

*ELIMINATION OF ECHOLALIC RESPONDING
TO QUESTIONS THROUGH THE TRAINING
OF A GENERALIZED VERBAL RESPONSE*

LAURA SCHREIBMAN¹ AND EDWARD G. CARR

CLAREMONT MEN'S COLLEGE AND STATE UNIVERSITY
OF NEW YORK AT STONY BROOK

Echolalia, the parroting of the speech of others, is a severe communication disorder frequently associated with childhood schizophrenia and mental retardation. Two echolalic children, one schizophrenic and one retarded, were treated in a multiple-baseline design across subjects. Each child was taught to make an appropriate, non-echolalic verbal response (*i.e.*, "I don't know") to a small set of previously echoed questions. After such training, this response generalized across a broad set of untrained questions that had formerly been echoed. The results obtained were the same irrespective of the specific experimenter who presented the questions. Further, each child discriminated appropriately between those questions that had previously been echoed and those that had not. Followup probes showed that treatment gains were maintained one month later. The procedure is economical, in that it produces a rapid and widespread cessation of echolalic responding.

DESCRIPTORS: echolalia, elimination of; nonecholalic response, generalization, language, schizophrenics, retardates

Echolalia is a form of speech generally defined as the repetition of a word or word group just spoken by another person (Fay, 1969). While echolalia appears to be part of a developmental phase in normal children, peaking at about age 30 months (Van Riper, 1963; Zipf, 1949), its occurrence or persistence past age three or four is considered pathological (Darley, 1964; Fay, 1967; Ricks and Wing, 1975). In-

deed, persistent echolalia is frequently used as one of the diagnostic criteria for autism and childhood schizophrenia.

Typically, this speech anomaly takes one of two forms. In delayed echolalia, the child will repeat words or statements heard in the past. However, these delayed statements are inappropriate to the present situation. For example, the child while seated at the dinner table may repeat commands heard at school the day before. The second major form of echolalia is immediate echolalia. This refers to the case in which the child repeats immediately what has just been heard. For example, the child echoes "What's your name?" When someone asks "What's your name?" The present investigation is concerned with immediate echolalia.

Clinically, the persistence of echolalic speech poses a problem for the therapist attempting to teach these children appropriate behaviors. For example, the child who echoes a teacher's commands, rather than complying, is unlikely to learn in the classroom situation. Further, children who simply echo conversation directed at them, rather than giving a relevant response,

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are apt to extinguish the social overtures of others. Thus, echolalia can be responsible for delay in the development of both academic and social behavior.

While the problems associated with immediate echolalia have been recognized, relatively little empirical research has been directed at understanding and remediating this speech anomaly. Risley and Wolf (1967) and Lovaas, Koegel, Simmons, and Long (1973) taught echolalic autistic children object-labelling, abstract speech, and the use of simple sentences by a combination of prompt-fading techniques and timeout or punishment. Although these studies provided useful information about possible techniques for increasing appropriate speech in echolalic children, important questions still remained regarding the variables controlling echolalic speech.

A substantial number of investigators have found a negative correlation between the level of a child's language development and the probability that the child will echo the speech of others (Cunningham, 1968; Fay, 1969; Fay and Butler, 1968; Wolff and Chess, 1965). An experiment by Carr, Schreibman, and Lovaas (1975) demonstrated that echolalic children were most likely to echo questions and commands to which they had not yet learned an appropriate response, but rarely echoed questions and commands to which they had learned an appropriate response. Further, once an echolalic child was taught an appropriate response to a previously echoed question, the child no longer echoed the question on future occasions. Although it appears that one can reduce echolalia by teaching an appropriate response, this strategy is not practical clinically, because it would be impossible to teach the child a response to every verbal stimulus that might be encountered. A more economical intervention would be to teach the child to make one general, non-echolalic response to the many verbal stimuli for which he or she had no response.

