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THE SOCIAL CONTROL OF GENERALIZED IMITATION[1]

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Instructions, discrimination procedures, and sources of reinforcement were manipulated in order to determine the bases for the maintained "non-reinforced" imitations observed in generalized imitation research. Six girls received imitation training from two exprimenters. One experimenter modelled only reinforced responses; the other modelled only non-reinforced responses. The children imitated all responses when no reinforced alternative was available, even though results of choice procedures and special instructions clearly demonstrated that they discriminated reinforced from non-reinforced responses. Instructions not to perform non-reinforced imitations immediately eliminated these behaviors. It is suggested that social setting events may be largely responsible for generalized imitation.

Much of the current research on imitation has focused on the issue of whether reinforcement is necessary for the development and maintenance of imitative behavior. Although it has been found that imitative behavior will develop if the child is rewarded for imitating, it has also been found that imitative behaviors that have never been reinforced can be developed and maintained as long as other imitative responses continue to be reinforced (Baer and Sherman, 1964; Metz, 1965; Lovaas, Berberich, Perloff, and Schaeffer, 1966; Baer, Peterson and Sherman, 1967; Lovaas, Freiteg, Nelson, and Whalen, 1967; Brigham and Sherman, 1968; Peterson, 1968; Burgess, Burgess, and Esveldt, 1970; Peterson and Whitehurst, 1970; Steinman, 1970). The non-reinforced imitations, maintained under these conditions, have been termed "generalized imitations" (Baer and Sherman, 1964).

To account for the generalized imitation findings, three major "explanations" have been proposed: (1) the "conditioned reinforcement" explanation (Baer and Sherman, 1964; Lovaas *et al.*, 1966; Baer *et al.*, 1967); (2) the "discrimination" explanation (Bandura, 1968, 1969a, b); and (3) the "reinforcement scheduling" explanation (Gewirtz, 1968; Gewirtz and Stingle, 1968).

The "conditioned reinforcement" explanation was the earliest of the explanations to be proposed. It was noted that in the generalized imitation paradigm, the child is given a reinforcer only after he has behaved similarly to the behavior of the model. Behavioral similarity, then, is often followed by reinforcement. If one can conceive of behavioral similarity as a "stimulus", then this "stimulus" often precedes reinforcement and, therefore, can develop conditioned reinforcement properties. Since the response-produced conditioned reinforcement occurs on non-reinforced trials as well as on reinforced trials, non-reinforced imitations continue to be performed despite the differential reinforcement. In short, the conditioned reinforcement explanation suggests that two reinforcement operations are simultaneously operative within the generalized imitation paradigm: (1) directly manipulated differential reinforcement, and (2) abstracted conditioned reinforcement derived from the manipulated reinforcers.

The "conditioned reinforcement" explanation can be criticized on both logical and empirical grounds. Logically, it would be difficult to explain why differential reinforcement should be effective under any circumstances, if the "conditioned reinforcement" explanation were true. Response-produced stimuli occur in every operant situation and they are frequently followed by reinforcement. How can stimulus control be developed under these other conditions and yet not be developed in the generalized imitation situation? The "con-

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ditioned reinforcement" explanation also seems to be inconsistent with data reported by Peterson (1968). He found that even non-imitative behavior could be maintained as long as imitative behaviors were reinforced. It is difficult to see how the conditioned reinforcing properties of behavioral similarity could operate to maintain these non-imitative behaviors.

The "discrimination" explanation suggests that the child continues to perform non-reinforced imitations simply because he can not discriminate reinforced from non-reinforced responses. Under typical generalized imitation procedures, several different imitative responses are reinforced. Randomly interspersed within these reinforced responses are several other non-reinforced responses. Discriminative imitation should, indeed, be difficult to obtain under these conditions. The "reinforcement scheduling" explanation simply emphasizes one aspect of the discrimination problem, *i.e.,* the variable-ratio schedule character of generalized imitation procedures. The child can not discriminate which response will be reinforced and, therefore, simply imitates every response modelled.

Recently, the author reported data that question the "discrimination" and "scheduling" explanations (Steinman, 1970). For several sessions, the imitations of children were differentially reinforced using procedures similar to those used in most other studies of generalized imitation. Under these conditions, all responses modelled were imitated, regardless of their reinforceing consequences. However, the same children were also given trials in each session on which they could imitate one of two responses modelled, *i.e.,* a reinforced response or non-reinforced response. They imitated the reinforced responses when given a choice, even though they continued to imitate the non-reinforced responses when no choice was available. The children then were instructed not to imitate responses that produced no reinforcement. They immediately stopped imitating most of the non-reinforced responses.

