

Conditions Governing Nonreinforced Imitation¹

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The present experiment tested alternative interpretations of imitative responding which is not explicitly reinforced. The conditioned reinforcement hypothesis assumes that positive reinforcement of matching responses endows similarity with rewarding properties that serve to maintain imitative behavior. According to the discrimination hypothesis, nonrewarded imitations persist in the absence of coercive control because individuals fail to discriminate differential reinforcement contingencies associated with diverse modeled behaviors. Measures were obtained of the rate with which children imitated exemplified activities as a function of whether or not models reinforced imitative responding, and whether the nonreinforceable responses differed topographically from rewarded demonstrations or were highly similar to them. In accord with the discrimination hypothesis, children continued to perform nonrewarded matching responses that were difficult to discriminate from rewarded imitations, but they discontinued imitating nonrewarding models and nonreinforced responses that were easily distinguishable. Evidence was also obtained that nonreinforced imitations may be maintained in some instances by erroneous anticipated consequences.

Recent years have witnessed a vigorous growth of research into the mechanisms governing observational learning and the conditions that control performance of matching behavior. Among the various controversies over modeling theories that have arisen is the explanation of imitative behavior which is not explicitly reinforced. This issue is of some importance because in everyday life and in most laboratory studies of delayed imitation (Bandura, 1969a), modeled behavior is often reproduced by observers in the absence of immediate external reinforcement.

Several interpretive schemes have been advanced to explain why nonreinforced

matching responses may be repeatedly performed. Baer and his associates (Baer, Peterson, & Sherman, 1967; Baer & Sherman, 1964) have interpreted the phenomenon in terms of conditioned reinforcement, and speak of "generalized imitation." According to this view, if accurate reproduction of modeling stimuli is frequently reinforced, behavioral similarity per se eventually acquires conditioned reinforcement properties. After similarity has become reinforcing in its own right, persons are disposed to perform imitative responses for their inherent reward value.

Experimental tests of the aforementioned hypothesis typically employ a discrete trial paradigm that proceeds in the following manner: Children are instructed by the model to imitate simple responses that he demonstrates sequentially, and each correct matching response is promptly reinforced. After a stable high rate of imitative responding is established a few similar responses that are never rewarded are randomly interspersed within a large changing set of reinforceable ones. Children generally imitate nonrewarded responses as long as accurate reproduction of other modeled behavior is positively reinforced. Continued imitation of

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nonrewarded responses is taken as confirmatory evidence that behavioral similarity has become endowed with reinforcing functions.

Explanation of nonreinforced imitation in terms of conditioned reinforcement is open to question on the basis of both conceptual and empirical considerations. First of all, the theory explains more than has ever been observed. If behavioral similarity is, in fact, inherently reinforcing, then people should display widespread reproduction of all types of behavior exhibited by different models. In actuality people tend to be selective in what they reproduce. A conditioned reinforcement interpretation would, therefore, have to include some contravening conditions to explain why people do not imitate indiscriminately everything that they may happen to observe.

According to the formulation proposed by Bandura (1969a; 1971), performance of imitative behavior is for the most part controlled by anticipated consequences of prospective actions. These anticipated consequences are established through differential reinforcement that is either directly experienced, inferred from observed response consequences of others, or conveyed through verbal explanations.

A variety of stimulus events can assume discriminative functions in signifying probable outcomes resulting from imitative behavior. People are often differentially reinforced for matching the behavior of models who differ in status, power, competence, age, sex, and a variety of other attributes. Model characteristics, therefore, often serve as discriminative stimuli for likely reinforcement contingencies. Differential consequences also often accompany different activities. Thus, for example, parental models are quick to reward their children for emulating achievement behavior, but they are inclined to discourage imitation of their martini drinking or cigarette smoking. Probable consequences can thus be conveyed by distinguishable features of the modeled behavior itself. Through a similar process of selective reinforcement, situational, temporal, and other cues likewise acquire informative value.

An alternative interpretation of the occurrence of nonreinforced modeling in the absence of coercive pressures can, therefore, be

offered in terms of discrimination rather than conditioned reinforcement processes. When a few nonrewarded modeled responses are randomly distributed in a large number that are consistently reinforced the two sets of responses cannot be easily distinguished and are, therefore, likely to be performed with similar frequency. If, on the other hand, the model performed a series of reinforced responses, followed by a set of readily discriminable responses that are never rewarded, the observer would eventually recognize that the latter responses never produce positive outcomes and he would, in all likelihood, discontinue imitating them. A discrimination hypothesis thus leads to a prediction which is opposite to that derived from the principle of secondary reinforcement. According to the acquired reward interpretation, the longer imitative responses are positively reinforced, the more strongly behavioral similarity is endowed with reinforcing properties and, consequently, the greater should be the resistance to extinction of nonrewarded matching responses. In contrast, a discrimination hypothesis would predict that the longer the differential reinforcement practices are continued, the more likely the observer is to distinguish between rewarded and nonrewarded matching behaviors, with resulting rapid decline of nonreinforced imitativeness.

