BEHAVIORAL SIMILARITY AS A REINFORCER FOR PRESCHOOL CHILDREN

BRUCE W. GLADSTONE AND JAMES COOLEY¹

RIDEAU REGIONAL CENTRE AND CARLETON UNIVERSITY, AND
UNIVERSITY OF KENTUCKY

Three experiments evaluated whether behavioral similarity provided by an adult could serve as a reinforcer for the modelling behavior of four preschoolers. In each experiment, sessions consisted of two kinds of trials: (1) experimenter-modelled trials, when the child's imitation of modelled motor responses was reinforced with praise and tokens, and (2) child-modelled trials when experimenter imitation of child-modelled responses was contingent upon the child's modelling one of three alternative responses: operation of a ball, horn, or clicker. Experiment I showed that the children consistently modelled whichever responses the experimenter imitated. Experiment II determined whether that performance was due to differences in the amount of experimenter behavior following imitated *versus* nonimitated child models or to experimenter imitation. Neither reducing nor increasing the amount of experimenter behavior following the children's nonimitated models altered their modelling of imitated responses. Experiment III evaluated whether experimenter imitation of child models was a reinforcer because the child's imitative responses were reinforced on experimenter-modelled trials. In Experiment III, the children's nonimitation of experimenter-models was reinforced with praise and tokens on a schedule of differential reinforcement of other behavior, yet they continued to model experimenter-imitated responses on child-modelled trials. These results indicate behavioral similarity was reinforcing, though no conditioning history through which it acquired that function was demonstrated.

Researchers in the area of imitation have repeatedly demonstrated that children imitate all experimenter-modelled responses so long as some imitations are reinforced. In the typical experiment, the subject sits opposite an adult who models responses to be imitated. In some studies, an instruction to imitate (*e.g.*, "Do this") precedes each modelled response. Not all of the subject's imitations are reinforced. Randomly interspersed among the models for reinforced imitations (the S^P models) are models of several topographically different responses, imitations of which are not reinforced (the S^A models). The persistence of imitations of S^A models, called generalized imitation (Baer and Sherman, 1964), has been demonstrated in normal, autistic, and retarded children (*e.g.*, Baer, Peterson,

and Sherman, 1967; Baer and Sherman, 1964; Brigham and Sherman, 1968; Burgess, Burgess, and Esveldt, 1970; Lovaas, Berberich, Perloff, and Schaeffer, 1966; Metz, 1965).

Several hypotheses have been proposed to explain why children imitate responses that are never reinforced. The earliest was the conditioned-reinforcement hypothesis proposed by Mowrer (1960, p. 73) and by Baer and associates (Baer *et al.*, 1967; Baer and Sherman, 1964). That hypothesis states that, since behavioral similarity precedes reinforcement in the imitation experiment, it may become predictive of reinforcement and so acquire conditioned reinforcing properties. Nonreinforced imitations are said to be maintained by the response-produced (intrinsic) conditioned reinforcement (*i.e.*, behavioral similarity between model and child) that occurs on both trials that are and trials that are not extrinsically reinforced. Thus, the conditioned-reinforcement hypothesis implies that two types of reinforcement operate within the generalized imitation paradigm: (1) extrinsic differential reinforcement from the experimenter and (2) intrinsic response-produced conditioned reinforcement.

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Bandura (1968) proposed what is known as the "failure to discriminate", or generalization hypothesis. It suggests that the child cannot discriminate models that are S^D s for imitation (*i.e.*, stimuli that set the occasion for reinforcement of imitation) from models that are S^A s for imitation (*i.e.*, stimuli that set the occasion for nonreinforcement of imitation) and therefore imitates all modelled responses. Similarly, Brigham and Sherman (1968) and Gewirtz and Stingle (1968) suggested that children may not discriminate S^D models from S^A models because of the variable-ratio schedule of reinforcement that prevails in most generalized imitation experiments.

In a study by Bandura and Barab (1971), one experimenter modelled only S^D motor responses and a second experimenter modelled only S^A motor responses. Under these conditions, the children reliably imitated the S^D models, but not the S^A models. When one experimenter modelled both S^D and S^A motor responses, the children reliably imitated all models. However, when one experimenter modelled S^D motor responses and S^A vocal responses, the children reliably imitated the former but not the latter. These findings support Bandura's hypothesis (Bandura, 1968) by showing that when the consequences associated with imitations of S^D and S^A models are distinguishable on the basis of characteristics of the person who models the responses and the topography of the modelled responses, children discontinue imitating the S^A responses.

