*PROGRAMMING "LOOSE TRAINING" AS A STRATEGY
TO FACILITATE LANGUAGE GENERALIZATION*

C. ROBERT CAMPBELL AND KATHLEEN STREMEL-CAMPBELL

UNIVERSITY OF KANSAS, PARSONS RESEARCH CENTER

This study investigated the generalization of spontaneous complex language behavior across a nontraining setting and the durability of generalization as a result of programming and "loose training" strategy. A within-subject, across-behaviors multiple-baseline design was used to examine the performance of two moderately retarded students in the use of *is/are* across three syntactic structures (i.e., "wh" questions, "yes/no" reversal questions, and statements). The language training procedure used in this study represented a functional example of programming "loose training." The procedure involved conducting concurrent language training within the context of an academic training task, and establishing a functional reduction in stimulus control by permitting the student to initiate a language response based on a wide array of naturally occurring stimulus events. Concurrent probes were conducted in the free play setting to assess the immediate generalization and the durability of the language behaviors. The results demonstrated that "loose training" was effective in establishing a specific set of language responses with the participants of this investigation. Further, both students demonstrated spontaneous use of the language behavior in the free play generalization setting and a trend was clearly evident for generalization to continue across time. Thus, the methods used appear to be successful for training the use of *is/are* in three syntactic structures.

DESCRIPTORS: language behavior, acquisition, generalization, classroom behavior, retarded children

Though language programmers have been successful in teaching language behaviors, evidence of language generalization is very limited. Baer, Wolf, and Risley (1968) emphasized that behavior change does not automatically ensure generality. Other authors (Harris, 1971; Stokes & Baer, 1977) have made the same observation about the generalization of language behavior. A successful language intervention process is highly dependent on the systematic examination of programming strategies that will pro-

mote both the acquisition and generalization of language behavior. The existing literature of applied behavior analysis contains few studies that have demonstrated the effects of programmed language intervention resulting in generalization across environmental conditions (Garcia, 1974; Hester & Hendrickson, 1977; Stokes, Baer, & Jackson, 1974). Of these studies, Hester and Hendrickson (1977) demonstrated spontaneous generalization of a complex language response across environmental conditions.

To date, the most complete description of programming strategies affecting generalization has been undertaken by Stokes and Baer (1977) who reviewed 270 applied behavior analysis studies. These authors describe an implicit technology of generalization, defining several strategies, including the programming of "loose training." This strategy suggests a procedure that

This research was supported by a contract to the University of Kansas Bureau of Child Research from the Bureau of Education for the Handicapped, USOE: Grant Number RFP 78-9-300 78 0344. The authors thank Charles R. Spellman and Joseph Spradlin for their assistance in the preparation of this manuscript. Reprints may be obtained from the first author at Teaching Research Division, Oregon State System of Higher Education, Todd Hall, Monmouth, Oregon 97361.

would permit the varying of irrelevant stimuli that may otherwise develop controlling properties within the training condition. Thus, a reduction in external stimulus control may result in greater opportunity to sample the relevant stimuli both in training and generalization conditions. A language training strategy that represents a functional example of "loose training," was used in the present study.

Specifically three questions were examined. Will acquisition of is/are in three syntactic structures (i.e., "wh" questions, "yes-no" questions and statements) occur when a "loose training" intervention procedure is used? Does generalization occur to a free play setting? Will generalization across time result if responses are maintained in the academic setting following criterion performance?

METHOD

Participants

Two specific criteria were used to select the participants for this study. Each boy expressed the basic syntactic structures in his spontaneous classroom conversation and included is/are only minimally within them. T.B. was a moderately language-delayed 10-yr-old, nonambulatory male with cerebral palsy. B.D. was a 12-yr-old ambulatory male with moderate language-delay. Tests based on the *Manual of Terminology and Classification* (Grossman, 1977) indicated that subjects T.B. and B.D. had Measured Intelligence and Adaptive Behavior levels of III, II; and II, III, respectively.

