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DEVELOPMENT OF SPONTANEOUS MANDING IN LANGUAGE DEFICIENT CHILDREN

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Six institutionalized children, aged 7-11, with little or no spontaneous vocal manding, were trained to request food items under appropriate natural conditions when snacks were presented. "I want a" was appropriate when an adult presented food in the playroom. "Out" was appropriate when the items were displayed in the hallway, across a half-door barrier from the child. A sequence of steps was trained, through increasingly naturalistic setting and cuing conditions. The two mands were trained in sequence, not concurrently. To encourage "spontaneous" productions, no vocal cuing was provided by the adult. After criterion performance in each step, several probe sessions were conducted for various cuing conditions, adults, and settings. Probes after imitation training showed no spontaneous manding. Thus, failure of manding was not due to production difficulties. In probes after training for "approximately" natural cues, most children showed little transfer to the natural cues. This implies that training for the specific appropriate cues may often be required. However, good transfer generally occurred across persons, and from training room to playroom. Probes also showed that most children did not use one of the trained mands in the stimulus conditions that were appropriate for the other mand. Thus, adding a second mand did not generally disrupt use of the first. However, significant disruption occurred for two children. Finally, at the end of training, extinction training was given for one mand in one setting. Performance of the other mand was litle affected. In sum, the appropriate form of a mand depends on specific stimulus and setting characteristics, and these characteristics must be considered in training.

DESCRIPTORS: language training, generalization, verbal behavior, expressive language, retarded children

Language deficient children commonly lack appropriate spontaneous speech; that is, speech not directly evoked by verbal cues (Gray & Ryan, 1973). Generally, language training is not sufficient to produce appropriate spontaneous speech (Lovaas, Koegel, Simmons, & Long, 1973). The language skills do not generalize to other settings, persons, or cues. There have been a few exceptions, but experimenters have seldom tried to determine what variables controlled the generalized speech.

A response is more likely to generalize to settings with similar discriminative cues to those in training (Rincover & Koegel, 1975); or if the response is trained for several individuals (Stokes, Baer, & Jackson, 1974) or settings (Lovaas & Simmons, 1969). To promote generalization, we might look at natural environmental antecedents or consequences. Baer and Wolf (1970) recommended developing responses likely to be consequated naturally. Mands should be good candidates.

Skinner (1957) defined a mand as "a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation." In addition, if a mand is to be of any use, the child must be able to discriminate the situations in which it is likely to be rewarded. The present

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study examined the effects of a sequence of training stages on the development and generalization of spontaneous manding to appropriate cues. Before and after each training stage, probes were taken in training and nontraining settings, by the trainer and nontrainers.

METHOD

Participants

Five retarded residents of a children's treatment center, four males and one female, aged 7 to 11, participated in the study. All children were ambulatory, but had no detectable functional speech.

Training and Probe Procedure

Pretraining was given to teach appropriate imitation of "I want a" and "Out" and touching an object. Further training conditions followed. In each of the training conditions, the child was trained to produce a single mand in the training room, for a single visual cue. However, imitation trials were always included for the second mand. The identical Probe condition was given after pretraining and after each subsequent training condition. The Probe condition consisted of several probe sessions, to test generalization to the natural cues and the natural setting (display of reinforcers in the ward playroom) and to a different adult (ward staff).

Training was done by the trainer in a quiet room. Modeling and contingent reinforcement were used. Praise was given for all correct responses. Continuous tangible reinforcement was given at first, and then thinned to approximately once for every five correct responses. Reinforcers were various types of food items. Each type was contained in a visible transparent bag or cup. Training in each condition continued to a criterion of 80% correct, with no prompts, during two consecutive sessions. The sequence of training conditions for each child depended on the child's response to the prior Probe conditions, as shown later.

Probe condition. The primary data of the study come from the Probe condition, which was repeated after pretraining and after each training condition. The Probe condition consisted of six 10-trial sessions per day, given for several days. The cues presented in each probe session were the "naturalistic" cues for one of the two mands. Four sessions tested for occurrence of each of "I want a" and "Out" in both the playroom and the training room; when the cues (the display of the reinforcers) were presented by the trainer. Two sessions probed only for use of the mand that had just been trained, when reinforcers were made available by a staff member, in each room. The order of sessions varied daily. This set of six sessions was repeated over at least 4 days. Then a new training condition began.

Each probe session consisted of five 20-sec visual stimulus presentations. A correct manding response in either or both halves of the 20-sec interval was rewarded, so that each presentation provided two trials. Incorrect responses were ignored.