To test this discrimination hypothesis, young children participated in a modeling situation patterned after the generalized imitation paradigm except that pressures for imitation, such as instructing children to perform modeled responses, waiting expectantly for long periods when they fail to do so, and other extraneous influences described later, were eliminated. These coercive controls were removed because demonstrations that children will perform imitative responses that are otherwise nonrewarded when pressed to do so have little practical or theoretical significance.

During the initial phase of the present study children were positively reinforced for reproducing a series of motor responses until they displayed a high level of imitative behavior. In the next phase, which measured generalization of imitation across models, children were consistently reinforced for re-

producing motor responses demonstrated by one model, but they were never rewarded for imitating a second model of the opposite sex who exhibited a subset of similar motor responses in the same sessions.

The final phase of the study was designed to test whether children would display differential imitation of the previously rewarding model depending on the discriminability and functional value of his behavior. Accordingly, he modeled three different sets of responses. These included the same reinforceable set of motor responses that continued to be rewarded; a subset of nonrewarded motor responses having no common distinguishing features that were randomly interspersed among similar rewarded motor responses; and a second subset of nonreinforced responses consisting of vocalizations that would make them distinguishable.

It was predicted that children would show high imitation of both the rewarded motor responses and the indistinguishable nonrewarded motor responses performed by the same model. On the other hand, imitation of the nonrewarding model and nonreinforced vocalizations by the rewarding model, for which the reinforcement contingencies are more readily discernible, would occur at a low level and decline progressively with succeeding modeling trials. No predictions were advanced, however, regarding differential imitation of behavior modeled under the latter two conditions.

Method

Subjects

Four severely retarded children with Stanford-Binet IQs between 31 and 50, and 12 normal kindergarten children, of lower-middle-class background served as subjects in the present experiment. Both types of children were included because previous studies of generalized imitation are primarily based on samples drawn from these two populations. The mean age of the retardates was 7 years 7 months, while the kindergarteners averaged 6 years 3 months. There was a total of 6 girls and 10 boys in the sample.

General Procedure

The discrete trial paradigm used to study generalized imitation typically includes a variety of extraneous rewards and coercive controls that can result in multiple confounding of the effects of reinforcement variables on imitative responding.

When models bring children to and from experimental situations, as is typically the case in these studies, the social interactions that inevitably occur between the participants over a long series of sessions can significantly affect children's level of imitativeness. Explicit demonstration of discrete responses in a trial-by-trial procedure by a model who also visibly records the children's performances are additional features that may compel imitative responding. To complicate matters further, initially each modeled response is generally preceded by a command to perform the demonstrated behavior. When children do not respond the model waits expectantly without saying anything for a relatively long time which can be quite upsetting. The strained silence can be terminated or attenuated only by performing the requested response. If subjects still fail to respond imitatively, the desired behavior is physically prompted by the model. Escape from discomfort created by the social demands could serve as a more powerful source of reinforcement maintaining imitative responding than the material rewards dispensed by the model. These factors might account for why responses modeled under such conditions are often imitated regardless of the rewarding consequences that are deliberately arranged (Peterson & Whitehurst, 1971; Steinman, 1970b).

In keeping with common usage, the term nonreinforced imitation is applied in this article to the occurrence of matching responses for which experimenters provide no direct reinforcement. As noted above, however, the procedures that have been widely employed to study this phenomenon inadvertently create contingencies wherein imitation produces external reinforcing consequences. Several general procedures were, therefore, adopted in the present experiment to minimize coercive control over imitative responding. In order to eliminate variability in imitative behavior arising from differential relationship experiences, children were escorted to and from the experimental room by a female assistant who did not participate in any way in the modeling sessions. No interactions took place between the children and the model outside the experimental room. However, to help the children become acquainted with the models by sight, they made several brief appearances on the play yard and in the classroom, without interacting with the children.

On the first day, the assistant brought the children individually to the room in which the experiment was to be conducted, where they played freely with various toys and puzzles. These preliminary activities were included to familiarize children with the experimental room, and to allay any apprehensions they might have about being removed from their classroom. At the end of the initial session the assistant explained to the children that they would meet the next day with other adults but otherwise no further instructions were given about the modeling situation.

During the imitation session experimenters modeled responses sequentially without instructing children to perform their behavior. Another im-

portant factor involved timing considerations. Extensive pretesting revealed that if children were going to imitate the model's behavior they invariably did so during or immediately upon completion of the demonstration. Any subsequent waiting time served merely as a social demand for them to respond when they would not otherwise do so. Consequently, after a given response had been modeled, children were given 3 seconds to initiate a matching response, which provided more than ample time without forcing behavior from them.