Setting

This investigation was conducted in classrooms for the severely and moderately handicapped. Academic training sessions were conducted in a partitioned area of these classrooms. Generalization observations were made directly in the classroom during periods when the child was not participating in a formal training session (i.e., free play).

Design

A within-subject, across-behaviors multiple-baseline design was used in the study. The performances of two children on three different syntactic structures were the dependent variables. Concurrent and untreated baseline probes were initiated for the boys' use of is/are in "wh" questions, "yes-no" reversal questions and statements prior to initiating training. Training criterion was established at 80% correct in each of two consecutive five-session blocks for is/are use in each of the syntactic structures. No specific generalization criterion was established.

Procedures

The training procedure used was the same for each boy and training was conducted concurrently within the context of training other skills that were part of their I.E.P. objectives (i.e., self-help skill training, academic training). The child could initiate a language response based on a wide array of naturally occurring stimulus events. Additionally, the teacher could attempt to evoke a statement or question by providing a contextual prompt by intentionally displacing training stimuli and reinforcers and providing indirect prompts or comments to get the subject to initiate questions or statements.

Training procedure. Two timed, 15-min training sessions were conducted each school day, one during an academic task and the second during a self-help task. Each training session began with the teacher seated beside the child at a table and training on the academic or self-help task was initiated. All "wh" questions (e.g., What are you doing?), whether child-initiated or prompted by the teacher, were treated as training trials for "wh is/are" sentences.

Correct use of "wh is/are" questions (singular or plural forms) was followed by social praise, repetition of the child's response, an answer to the child's question, and a token. An incorrect response was defined either as a grammatical error (e.g., Where is my glasses?) or an omission error (e.g., Where my glasses?). Errors

were followed by a correction procedure which included an expanded model of the correct use of *is/are*, then a 2 sec wait. A correctly imitated model was consequated as a correct response but the token was withheld. If the child did not correctly imitate the expanded model, the teacher continued to the next concurrent training trial. Self-corrections were consequated as a correct response. If the child made an error in self-correcting it was treated as an incorrect response.

When criterion performance was established, training was initiated in similar fashion for yes/no reversal questions (e.g., Is this mine?) and then for statements (e.g., These are mine.). After criterion was met on each syntactic structure, a maintenance procedure was initiated.

Training maintenance procedures. Maintenance training of the acquired target was conducted concurrently with each subsequent syntactic structure. Correct responses within the maintenance condition were socially reinforced when they were spontaneously produced and a VR3 schedule of token reinforcement was established. Trained sentences were not prompted during the maintenance condition; therefore, the verbal control formerly used to evoke initiations was decreased to loosen the stimulus control.

Collection of training data. Specific training data were collected on child acquisition of each syntactic structure. The teacher was required to record data only on the academic or self-help training task. Specific language training data were taken simultaneously by one observer stationed on one side of the child. A second observer stationed on the other side took a verbatim sample of the same duration as the training session. The verbatim sample was a record of every spontaneous conversational initiation and response the child made.

Assessing generalization in the free play setting. In order to examine the effects of the training procedure, two timed, 15-min verbatim samples were collected in a nontraining free play setting. Samples were not collected immediately before or after each training session.

During free play the children were encouraged to engage in activities of their choice and to enter into conversation with both peers and adults in the classroom. The adults in the classroom were instructed not to provide any contingent reinforcement for the use of *is/are*.

Reliability

Training sessions. Observers were stationed across the room from each other approximately 20 ft apart. Each observer's verbatim data form was invisible to the other. The child's response, the teacher's expansion or reinforcement, and the child's response to the teacher's expansion were scored for agreement for each word on a point-by-point basis.

Probes were conducted on 27 of the 155 academic training sessions for T.B. and on 28 of 125 sessions for B.D. The mean agreement between observers was 96% with a range of 80% to 100% for T.B. For B.D., the mean agreement was 89% with a range of 63% to 100%.

Generalization Session

Point-by-point reliability probes were conducted on verbatim samples collected in the freeplay setting. Physical arrangements were similar to those of the training reliability probes. For T.B., reliability probes were conducted on 27 of 155 sessions and for B.D., on 20 of 125 samples. The mean agreement between observers for T.B. was 86% with a range of 68% to 90%. For B.D., the mean agreement between observers was 89% with a range of 66% to 100%.

