

*TEACHING CHILDREN WITH AUTISM TO SEEK INFORMATION:
ACQUISITION OF NOVEL INFORMATION AND
GENERALIZATION OF RESPONDING*

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A time delay procedure was used to teach 3 children with autism to ask the question "What's that?" when novel stimuli were presented during an instructional task. Once the ability to ask the question was acquired, the children's ability to learn novel information by asking the question was assessed. The children were then taught to ask the question within a less structured context. All three studies used a multiple baseline across participants. Generalization was assessed in a different room, to a new person, and to novel stimuli. All of the children learned to ask the question within the instructional context, while on a walk in the school building, and to request information about three-dimensional objects. The acquisition of novel information was consistent for receptive and expressive tests for 2 of the children, with varied results for the 3rd. These studies indicate that children with autism can be taught to ask questions that lead to the acquisition of new information.

DESCRIPTORS: autism, time delay, social language

A significant deficit common to children with autism is a lack of spontaneous social language (Rutter, 1978). These children typically require systematic intervention to master basic social language skills such as offering assistance (Harris, Handleman, & Alessandri, 1990), initiating greetings (Charlop & Trasowech, 1991), or saying "please" and "thank you" (Matson, Sevin, Fridley, & Love, 1990). One aspect of social language notably lacking in children with autism is the ability to ask questions. Parents of normally developing children often marvel at their young child's endless questions about the environment (Brown, 1968). This form of curious behavior is a useful and socially meaningful skill. Not only does it lead to a conversational exchange with another person, but it can also result in children learning novel information.

Despite the significance of question asking, little research has been directed toward teaching children with autism to generate wh- questions. However,

a few studies have illustrated that they can learn to answer questions. Children with autism have been taught to answer the questions "what," "why," and "how" when shown magazine pictures, and to answer questions about temporally remote events (Krantz, Zaluski, Hall, Fenske, & McClannahan, 1981). Question-answering skills have also been promoted in natural contexts where the relevant cues were visible (Secan, Egel, & Tilley, 1989).

Several studies have demonstrated that children with language delays or mental retardation can be taught to ask questions (Twardosz & Baer, 1973; Wilcox & Leonard, 1978; Zimmerman & Pike, 1972). Hung (1977) taught four youths with autism to ask "What is ___ for?" and "What is/are ___ doing?" by modeling the questions and providing contingent reinforcement for question asking. However, all youths required additional instruction to learn the answers to questions they had been asking. In other words, although they had learned to ask questions, they did not use this skill to learn the information they requested.

The present series of studies examined the extent to which children with autism could (a) be taught to ask the question "What's that?" when pointing to an unknown stimulus, (b) learn novel information by asking the question, and (c) be taught to ask the question in the less structured context of a school walk.

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GENERAL METHOD

Participants

The 3 participants were students at a private, nonprofit education and treatment program for children with autism. Each child met the diagnostic criteria for autistic disorder according to the *Diagnostic and Statistical Manual* (American Psychiatric Association, 1987) and had been diagnosed by outside agencies prior to enrollment in the program. Each displayed marked deficits in language, socialization, play, and academic skills, and none had been observed to ask questions.

Mary was 9 years old, and had been in the program for 8 months prior to the start of Experiment 1. Her language was limited to requests for desired items, her mean length of utterance was 2.8 words, and her Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1981) age-equivalent score was 3 years 2 months. Since entry into the program, Mary had learned a number of skills, including spontaneous greeting of adults and peers, playing simple games with peers, and following a written activity schedule.

Russel was 5 years old and had been attending the program for 8 months at the start of the studies. His spontaneous language consisted primarily of delayed echolalia and noncontextual speech. His PPVT score was 3 years 9 months. Since entry into the program, he had mastered verbal skills of reciprocating greetings, labeling, and answering "I don't know" when asked novel questions.

Jack was 9 years old at the start of the studies. He had been attending the program for 24 months, during which time he had learned to describe objects and pictures in short sentences, to acquire new responses by observing peers, and to request items in full sentences. Jack rarely initiated conversation with adults or peers except to request desired activities. His PPVT score at the time of the study was 4 years 2 months.

Experimenters

The three experimenters were teaching assistants with whom the children were familiar. Each had an undergraduate degree in special education or a

related field and had been trained in behavioral intervention prior to teaching the children. The experimenters, who worked interchangeably with all 3 children, also worked daily with the participants in their classroom on their regularly scheduled teaching programs. An additional staff member participated in assessment of generalization to a novel person. She taught regularly scheduled programs but did not participate in teaching sessions for this study.

Setting

The 3 children participated in all three experiments, which were conducted in the course of the children's regular school day. Baseline and teaching sessions for Experiments 1 and 2 were conducted in the children's classrooms, while the students sat at their desks and the experimenter sat across from them. Generalization probes for Experiment 1 were conducted in the school kitchen.