In the present study, we taught two echolalic children to respond to a set of previously echoed

questions with the sentence, "I don't know". At the same time, we maintained their nonecholalic responding to those few questions to which they already had an appropriate response. We then tested the children on a different set of previously echoed questions to see if our treatment intervention generalized to these new questions. We also assessed generalization to other types of questions, generalization to other experimenters, and maintenance at a one-month followup.

Our choice of "I don't know" as the general, nonecholalic response was dictated by two considerations. First, given that previous research had demonstrated that echolalia occurred to questions to which the child had not yet learned an appropriate response, it seemed reasonable to ask what response a normal child might give to such questions. The most typical response given by normal children when confronted with such questions is, "I don't know". Therefore, teaching echolalic children to give the same answer should help normalize their speech. Second, such an answer conveys to the person asking the question that the child has no response. Therefore, the answer might provide an educator, for example, with a prompt to undertake appropriate teaching activities.

METHOD

Experimental Design

A multiple-baseline design (Baer, Wolf, and Risley, 1968) was employed across two subjects. Two types of experimental sessions were conducted: training sessions and probe sessions. In a training session, a child was trained to answer "I don't know" to one question from a list of previously echoed "what", "how", and "who" questions (*e.g.*, "What is a peach?") until a criterion performance was attained. Then, in a probe session, the child was presented with untrained (previously echoed) "what", "how", and "who" questions to determine whether the trained response generalized. If generalization to the untrained questions was incomplete, the

child was trained to respond "I don't know" to a second "what", "how", or "who" question (e.g., "How do trucks run?") and again tested for generalization. This alternation between training and probing on "what", "how", and "who" questions continued until the child responded correctly to at least 14 of 15 of the untrained questions in two consecutive probe sessions. At this point, the child was presented with a list of previously echoed "where", "why", and "when" questions to see if generalization of the trained response also occurred to these types of questions, even though the child had not received any training on such questions during the experiment.

On several of the probe sessions, an experimenter who was naive about the purpose of the study presented the untrained questions to each subject so that any experimenter-specific effects of training could be assessed. Further, in all of the probe sessions, several questions to which each child could already respond without echoing at the start of the experiment (e.g., "What's your name?") were intermixed with the untrained probe questions. This procedure was carried out to assess whether each child had learned to discriminate appropriately between the two types of questions. Finally, followup probes were conducted one month after termination of treatment to test for maintenance of therapeutic gains.

Sessions were conducted once per day, three times per week. The total time span of the study, exclusive of followup, was approximately four months.

Subjects

DeForrest was a 7-yr-old boy with a diagnosis of schizophrenia, childhood type, and a mental age of 2.8 as measured by the Peabody Picture Vocabulary Test. Jane was a 15-yr-old girl with a diagnosis of mental retardation of unknown etiology. Her mental age was 2.7 yr, as measured by the Stanford Binet, Form L-M. Each child resided in a large state hospital in California. Both children would, on occasion,

initiate social interaction with others, and both used toys appropriately. Each child could obey simple commands (e.g., "Pick up your clothes") as well as label common objects (e.g., "cookie", "shoe"). However, neither child could express nor comprehend more abstract language, such as that involving pronouns or prepositions. When presented with questions beginning with adverbial interrogatives (e.g., "where", "how", "why"), both children would almost invariably echo all or part of the question. Finally, neither child had ever been heard to answer "I don't know" to any question.

Response Recording and Reliability

Any verbal response that the child made within 10 sec of the presentation of a question was recorded by the experimenter on a precoded data sheet. The responses recorded included (a) echolalia, (b) appropriate verbal and (c) other verbal. An *echolalic* response was recorded if the child repeated any part of a question, whether the entire question or only one word. An *appropriate verbal* response was scored (a) if the child responded with the correct answer to certain questions, henceforth to be referred to as "known" questions (e.g., answered "DeForrest" when asked "What's your name?") or (b) answered "I don't know" to any training question or untrained probe question. For this category, the *exact* response that the child gave to each question was recorded. Thus, if the child answered "I don't know" to a question, this response was written out on the data sheet. If the child answered "Fine" to "How are you?", then "Fine" would be recorded on the data sheet. By writing out each child's responses in the above manner, it was possible to differentiate the two possible types of appropriate responses for this category. Finally, *other verbal* was scored if the child was silent during the answer period or responded with neither echolalia nor appropriate verbal to a question (e.g., answered "bicycle" when asked "How do trucks run?").