The conditioned-reinforcement hypothesis, though frequently challenged on logical grounds (Bandura and Barab, 1971; Steinman, 1970a, 1970b), has received little, if any, direct experimental evaluation. Some indirect support was provided in a study by Parton and Fouts (1969). Using a match-to-sample task, they demonstrated that a dimension of similarity between two nonbehavioral stimuli (colors) could have a reinforcing function for preschool children. In that study, the children could operate two response keys to produce either a stimulus that was similar to the standard (*i.e.*, a match) or a stimulus different from the standard. The children's matching behavior was not extrinsically reinforced. Children who could produce either similar or dissimilar stimuli maximized similarity.

Direct confirmation of the conditioned-reinforcement hypothesis would require, first, a

demonstration that *behavioral* similarity can function as a reinforcing stimulus in an imitation situation; second, a demonstration that the (conditioned) reinforcing properties of behavioral similarity depend upon similarity being predictive of (or paired with) reinforcement; and finally, a demonstration that the reinforcing properties of behavioral similarity are powerful enough to maintain generalized imitation under conditions where "coercive controls" (Bandura and Barab, 1971), such as verbal instructions and physical prompting, are absent. The present study addressed itself to the first two of these requirements.

The present study sought to determine whether *behavioral* similarity between an adult's imitations and a child's modelled responses could function as a reinforcing stimulus for modelling behavior of the child, and, if so, whether that function depends upon contingent reinforcement of some of the child's imitative responses.

EXPERIMENT I

METHOD

Subjects

Three boys and one girl from the University of Kansas Preschool participated. Their ages were as follows: Subject 1, 3 yr and three months; Subject 2, 4 yr and three months; Subject 3, 4 yr and three months; Subject 4, 3 yr and six months. Subject 4 was the only girl. None had participated in imitation experiments before this study.

Experimental Setting and Apparatus

Experimental sessions were held four days a week in a small room containing one table and three small chairs. Each subject was seen individually for one 15-min session each day. During each session, the subject and the experimenter sat facing each other, about 3 ft (0.9 m) apart. An observer sat in one corner of the room, behind the subject. The experimenter was a 24-yr-old male.

The apparatus was a brightly colored rectangular box with three sides, in which were mounted three noisemakers: a desk bell, a rubber horn, and a cricket clicker. Each noisemaker was hand-operated. The box was situated on the table to one side of the experimenter and the subject.

Procedures

During the first session, the experimenter read the following instructions to the subject:

We are going to play a game with these toys. Here's how they work. (Experimenter operates each toy.) Sometimes it will be my turn (*experimenter-modelled trial*) and sometimes it will be your turn (*subject-modelled trial*). When I say, "Now it's my turn", you should watch me very carefully. If you do the right thing after my turn I'll give you a nickel and ask you what you did. When I say, "Now it's your turn", then you choose one of the toys to work. I will work a toy right after you do. Watch me carefully because I will ask you what I did.

When you get 10 nickels you can have a white token. When you have 10 white tokens you can buy a large toy.

These instructions were read only once to each subject during the entire study. Also during the first session, the experimenter asked each subject to describe the kinds of toys he would like to purchase with the white tokens. The three boys preferred model racing cars, trucks, buses, and boats. The girl preferred paints and water-color sets. Each subject earned 10 white tokens in six or seven sessions, at which time they purchased one large toy from an assortment selected by the experimenter on the basis of their preferences.

Experimenter-modelled trials. The experimenter-modelled trials began when the experimenter said: "Now it's my turn". On these trials, the experimenter modelled either a gross motor response (*e.g.*, stamping foot) or operated one of the three noisemakers. There were two types of experimenter-modelled trials, S^D trials and S^A trials. On S^D trials, if the subject imitated the experimenter's response within 5 sec, he received a nickel (dropped in a glass) accompanied by the comment "Very good". If he did not imitate the experimenter's response or respond within 5 sec, the experimenter proceeded to the next trial. Each correct imitation on S^D trials was reinforced.