A probe presentation for "I want a" began when the prober entered the room carrying the tray of edibles, and faced the child, approximately 5 ft. (15 m) away. A correct response was to say "I want a" and touch a food container on the tray. The food item touched was given to the child. Thus, correct probe responses were reinforced. After the presentation the prober left the room briefly, then reentered for the next presentation.

For probe presentations for "Out," the prober stood visibly outside the room. Outside the training room, she looked in through a glass window; and outside the playroom, she looked in over the half-door and showed the reinforcer tray. Correct responding required saying "Out" and approaching or remaining within touching distance of the door, upon which action the door was opened and the child was given access to the tray, as for the other mand.

Training: manding. Training occurred in the training room. The cues given by the trainer resembled those in the natural environment, but

differed in details, as appropriate for the training room setting. Trainer and trainee faced each other across a table. The trainer presented the edibles in bags on a tray. Correct performance for "I want a" was to verbalize this response and touch a bag with no prompt. Correct performance for "Out" was to verbalize this response and touch a 12-inch (30.5-m) high mini-door which was shaped like the half-door of the training room. Prompts were gradually faded as training progressed.

Training: natural cues. Each child was trained in the training room to mand reinforcers presented on a tray out of reach. The experimenter's cues were the same as in the probe sessions. For "I want a," the trainer entered the training room carrying the tray, and faced the child about 5 ft. (15 m) away. Correct responding included saying "I want a," and approaching and touching a bag of edibles. The cue for "Out" was the appearance of the trainer holding the tray and edibles, on the other side of the window in the training room door. Correct responding included saying "Out," and approaching within touching distance of the window.

Training: reversal and reinstatement. After the child used both mands correctly in the Probe condition, reinforcement was removed for the first trained response in the training room, until correct use of this mand decreased to less than 10% for two consecutive days. Reinforcement was reintroduced after the Probe condition.

Individual training sequences. The order of training conditions for Steven and Bobby was: Imitation Pretraining; Manding ("I want a"); Natural Cues ("I want a"); Manding ("Out"); Natural Cues ("Out"); Reversal (extinction for "I want a"); Reinstatement. Ricky received the same conditions, but "Out" was trained first. Susan received the same conditions as Ricky up through the second Manding Training. She decreased her correct use of the first-trained mand ("Out") after Manding Training for "I want a," which she used for all cues. Therefore, Natural Cue Training for "Out" was repeated, followed by the Reversal and Reinstatement conditions. Billy received Imitation Pretraining, then Manding ("I want a"). This mand generalized to the playroom and staff member, so Manding ("Out") was given, and finally Natural Cues ("Out").

Reliability

Independent recordings of the child's responses were made approximately once each week. Thirty checks were made. For each response, percentage agreement was calculated using the usual agreements formula. Intervals were included only if at least one observer recorded a correct response. Average reliability was 99.20.

RESULTS

Training trials for each condition varied from 32 to 686 trials (average = 275). Averages for individual children ranged from 156 (Ricky) to 584 (Billy). These averages exclude the reversal condition. Training procedures for a given condition varied somewhat between children. Details of training are not given because the probe results were the object of study.

Figures 1 and 2 show some of the results for the probe sessions following the training conditions shown in the headings. Figure 1 shows results for Steven. His data are characteristic of those for Steven, Ricky, and Bobby. Results for correct manding are shown separately for the two trainers and the two settings. Figure 2 shows playroom data only, for Susan and Billy, whose results differ from the mode. Playroom and training room data were quite similar. Figure 2, for Billy and Susan, also shows the percentage of trials on which the incorrect mand was used. Trials are combined for trainer and the staff member as prober because their results were similar.

Steven, Ricky, and Bobby generalized the trained mand appropriately after Natural Cue Training, for both responses. Incorrect mands were rare. After Billy received Manding Training for "I want a," he used this response in