Reliability was evaluated by an additional observer who was naive about the purpose of the experiment. Reliability checks were distributed such that in any group of three probe sessions, reliability was assessed at least once. The observer's and experimenter's recording sheets were compared on trial-by-trial basis and an agreement was scored only if both had recorded the same response. Reliability was computed by dividing the number of agreements on occurrence and nonoccurrence per session by the number of agreements plus disagreements and multiplying this fraction by 100. Reliability was 100% in all sessions.

Procedure

Stimulus selection. Four lists of questions were constructed. *Training questions* consisted of a pool of 10 "what", 10 "how", and 10 "who" questions (e.g., "What are we doing?" "How is your tummy?" and "Who are my friends?"). These were the questions to which each child would subsequently be trained to answer "I don't know". *Probe 1 questions* consisted of a pool of five "what", five "how", and five "who" questions. The specific questions used were of course different from those appearing on the list of training questions. Each child would subsequently be tested on these questions during probe sessions to assess whether the "I don't know" response had generalized to these untrained questions. *Probe 2 questions* consisted of a pool of five "where", five "why", and five "when" questions (e.g., "Why do rabbits run?" "Where do fish swim?" and "When do we play?"). These questions would subsequently be presented to each child to assess whether the "I don't know" response had generalized to these types of questions, questions to which the child had not been trained to answer "I don't know". Finally, *known questions* consisted of a pool of three questions (i.e., "What's your name?" "How are you?" and "Who am I?"). This group of questions was compiled on the basis of interviewing each child's teacher and

asking her to list those questions that she thought would be responded to consistently and appropriately without echoing. The lists thus generated were only five to six questions long for each child. The three known questions mentioned above were the only ones shared in common by both children. As a check on the validity of the teacher's choices, the three questions were included in the experimental sessions (described below) and each child's responses to these questions were recorded.

Pretest sessions. Each child was presented with the list of 30 "what", "how", and "who" training questions, randomly intermingled, a total of three times (i.e., three sessions) to determine whether the children would echo these questions. Then, the list of Probe 2 questions was presented to each child three times (i.e., three sessions). Each session consisted of the 15 probe questions (presented once each) randomly intermingled with the three known questions (presented five times each) for a total of 30 questions per session. This procedure was then repeated with the list of Probe 1 questions, with Jane receiving three such sessions and DeForrest, 10 such sessions. In each of the above conditions, an observer who was naive about the purpose of the experiment presented the questions to each child on an average of one of every three sessions.

In these and all other sessions, the experimenter sat facing the child across a small table. A question was delivered only when the child was sitting quietly and attending visually to the experimenter. The question was presented slowly and clearly. The experimenter was then silent and watched the child for 10 sec. Any response during this 10-sec interval was recorded. The intertrial interval was 15 to 30 sec.

During pretesting, there were no consequences for responding to the questions. Therefore, to maintain the child's responding and cooperation, food reinforcers and praise were delivered intermittently on an average of every 2 min contingent on nonverbal responses such

as visual attention to the experimenter or sitting quietly in the chair.

Training sessions. The training procedure consisted of three phases. First, the question to be trained was drawn randomly from the list of training questions. The experimenter used a verbal prompt-fading procedure to teach the "I don't know" response. That is, the experimenter would present the question and then immediately say "I don't know" (e.g., "How do trucks run—I don't know"). By placing the correct response at the end of the question, it was very likely that the response would be echoed. This procedure is similar to that used by Risley and Wolf (1967). When the prompt was echoed by the child, the experimenter reinforced the response. The prompt was then gradually faded until the child would give the correct response unprompted. This phase (Phase 1) of training was considered complete when the child responded correctly on three unprompted trials in a row.