Eye contact can serve, among other functions, to control the attention of others, to prompt response from them, and to reinforce their behavior. In this study the model focused his attention on the movements he was performing during response demonstration and on the list of items pinned to the side of the table during the waiting period. Eye contact was established and maintained with the child only when he was being reinforced.

If children failed to imitate within the specified interval, the model demonstrated the next response. Whenever children reproduced a response in the nonreinforced class, the model waited for 3 seconds—the time that it would ordinarily take to administer rewards—and then proceeded to demonstrate the next response. On the other hand, accurate reproductions of modeled behavior in the reinforced class produced a series of positive consequences. The model smiled, attended to the child, praised him, occasionally patted or tickled him, and offered him cookies, candy, or sherbert as rewards. The aforementioned procedures were employed in all phases of the experiment. Children participated in the study daily, in sessions of approximately 5-minute duration.

Four different sets of responses were employed in various phases of the experiment. Three of these sets consisted of motor responses similar to those used by Baer et al. (1967), having no conspicuous features that would make them distinguishable from each other. One of these sets, which contained 20 items, was assigned to the reinforced group. These responses were demonstrated by the rewarding model in every session of the experiment and correct reproductions were consistently reinforced. The second group of motor responses, comprising 10 items, was exhibited in the dual model phase of the experiment by the nonrewarding model, and was never reinforced. The third set of 5 motor responses, which was demonstrated in the last phase of the study by the rewarding model, was likewise never reinforced. Finally, the fourth set of items, also used in the final phase and never reinforced, included 5 vocal responses that were easily discriminable from the motor responses. The motor responses included simple activities such as brushing one's hair, and squeezing oneself with the arms, while the vocal responses contained vowel speech sounds (e.g., OO, EE) clearly within the children's capabilities.

These sets of responses were modeled with imitation-contingent reinforcement for six children who were not participants in the formal study to

measure whether the items were of comparable difficulty level. These children were drawn from the same classroom as their experimental counterparts. The percentage of correct reproductions was 98.4, 98.7, and 100 for the motor reinforced, motor nonreinforced, and vocal nonreinforced responses, respectively. The three sets of responses were thus virtually identical in the ease with which they could be reproduced.

All of the children's responses were scored independently by the two experimenters. Responses were recorded by activating inconspicuous foot-switches connected to an Esterline-Angus event recorder. During the dual model phase both experimenters scored the responses in the experimental room, while in the single model phase the second experimenter observed through a one-way screen and recorded the children's imitative behavior. High interscorer reliabilities were obtained, ranging from 97% to 99% for the different sets of responses.

Two adults, a male and a female, served as models. The sex of the model who rewarded imitation was counterbalanced so that the female functioned as the rewarding model with some of the children, and the male served in that role with the remainder. It was originally planned to use a balanced design. However, due to an initial difference mainly in the retarded children's spontaneous imitation of male and female models, and the decision to include all subjects who qualified for the experiment, the reinforcing role was performed by the female model with 11 children and by the male with 5. The experiment, which contained three separate phases, proceeded in the following manner.

Establishment of Imitative Responding

The preliminary phase of the study was designed to produce a high level of imitative responding in children so that behavioral similarity could be frequently reinforced before differential reinforcement was instituted. High stable imitativeness constituted the precondition for inclusion in the experiment. After the assistant seated the child at the table the experimenter modeled the 20 reinforceable motor responses sequentially without instructing the child to reproduce his behavior. Whenever the child performed a correct imitative response he was promptly rewarded as described earlier.

This phase was continued until children reached the criterion of at least 75% correct imitations. A standard sequence of procedures was employed to produce a high level of imitative responding without resort to coercive controls. If children failed to attain the selected criterion in the first session of imitation-contingent reinforcement, they received an additional session in which correct imitations were positively reinforced. As is shown later, the vast majority of children did not perform a single imitative response during either of the first two sessions.

Since the behavior being modeled was clearly

within the children's capabilities, it was assumed that the absence of imitation was not a question of either learning to imitate or learning the specific behaviors being demonstrated. Rather, the apparent imitation deficit primarily reflected a lack of awareness of the reinforcement contingencies—that reproducing the model's behavior was appropriate and would bring rewarding consequences. To convey this contingency information without having experimenters assume a compelling role, a brief peer-modeling procedure was used.

During the third session, nonimitating children took turns in modeling trials with a peer who had been preinstructed by the experimenter to reproduce his behavior. After demonstrating a response for the peer and rewarding his matching behavior, the experimenter modeled two items for the subject and rewarded accurate imitations; this procedure was continued until 10 peer-modeling trials and 20 subject-modeling trials were completed. Since the observational trials were designed to convey contingency information rather than to produce response learning, the responses modeled for the peer were never administered to the subjects. Peer modeling proved exceedingly effective, producing essentially asymptotic imitative performances immediately in most children. To further strengthen and stabilize their imitative behavior, subjects participated in an additional session without the peer during which the 20 reinforceable responses were demonstrated and correct imitations were reinforced.

