immediate when the experimenter instructed the child to look, but was delayed when the caregiver provided the same instruction. Because the labeling of objects and pictures was not required in the "Look" task, this may not account for the generalization of question-asking to this task. Perhaps generalization occurred because of other common elements between this task and the naming tasks. For instance, in both the naming and the look tasks, the child is presented with known and unknown pictures and objects.

Also, this study analyzed two versions of programming common stimuli: (a) programming unknown items for which generalization had already been shown in other tasks was introduced in the failed generalization task; and (b) programming the question, "What is this?" in the failed generalization task. Programming unknown objects for which generalization of question-asking was already demonstrated did not have any effect on the generalization of question-asking to the failed generalization task. Perhaps this was due to competing stimuli for question-asking (i.e., presenting an instruction unrelated to asking questions). In order to promote generalization in the "Give this to..." task, it was necessary to require the child to label the item or ask, "What's that?" to an unknown item. This occurred only when the question, "What's this?" was introduced after the experimenter gave the instruction "Give this to..." and
briefly waited for the child’s response before allowing the child to execute the task. Thus, it seems that the effects of programming the common question depended on the point at which the question was introduced during the instruction. It appears that in order to promote the generalization of question-asking, the question should be introduced as part of the task. If the question is presented immediately before the task, it may maintain the independence of the two tasks. That is, the child may have seen them as two sequenced, yet unrelated tasks.

Finally, the generalization to other tasks where labeling is not required (e.g., eating, watching TV, playing, etc.) was not assessed in this study. Future research is needed to further assess the generalization of question-asking to such competing situations, since these situations represent the majority of activities children usually engage in daily. Such research will also provide an opportunity to systematically study the generality of programming common stimuli as way to promote the generalization of question-asking. Several authors have hypothesized about the importance of question-asking for the future development of children's repertoires (e.g., Nelson, 1973; Parnell & Amerman, 1984; Secan, Egel, & Tilley, 1989). To the extent that learning to ask questions in the presence of unknown stimuli in a variety of tasks can provide the child with access to expanded environments in which much incidental learning can take place, programming such a seemingly simple behavior change could result in far reaching behavior changes. If so, teaching question-asking would meet the definition of a behavioral cusp, a special instance of behavior change
that has farther-reaching developmental implications than solely the immediate behavior change (Rosales-Ruiz & Baer, 1996, in press).

What makes a behavior change a cusp is that it exposes the individual's repertoire to new environments, especially new reinforcers and punishers, new contingencies, new responses, new stimulus controls, and new communities of maintaining or destructive contingencies. When some or all of those events happen, the individual's repertoire expands; it encounters a differentially selective maintenance of the new as well as some old repertoires, and perhaps that leads to some further cusps. (Rosales-Ruiz & Baer, in press).
APPENDIX

Task Format Training

This training was designed to teach the child to point to and label all items placed on a table. The experimenter placed 4 known items on the table in front of the subject and gave the instruction, “Tell me what you see on the table.” A correct response consisted of the subject to independently pointing to and labeling each known item. The experimenter praised each correct response. An incorrect response was scored if the subject did not respond to the instruction within 5 s or incorrectly labeled an item. Following incorrect responses, the experimenter repeated the instruction. If the subject still did not respond within the next 5 s, the experimenter modeled the correct response for the subject to imitate. The experimenter did not respond if the subject provided an incorrect label for an item. Subsequently, that item was removed from the task. Verbal praise and an edible were presented to the subject on an intermittent schedule for complying with the task demands. Two training sessions were presented each day. In each session 5 sets of stimuli were presented. Each set consisted of 4 trials of known items. The stimuli consisted of a variety of known objects and flashcards which were randomly selected before each session. Criterion was 80% correct responses for three consecutive sessions.
Table 1.

**Stimulus Materials**

<table>
<thead>
<tr>
<th>Known Stimuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal flashcards: giraffe, mouse, frog, camel, tiger, snake, turtle, rabbit, elephant, alligator, bear, lion, zebra, horse, dog, chicken</td>
</tr>
<tr>
<td>Color flashcards: black, blue, orange, pink, red, yellow</td>
</tr>
<tr>
<td>Shape flashcards: heart, circle, triangle, square, rectangle</td>
</tr>
<tr>
<td>Character flashcards: Stretch, Stinky, Casper</td>
</tr>
<tr>
<td>Clothing items: shoes, socks</td>
</tr>
<tr>
<td>Food items: apple, banana, orange, grape</td>
</tr>
<tr>
<td>Play/toys: Barney, Baby Bop, crab, soccerball, basketball, football, playdoh, bubbles, T-Rex, Rita, Kimberly, Zack</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unknown Stimuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number flashcards: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
</tr>
<tr>
<td>Time flashcards: 5:00, 6:00, 7:00, 11:00, 12:00</td>
</tr>
<tr>
<td>Kitchen items: bowl, cup, fork, glass, knife, napkin, plate, spoon, counter, cabinet, refrigerator</td>
</tr>
<tr>
<td>Bathroom items: toothpaste, toilet paper, shampoo, comb, hair clip</td>
</tr>
</tbody>
</table>

*(table continues)*
### Unknown Stimuli (cont.)