In Phase 2, the newly trained question was randomly interspersed among the three known questions, in a ratio of one known question to each training question. This procedure was carried out to ensure that the child would not simply learn to answer "I don't know" to all questions, including those few to which he/she already had an appropriate response. The child was taught to discriminate between the two types of questions; for example, the child would be rewarded for answering "I don't know" to the question, "How do trucks run?" and "De-Forrest" to the question "What's your name?" The criterion for completion of this phase was correct responding on 10 consecutive unprompted trials in a row across each type of question.

In Phase 3, additional trials were conducted (on the above discrimination) during which the schedule of reinforcement was reduced from continuous reinforcement to reinforcement for only two of every three correct responses on 10 trials in a row irrespective of question type.

Thus, if a child made no errors, the minimum number of trials required to complete Phases 1 to 3 of training was 33 (i.e., $3 + 20 + 10$). After completion of Phase 3, Probe 1 was introduced to assess generalization of the trained "I don't know" response to the untrained Probe 1 stimuli.

If the child did not reach criterion on the Probe 1 questions (described below), further training was undertaken as follows. A second question was drawn from the training list and the child was trained to answer "I don't know" with the same procedure used to train the first question. Next, the two trained questions were randomly interspersed among the three known questions, so that there were equal numbers of training and known questions. The child was then taught to discriminate between the two types of questions with exactly the same procedure described above.

This training procedure was repeated for other questions from the training list until the child had successfully reached criterion on the list of Probe 1 questions.

Probe 1 sessions. A Probe 1 session followed each training session in which a child reached the training criterion. Each probe session consisted of 45 questions: the 15 untrained Probe 1 questions, plus 15 training questions, plus 15 known questions (i.e., five presentations of each of the three known questions). The three types of questions were randomly intermixed. At first, when a child had been trained on only one question, that question was presented 15 times during each probe session. Later, when a child had been trained on more than one question, the 15 presentations of the training questions during the probe were divided more or less equally among the various training questions. For example, if a child had been trained on four questions, then during the probe, three of the training questions would be presented four times each and the fourth presented three times for a total of 15 training questions. If a child had to be trained on more than 15 questions, then during the probe the 15 training

questions would be randomly selected from the pool of all those questions that had been trained.

The method of presenting the questions was the same as that during the pretest. The following procedure was in effect, however, with respect to presenting consequences. Each correct response to the training and known questions was reinforced with praise and a food reward. If a child answered a training or known question incorrectly, the question would be repeated and if necessary the correct response would be prompted before going on to the next question. Responses to Probe 1 questions were never prompted or reinforced; they were merely recorded. Thus, if a child answered all the known and training questions correctly, reinforcement would be delivered on two out of every three trials on the average, the same ratio of reinforcement received during Phase 3 of the training sessions.

After the child had reached criterion on the Probe 1 questions (*i.e.*, responded correctly to at least 14 of 15 of the untrained questions in two consecutive probe sessions), the child received three additional probe sessions conducted by an experimenter who was naive about the purpose of the study. This procedure was carried out to assess any experimenter-specific effects of training.

Probe 2 sessions. When the first child to be trained on the "what", "how", and "who" questions successfully generalized to the untrained Probe 1 questions, that child and the as yet untrained second child were each given three sessions of the Probe 2 questions. These sessions were identical to the Probe 1 sessions described above except, of course, that the untrained probe questions were "where", "why", and "when" questions instead of "what", "how", and "who". (As with Probe 1, "known" questions were interspersed among the Probe 2 questions.) Then, after the second child had generalized to the untrained Probe 1 questions, the two children were again given three sessions each of the Probe 2 questions. One of every three

Probe 2 sessions was conducted by a naive experimenter.

One month after the experiment terminated, each child was given two sessions of Probe 1 questions and two sessions of Probe 2 questions.

RESULTS

During the pretest, each child echoed 100% of the "what", "how", and "who" training questions, as was expected.