During Experiment 3, the students walked through all areas of the school building, including the hallway, multipurpose room, computer room, and bathroom. In all studies, other students and teachers were present, participating in their regularly scheduled teaching sessions. However, students who were participating in the study did not observe each other's sessions.

Stimulus Materials

In Experiments 1 and 2, the picture cards used were nouns from the *Photo Resource Kit* (Pro-Ed, Inc., Austin, Texas). Objects used for generalization tests and Experiment 3 were chosen based on their novelty, in order to provide opportunity for a query. These included toys and functional objects to which the participants did not have regular access (e.g., air freshener in the bathroom, broom in the hallway, fire extinguisher in the multipurpose room).

Dependent Measures

The dependent variable for children in Experiments 1 and 3 was asking "What's that?" when pointing to an unknown stimulus prior to the presentation of a model. Correct responses were scored only when the child independently pointed to an

unknown stimulus and asked the question. In Experiment 2, the dependent variable on the receptive task was pointing to the correct picture when instructed to "Point to ___"; the dependent variable on the expressive task was naming a picture correctly when asked "What is this?"

Interobserver Agreement

Trial-by-trial interobserver agreement on question asking was obtained for Experiments 1 and 3, and for correct responses to the receptive and expressive tests in Experiment 2. Interobserver agreement was calculated by dividing the total number of agreements by total agreements plus disagreements and multiplying by 100%. Interobserver agreement was obtained during 70% of baseline sessions, 80% of teaching sessions, and 100% of the generalization probes in Experiment 1.

During Experiments 1 and 2, a second observer sat approximately 1.5 m away from the student's desk and scored responses. The mean interobserver agreement of question asking for all 3 participants during baseline for Experiment 1 was 99% (range, 90% to 100%). During instruction, mean agreement was 97% (range, 80% to 100%). During generalization probes, agreement was 100% for all 3 children.

For Experiment 2, mean agreement on correct and incorrect responses to the receptive tests during baseline was 95% (range, 60% to 100%) and was 99% (range, 90% to 100%) during instruction. During baseline sessions of the expressive tests, mean interobserver agreement was 99% (range, 80% to 100%) and was 98% (range, 70% to 100%) during instruction.

During Experiment 3, a second rater followed approximately 1.5 m behind the experimenter and the student as they walked through the school building. Mean agreement on question asking for Experiment 3 during baseline was 93% (range, 60% to 100%) and was 96% (range, 70% to 100%) during instruction.

Experimental Design and Procedures

All three experiments used a multiple baseline design across students. In the first study, the chil-

dren were taught to ask the wh- question "What's that?" when unknown stimuli were presented during an instructional task. Generalization probes were conducted to assess the student's ability to ask the question with three-dimensional stimuli, while in a different room, and with another person. The second study examined the children's ability to learn novel information when asking the question "What's that?" The third study taught children to ask the question while on a walk in the school building.

Experiments 1 and 3 used a delay procedure (Charlop, Schreibman, & Thibodeau, 1985; Charlop & Trasowech, 1991; Charlop & Walsh, 1986), in which prompts for target responses were provided following gradual time increments. In all three experiments, the order in which children were taught was determined randomly. Individual motivation systems for each child, such as contingent edible items or tokens, were used to reward desired performances and appropriate attending. Reinforcement ratios, which approximated a variable-ratio 3 schedule, were consistent with the procedures in effect for other instructional programs.

EXPERIMENT 1

Procedure

Pretests. Two pretests were administered to each child. Pretest 1 was designed to identify 20 pictures that the child could label correctly and 30 pictures that the child could not identify. Pretest 2 was designed to generate 20 objects that the child could label correctly and 20 objects that the child could not identify.

Three pretest sessions were run daily. Approximately 10 different items were presented during each session. During the session, the student sat in a chair across from the experimenter, who presented each stimulus in random order asking, "What is this?" Intermittent verbal praise was provided for attending and compliance, but there was no praise contingent on correct responding. Items that were labeled correctly on 80% of the trials in two consecutive sessions were designated as known. If the child incorrectly labeled the item or failed to re-

spond to the question within 5 s on all trials over two consecutive sessions, the item was defined as an unknown stimulus. Items correctly labeled 1% to 79% of the trials were discarded from the study.

Preteaching of the instructional task. Children were taught to label four pictures when instructed, "Tell me what you see on the table." Four randomly selected known pictures from the group of 20 were placed on the table, and the instruction "Tell me what you see on the table" was given. If the student did not begin to point to the pictures on the table from left to right and name each picture or named only some of the pictures, the experimenter physically guided the student's hand to point to each picture and verbally modeled the name of each picture. Responses were scored as correct if the child pointed independently to each picture from left to right and stated the correct label. Correct responses were followed by behavior-specific praise and edible items or tokens. Ten trials took place for each session, with a different combination of randomly selected known pictures on each trial. Criterion for correctly responding to the instruction was 80% correct across three preteaching sessions.