On S^A trials, the experimenter also modelled a response. However, there were no consequences, whether or not the subject imi-

tated the modelled response. An S^A trial was terminated by the subject's imitation or non-imitation of the modelled response, or by the end of a 5-sec interval during which he did not respond. The S^A trials served as probes for the development and maintenance of a generalized imitative repertoire.

During each session, 20 different responses were modelled. Seventeen of those responses were used for S^D trials and three were used for S^A trials. During each session, three of the 17 S^D responses involved the model's operation of a noisemaker. Operation of each noisemaker was modelled only once during each session. Operation of the noisemakers was never used as an S^A response. If the experimenter accidentally reinforced an imitation on an S^A trial, that response was never used again in any session. Each response modelled for S^A trials was modelled for six consecutive sessions and then replaced by a new response. Table 1 lists the responses used for S^D and S^A trials.

Subject-modelled trials. Subject-modelled trials began when the experimenter said: "Now it's your turn to choose a toy", (indicating the three noisemakers). Before each session, responses on one of the three noisemakers had been selected to be imitated by the experimenter. If the subject operated the selected noisemaker, the experimenter imitated the child's behavior directly before and during operation of that noisemaker. For example, if the subject crossed his legs, scratched his head, made a funny face, and then operated the designated noisemaker, the experimenter did the same. If a child modelled behavior that took up more than 5 sec, the experimenter allowed him to finish his modelling performance. On only a few occasions with Subjects 1, 2, and 3, did the experimenter interrupt because the modelling continued too far beyond the 5 sec allowed. Only one noisemaker at a time served as the imitated response. The children were never told which noisemaker would result in imitation by the experimenter.

If the subject operated one of the two nonimitated noisemakers, the experimenter responded immediately by operating the other nonimitated noisemaker, without imitating any of the subject's preceding behavior. If the subject failed to operate a noisemaker within 5 sec (which rarely occurred), the experimenter

Table 1

Responses modelled by the experimenter for S¹ and S^A trials.

<i>Responses modelled for S^D trials</i>	
1. pat head	
2. stamp foot	
3. operate bell	
4. nod no	
5. tap chest with index finger	
6. pound table with fist	
7. stand up and sit down quickly	
8. flex left arm	
9. place hands on top of head	
10. cover eyes with hands	
11. operate clicker	
12. open mouth wide	
13. cover ears	
14. operate horn	
15. hands up high	
16. tap table with index finger	
17. extend one arm to side	
<i>Responses modelled for S^A trials</i>	
1. pat floor with hand	
2. clap hands	
3. place index finger on tip of nose	
4. extend both arms out from side	
5. pat head and cover mouth simultaneously	
6. fold arms across chest	
7. slap thigh	
8. shake fist	
9. move hands in circle	
10. stand up and bow from waist	
11. "Peace sign"—two fingers	
12. clasp hands and shake over head	
13. safe sign—as in baseball	
14. thumb nose	
15. make like a bull with horns	

proceeded to the next scheduled trial. A subject-modelled trial was terminated by the experimenter's imitative or nonimitative response or by the subject's failure to operate a noisemaker within 5 sec. There were never any consequences, other than those described above, for the subject's modelling behavior.

Schedule of trials. Each session involved 20 experimenter-modelled trials and 60 subject-modelled trials, for a total of 80 trials per session. The experimenter-modelled trials were interspersed among the subject-modelled trials on a variable one-to-three ratio. Three of the 20 experimenter-modelled trials were trials on which S^A responses were modelled by the experimenter. No more than five subject-modelled trials ever occurred in sequence.

Criterion. The major dependent variable was the number of times a child modelled a response (operation of a noisemaker) that the experimenter would imitate. When a child

had modelled imitated responses on at least 16 of 20 consecutive subject-modelled trials (80%), another noisemaker became the imitated response. (This will be referred to as a shift of the imitated response.)