Figure 1 shows each child's performance on the untrained Probe 1 questions (15 per session). During the Pretest condition, Jane and DeForrest echoed all 15 of the untrained questions without giving a single "I don't know" response. They also responded errorlessly to the known questions; in fact, the two children responded correctly to known questions throughout the experiment (that is, during *both* Probes 1 and 2).

During training, Jane required 37 trials to reach criterion on the first training question, 35 trials to reach criterion on the second, and 35 trials on the third. The Generalization Test condition in Figure 1 shows Jane's performance on the untrained Probe 1 questions following acquisition of each training question. After she reached criterion on the first training question, her performance on the probe questions (Session 4) immediately improved so that she echoed only nine questions and answered "I don't know" to the other six. There was, in fact, a reciprocal relationship between echoing and answering "I don't know": as Jane was trained on a second and then a third training question, her echolalia decreased to two and then zero while her "I don't know" answers increased to 13 and then 15 on the same questions. Beginning with Session 14, she no longer echoed probe questions but, instead, answered "I don't know" to these questions. During the probe sessions, she responded correctly to 99% of the interspersed training questions.

During training, DeForrest required 41 trials to reach criterion on the first training question,

WHAT/HOW/WHO QUESTIONS

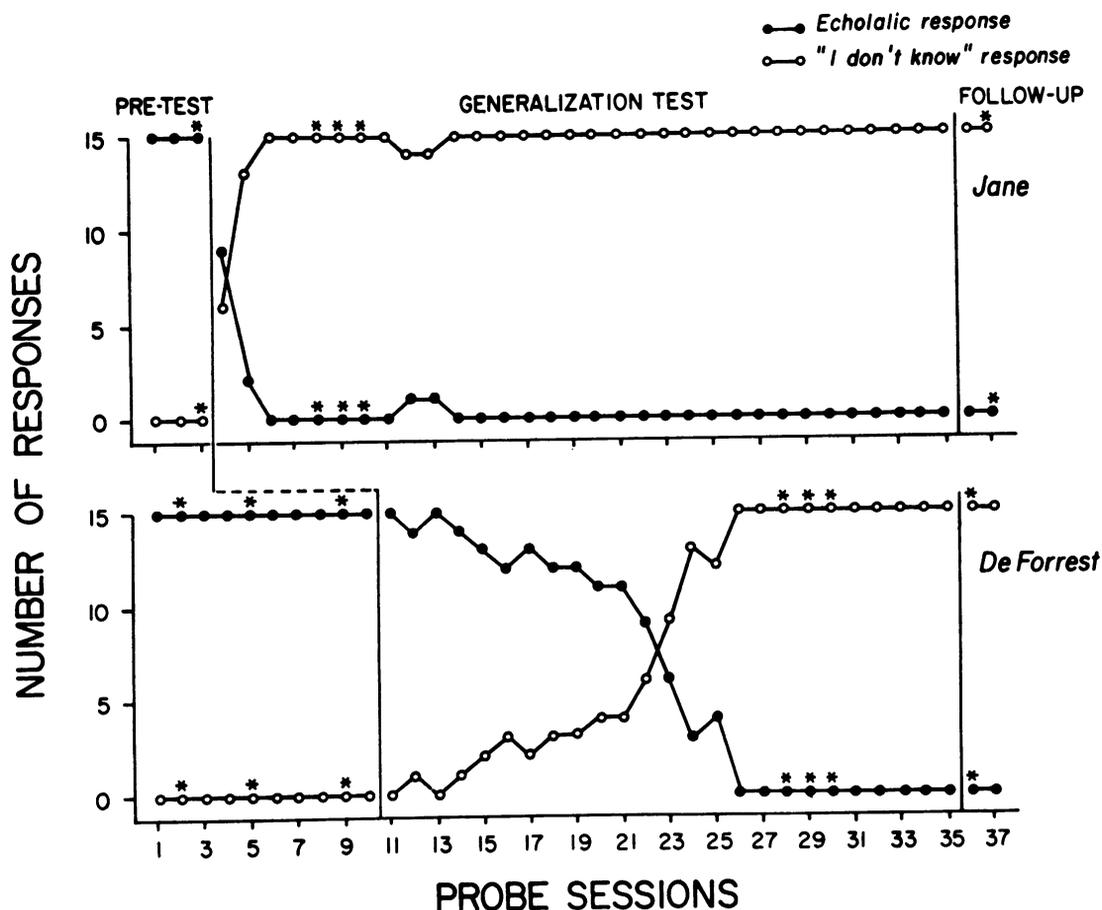


Fig. 1. Number of echolalic responses given by each child to the untrained "what", "how", and "who" questions of Probe 1. Filled circles represent echolalic answers and open circles represent "I don't know" answers. Data collected by naive experimenters are indicated with asterisks.

36 trials to reach criterion on the second, and 34 trials on each of the remaining questions.

Figure 1 (lower graph) shows that DeForrest required training on 16 questions before the "I don't know" response generalized fully to the untrained probe questions. As was the case with Jane, there was a reciprocal relationship between echoing and answering "I don't know" to the untrained probe questions. DeForrest's echolalia gradually decreased, from a high of 15 in Session 11 to zero by Session 26, as more and more questions were trained. From Sessions 26 to 35, the appropriate response was

observed on 100% of the probe trials and echolalia was totally absent. During the probe sessions, DeForrest responded correctly to 99% of the interspersed training questions.

Figure 2 shows each child's responding to the untrained "where", "why", and "when" questions of Probe 2. The Pretest condition shows that before training, each child echoed all of the untrained Probe 2 questions and never answered "I don't know". After training (the Generalization Test condition), however, each child answered, "I don't know" to all of the untrained Probe 2 questions and never echoed