Four retardates and three kindergarteners who did not display response gains after observing another child rewarded for imitation were given multiple peer modeling of the same behavior, manual prompting of matching responses, or verbal instructions to perform demonstrated behavior, merely to show that imitative responding can be promptly instated by compelling methods. The retardates imitated nearly all modeled responses (87%) when, in addition to these procedures, specific idiosyncratic reinforcers were introduced. The kindergarteners showed a similar marked imitativeness (99%) in response to explicit requests for them to reproduce demonstrated behavior. These children were not included in the formal study because the forceful induction influences would obscure the effects of response discriminability and manipulated reinforcement contingencies on imitation of nonreinforced behavior.

Differential Reinforcement of Imitation through Dual Modeling

In the second phase of the experiment, which measured generalization of imitation across models, children performed the imitation task with both the male and the female model. The rewarding model continued to demonstrate and to reinforce imitation of the 20 reinforceable motor responses. The nonrewarding model performed 10 motor responses in each session, but children were never reinforced for imitating them. During the first dual modeling session, the nonreinforced re-

sponses were randomly intermixed with the 20 reinforced items; in subsequent sessions the nonreinforced responses were modeled in two blocks of 5 items each, one block coming within the first third and the other block within the last third of reinforceable responses demonstrated by the rewarding model. Each experimental session thus contained a total of 30 modeling trials.

Differential reinforcement for imitation of the two models was continued until children either ceased imitating the responses exhibited by the nonrewarding model or, in the event that this did not occur, after five sessions were completed.

Differential Reinforcement of Responses Exhibited by the Same Model

In the third and final phase of the study the experimenter who had modeled only reinforced responses in preceding sessions displayed three sets of responses associated with different reinforcement contingencies. The 20 reinforceable motor responses continued to be modeled and children were consistently rewarded for imitating them. The set of 5 nonreinforced motor responses was randomly interspersed among the larger number of reinforced motor responses. In addition, the experimenter modeled the 5 easily distinguishable but nonrewarded vocal responses.

During the initial session of this phase of the experiment the three sets of responses were randomly intermixed. Thereafter, the nonreinforced motor responses continued to be distributed throughout the set of reinforced motor responses in an unpredictable order, while the vocalizations were modeled one after the other within a single block of trials, to further increase their discriminability. As in the preceding phase, differential reinforcement of matching behavior was continued until children either ceased imitating the discriminable vocal responses, or until five sessions were completed.

Postexperimental Interview

At the conclusion of the experiment all of the kindergarten children were interviewed by the assistant to assess the degree to which they discerned the differential reinforcement contingencies and whether or not they regulated their imitative performances in accordance with this knowledge. In addition, children were administered a brief contingency recognition test in which the assistant demonstrated two responses drawn at random from each of the three sets of responses performed by the rewarding model, and the children reported whether or not the different responses had been reinforced during the experimental sessions.

Results

Seventy percent of the children performed no matching responses during the initial two sessions of imitation-contingent reinforcement. Observing a peer model rewarded for

imitation produced an abrupt rise in correct matching responses from 0% to 90% in these initially nonimitative children. Thus, a few vicarious reinforcement trials were sufficient to convey the information necessary to instill a high level of imitative responding. Chi-square analyses of initial imitativeness, based on the combined data from the 16 subjects and the subgroup of children who participated only in the imitation induction phase, revealed no significant sex differences, nor did retardates and kindergarteners differ in this respect. However, children in this initial phase were more prone to imitate spontaneously the female model than the male model ($\chi^2 = 4.69, p < .05$). This initial difference was due mainly to the retardates, since the kindergarteners, who make up the bulk of the experimental sample, were equally imitative of the two models ($\chi^2 = .57$). Moreover, as is shown later, after children discovered in the introductory sessions that it was appropriate to imitate the modeled activities both the retardates and the kindergarteners were equally responsive to the two models during the experimental phases of the study.

The postexperimental recognition test was scored to determine the accuracy with which children identified the reinforcement contingencies associated with the various responses. They specified the correct consequences without error (100%) for the rewarded motor responses; they were highly accurate (75%; $p < .05$) with respect to the nonrewarded vocal responses; but their accuracy rate (58%) for the nondiscriminable motor responses that were never reinforced did not differ significantly from the 50% chance level. The experimental procedures thus succeeded in creating uncertainty about the consequences accompanying imitation of responses in the last class.

Total Imitation

The percentages of correct imitations were transformed to arc sines to reduce heterogeneity of variance and all the statistical tests were applied to the transformed values. An overall analysis of variance was computed on correct imitations shown by children in the two phases of differential rein-

forcement. Response class was a major contributor to variation in imitativeness ($F = 4.13, p < .01$), but neither sex of the model nor the interaction of these two variables had any significant effects.