Reporting procedure. At the end of each experimenter-modelled trial, the experimenter said to the subject: "Did you do the same thing I did, or a different thing?" Similarly, at the end of each subject-modelled trial the experimenter said: "Did I do the same thing you did, or a different thing?" The subject replied by saying "the same" or "a different thing", or some equivalent response. During the first three sessions, the reporting of Subjects 1, 2, and 3 was frequently inaccurate, possibly because they were not familiar with the verbal distinction between "same" and "different". To increase the frequency of accurate reporting, inaccurate reports were punished during the first three sessions by the removal of a nickel from the nickel cup and a verbal correction, e.g., "No, you did a different thing", or "No, you did the same thing I did". This procedure never occurred more than four times during any one of the first three sessions. Thereafter, the reporting of Subjects 1, 2, and 3 was accurate on nearly every occasion. Subject 4 never reported inaccurately. The purpose of the reporting procedure was to ensure that each subject could discriminatively label (tact) the relation between his behavior and the experimenter's behavior in each trial.

RESULTS

Recording and Reliability

During every session, the experimenter recorded the subject's modelling responses, imitative responses, reporting responses, and the delivery of each reinforcement. Reliability of the experimenter's recording was checked during nearly every session. An observer seated behind the subject recorded the same information. Reliability was calculated as the percentage of agreement between observer and experimenter on the occurrence and non-occurrence of each item on the data sheet. For all items and all sessions in which checks were made, the percentage of agreement was never less than 95%. The percentage of agreement was calculated as the total number of agreements divided by the total number of disagreements plus agreements, multiplied by 100.

Figure 1 presents the percentage of subject-modelled trials on which the child operated each noisemaker. Data are shown for only the first three shifts of the imitated response during Experiment I. (The number of subsequent shifts of the imitated response and the number of trials to criterion are presented in Table 2.) Each point along the x-axis represents a block of 10 subject-modelled trials. The percentage of operations of the bell, the horn, and the clicker is plotted along the y-axis. A plus mark (+) following the letters at the top of each graph in the figure indicates which noisemaker was the experimenter-imitated response. The vertical broken lines indicate that the imitated response had been changed.

The figure shows increases in each subject's modelling of the response that produced imitation by the experimenter, and corresponding decreases in his nonimitated responses. On

only one occasion in Experiment I did a subject operate a nonimitated noisemaker on at least 16 of 20 consecutive subject-modelled trials (see blocks 9 and 10 for Subject 2).

Table 2 presents the number of times each subject reached criterion on each imitated response and the total number of blocks of 10 subject-modelled trials for each subject in Experiment I. From the table it can be seen that Subject 1 reached criterion on the imitated response 22 times in 22 sessions; Subject 2, 13 times in 20 sessions; Subject 3, eight times in 12 sessions; Subject 4, four times in 11 sessions.

Not shown are the percentages of S^D and S^A responses imitated by each subject on experimenter-modelled trials. Throughout Experiment I, Subject 1 imitated 83% of the S^D and 98% of the S^A responses. Subject 3 imitated 97% of the S^D and 100% of the S^A responses. Subjects 2 and 4 imitated all responses.

Fig. 1. The percentage of subject-modelled responses to each noisemaker. A plus mark (+) following the letters B, H, and C indicates which noisemaker (bell, horn, or clicker) was the experimenter-imitated response.

Table 2

For each subject in Experiment I the number of times criterion was reached on each noisemaker, the number of blocks of 10 subject-modelled trials, and the number of daily sessions.

Subject	Number of Times Criterion Reached on Each Noisemaker			Total Blocks of 10 Subject- Modelled Trials	Total Number of Sessions
	Bell	Horn	Clicker		
S1	8	6	8	134	22
S2	5	5	3	120	20
S3	2	3	3	75	12
S4	2	1	1	66	11

EXPERIMENT II

Experiment I showed that each subject consistently operated whichever noisemaker produced imitation by the experimenter. Experiment II sought to determine which variables in the experimental situation controlled the subjects' modelling behavior. Two questions were asked.

First, did the subjects consistently model imitated responses because the consequence of modelling either of the two nonimitated responses was mildly aversive? If the consequence of modelling nonimitated responses (*i.e.*, the experimenter behaving in a way "contrary to" the child's behavior) was aversive, then the subjects might have avoided that consequence by consistently modelling imitated responses.

Second, did the subjects consistently model imitated responses because by doing so they caused the experimenter to imitate them, or because modelling an imitated response caused the experimenter to behave more, or to be more active than did modelling a nonimitated response? In Experiment I, if the subject modelled an imitated response, the experimenter imitated his behavior directly before and during operation of that noisemaker. However, if the subject modelled a nonimitated response, the experimenter responded only by operating the other nonimitated noisemaker without imitating any of the subject's preceding behavior.