WHERE/WHY/WHEN QUESTIONS

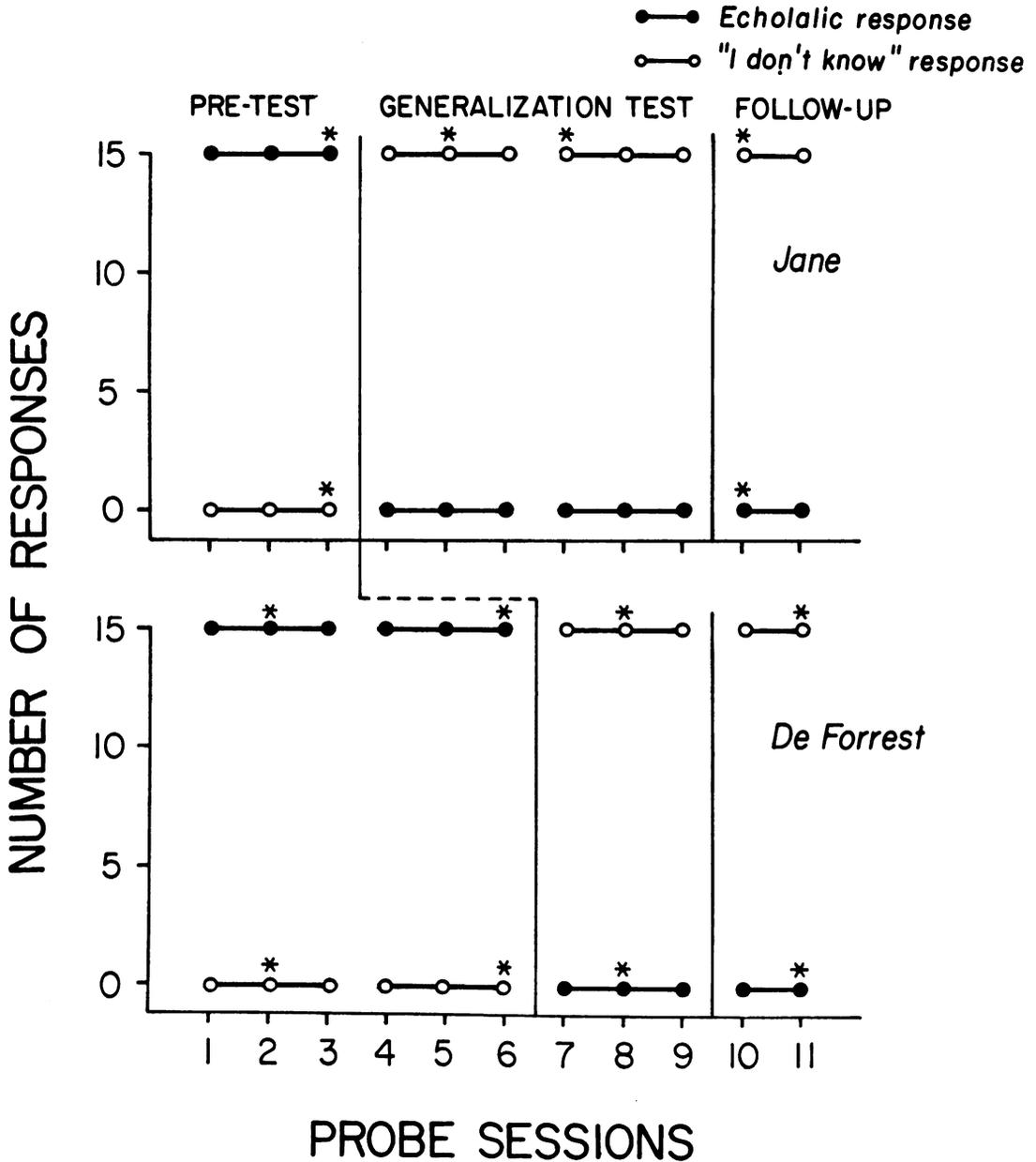


Fig. 2. Number of echolalic responses given by each child to the "where", "why", and "when" questions of Probe 2. Filled circles represent echolalic answers and open circles represent "I don't know" answers. Data collected by naive experimenters are indicated with asterisks.

them. During these probe sessions, each child responded correctly to 99% of the interspersed "what", "how", and "who" training questions.

In Figures 1 and 2, asterisks mark those sessions conducted by a naive experimenter. The data obtained when the sessions were con-

ducted by a naive experimenter were the same as that obtained when an informed experimenter conducted the sessions. That is, each child echoed all the questions in the pretest and answered "I don't know" to those same questions after criterion had been reached during the probe sessions. Thus, the appropriate verbal response generalized across experimenters as well as across untrained questions.

Finally, one month after the experiment ended, each child responded appropriately, without echoing, to the Probe 1 questions (Figure 1, Sessions 36 and 37) and to the Probe 2 questions (Figure 2, Sessions 10 and 11).

DISCUSSION

The present study suggests that a child's echolalic responding to a broad set of questions can be eliminated by teaching the child to make a generalized verbal response in place of the echolalia. By training the child to answer "I don't know" to a relatively small number of "what", "how", and "who" questions, we were able to obtain generalization of this response to a much larger set of *untrained* "what", "how", "who", "where", "why", and "when" probe questions that had previously been echoed. Most important, each child continued to respond appropriately to the three "known" questions to which he or she already had an appropriate response at the start of the experiment. This result demonstrates that each child *discriminated* between those questions that were previously echoed and those that were not, a fact which shows that questions *per se* had not simply become a "go" signal for answering "I don't know".

A second result, namely that echolalic responding to a given training question was eliminated once the child had been taught to answer "I don't know" to that question is consistent with previous findings reported by Risley and Wolf (1967) and Carr *et al.* (1975). In addition, the present data suggest that it is not necessary to teach a different response to each

question in order to eliminate echolalia to an entire set of untrained questions. For this reason, the technique described in this paper has the potential for being a very economical form of treatment.

Also, our results indicated that the children responded appropriately even when the person asking the questions was naive with respect to the purposes of the study. This fact demonstrates that the elimination of echolalia was not due to the informed therapist's presenting the questions in some idiosyncratic manner unrelated to our treatment intervention.