The mean percentage of correct imitations was 94.6 for the reinforced motor responses; 93.8 for the intermixed motor responses that were never reinforced; 69.9 for the nonreinforced vocal responses; and 52.5 for the motor responses demonstrated by the nonrewarding model. Individual comparisons between these means reveal that both discriminability of responses and discriminative properties of the model are, as hypothesized, important determiners of imitative responding. Models who rewarded matching responses were imitated much more frequently than models who never rewarded the children for reproducing their behavior ($F = 25.34, p < .001$). Nondiscriminable motor responses that never received reinforcement in the single model phase of the study were imitated at the same high rate as reinforced motor responses exhibited by the same model ($F = .04$). By contrast, nonreinforced vocal responses were imitated to a substantially lesser degree than either the reinforced motor responses ($F = 7.20, p < .025$) or the nonrewarded motor responses intermixed within the latter group ($F = 6.20, p < .025$).

In addition, children were much less inclined to perform motor responses displayed by the nonrewarding model than they were to imitate nonreinforced motor ($F = 23.42, p < .001$) and vocal ($F = 6.20, p < .025$) responses exhibited by the rewarding model.

Imitation on Successive Modeling Trials

A more stringent test of the discrimination hypothesis can be made by comparing changes in rate of imitative responding in the different response classes over successive modeling trials. For this analysis, the total number of modeling trials that each subject received in each of the response classes was divided into five equal blocks. This was done separately for data from the dual model and the single model phases. The mean percentages of correct imitations on the five successive blocks of modeling trials are plotted in Figure 1.

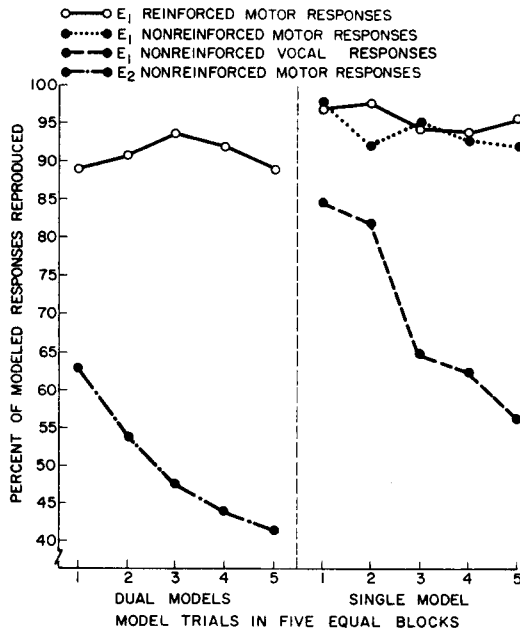


FIG. 1. Percentage of modeled responses reproduced by children on successive blocks of modeling trials as a function of differential reinforcement for matching performances based on model characteristics and topography of the responses. (E_1 refers to the model who rewarded imitations of 20 motor responses; E_2 refers to the model who never reinforced children for reproducing his behavior.)

Dual model phase. A two-way analysis of variance performed on data from the dual model phase of the study revealed a significant main effect for the differential reinforcement contingencies associated with the two models ($F = 16.23, p < .005$), and a significant Models \times Blocks of Trials interaction ($F = 3.54, p < .025$). Separate trend analyses disclosed no change in the degree to which children imitated the rewarding model across trial blocks ($F = .22$), whereas they showed a progressive decline in imitation of the nonrewarding model ($F = 57.85, p < .001$).

Tests of significance were also conducted on the differential imitation of the two models at each of the five blocks of modeling trials. The model differences are highly significant on the first block ($F = 22.97, p < .001$) and the F values for these differences increase with successive trial blocks, the fifth one yielding an F value of 79.64 ($p < .001$).

Single model phase. Similar statistical analyses were computed on differential imitation of the three sets of responses demonstrated by the rewarding model in the third phase of the experiment. Analysis of variance of these scores showed significant differences for response class ($F = 8.06, p < .005$) and blocks of trials ($F = 4.36, p < .005$), as well as a significant Response \times Blocks interaction effect ($F = 2.64, p < .02$). In tests for linear trend, imitation of reinforced motor responses ($F = .07$) and nondistinguishable motor responses that were never rewarded ($F = .81$) remained consistently high across blocks of trials. Imitation of nonreinforced vocal responses, on the other hand, dropped sharply ($F = 30.97, p < .001$) over successive modeling trials.

In separate comparisons between mean imitation scores, reinforced and nonreinforced motor performances did not differ from each other at any of the five trial blocks. By contrast, vocal responses were imitated less often than the two sets of motor responses on the first block of modeling trials ($F = 6.58, p < .02$), and the significance levels became progressively larger as reproduction of vocal responses decreased sharply on succeeding trials. At the fifth and final block of modeling trials the difference between vocal and motor imitations was highly significant ($F = 49.59, p < .001$).