METHOD

Subjects and Apparatus

Subjects 1, 2, and 3 participated in Experiment II. Subject 4 did not want to participate.

No changes were made in the experimental apparatus.

Procedures

The two questions stated above were answered separately by varying the amount of experimenter behavior following the child's modelling of nonimitated responses in two ways: (1) by reducing the amount of experimenter behavior following the child's modelling responses and, (2) by increasing the amount of experimenter behavior following the child's modelling responses. Except for the procedures described below, the basic procedure described in Experiment I was unchanged.

Phase I: reducing the amount of experimenter behavior following models of non-imitated responses. If the consequence of modelling nonimitated responses (operation of the other nonimitated noisemaker by experimenter) was aversive, and if that consequence functioned to maintain modelling the imitated response, then removing that consequence should reduce the number of times the subject modelled imitated responses. The consequence of modelling a nonimitated response was changed by reducing the amount of experimenter behavior. Now, whenever the subject modelled a nonimitated response, the experimenter waited for 5 sec without responding and then said: "Did I do anything?" The consequence for modelling imitated responses remained the same. For Subjects 1 and 3, this procedure was in effect until they reached criterion (80%) on one imitated response. For Subject 2, the procedure was repeated for one shift of the imitated response.

Phase II: increasing the amount of experimenter behavior following models of non-imitated responses. If the subjects consistently modelled imitated responses because that caused the experimenter to produce more behavior or to respond more actively than did the modelling of nonimitated responses, then making the consequence of modelling both imitated and nonimitated responses equivalent with respect to the amount of behavior produced by the experimenter should reduce the number of times the subject modelled imitated responses. The experimenter produced several different nonimitative responses of varying topography following each of the subject's models of nonimitated responses. For example,

instead of only operating the other nonimitated noisemaker (as in Experiment I), the experimenter stood up, turned a complete circle, sat down, and then operated the appropriate nonimitated noisemaker. This procedure was in effect for Subjects 1 and 2 until they reached the 80% criterion on at least three different imitated responses. Subject 3 was removed from the preschool and did not participate in this procedure.

RESULTS

Recording and Reliability

During Phase I, the experimenter and one observer recorded each session exactly as they had done in Experiment I. The percentage of agreement between observer and experimenter for each item for each session was 100%.

During Phase II, two additional observers recorded each session from behind a one-way screen. They were instructed to record on each subject-modelled trial whether or not the experimenter made more than one response (including operation of a noisemaker) that was topographically dissimilar to the subject's modelled response, if it was a nonimitated response. If the subject modelled an imitated response, the observers recorded whether or not the experimenter's response was topographically similar to the subject's response. The percentage of agreement between these two observers was 99%.

Figure 2 presents the model responses of Subjects 1, 2, and 3 in Phase I. All subjects modelled imitated responses despite the reduction in the amount of nonimitative behav-

Fig. 2. The percentage of subject-modelled responses to each noisemaker for Subjects 1, 2, and 3 during Phase I of Experiment II. A plus mark (+) following the letters B, H, and C indicates which noisemaker (bell, horn, or clicker) was the experimenter-imitated response.

ior by the experimenter following the subject's modelling of nonimitated responses.

Figure 3 presents the model responses of Subjects 1 and 2 during Phase II. Both subjects modelled imitated responses despite increases in the amount and variety of dissimilar experimenter behavior following models of all non-imitated responses.

Throughout Experiment II, Subject 1 imitated 98% of the S^D responses modelled by the experimenter and 100% of the S^A responses. Subjects 2 and 3 each imitated all experimenter-modelled responses.

EXPERIMENT III

Experiments I and II together established that being imitated by the experimenter was a reinforcing event for the modelling behavior of Subjects 1, 2, and 3. The purpose of the

entire study was to evaluate directly the conditioned reinforcement explanation of generalized imitation (Baer and Sherman, 1964; Mowrer, 1960) by attempting to demonstrate (1) that behavioral similarity provided by an adult's imitation can function as a reinforcer for a child's modelling behavior and (2) that that reinforcing function depends upon behavioral similarity between the experimenter and the child being predictive of reinforcement for the child's responses (on experimenter-modelled trials). Experiments I and II provide evidence for the first point. Experiment III was conducted to evaluate the second point.