Baseline. After children met criterion on the preteaching instructional task, baseline sessions were conducted to assess each child's ability to ask "What's that?" when novel stimuli (unknown pictures) were presented. Ten trials were presented during each baseline session. On each trial, the experimenter placed four pictures on the table (one unknown picture and three known pictures randomly selected from the pretest lists). Each of the 30 unknown pictures was presented once during the three baseline sessions.

The instruction "Tell me what you see on the table" was given for each trial. Children were required to label pictures from left to right. If necessary, the experimenter physically guided the student's hand to point to each picture and verbally modeled the name of each known picture. When the child pointed to the unknown picture and asked "What's that?" the experimenter scored this response as correct and answered the question (e.g., "It's a camera"). Intermittent verbal praise was provided for attending and compliance, but there

was no praise contingent on correct responding. Incorrect responses were scored if the child skipped the unknown picture, provided an inaccurate label, or pointed to the picture without saying anything.

Instruction. Three teaching sessions were conducted each day in the child's classroom. During each session, 10 trials were presented. Each trial consisted of presentations of three known pictures, one unknown picture, and the instruction "Tell me what you see on the table." Different combinations of three known pictures and one unknown picture were chosen randomly prior to each session.

As previously taught, children were required to point to and label each picture from left to right. As soon as the child's finger pointed to the unknown picture, the experimenter immediately modeled (0-s delay) the response "What's that?" (in an exaggerated questioning tone of voice). If the child imitated the response, the experimenter said "Good asking, it's a [name of picture]," and presented tangible reinforcement. When the child imitated the experimenter (repeated "What's that?") for three consecutive trials, a delay of 2 s was presented between the time the child pointed to the unknown picture and the presentation of the modeled response "What's that?" If necessary, the experimenter lightly held the child's finger in a pointing position on the picture card for the length of the delay. Physical prompts to point to novel stimuli were gradually faded during the instructional trials. If the child asked the question "What's that?" prior to a model, the experimenter said "Good asking, it's a [name of picture]" and presented tangible reinforcement.

After three consecutive responses of asking "What's that?" within the 2-s delay or correctly imitating the model, the experimenter moved to a 4-s delay, and so on, until a 10-s delay was established. Correct responses were scored only when a child independently pointed to an unknown stimulus and asked "What's that?" prior to the presentation of a model. Criterion was asking the question "What's that?" within a 10-s delay when pointing to an unknown stimulus, during 8 of 10 trials over three teaching sessions. When criterion was reached by the 1st child, instruction began for the 2nd child, and so on.

Incorrect responses occurred when the child failed to imitate a prompt, failed to point to the unknown stimulus when asking the question, or stated "I don't know" when pointing to an unknown picture. Incorrect responses were ignored and the same delay was continued in the next trial. If children guessed incorrectly, they were told "No that's not a ____." When a child stated the correct name of a novel stimulus on any two trials, the picture was discarded from the unknown subset in order to assure that truly novel stimuli were presented on each trial. Following each response, physical guidance and verbal models were used, if necessary, to prompt the children to continue labeling the known pictures.

Generalization probes. Generalization probes in the school kitchen were conducted to assess the child's ability to ask "What's that?" when pointing to three-dimensional objects, in a different setting, and with another adult. The procedures for generalization probes were identical to those in baseline, except that objects rather than pictures were used and an adult who was not participating in the teaching sessions conducted the probes in the kitchen. Four generalization probes took place during baseline and during instruction for all students. Known and unknown objects were those established during the pretest session. Correct responses were scored if the child asked "What's that?" when pointing to an unknown object. The experimenter then provided the correct label (e.g., "It's a blender"), but did not provide reinforcement for asking the question.

Results and Discussion

Figure 1 depicts the performance of all 3 children across a multiple baseline for Experiment 1. In baseline, neither Mary nor Jack asked the question "What's that?" when pointing to an unknown stimulus. Russel asked the question twice, on two separate baseline days. All 3 participants demonstrated rapid acquisition of the skill during teaching. Within seven sessions, Mary met the 80% criterion and maintained a mean of 96% correct during the following 24 sessions. Jack acquired the skill in five teaching sessions; his mean correct responding was 98% across the following 17 sessions.

Russel demonstrated mastery within four sessions and achieved a mean of 99% correct during the last 15 sessions.

The skill of asking "What's that?" generalized to objects, in a different room, and with another adult for all 3 children. None of the children asked the question during the generalization probes prior to the introduction of classroom instruction. Mean performance during instruction rose to 78%, 80%, and 82% for Mary, Russel, and Jack, respectively.