Supplementary Analyses

The variances within the classes of responses differed somewhat. Although the treatment effects are sufficiently large that they remain significant even by highly conservative statistical standards, the data were also analyzed by nonparametric methods. Results of these supplementary analyses are essentially the same as those yielded by the parametric tests. The Friedman two-way analysis of variance computed on the total imitation scores revealed differential imitation depending on the ease with which the reinforcements accompanying the various groups of responses could be discerned ($\chi^2 = 9.52, p < .025$). Reinforced and nondiscriminable nonreinforced motor responses were imitated at an equally high rate but both differed above the .02 significance level

from vocal imitations, and beyond the .005 level from reproductions of motor responses exhibited by the nonrewarding model. No significant differences were obtained in the extent to which the latter two discriminable classes of nonreinforced responses were imitated.

Wilcoxon signed-rank tests performed on the data from the dual model phase showed that children imitated the rewarding model substantially more often than the nonrewarding model, beyond the .005 significance level at each of the five successive blocks of modeling trials. On similar Wilcoxon analyses of reproduction scores from the single model phase, children imitated the rewarded motor responses and the nondiscriminable nonreinforced responses at the same high level throughout the series, whereas vocal imitation diverged progressively more from them. In the first two blocks of trials, vocal imitation differed beyond the .05 and .025 significance level from the rewarded motor responses but not from the nonrewarded ones; in the third block, vocal imitation departed from the latter two groups beyond the .01 and the .025 levels, respectively; vocal imitation differed from each of the two sets of motor responses beyond the .025 significance level in the fourth block, and at the .01 level in the fifth block of modeling trials.

The preceding statistical analyses are based on composite data from the 16 children in the experiment. Although most of the children displayed discriminative modeling there was, of course, some intersubject variability in imitative performances both across models and over the different classes of responses. Individual performance curves presented in Figure 2 illustrate the different patterns of imitative responding obtained in the study.

Children's responses to the postexperimental interview indicated that imitation of discriminable nonrewarded responses, when it did occur, was primarily controlled by erroneous expectations regarding probable consequences for nonresponding. Some believed that they were obliged to reproduce all modeled behavior ("I supposed to"); in others nonrewarded imitative performances were maintained by mistaken beliefs that eventually the unresponsive model would be-

come more beneficent ("I thought if I kept trying lots of times he might get used to it and start up giving candy like the lady did"); and still others performed some nonrewarded behavior to confirm their hypotheses about the responses required to obtain reinforcement ("Sometimes I'd do it and sometimes not to see if I'd get any candy.").

Discussion

Findings of the present experiment reveal that discrimination processes play an influential role in nonreinforced imitation. When differential consequences associated with diverse modeled behavior can be readily discerned, either on the basis of distinguishable model characteristics or topography of the responses themselves, children perform rewarded imitations at a high stable rate, but they discontinue nonrewarded imitations. Under conditions where some imitative responses are positively reinforced, similar nondiscriminable responses can be effectively maintained even though they never produce reinforcement. These findings, taken together, call into question the conditioned reinforcement hypothesis, which assumes that if some matching responses are rewarded, similarity itself becomes a conditioned reinforcer that maintains all nonreinforced imitative behavior.

Results of a number of other studies similarly are counter to the hypothesis that performance of nonrewarded imitations is under intrinsic reinforcement control. Rather, such performances are generally sustained by a variety of external stimulus supports; consequently, nonrewarded imitations promptly cease when these external controls are removed. It has been shown, for example, that nonreinforced imitations drop markedly when instructions to imitate modeled behavior are rescinded (Zahn & Yarrow, 1970), when tangible rewards used to reinforce other matching responses are not visibly displayed (Berkowitz, 1968), when nonrewarded responses are spontaneously demonstrated by the same model in a different context (Zahn & Yarrow, 1970), and when the model absents himself from the room immediately after demonstrating nonreinforced responses (Peterson & Whitehurst, 1971).