On experimenter-modelled trials, the subject's imitative responses always preceded reinforcement (the delivery of a nickel accompanied by "very good") and may have become predictive of that reinforcement. Stimuli that

Fig. 3. The percentage of subject-modelled responses to each noisemaker for Subjects 1 and 2 during Phase II of Experiment II. A plus mark (+) following the letters B, H, and C indicates which noisemaker (bell, horn, or clicker) was the experimenter-imitated response.

are predictive of reinforcement may have a reinforcing function also (*e.g.*, Lovaas, Freitag, Kinder, Rubenstein, Schaeffer, and Simmons, 1966). Perhaps imitation of the subject by the experimenter functioned as a conditioned reinforcer because imitation of the experimenter by the subject was predictive of reinforcement on experimenter-modelled trials. If so, then making imitation or behavioral similarity predictive of nonreinforcement on experimenter-modelled trials should weaken or eliminate the reinforcing function of the experimenter's imitation of the subject on subject-modelled trials.

METHOD

Subjects and Apparatus

Subjects 1 and 2 participated in Experiment III. No changes were made in the apparatus.

Procedures

Except for the procedures described below, the basic procedure described in Experiment I was unchanged.

Nonreinforcement of imitation on experimenter-modelled trials. Behavioral similarity was made predictive of nonreinforcement on experimenter-modelled trials by making the delivery of a nickel and "very good" contingent upon any subject behavior other than imitation. This procedure is called differential reinforcement of other behavior (DRO). On the first trial of the DRO procedure, the experimenter modelled a response and immediately delivered the reinforcer before the subject could respond. This DRO 0-sec procedure was used on approximately the first 17 experimenter-modelled trials for each subject. Thereafter, the experimenter delivered reinforcements to the subject for waiting for progressively longer periods of time, up to 10 sec, without imitating an experimenter-modelled response. The DRO procedure did not apply to models of S^A responses; reinforcement was not delivered regardless of whether or not an S^A response was imitated.

RESULTS

Recording Procedure

The experimenter and one observer recorded sessions exactly as they did in Experiment I. The observer had a stopwatch and signalled the experimenter when 10 sec elapsed

during the DRO procedure. Checks on the reliability of the experimenter's recording were made during every session. The percentage of agreement between observer and experimenter was never less than 99%.

The results of Experiment III for Subject 1 are presented in Figure 4. The percentage of subject-modelled responses to each noisemaker within blocks of 10 subject-modelled trials is plotted in the upper three graphs in Figure 4. Interspersed among the 10 subject-modelled trials of each block were three or four experimenter-modelled trials (every fourth trial on the average was an experimenter-modelled trial). The points in the bottom graph indicate the percentage of S^D model responses the child imitated. Occasionally, the experimenter modelled an S^A response. The child's imitation of S^A models is indicated by the squares in the bottom graph. Not more than one S^A model occurred during any block of experimenter-modelled trials. Since it was either imitated or not imitated, the squares are plotted either at 100% or 0% in the bottom graph.

During the first seven blocks, a DRO 0-sec procedure was employed on all experimenter-modelled S^D trials and operation of the horn was the imitated response. Under the DRO 0-sec procedure, Subject 1 imitated all S^D and S^A responses. On Block 9, the experimenter physically restrained the subject from making an imitative response on one S^D trial. After Block 11, imitation of nearly all experimenter-modelled responses ceased. Thereafter, Subject 1 reached criterion on four successive shifts of the imitated, subject-modelled response.