In sum, a time delay procedure led to fairly rapid acquisition of the question "What's that?" during the instructional task for all 3 children. Once teaching began, the children also began to demonstrate the skill in a new setting, with novel three-dimensional objects, and with a different person. Although generalization probes were conducted only in the school kitchen, anecdotal reports from parents and teachers revealed that all of the children asked the question in additional natural contexts. For example, Mary's mother reported that Mary pointed to a fountain in a neighbor's yard and asked "What's that?" Jack asked "What's that?" while pointing to a person he did not know.

Although this study did not formally assess acquisition of novel labels, it is worth noting that all 3 children began to name several items once they began to ask the question, and replacement photos (new unknown pictures) had to be added to each student's set of novel stimuli. Seven of Jack's novel stimuli were replaced over the teaching sessions, three were replaced for Mary, and five were replaced for Russel.

EXPERIMENT 2

Following acquisition of asking "What's that?" when pointing to a novel stimulus, the children were tested on whether they could learn novel labels by asking the question.

Procedure

Pretest. As in the first experiment, a pretest was administered to each child to identify 10 pictures that he or she could not label correctly. The same known pictures, as determined in Experiment 1, were used in Experiment 2.

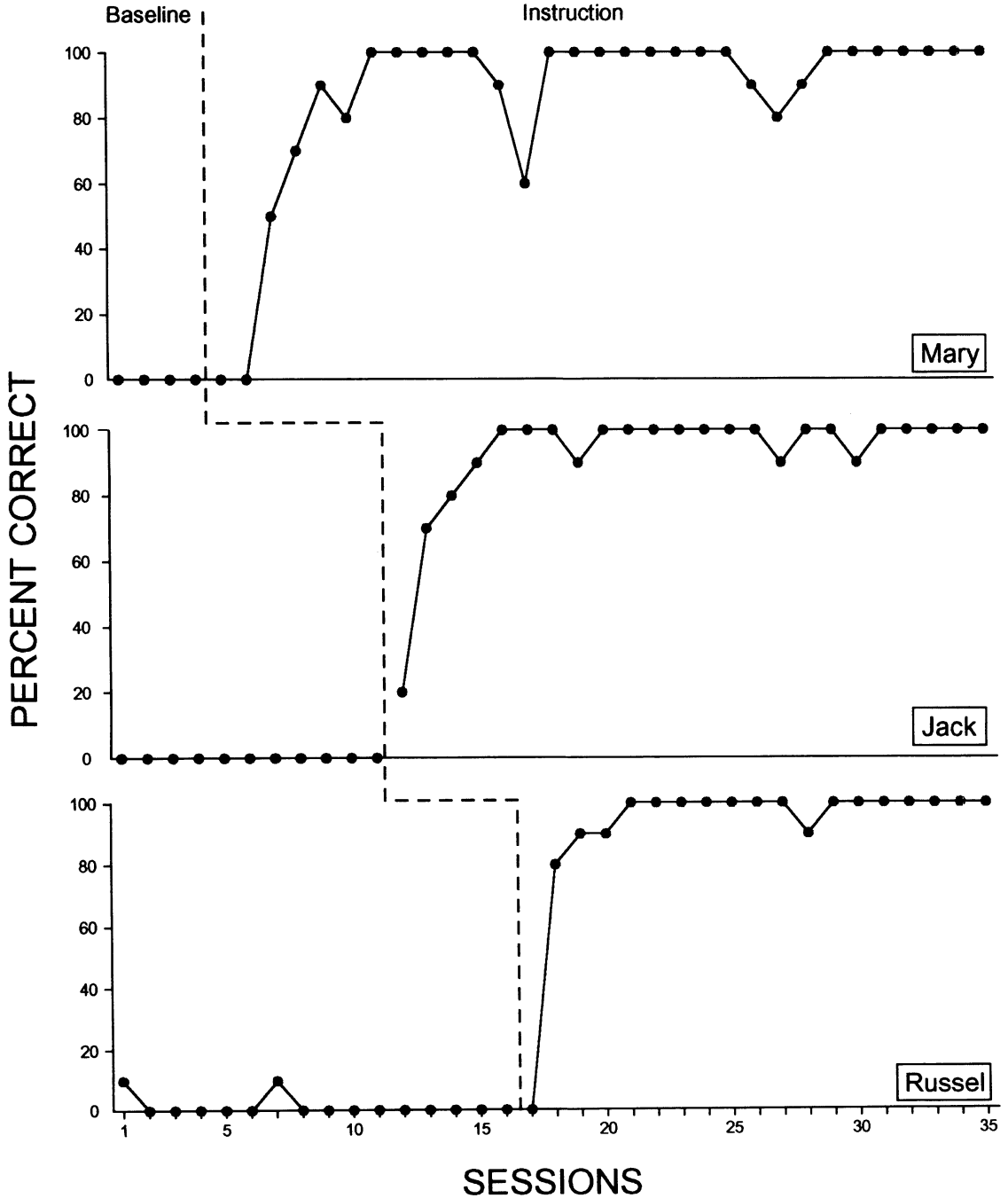


Figure 1. Percentage of correctly asking "What's that?" when pointing to a novel stimulus during baseline and instruction in Experiment 1.

