

## PROGRAMMING MAINTENANCE AFTER CORRESPONDENCE TRAINING INTERVENTIONS WITH CHILDREN

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Interventions were employed to program maintenance following correspondence training. The use of reinforcement of verbalization and a mixed sequence of procedures designed to establish indiscriminable contingencies was evaluated in multiple-baseline designs across subjects and behaviors. The results indicated that target behaviors were maintained under less intrusive interventions and in the absence of programmed contingencies during extended follow-up conditions. The results are discussed in terms of changes in reinforcement schedules established in maintenance interventions.

**DESCRIPTORS:** correspondence training, verbal mediation, indiscriminable contingencies, preschool children, maintenance

Establishing children's verbalizations as stimuli for controlling other responses has been used to enhance generalization of treatment effects (e.g., Rogers-Warren & Baer, 1976). Although children's statements may function as discriminative stimuli, often this is not so, or the controlling effect is transitory (Baer, Williams, Osnes, & Stokes, 1985). Controlling functions, when absent, are typically achieved by reinforcing statements that match the child's actual behavior, i.e., correspondence training.

Several investigators have demonstrated that generalized verbal control may occur following correspondence training. That is, when certain programming tactics are used (e.g., indiscriminable contingencies) in training, reinforcement of statements alone is sometimes sufficient to control related behavior that has not been directly reinforced (e.g., Baer, Williams, Osnes, & Stokes, 1984).

Despite these promising findings, few investigators have systematically evaluated maintenance following correspondence training interventions.

Studies that returned to baseline conditions after correspondence training have typically found either no maintenance in responses when the recently manipulated contingencies have been withdrawn (Williams & Stokes, 1982). Because correspondence training generally involves a continuous reinforcement schedule for engaging in target behaviors, rapid extinction following its removal is not surprising (e.g., Karlan & Rusch, 1982).

We examined maintenance following correspondence training both under less intrusive maintenance interventions and during extended baselines in which no experimental contingencies were introduced. Two strategies were used to enhance the durable effects of correspondence training: reinforcement of verbalizations and a mixed sequence of procedures designed to establish indiscriminable contingencies.

### METHOD

#### *Subjects and Setting*

Two 4-year-old children, Mary Lou and Ed, participated. They attended a private preschool serving atypical and normal children. Both were intellectually and developmentally normal. The preschool was attended by 12 children for a 3-hr morning session daily.

The participants were systematically observed for

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1 month and selected because they infrequently engaged in several behaviors (e.g., on-task) determined by teachers to be important at the preschool. Observations and target behaviors occurred in three different settings: play, large group academic periods, and snack, where children answered questions about the snack foods and lessons of the day. Parental consent was obtained for the children to participate in the study.

### *Target Behaviors and Measurement*

Target behaviors for Mary Lou were: (a) *Peer-directed talk*—any verbalization, excluding shrieks, whines, singing, or other vocalizations without verbal content, directed to a peer or group of peers. Observations were made for 15 min during play in 10-s intervals. A maximum of one verbalization could be recorded in a single interval. Empirically derived criteria for the delivery of consequences were established by comparison data collected on all children at the preschool (reported in Osnes, Guevremont, & Stokes, in press). The mean (28% of the intervals) was used to establish a criterion for correspondence. (b) *Straighten mats*—all 12 mats used during group activities were rearranged and straightened so that there was no more than 8 cm of overlap in the pile. This behavior was scored only when the child began cleaning up within 45 s of the teacher's instruction to the group to put the mats away. Scoring ended when she left the area where mats were stacked and was on a yes-or-no basis.

Target behaviors for Ed were (a) *On-task behavior*—the child was seated on his mat during large group with no part of his body off the sides of the mat, eyes directed toward the teacher or relevant material, and there were no inappropriate body movements, e.g., foot kicking. On-task behavior was recorded for 15 min in 10-s intervals and was recorded only when the child remained on-task for a full 10-s interval. (b) *Hand-raising*—the hand was raised completely above and at least 3 cm away from the head in response to a question by the teacher to the group. The frequency of hand raises and questions by the teacher was recorded for the duration of the snack period (about 15 min). The mean number of teacher

questions remained relatively constant across experimental conditions (range, 18–21). Normative data were not collected on large group or snack behaviors. Criteria for correspondence for on-task and hand-raising were 75% and 55%, respectively, selected as an increase of 25% over mean baseline performance.

### *Reliability*

Observers were graduate and undergraduate students in psychology trained to an 80% agreement criterion on all behavior codes. Two observers were present on 23% of the days to simultaneously but independently record target behaviors. For target behaviors recorded on an interval system, agreements were calculated on occurrences in order to provide conservative estimates for low-frequency behavior. Interobserver agreement was calculated on an interval-by-interval basis by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. For straightening mats, which was scored as yes or no, an agreement was counted when both observers recorded the occurrence of the behavior; a disagreement was counted when one observer scored the occurrence of the behavior and the other did not. Interscorer agreement was calculated using the formula described above. For hand raises, both hand raises and teacher questions were examined separately. For both, the smaller frequency recorded was divided by the larger frequency recorded and plotted as a percentage of hand raises in response to questions. Hand raising was not recorded on an interval system.