RESULTS

T.B.

Response acquisition. Figure 1a presents the number of correct responses T.B. made per five-session block in the academic training setting. Because T.B. transferred to a different school system prior to the completion of training, *is/are* use in statements was not trained. T.B. successfully demonstrated criterion performance for

the use of is/are in "wh" questions in phase one and for "yes-no" reversal questions in phase two of training. The number of training sessions required to reach criterion performance on is/are use for a given syntactic structure varied. T.B. required 70 sessions to reach criterion on "wh" questions and 45 sessions on the "yes-no" reversal questions. His use of is/are in statements remained at or near baseline for 155 sessions.

Maintenance training. A maintenance condition was initiated for "wh" questions (sessions

111 through 155), when training was initiated for "yes-no" reversal questions. As can be seen from Figure 1a, even though frequency correct declined across time, frequency incorrect also declined following the end of formal training. These data for "wh" question maintenance suggest that placing contingencies on the use of correct is/are was adequate to maintain their correct use, even though a second syntactic structure was being trained concurrently.

Generalization. Figure 1b presents the num-

Fig. 1a. The number of correct and incorrect "is/are" responses T.B. made per five-session block in the academic training setting.

Fig. 1b. The number of correct and incorrect "is/are" responses T.B. made per five-session block in the free play generalization setting.

ber of correct and incorrect responses T.B. made per five-session block in the free play generalization setting. These data represent T.B.'s use of *is/are* in his spontaneous speech.

As can be seen in Figure 1b, T.B. used *is/are* correctly in "wh" questions only minimal during baseline. This trend did not change significantly until nearly halfway through training (block 85). After block 85, T.B. made consistently more correct "wh" question responses. T.B.'s spontaneous use of "yes-no" reversal question forms did not show this trend toward fewer errors than correct responses until the last two blocks of verbatim samples (blocks 150 and 155).

B.D.

Response acquisition. The results presented for B.D. represent a replication of the experimental procedures demonstrated with T.B.. Additionally, a third syntactic structure (i.e., statements) was trained. Figure 2a presents the number of correct and incorrect responses that B.D. made per five-session block in the academic training setting.

During the first training condition following baseline, B.D. demonstrated the use of *is/are* in the "wh" questions. In two subsequent training conditions, "yes-no" reversal questions and statements were trained to criterion. B.D.'s data were similar to those of T.B. for the first two syntactic structures in that more sessions were required for acquisition of the first than the second. However, B.D. required fewer overall sessions than T.B. to meet criterion. B.D. required 40 sessions for "wh" questions and 20 sessions for "yes-no" reversal questions. Ten additional training blocks (sessions 90-100) were conducted for "yes-no" reversal questions to confirm the stability of the statement baseline. Criterion performance for statements required only 15 sessions.

Maintenance training. The data from the maintenance condition replicate T.B.'s performance. As can be seen from Figure 2a, B.D.'s

frequency of correct responses remained consistently higher than errors, similar to T.B.'s.

Generalization. The generalization data for B.D. represents a replication of similar effects observed for T.B. Figure 2b presents the number of correct and incorrect responses that B.D. made per five-session block in the free play generalization setting.

Observation of Figure 2b shows the initial points at which correct responses began to occur at a higher frequency than errors across each syntactic structure, indicating the points that generalization may have emerged in the free play generalization setting. Until block 50, B.D. had a greater number of errors than correct responses in the use of *is/are* in "wh" questions. The point at which greater numbers of correct responses for "yes-no" reversal questions occurred was block 85. Greater numbers of correct than incorrect responses occurred for statements concurrently with the initiation of statement training condition in the academic training setting.