Baseline. During baseline assessment of expressive labels, the experimenter randomly presented all 10 pictures, one at a time, and asked "What is this?" Correct responses were scored when

the child provided a correct label for the picture, but the experimenter did not provide verbal praise and went to the next stimulus. If the student failed to respond within 5 s or stated an incorrect

label, the experimenter did not provide any corrective feedback and went on to the next stimulus.

During the receptive baseline sessions, the experimenter randomly placed four of the novel pictures on the table facing the student and said "Point to [label of picture]." Responses were scored as correct when the child pointed to the novel stimulus, but correct responses were not reinforced. Incorrect and correct responses were ignored and the experimenter went on to the next trial. All 10 pictures were presented each session. Attending was maintained with verbal praise and intermittent tangible reinforcement.

Instruction. Following baseline, teaching sessions were conducted exactly as in Experiment 1. On each trial, three known pictures and one of the new unknown pictures were randomly selected from the pretest list and placed on the table. The child was given the instruction "Tell me what you see on the table." If the child asked the question "What's that?" when pointing to the unknown picture, question asking was immediately reinforced by stating "Good asking, it's a [name of picture]," followed by tangible reinforcement.

Acquisition tests. Posttest sessions occurred immediately following each teaching session to assess acquisition of labels. Posttest sessions alternated between receptive and expressive tests. Both expressive and receptive posttest sessions were identical to baseline. Correct responses were scored when the child provided a correct label during the expressive test or pointed to the correct picture during the receptive test. If the student did not respond correctly, the experimenter did not provide any corrective feedback and went on to the next trial. Criterion for acquisition was 100% correct on the receptive and expressive tests across three consecutive posttest sessions.

Results and Discussion

Figure 2 displays all 3 children's performances across a multiple baseline for receptive and expressive language tests during baseline and training. During instruction, the children demonstrated more rapid acquisition of receptive than expressive identification of novel stimuli. Mary's baseline perfor-

mance shows a mean of 15% correct responding on the receptive tests and 0% on the expressive tests. Following instruction, her performance rose to a mean of 82% for receptive tests and a mean of 33% for expressive tests. Mary's mean performance on the expressive tests was maintained at a mean of 50% over the last 17 sessions.

Russel's mean baseline performance was 0% for the expressive tests and 20% for the receptive tests. During instruction, Russel's performance increased to a mean of 88% on the receptive tests and mean of 43% on the expressive tests. Jack's performance rose from a baseline mean of 15% for the receptive tests and 2% for the expressive tests to teaching means of 73% for the receptive tests and 78% for the expressive tests. All children maintained the skill of question asking from Experiment 1 at criterion performance (80% to 100%). None required additional teaching to ask the question with the new set of unknown stimuli.

Experiment 2 illustrated that the children learned new information by asking "What's that?" All 3 children acquired receptive labels when opportunities were provided to ask the question. Although some correct responses to the receptive tests were scored during baseline, this was likely due to chance, given the nature of the four-choice task (students may have randomly chosen the correct label).

Acquisition of expressive labels was consistent for Jack and Russel. However, Mary did not learn expressive labels for 5 of the 10 pictures in the unknown set. Inattention cannot be ruled out as the basis for Mary's failure to master half the material, but she appeared to be generally cooperative. A follow-up procedure, teaching the labels via discrete-trials, was successful for Mary, and highlighted the importance of an individualized approach to instruction of students with autism.

Although Hung's (1977) study found that participants required additional modeling in order to learn the answers to questions concerning actions and functions, our results indicate that the skill of asking the question "What's that?" proved to be useful in learning novel labels. It may be that it is easier for children to learn information about labels than to learn answers to the more complex action and function questions targeted in Hung's study.