The mean percentage agreement was 86.4% (range, 62%–100%) on peer-directed talk and 91.1% (range, 58%–100%) for on-task. Percentage agreement below 70% occurred on only 2 days. Mean percentage agreement for questions asked was 94.3% (range, 84%–100%) and 96.8% (range, 79%–100%) for hand raises. There were no disagreements on any day for straightening up the mats.

### *Experimental Conditions*

*Baseline.* No verbalizations were prompted during baseline and no consequences were admin-

istered for engaging in target behaviors. Staff members delivered praise for appropriate play and group behaviors (e.g., sharing, answering questions) and these procedures were in effect during all experimental conditions throughout the study.

*Correspondence training.* Children were prompted to verbalize the behavior they were to engage in and the setting in which it was to occur (e.g., "I'm going to raise my hand a lot in snack today."). Positive consequences (e.g., stickers, piggyback rides) were provided contingent upon the children's performance of the behaviors that they said they would do. Only minimal acknowledgment (e.g., "all right") was provided for verbalizations. Immediately following the observation period, children were taken individually into an adjoining office and were told, for example, "You said you were going to raise your hand a lot in snack and you did. You get to pick a reward." When children did not correspond, they were told that they could not earn a reward because "You didn't do what you said you were going to do."

*Reinforcement of verbalizations.* Positive consequences were contingent upon correct and complete verbalizations and were delivered prior to the observation period. No consequences were administered for engaging in the target behaviors.

*Indiscriminable contingencies.* A mixed sequence of contingencies was used to establish indiscriminable contingencies. The sequence was: (a) positive consequences delivered immediately following prompted verbalizations but not following correspondence, (b) positive consequences delivered after the observation for correspondence but not following the prompted verbalizations, (c) days on which no verbalizations were prompted and no consequences were delivered, (d) delayed positive consequences for prompted verbalizations but no consequences for correspondence, and (e) days on which no consequences were delivered for either prompted verbalizations or correspondence. Delayed consequences for verbalizations (see Baer et al., 1984) included only minimal consequences (e.g., "O.K.") immediately following the verbalization. Positive consequences were then delivered following the observation period and the content of the feedback to the children included only praise

for their prior verbalizations (e.g., "You said that you were going to raise your hand a lot in snack today. Good boy.>"). These consequences were delivered regardless of whether a child actually engaged in the target behavior. Children received the sequence of five procedures in the same order and on consecutive days.

### *Design*

Multiple-baseline designs across children were used to control for the introduction of correspondence training and maintenance interventions. Correspondence training and indiscriminable contingencies conditions were sequentially introduced across Mary Lou and Ed in one multiple baseline and correspondence training and reinforcement of verbalizations were sequentially introduced in a second multiple-baseline design. Because each child had two target behaviors, within-subject multiple baselines across behaviors also were used to experimentally control for the effect of correspondence training.

## RESULTS

The multiple-baseline design across subjects and behaviors is presented in Figure 1. In the first two legs of the multiple baseline, correspondence training and indiscriminable contingencies conditions were introduced sequentially across Mary Lou and Ed. Both subjects showed an immediate increase in target behaviors with the introduction of correspondence training, which was maintained at comparable levels when indiscriminable contingencies were introduced. During the final baseline, Mary Lou's and Ed's target behaviors were maintained for the remainder of the school year.

The third and fourth legs of the multiple-baseline design represent the sequential introduction of correspondence training and reinforcement of verbalizations across Ed and Mary Lou. When correspondence training was introduced, a substantial increase in the target behavior of both subjects occurred. Ed's on-task behavior was maintained at a comparably high level when reinforcement of verbalizations was introduced, and remained at a relatively high percentage for the remainder of the