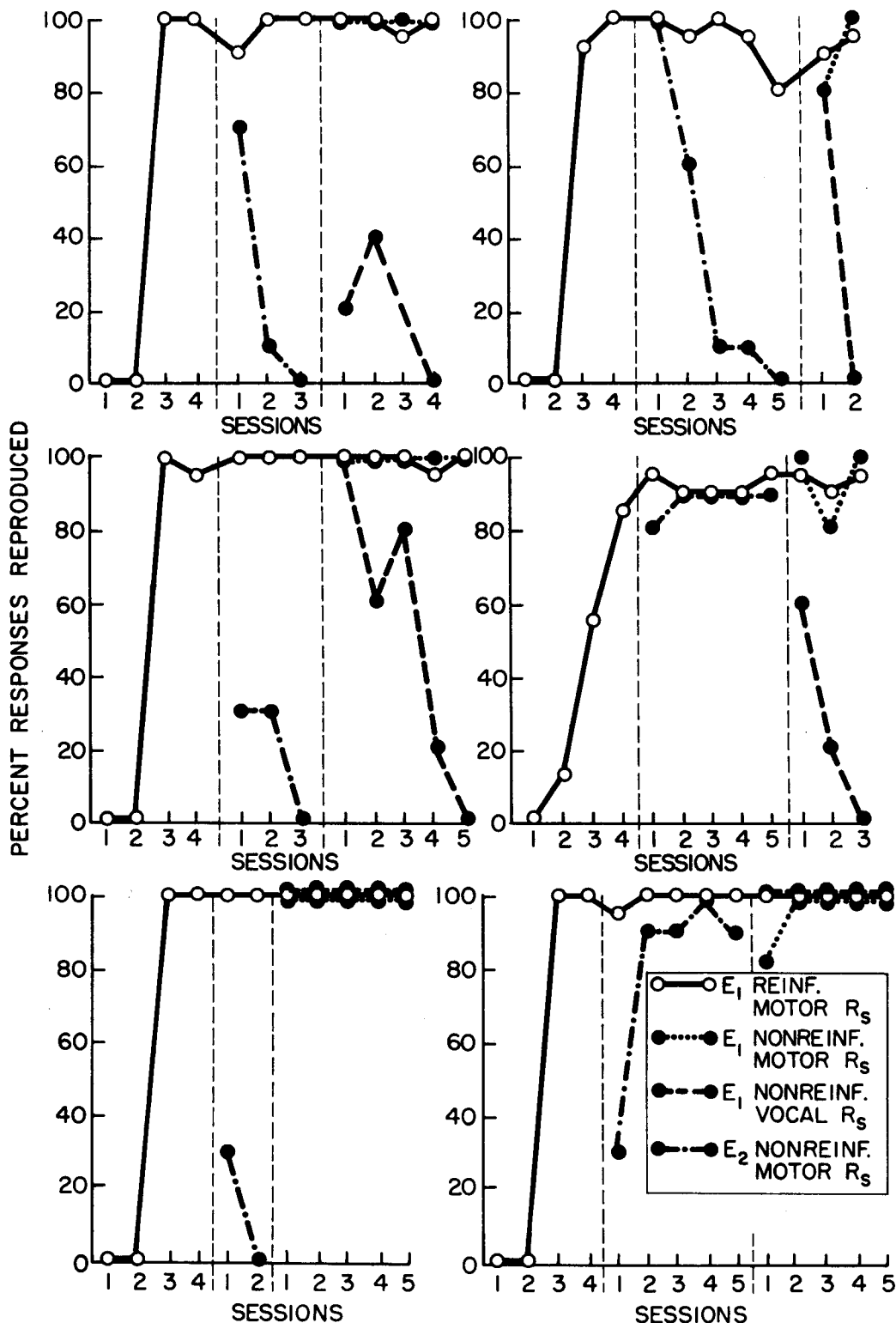


FIG. 2. Differential imitative performances of individual children across models and different classes of modeled behavior. (The first two sessions of the initial phase involved imitation-contingent reinforcement; the third session included peer modeling with imitation-contingent reinforcement; in the fourth session, children received additional imitation-contingent reinforcement to strengthen further imitative responding. The child whose data are presented in the middle right graph increased matching responses on the basis of imitation-contingent reinforcement and did not receive peer modeling. The second phase included dual modeling with differential reinforcement. The third, and final, phase involved differential reinforcement of different classes of responses demonstrated by the rewarding model.)

Finally, in studies presented in support of the conditioned reinforcement hypothesis (Baer et al., 1967; Brigham & Sherman, 1968), when contingent reinforcement for imitative responses is discontinued all imitations generally drop precipitously and reappear with equal suddenness when reinforcement of some imitations is reinstated. If behavioral similarity were rewarding in its own right, matching performances should not undergo such abrupt changes the moment that external reinforcement for the larger subclass of imitative responses is withdrawn. The intrinsic rewards arising from precise response duplication, if operative, should sustain imitative behavior for some time in the absence of extrinsic reinforcement.

The preceding discussion is not meant to imply that all imitative behavior is exclusively under the joint control of discriminative stimuli and external reinforcement. Imitative behavior can be rendered partially independent of its external consequences. It is important to distinguish, however, between response similarity as an automatic conditioned reinforcer and self-reinforcement of one's own performances. There is a growing body of evidence (Bandura, 1971) that human behavior is extensively under self-reinforcement control. In this type of self-regulatory system people set themselves certain performance standards and respond to their own behavior in self-rewarding and self-punishing ways in accordance with their self-imposed demands. For this reason similarity is not invariably rewarding. People are inclined to respond self-approvingly, and thereby to reinforce their own efforts, whenever they achieve close matches to meritorious performances. On the other hand, equally close matches to devalued behaviors are likely to evoke self-punishing reactions and are therefore not repeated.