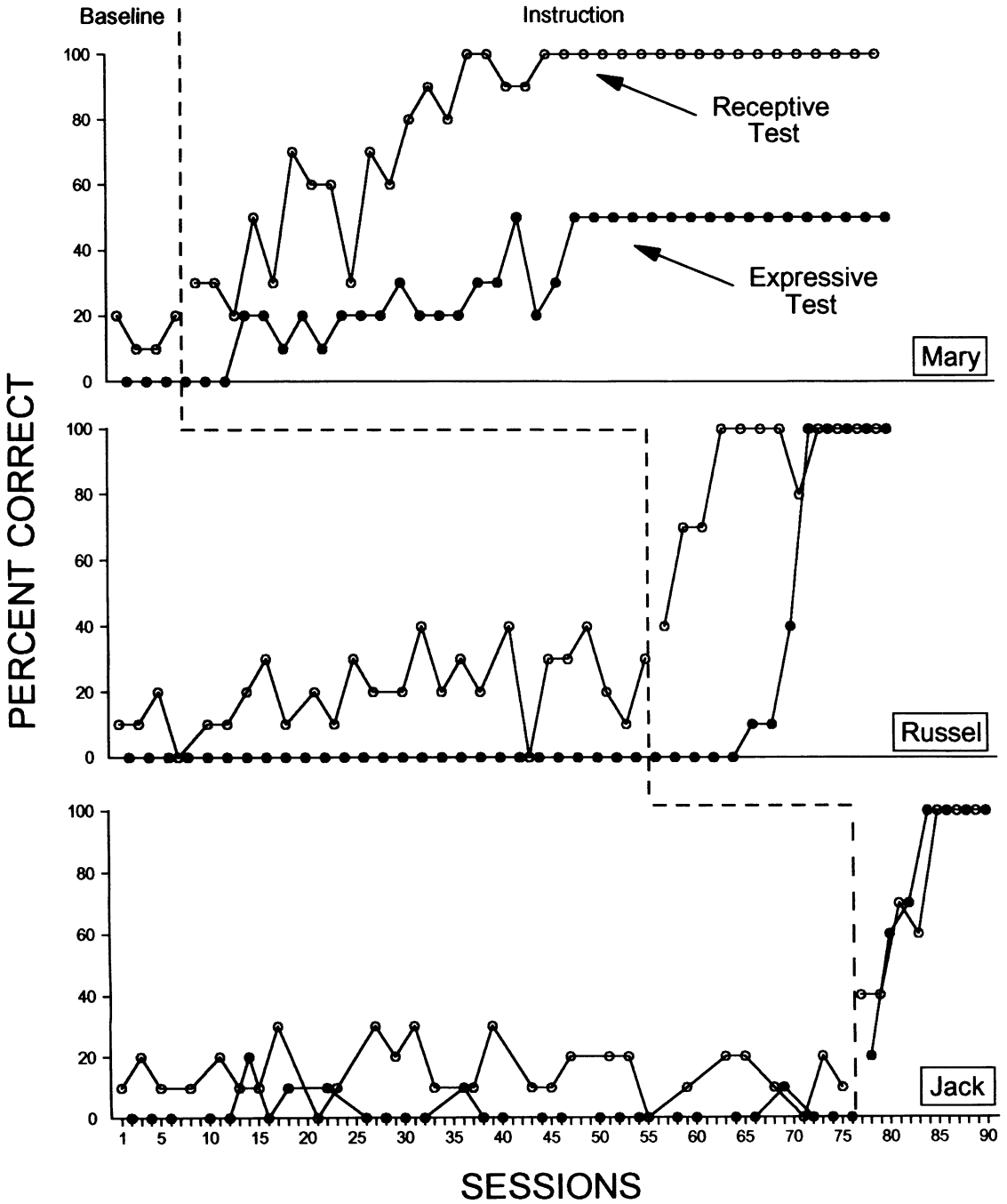


Figure 2. Percentage of correct responses on receptive and expressive tests during baseline and instruction in Experiment 2.

Nonetheless, the present findings suggest that the question "What's that?" was not simply a rote response, but rather was a means for the children to gain information.

EXPERIMENT 3

The purpose of Experiment 3 was to teach the children to generate the question in a less structured context, while on a walk in the school building.

Procedure

Pretest. Prior to baseline and teaching, a new group of 30 unknown objects was identified for each child. The procedure and criteria for object selection were the same as in Experiment 1.

Baseline. Baseline measures for all 3 children assessed their use of the wh- question "What's that?" when passing unknown objects on a daily walk within the school building. Prior to going on a walk, the experimenter placed 10 unknown objects at various locations throughout the school. The placement of these objects was determined randomly and changed each session. Objects were not always placed where they were usually located. For example, a gum ball machine might have been placed in the bathroom. Once a day, the experimenter approached the child and said "Let's go for a walk." During the walk, as the experimenter and child approached a novel object, the experimenter paused approximately 1 m from the object for 1 s to assess whether the child would point to the novel item and ask "What's that?" If the child asked the question during baseline, the experimenter answered the question (e.g., "It's a watering can") and continued the walk. If the child did not ask the question, the experimenter physically guided the child to continue the walk and repeated this procedure for the remaining unknown objects. Each approach to an unknown object was considered to be the onset of a trial, and 10 trials were conducted per walk.