DISCUSSION

The training procedure used in the present study represented a training approach that placed language instruction in context of its subsequent use in the classroom. Thus, as Stokes and Baer (1977) recommended, teaching was conducted with less control over the stimuli presented and the correct responses allowed. Therefore, the students learned a specific set of language behaviors across a wide variety of stimulus conditions. Further, the study represented a type of generalized treatment effect in which generalization occurred in a different setting with the same class of behaviors for each subject while treatment was ongoing. (Drabman, Hammer, and Rosenbaum, 1979).

Acquisition of the set of language responses was demonstrated while reducing the control, restriction, and standardization generally associated with systematic instruction. Unlike the study conducted by Garcia (1974) in which a

Fig. 2a. The number of correct and incorrect "is/are" responses B.D. made per five-session block in the academic training setting.

Fig. 2b. The number of correct and incorrect "is/are" responses B.D. made per five-session block in the free play generalization setting.

limited set of stimuli were used, a wide range of examples of the stimuli were permitted. This provides much greater opportunity for the trainer to sample the functional use of a given

language response. Each participant in this study correctly emitted over 400 different syntactic structures (e.g., What is pronoun/where is noun verbing?) while reaching criterion on the use

of is/are. By comparing this with the 10 to even 60 examples traditionally trained (e.g., Garcia, 1974) in language instruction, one can see an obvious advantage of the procedure. Similar to the procedure used in an investigation conducted by Hester and Hendrickson (1977), the present training procedure involved a dynamic relationship between the child and his language training environment. The syntactic structures came from the functional context of the academic training setting, and thus language was learned within the dynamic context of other classroom instruction and activities.

Even though each structure selected for training contained some form of the verb, is/are, each was syntactically quite different. Because of this difference, one would not necessarily expect the structures to form a response class. However, since the forms did contain a similar linguistic element, one would expect that once is/are was trained in one structure and the ordering of is/are was trained in new syntactic structures, training time should be sufficiently reduced. Therefore, the finding that each child required fewer sessions to reach criterion across successive syntactic structures suggests a clear savings in training time. The reader may obtain a clearer idea of the actual level of generalization that occurred if the generalization frequency data are examined as percentages. These percentages are comparable to the criterion performance (i.e., 80%) of the boys during training/maintenance. T.B.'s use of "wh is/are" questions in the free play setting ranged from 59% to 80% correct with a mean of 74%. B.D.'s generalization of the correct use of "wh is/are" questions ranged from 63% to 93% with a mean of 87%; "yes-no" reversal questions ranged from 78% to 92% with a mean of 88%; and, "is/are" statements ranged from

69% to 88% with a mean of 79%. However, both boys demonstrated inconsistent patterns of generalization across days. These data suggest that additional generalization programming strategies such as "training to generalize" or further manipulation of the schedules of reinforcement may be necessary to achieve greater consistency of generalization, which were similar to those established in the training/maintenance condition.

REFERENCES

- Baer, D. M., Wolf, M. M., & Risley, T. R. Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1968, 1, 91-97.
- Drabman, R. S., Hammer, D., & Rosenbaum, M. S. Assessing generalization in behavior modification with children: The generalization map. *Behavioral Assessment*, 1979, 1, 203-219.
- Garcia, E. The training and generalization of a conversational speech form in nonverbal retardates. *Journal of Applied Behavior Analysis*, 1974, 7, 137-149.
- Grossman, H. J. (Ed.). *Manual on terminology and classification in mental retardation*. Washington, D.C.: American Association on Mental Deficiency, 1977.
- Harris, S. L. Teaching language to nonverbal children—With emphasis on problems of generalization. *Psychological Bulletin*, 1975, 82 (4), 565-580.
- Hester, P., & Hendrickson, J. Training functional expressive language: The acquisition and generalization of five element syntactic responses. *Journal of Applied Behavior Analysis*, 1977, 10, 316. (Abstract)
- Stokes, T. F., & Baer, D. M. An implicit technology of generalization. *Journal of Applied Behavior Analysis*, 1977, 10, 349-367.
- Stokes, T. T., Baer, D. M., & Jackson, R. L. Programming the generalization of a greeting response in four retarded children. *Journal of Applied Behavior Analysis*, 1974, 7, 599-610.

Received March 9, 1981

Final acceptance September 24, 1981