Figure 5 presents the results of Experiment III for Subject 2. The DRO 0-sec procedure was employed during the first seven blocks and the subject imitated all experimenter-modelled responses. The DRO shaping began on Block 8 and continued through Block 31. To ensure that this subject's imitative responses would decrease strictly as a function of exposure to the DRO contingencies, the experimenter never physically restrained him from imitating. Under the DRO 10-sec procedure, imitation of S^A responses declined rather rapidly in comparison to imitation of S^D responses. For this subject, the imitated noisemaker was not shifted until his imitation of all experimenter-modelled responses ceased. While imitative responses remained at zero under the DRO 10-sec procedure, Subject 2 reached criterion on

Fig. 4. The percentage of subject-modelled responses of Subject 1 to each noisemaker (upper three graphs) and the percentage of S^P responses imitated by Subject 1 on experimenter-modelled trials (bottom graph). Experimenter-modelled trials were interspersed among subject-modelled trials on a variable one-to-three ratio. The percentage of S^A (probe) responses imitated on experimenter-modelled trials is indicated by the squares in the bottom graph.

four successive shifts of the subject-modelled response.

The results for both subjects in Experiment III indicate that the reinforcing function of behavioral similarity (the experimenter's imitation of the children on subject-modelled trials) was not dependent upon whether or not the children received reinforcement for imitation on experimenter-modelled trials.

DISCUSSION

Earlier, three requirements of a direct confirmation of the conditioned-reinforcement hypothesis (Baer and Sherman, 1964; Mowrer, 1960) of generalized imitation were suggested. They were, first, a demonstration that behavioral similarity can function as a reinforcing stimulus in an imitation situation; second, a

Fig. 5. The percentage of subject-modelled responses of Subject 2 to each noisemaker (upper three graphs) and the percentage of S^P responses imitated by Subject 2 on experimenter-modelled trials (bottom graph). Experimenter-modelled trials were interspersed among subject-modelled trials on a variable one-to-three ratio. The percentage of S^A (probe) responses imitated on experimenter-modelled trials is indicated by the squares in the bottom graph.

demonstration that the (conditioned) reinforcing properties of behavioral similarity depend upon similarities being predictive of reinforcement in the imitation situation; and third, a demonstration that the reinforcing properties of behavioral similarity are powerful enough to maintain generalized imitative responding when "coercive controls" (*e.g.*, verbal instructions) are absent. The present study was concerned with the first two of these requirements.

The results of Experiments I and II indicate that behavioral similarity provided by the experimenter functioned as a positive reinforcing stimulus, thus satisfying the first requirement of the conditioned-reinforcement hypothesis. In addition, the results of Experiments I and II extend the findings of Parton and Fouts (1969), who found that a dimension of sim-

ilarity between nonbehavioral stimuli (*e.g.*, colors) could function as a positive reinforcer for preschool children's matching behavior. The present study extended that finding by showing that the children maximized the occasions on which the experimenter imitated some of their behavior.

The question may be raised whether the reporting procedure requiring the children to label (tact) the relation between their behavior and the experimenter's as the "same" or "different" was "coercive", and served to maintain the modelling of experimenter-imitated responses. After experimenter-modelled trials, the children were asked whether their response was the "same" as or "different" from the experimenter's model, and after subject-modelled trials they were asked whether the experimenter's response was the "same" as or "differ-

ent" from their model. The questions themselves may have compelled an answer—either "same" or "different"—but since no reinforcing or punishing consequences were differentially associated with either answer (except occasionally during the first four sessions with three subjects) it seems unlikely that the reporting could have influenced the children's modelling of experimenter-imitated responses.

Experiment III failed to satisfy the second requirement. The results clearly indicate that the reinforcing function of behavioral similarity was independent of whether or not the children's own imitative responses were reinforced on experimenter-modelled trials within this experimental setting. Thus, although imitation functioned as a reinforcer, no specific history of conditioning through which it acquired that function was demonstrated experimentally. The demonstration of some such history is crucial to the conditioned reinforcement explanation of generalized imitation.

The failure to demonstrate such a history in the present study is not surprising, since each child came to the experimental situation with a well-established imitative repertoire. In the process of acquiring imitative repertoires at home and in school, behavioral similarity provided by adults and peers may have developed conditioned reinforcing properties for these children that were too well established to be influenced by the DRO procedure of Experiment III. Observations of parent-child interactions well before children become skilled imitators might provide better opportunities for evaluating the conditioned-reinforcement hypothesis, or for demonstrating that the reinforcing properties of behavioral similarity do indeed depend upon similarity being predictive of reinforcement. A replication of Experiment III using children who displayed no spontaneous imitative behavior (e.g., very young children or retarded children) might show the dependence of the reinforcing function of behavioral similarity upon its predictive or discriminative properties.

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