These data indicate that even though a child may discriminate a particular response as an occasion for non-reinforcement (*i.e.,* an S^{Δ}), he still may imitate the response if it is the only response modelled on a trial and if he has not been instructed to imitate only reinforced responses. The data also suggest that variables other than discrimination difficulty, scheduling, and response-produced acquired reinforcement may be responsible for the generalized imitation effect.

Under the typical procedures used in generalized imitation research, responses are modelled successively, with the modelling of each response constituting a trial. The modelling of each response usually is preceded by an instruction to imitate, *e.g.,* "Do this", or "Say", although in some studies (*e.g.,* Brigham and Sherman, 1968) the verbal instruction is dropped after a few sessions. In addition, after the response is modelled, the experimenter waits a fixed period of time before modelling the next response in order to maintain a constant intertrial interval.

When a response is modelled under these conditions, the past or present instructions to imitate and the continued presence of the adult model throughout the intertrial interval may function as setting events, increasing the probability that the child will respond imitatively. Depending upon the child's reinforcement and punishment history with respect to complying with an adult's instructions, it simply may be more aversive for him to sit through the intertrial interval without responding than it is to imitate an S^{Δ} response. The action of imitating an S^{Δ} response may require some effort, but the former demands that he directly disobey the adult. If the social setting conditions are changed by changing the instructions (Steinman, 1970), or by removing the adult immediately after a response is modelled (Peterson and Whitehurst, 1970), the imitation of non-reinforced responses quickly ceases. It might be expected, therefore, that other variables that function to reduce the instructional or social control exercised by the model also might decrease the probability of generalized imitation.

The social control operative within the generalized imitation situation may derive from the child's pre-experimental history concerning adults and compliance with their instructions. However, another source can be found within the experimental situation itself. In every generalized imitation experiment, one experimenter has modelled all responses—reinforced and non-reinforced. On reinforced trials the experimenter is paired with the delivery of reinforcement. These pairings may be sufficient to develop and/or maintain the effective-

ness of the experimenter's instructions to imitate on non-reinforcing trials.

An alternative to the single-experimenter procedure is to provide two experimenters—one who models only reinforced responses and thus is consistently paired with reinforcement, and another who models only non-reinforced responses and therefore is never paired with reinforcement.

The purpose of the present experiment was threefold: (1) to determine whether an experimenter who is never paired with reinforcement will cease to be imitated within the generalized imitation paradigm; (2) to determine whether a child's continued imitation of non-reinforced responses can reasonably be attributed to his inability to discriminate reinforced from non-reinforced responses, and (3) to examine further the instructional control within generalized imitation procedures by manipulating the instructions under which the child performs.

METHOD

Six girls (ages 7.2-9.0 yr) served as subjects. They were randomly selected from the summer classes at Prairie Public School, Urbana, Illinois.[2] Two female graduate students served as experimenters. For three subjects, Experimenter$_1$ modelled the responses to be reinforced (S^D responses). Experimenter$_2$ modelled the non-reinforced responses (S^Δ responses). For the other three subjects, Experimenter$_1$ modelled S^Δ responses and Experimenter$_2$ modelled S^D responses. Both experimenters independently observed and scored all responses. The inter-scorer reliability was never less than 98%.

The eight S^D responses and four S^Δ responses used are listed in Table 1. On S^D trials, a bead was given for correct imitations. The beads were placed in a plastic cup. When the cup was filled with beads earned by the child—approximately two to three sessions—it could be traded for any one of a number of toys, games, or trinkets.

Two kinds of trials were used in various phases of the experiment, *i.e.*, single-presentation trials and choice trials. As in most other investigations of generalized imitation, every single-presentation trial was preceded by the command, "Do this". The experimenter then modelled a response. Also, as in previous research, in order to reduce the probability of chaining *i.e.*, the subject performing an S^Δ imitation so the next S^D response might occur sooner, a constant interval was maintained between responses modelled, whether the subject imitated the response or not. At the beginning of each single-presentation trial, the experimenter entered the experimental room, sat in her chair in front of the subject, said "Do this", modelled the response scheduled for that trial, delivered a reinforcer if an S^D response had been modelled and imitated, and then, 10 sec after modelling the response, left the room whether the subject had imitated the response or not. During the 10-sec period, the experimenter refrained from any conversation with the child and made no eye-contact with her. Five seconds after leaving the room, the appropriate experimenter entered the room for the next trial.