In several experiments reported by Steinman (1970a, 1970b), in which each modeled response was preceded by a command to the child to reproduce the demonstrated behavior, children imitated nonreinforced responses that they discriminated when no other alternatives were available. Discriminative responding is, of course, unlikely to emerge under conditions where subjects are commanded to respond alike to stimuli that

are correlated with reinforcement and those that are not. When strong coercive control is superimposed on a differential reinforcement schedule one would expect children to perform the demanded behavior regardless of whether or not it might later be rewarded. Steinman's research provides a convincing demonstration that instructional control can override the effects of differential reward for imitation in the paradigm widely employed to study nonreinforced imitation. However, the findings have little bearing on the more important question of whether failure to discriminate differential consequences accounts for persistence of nonrewarded imitations under conditions where modeled behavior is rarely, if ever, preceded by commands for immediate imitation.

When children were given choices between imitating reinforceable and nonreinforceable modeled responses (Steinman, 1970b) they initially exhibited a relatively high rate of nonrewarded imitations but decreased such performances in succeeding modeling trials. Moreover, nonrewarded imitations were performed at a much higher level when they were topographically similar to the reinforced demonstrations than when they differed from them. This pattern of results, from the few cases studied, lends further support for the discrimination hypothesis.

Considering the coercive features inherent in the generalized imitation paradigm, it may be poorly suited for exploring the reinforcement conditions governing generalization of imitative responding, especially as it occurs in everyday life. Imitative responding is so strongly determined by characteristics of the procedure itself that, unless a host of extraneous influences are removed, the effects of variables known to exercise a high degree of behavioral control are obliterated. Paradigms in which reproduction of modeled behavior is measured at varied temporal intervals, in relation to different models, and in different social contexts, are likely to yield more representative empirical relationships. Much of the research conducted within the social learning framework (Bandura, 1969b; Flanders, 1968; Masters & Morris, 1970), in fact, investigates conditions governing the occurrence of nonreinforced imitations under these more natural circumstances.

It is interesting to note that some of the children in the present study recognized the differential reinforcement contingencies but they did not act on their knowledge because of erroneous expectations that nonimitation would be punished, or that ignored imitations would eventually be rewarded. The influential role of anticipated consequences in regulating imitative behavior is consistent with evidence reported by Kaufman, Baron, and Koff (1966) that illusory schedules of reinforcement can exercise strong control over nonimitative responding. In that study, the reinforcement schedules that subjects believed to be in effect outweighed the influence of the program of reinforcement that was actually imposed on their behavior. These and other similar findings indicate that theories assuming that imitative behavior is maintained solely by extrinsic reinforcers (Gewirtz & Stingle, 1968) must consider cognitive influences on behavior if their predictive power is to be increased.

Unlike the prevalence of imitativeness in more lifelike modeling situations, children were initially reluctant to imitate an unfamiliar adult in the discrete trial paradigm. Considering that the models exhibited unrelated disjunctive actions in a formal setting it is not surprising that most children did not imitate until shown by a reinforced peer that it was appropriate and functional to behave that way. When repeated presentation of modeling stimuli fails to produce imitative behavior, the observers are often characterized as "lacking imitative repertoires." The precise nature of the presumed deficit—whether it be absence of behavioral elements, of integrated matching responses, or of imitative sets—is never specified. Results of the present experiment reveal that nonimitators are fully capable of behaving imitatively but they fail to do so for a variety of other reasons. A high level of imitative responding was promptly elicited from these children when reinforcement contingencies were made more explicit, when idiosyncratic reinforcers were introduced, or when a familiar person served as the model; and two of the retarded children imitated only if food rewards were deleted! When imitative deficits are prematurely invoked, search for condi-

tions determining nonimitativeness is apt to be discontinued.

The implication of the overall research findings is that if one wished to produce indiscriminate imitation one would consistently have to reinforce imitation of different models performing diverse behaviors in varied settings, rather than depend on an inherent reinforcement mechanism to do the job. Such an outcome would not only be exceedingly difficult to achieve and even harder to maintain under the highly variable contingencies of everyday life, but since adaptive functioning requires discriminative responding, it would often create adverse consequences for undiscerning imitatees.

"Generalized imitation" might be more accurately designated as generalization of imitative responding which is largely regulated by discriminability of stimuli signifying probable consequences, by prior history of selective reinforcement of imitative performances, and by subjective reinforcement contingencies derived by individuals from other informative cues. These influences control imitative behavior primarily through anticipated consequences that may or may not accurately reflect objective conditions of reinforcement. In everyday life, of course, some imitative behavior is undoubtedly self-maintained in the absence of external reinforcement through self-rewarding reactions to one's own skillful reproductions of personally valued activities.

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