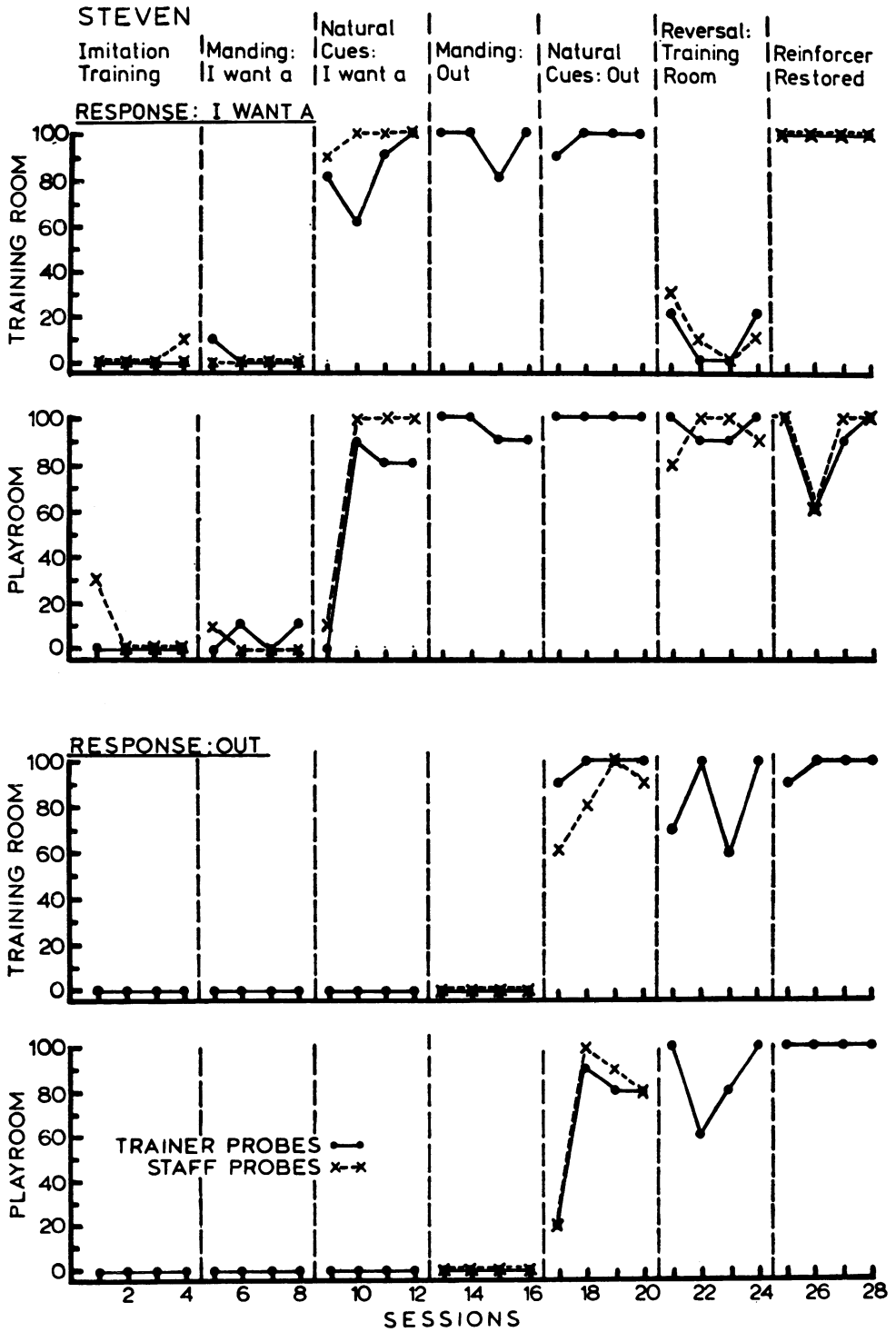

Fig. 1. Steven: Percentage of correct responses ("I want a" and "Out") in probe sessions after Imitation Pretraining and after each training condition. Each heading shows the response trained in the condition preceding the Probe condition. Results for the two responses and the two settings are shown separately.