Instruction. As in baseline, the experimenter placed 10 unknown objects at various locations throughout the school. As in Experiment 1, prompts

were provided using a graduated delay of 2-s increments. Once a day, the experimenter approached the child and said, "Let's go for a walk." As soon as the child and experimenter approached a novel object, the experimenter immediately (0-s delay) prompted the student to point toward the object and modeled "What's that?" (in an exaggerated questioning tone of voice). When the child imitated the experimenter (repeated "What's that?") for three consecutive trials (over three objects), a 2-s delay was presented between the child's pointing response and the experimenter's model. If necessary, the experimenter held the child's finger in a pointing position in the direction of the object for the length of the delay. Physical prompts to point to the unknown object were gradually faded over the teaching trials. When the child asked "What's that?" within the designated delay or imitated the model, the experimenter said "Good asking, it's a [name of object]" and presented tangible reinforcement. Subsequently, the child was physically guided, when necessary, to continue the walk.

After three consecutive responses of asking "What's that?" within the 2-s delay or correctly imitating a model, the experimenter moved to the 4-s delay, and so on, until a 10-s delay was established. When the child failed to imitate the prompt, the same delay increment was continued in the next trial. When the child pointed to an item that was not preplaced by the experimenter and asked "What's that?" the experimenter answered the question and provided praise and rewards. These responses were recorded but were not counted as a trial.

Correct responses were scored only when the child asked "What's that?" when pointing to a predesignated unknown object prior to the verbal model. Criterion was pointing and asking "What's that?" prior to a verbal prompt on 8 of 10 trials during three consecutive instructional sessions.

Results and Discussion

Figure 3 shows the children's use of the question "What's that?" on a walk in the school building. During baseline, Mary's and Jack's mean percent-