A final result of some clinical significance is that both children maintained their appropriate, nonecholalic responding one month later at followup. The procedure is therefore capable of producing durable behavior change.

Generality of Results

Two issues can be raised pertaining to the generality of the above results. First, there is the issue of breadth of generalization. That is, did the children generalize to other types of question and nonquestion verbal stimuli not used in the training? Second, there is the issue of setting generality. That is, did the treatment gains generalize outside of the specific training situation?

In a preliminary way, we attempted to address each of these questions. Thus, before any training, we obtained data on the children's responses to three other types of verbal stimuli: *mands* (e.g., "Clap your hands."), *inversion questions* (e.g., "Is it sunny today?"), and *tag questions* (e.g., "You can swim, can't you?"). These stimuli were presented with the same procedure used for the Probe 1 sessions. This included interspersed presentations of the "known" questions. Both children echoed all of the inversion and tag questions and responded appropriately to all of the "known" questions and mands. (An appropriate response to a mand was defined as carrying out the command without echoing or saying "I don't know".) After the Probe 2 sessions had been completed,

we again presented these stimuli to one child, DeForrest, to assess the breadth of generalization of the "I don't know" response. (Jane was no longer available to participate in the study.) DeForrest generalized completely and appropriately. That is, he answered "I don't know" to all of the inversion and tag questions and continued to respond appropriately to the "known" questions and mands.

To address the question of setting generality, we presented DeForrest with the stimuli from the Probe 1 and 2 lists in a novel playground setting both at the start of the experiment, before any training had been undertaken, and again at the end, after all training had been completed. The method used to present these stimuli was the same as that used to carry out the Probe 1 and 2 sessions in the regular training environment. Initially, DeForrest echoed all of the probe stimuli. However, after training was completed, he no longer echoed any of the probe stimuli in the playground setting but, instead, answered "I don't know" to them.

The above generalization data are of course only suggestive. They must be interpreted with caution because they are based on only one subject and because they lack multiple-baseline controls. Nonetheless, the results are sufficiently promising to justify a more comprehensive analysis in future research on this problem.

Other Considerations

Another question that can be raised is whether teaching a generalized verbal response could interfere with the language training of such children. Since immediate imitation can be an important tool in teaching language to these children (Risley and Wolf, 1967), one would not want to eliminate this type of imitation. In our subsequent work with a number of echolalic children, we have found that the interference alluded to above could be avoided by teaching a discrimination in which the child is rewarded for imitating a verbal stimulus *only* when that stimulus is preceded by a command to imitate (e.g., Say, "What's for lunch?").

With this method, the child learns to imitate when requested to do so but otherwise responds with an appropriate, nonimitative answer such as, for example, "I don't know".

Finally, in order to evaluate our treatment intervention, a multiple-baseline design was used. This design required certain procedures that may have retarded the acquisition of the generalized verbal response. DeForrest, for example, had a 10-session baseline on the Probe 1 stimuli, an event that may have facilitated his forming a discrimination between the training and probe stimuli, thus retarding generalization. Significantly, Jane, who had a much shorter baseline (three sessions), generalized much more quickly than DeForrest. In clinical application, where scientific rigor is not required, generalization might be hastened by taking only a brief baseline and by training the general, nonecholalic verbal response to several questions concurrently, rather than one at a time, as was done in the present study. Subsequent to this study, we have applied this very procedure to several echolalic children and obtained rapid generalization.

To conclude, the procedure described suggests the effectiveness of teaching a generalized verbal response to eliminate echolalic responding. The advantages of this procedure are several. First, the procedure is economical in that a therapist need not train a specific response to every question. Second, the child sounds more normal. Third, the child who responds, "I don't know" to a question, rather than echoing, provides the teacher with a strong prompt to initiate appropriate teaching activity that will eventually result in supplanting the "I don't know" response to many questions with specific answers. Thus, the procedure described above is a transitional one that should facilitate the education of the echolalic child.

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