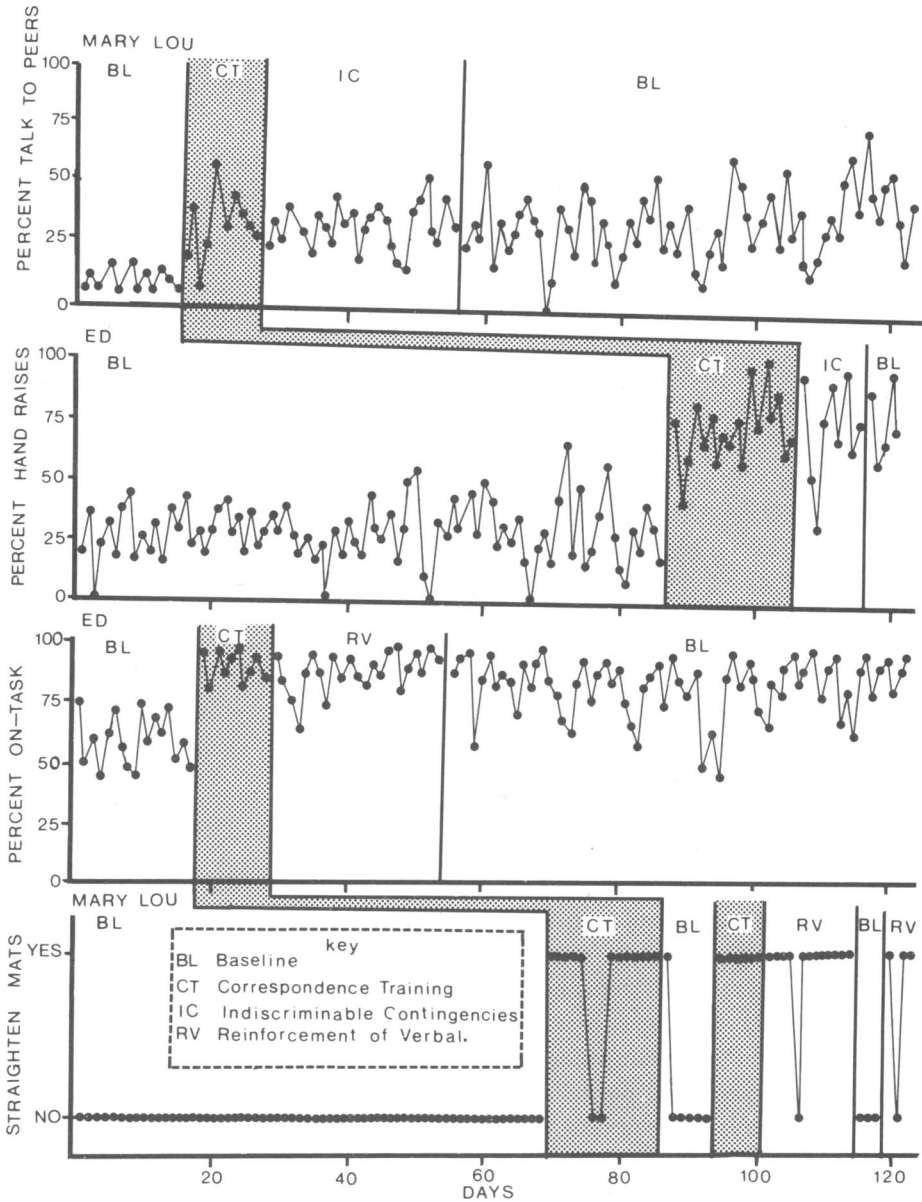


Figure 1. Multiple baseline design across subjects and behaviors with correspondence training (CT), reinforcement of verbalizations (RV), and indiscriminable contingencies (IC) introduced sequentially.

study in baseline conditions. Mary Lou's mat straightening behavior was not maintained when baseline was reintroduced after correspondence training but a second correspondence training intervention immediately established the behavior on 100% of the days. Reinforcement of verbalizations effectively maintained the behavior but an immediate reversal was observed when baseline was again introduced. For the last 4 days that Mary Lou

participated in the study, reinforcement of verbalizations effectively reestablished the occurrence of the target behavior.

### DISCUSSION

These results support and extend previous studies in demonstrating significant behavior change through correspondence training. Furthermore, this

study systematically and extensively evaluated maintenance. Consistent with the findings of other investigators (e.g., Whitman, Scibak, Butler, Richter, & Johnson, 1982), children's behavior was maintained after correspondence training by reinforcing verbalizations prior to the observation period. A sequence of mixed procedures, designed to establish indiscriminable reinforcement contingencies, was similarly effective in maintaining target behaviors. In contrast to abrupt schedule changes that occur when all training contingencies are removed, the mixed schedule of procedures may have decreased the discriminability of contingencies that subsequently led to continued responding.

We also evaluated maintenance under extended baseline conditions when no external consequences were delivered. Despite an increase in the variability of performance during these baseline conditions, children continued to engage in target behaviors at relatively high rates. This was apparent when target behaviors were monitored for up to 67 days following the withdrawal of programmed contingencies. These results were probably related to the scheduling of maintenance procedures after correspondence training. The control of target behaviors under reinforcement of verbalizations provided a history in which target behaviors were not directly reinforced. Because baseline conditions are similarly devoid of externally delivered consequences, there is actually no change in the reinforcement schedule for performance of the target behaviors. The mixed sequence of consequences may have similarly provided an intermittent withdrawal of contingencies which, unlike typically used correspondence training programs, does not represent an abrupt and easily discriminable schedule change in the setting where the child's target behavior occurs. Consistent with prior research, reinforcement of verbalization did not always lead to maintenance (such as was the case with mat straightening) and it may be necessary to include procedures that provide less discriminable schedule changes.

Several limitations in the present study should be considered in future research. First, the experimental design did not allow for direct comparison of the two maintenance procedures or examination of whether correspondence training was a critical historical prerequisite for the effects of these transitional maintenance interventions. Second, analysis of competing contingencies and naturally occurring reinforcement may help identify factors limiting (e.g., Mary Lou's mat straightening) or facilitating (e.g., peer reaction to Mary Lou's talking) maintenance and might be examined by collecting process data on peer and teacher behaviors. Finally, replication across additional children and behaviors is warranted.

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