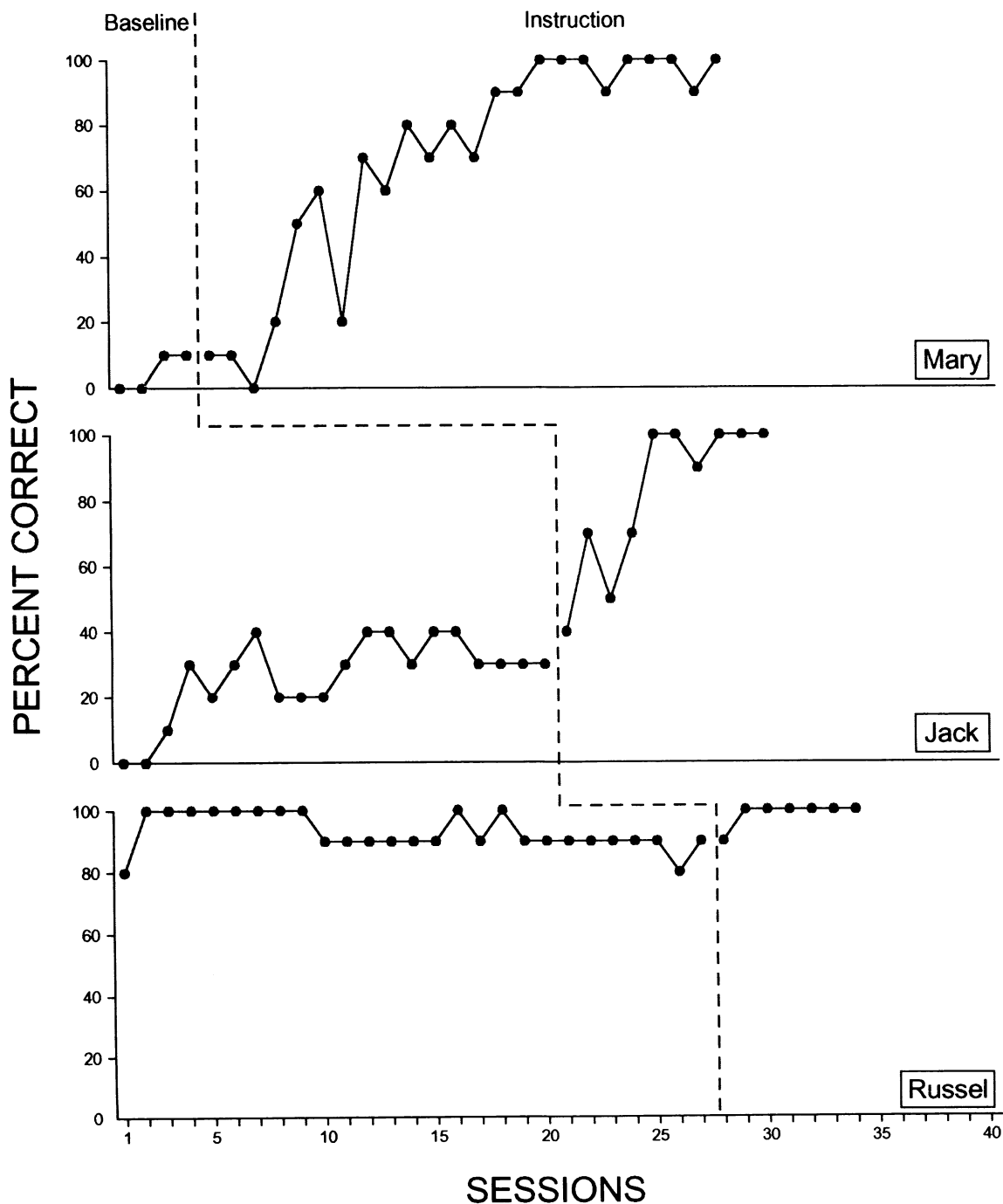


Figure 3. Percentage of correctly asking "What's that?" when pointing to a novel stimulus while on a walk in the school building during baseline and instruction in Experiment 3.

ages of asking the question were 5% and 26%, respectively. During instruction, their performances rose to mastery. Mary mastered the skill within 16 sessions and maintained a mean of 98% correct

responding over the last eight sessions. Jack met criterion within seven sessions and achieved 100% accuracy over the last three sessions. Russel's performance during baseline ranged from 80% to

100%. During instruction, his performance rose to a mean of 99%.

All of the children were observed to point to stimuli that were not preplaced by the experimenter and to ask the question. Over the training sessions, Jack asked the question three times about nontargeted items, Mary asked the question once, and Russel used the question six times.

Experiment 3 demonstrated that the children could learn to ask the question in a less structured context. During baseline, all of the children (especially Russel) were observed to ask "What's that?"; this suggested some generalization of the skill from Experiment 1. Following instruction with the delay procedure, the children's question asking increased to criterion performance.

Although question asking occurred in this setting in the absence of a verbal cue, the brief pause and prompt to point to novel stimuli may have served as a discriminative stimulus for question asking. Nonetheless, all 3 students were observed to ask about objects when no pause or pointing prompt occurred (for both target and nontarget items).

GENERAL DISCUSSION

Asking questions is a skill that typical children display early in their development (Brown, 1968). For the child with autism, whose social and communicative abilities are severely impaired, the skill of asking questions is often lacking. Although the challenge of teaching self-initiated language skills to these children has been well documented, the present research has demonstrated that they can be taught to ask a question in relation to novel stimuli. In addition, these studies reveal that question asking can be a useful skill that leads to the acquisition of new information.

Following teaching with a delay procedure, all of the children learned to initiate a query to request information about novel stimuli. Students learned to ask the question in the instructional context, the generalization condition, and while on a walk in the school building. Further, question asking led to acquisition of skills in identifying pictures by all of the children, and 2 of the children learned new verbal labels from their questions.

All children demonstrated the skill of asking questions during baseline in Experiment 3 (with Russel demonstrating the skill at near-criterion level in Experiment 3 and twice prior to instruction in Experiment 1). It is possible that the question was already in Russel's repertoire, and assessment conditions may have extinguished responding due to lack of contingent reinforcement. Nevertheless, the rapid recovery of question asking during instruction suggests that the teaching procedures were effective in promoting generalized responding in the context of a school walk for all 3 children.

There are several limitations to the present studies that suggest avenues for future research. For one, although children were able to ask the question in a number of conditions within the school building as well as to untrained stimuli, additional assessments of generalization would be an important focus for future investigations. These might include exploration of response generalization (to new wh-questions), setting generalization (e.g., home), and generalization of the skill to informal activities (e.g., looking at a book or watching television). Further, it would be interesting to investigate whether children can learn to ask questions in response to non-visual (e.g., verbal) stimuli.

The skill of asking questions was taught and assessed within a somewhat contrived context, supplemented with prompts that may not be available in natural settings. Although anecdotal reports and the school walk in Experiment 3 suggested some transfer of question-asking skills, the issue of learning the answers to questions in more natural settings requires further exploration. Finally, because there probably were history effects of participating in the present series of studies, future research might best combine assessment of question asking and acquisition in one study.

The present series of studies are promising, and suggest the possibility that children with autism can be taught to ask questions. Although question asking has been included as one of the behaviors under the rubric of curiosity (Beer, 1986; Henderson & Moore, 1980; Kreidler, Zigler, & Kreidler, 1975), it is uncertain whether Mary, Jack, and Russel have learned to be curious. These studies tapped into one aspect of curiosity and one form

of a wh- question. Further research is required to define more precisely the behaviors that constitute curiosity, and to determine whether or not these behaviors can be systematically taught to children who exhibit significant social and language deficits.

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