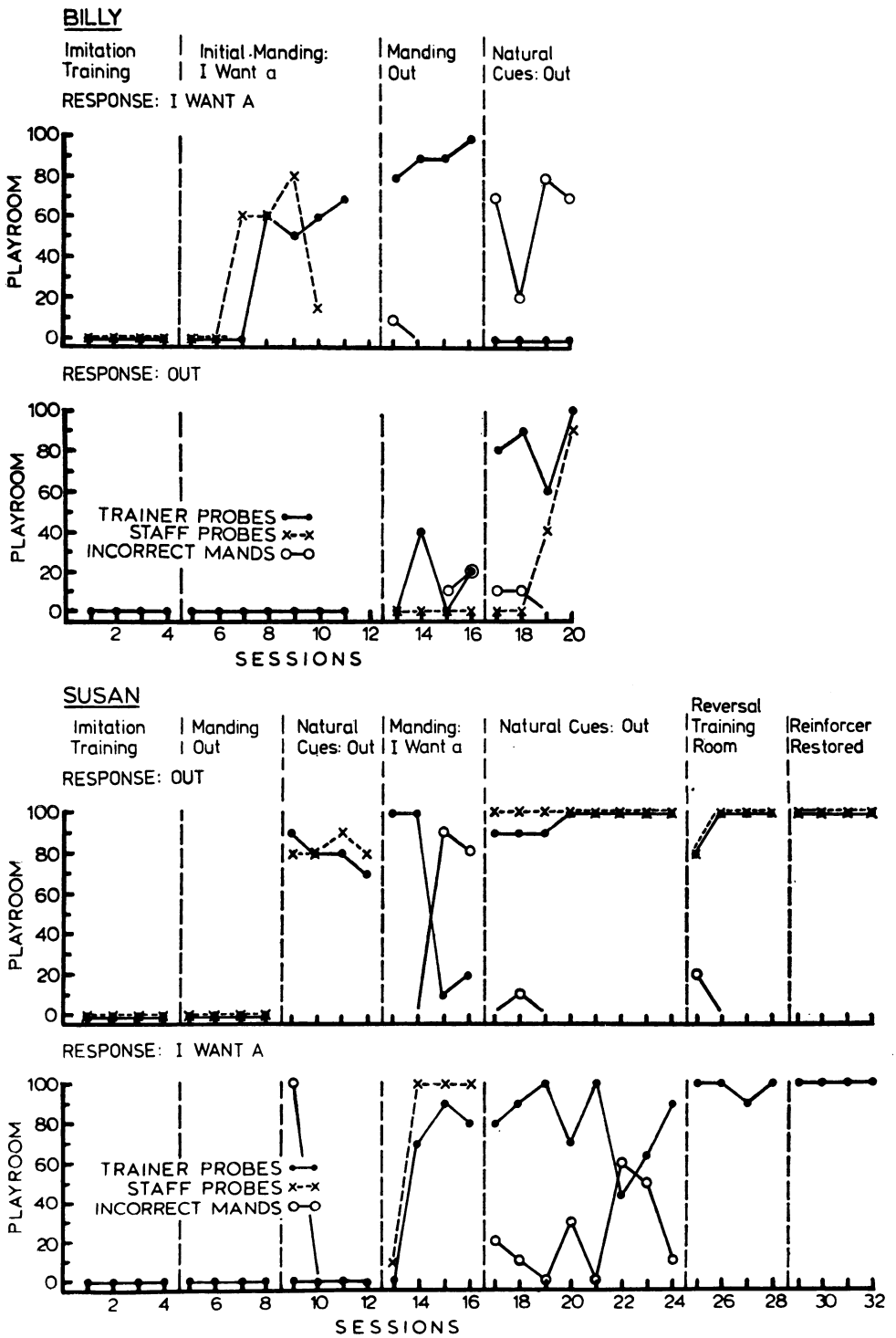

Fig. 2. Billy and Susan (playroom results only): Percentage of correct responses ("I want a" and "Out") in probe sessions after Imitation Pretraining and after each training condition. Each heading shows the response training in the condition preceding the Probe condition. Nonzero values for percentage of incorrect manding are also shown.

both probe settings, so Natural Cue Training was omitted. After Manding Training for "Out," Billy used "I want a" for all probes. Uses of "I want a" for "Out," or the reverse, are shown as open circles in Figure 2, which shows that training one mand at a time did not produce adequate discrimination. After Susan received Manding Training for the second mand, "I want a," she generalized this response too widely. Open circles in Figure 2 show incorrect mand uses. Natural Cue Training for "Out" was repeated, after which both mands were used correctly, so that training for "I want a" was unnecessary.

The Reversal Condition showed a similar result in all cases. Reversal training reduced the trained mand in the training room, but not in the playroom, and the untrained mand was unaffected. Reinstatement training produced the expected result.

DISCUSSION

After initial training in the production of the mands, several types of generalization or transfer were examined: (a) No child used either mand correctly after imitation training, indicating that response availability was not a sufficient cause for the absence of manding. (b) After manding training using cues approximate to the natural cues, transfer to the natural cues was rare. (c) Transfer from the trainer to a staff person generally occurred readily. Good transfer also occurred from training room to playroom. (d) Three children showed little interference between mands, but two transferred the first mand to the cues for the second. One of the two discriminated successfully at the end of training. (e) After extinction for one mand in one setting, appropriate responding continued elsewhere.

These results show that the occurrence and form of a mand depend on specific setting and stimulus conditions, as well as upon deprivation or aversive stimulation. This finding is implicit in the training, which is similar to that used in training tacting (e.g., object labeling). "Out" and "I want a" became "labels" for the experimenter's cues, and were thus brought under stimulus control.

Training produced generalization effects that differed across children. These effects may be important for the success of training. If generalization is quite limited, the trained response may not occur for many of the appropriate situations. If generalization occurs too widely, extinction could occur even for the reinforced cues. Also, new mand training may disrupt older forms. Correcting this problem, by added discrimination training, could impose a considerable burden on the trainer.

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