<table>
<thead>
<tr>
<th>Category</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparel</td>
<td>watch, ring, scarf</td>
</tr>
<tr>
<td>School items</td>
<td>crayon, tape, pencil, pen, ruler, stapler, hole punch, paper clip, pencil sharpener, eraser, rubber band</td>
</tr>
<tr>
<td>Food items</td>
<td>mango</td>
</tr>
<tr>
<td>Monetary items</td>
<td>dollar</td>
</tr>
<tr>
<td>Other items</td>
<td>keys, frame, tissue, newspaper</td>
</tr>
</tbody>
</table>
Training Task

Present item and ask, "What's this?"

- Correct label w/in 5 sec?
  - Yes: Praise
  - No: Ask, "What's that?"
    - Yes: Correct imitation?
      - Yes: *This is a ______. What is this?*
      - No: Next trial
    - No: Correct label?

- Or
  - Say, what's that.*
    - No: Correct label?
      - Yes: Next trial
      - No: Next trial
Figure 1. Training procedures for question-asking and item labeling.
Programming Generalization

- Exchange the stimuli of the generalization task for the stimuli of the training task
- Probe w/original generalization task stimuli
  - Yes: Generalization?
  - No: Probe for generalization in other tasks
  - Yes: Generalization?
    - No: Give the instruction, then ask child, "What's that?"
      - Yes: Generalization?
        - No: END
          - Yes: Probe for generalization in other tasks
Figure 2. Programming common stimuli across generalization tasks.
Notes about the graph:

Training Task - Experimenter
"What's this?"

**Known Stimuli**
- Baseline
- Training
- Probe

**Unknown Stimuli**
- Baseline
- Training
- Probe

Legend:
- --- OPPORTUNITIES
- ▲ LABELS
- ○ QUESTIONS

Sessions:
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70

Number of Responses:
0 - 1 - 2 - 3 - 4 - 5

Graph showing the number of responses over sessions for both known and unknown stimuli with different markers for opportunities, labels, and questions.
Figure 3. Acquisition and within task generalization of question-asking.
Generalization Tasks - Experimenter

GT 1 - "Tell me what you see on the table."

Known Stimuli

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Unknown Stimuli

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

GT 2 - "Pick one."

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

GT 3 - "Look (name of subject)."

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
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</tbody>
</table>
Figure 4. Generalization of question-asking across tasks 1-3 conducted by the experimenter.
Generalization Task - Experimenter

GT 4 - "Put this on the table/counter/bed." or "Give this to (name of person)."

Known Stimuli

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probes</th>
<th>TT</th>
<th>GTSProbe</th>
<th>QBI</th>
<th>Probe</th>
<th>QAI</th>
<th>Probe</th>
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Unknown Stimuli

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Baseline</th>
<th>Probes</th>
<th>TTS GTSProbe</th>
<th>QBI</th>
<th>Probe</th>
<th>QA</th>
<th>Probe</th>
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</table>

TTS - Training Task Stimuli
GTS - Generalization Task Stimuli
QBI - Question Before Instruction
QAI - Question After Instruction

Legend:
- Dashed line - OPPORTUNITIES
- Triangle - LABELS
- Circle - QUESTIONS
Figure 5. Generalization of question-asking within task 4.
Generalization Tasks - Caregiver

Training Task - "What's This?"

GT 1 - "Tell me what you see on the table."

GT 2 - "Pick one."

Sessions

- **OPPORTUNITIES**
- ▲ LABELS
- ○ QUESTIONS
Figure 6. Generalization of question-asking across the training task and generalization tasks 1 and 3 conducted by the caregiver.
Generalization Tasks - Caregiver

GT 3 - "Look, (name of subject.)"

Known Stimuli

Baseline Probes

Unknown Stimuli

Baseline Probes

GT 4 - "Put this on the ..." or "Give this to..."

Baseline Probes
Figure 7. Generalization of question-asking across generalization tasks 3 and 4 conducted by the caregiver.
Figure 8. Newly learned labels.
REFERENCES