Table 1

Responses Used

Reinforced Imitations	*Unreinforced Imitations*
1. Hands in lap	A. Hands folded on table
2. Hands on ears	B. Put one eraser on top of another
3. Hands moving overhead	C. Rotate feet
4. Hands on head	D. Verbal statement, "Good-bye"
5. Clap hands	
6. Hands flat on table	
7. Move pencil on table	
8. Pick up paper bag	

On choice trials, both experimenters remained seated in front of the subject during and between trials. At the beginning of each trial one experimenter said, "Do this", and then modelled a response. Immediately after the first experimenter modeled a response, the second experimenter said, "or do this", and modelled a response. As with the single-presentation trials, the intertrial intervals were 15 sec, conversation was ignored, no eye-contact was made by either experimenter, and postural and facial gestures were controlled.

The experiment proceeded in six phases:

Phase A: single-presentation trials only. Each of the first few sessions was composed of single-presentation trials only. Within each session were three blocks of 12 trials. In each

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block, every S^D response and S^Δ response was modelled once in a random order.

Phase B: single and choice trials. Each session started with one block of 12 single-presentation trials followed by two blocks of eight choice trials. In the single-presentation block each response was modelled once in a random order. On the choice trials, each S^Δ response was randomly paired with an S^D alternative. Within each block of eight choices, each S^Δ response was modelled twice, once as the first response of a pair and once as the second response. All choices were between an S^Δ response and an S^D response.

Phase C: single-presentation trials only. This phase was identical to Phase A.

Phase D: Instruction 1. Each session contained three blocks of 12 single-presentation trials, as in Phases A and C. The only difference in this phase was that each block of trials was preceded by the following instructions:

> First block of the session: "Today don't do the ones you don't get a bead for doing. Remember, if you don't get a bead for doing something, don't do it. Tell me what you're supposed to do today." (If the answer was incorrect, the instruction was repeated.)
>
> Second and third blocks: "Remember, don't do the ones you don't get a bead for doing."

For half the subjects, the instructions were given by the S^D experimenter and for the other half they were given by the S^Δ experimenter. As with all single-presentation trials, every trial still began with the command, "Do this".

Phase E: Instruction 2. Phase E also contained three blocks of 12 single-presentation trials per session. However, the following instructions were given:

> First block of the session: "Today it doesn't make any difference whether you do the ones you don't get beads for or not. We don't care. If you want to do the ones you don't get beads for, that's fine. If you don't want to do the ones you don't get beads for, then that's fine too. It's up to you."
>
> Second and third blocks: "Remember, it doesn't make any difference whether you do the ones you don't get beads for or not."

These instructions were given by the same experimenter who gave Instruction 1.

Phase F: no instructions. As before, Phase F contained three blocks of 12 single-presentation trials. However, no special instructions were given and both experimenters were present throughout the entire session.

RESULTS

The imitative behavior of the six subjects is presented in Fig. 1. The closed circles represent the percentage of singly presented S^D responses imitated in each session. The open circles summarize the percentage of singly presented S^Δ responses imitated. The open squares represent the percentage of S^Δ responses imitated on choice trials. If a subject were to imitate randomly on the choice trials, the precentages would approximate 50%.

Four of the six subjects imitated every singly presented response modelled throughout the first three phases of the experiment, regardless of the reinforcing consequences for imitating. A fifth subject (S_2) imitated all but one S^D response; the one "failure" occurring in Session 17 when S_2 performed Response 2 when Response 4 had been modelled (See Table 1). S_5 imitated every singly presented S^D response throughout the experiment. However, on eight occasions within the first three phases, S_5 failed to imitate a singly presented S^Δ response. The eight failures to imitate involved two of the S^Δ responses (Response A and D). On four of the eight occasions S_5 substituted S^D Response 1 for the S^Δ Response A modelled on the trial. In the case of the other four occasions S_5 simply failed to perform the verbal S^Δ (Response D).

In sharp contrast to the behavior on the single presentation trials, five of the six subjects clearly performed differentially on the choice trials of Phase B. Three subjects imitated none of the S^Δ alternatives after the first one or two sessions. Instead, these subjects imitated the S^D response on 100% of the choices. Two other subjects clearly decreased their S^Δ choices over sessions until, by the end of Phase B, 80% to 100% of the responses imitated were S^D responses. The final subject (S_6) did not imitate differentially on the choice trials. Instead, S_6 almost always performed the last of the two responses modelled on each trial, regardless of its reinforcing consequences.

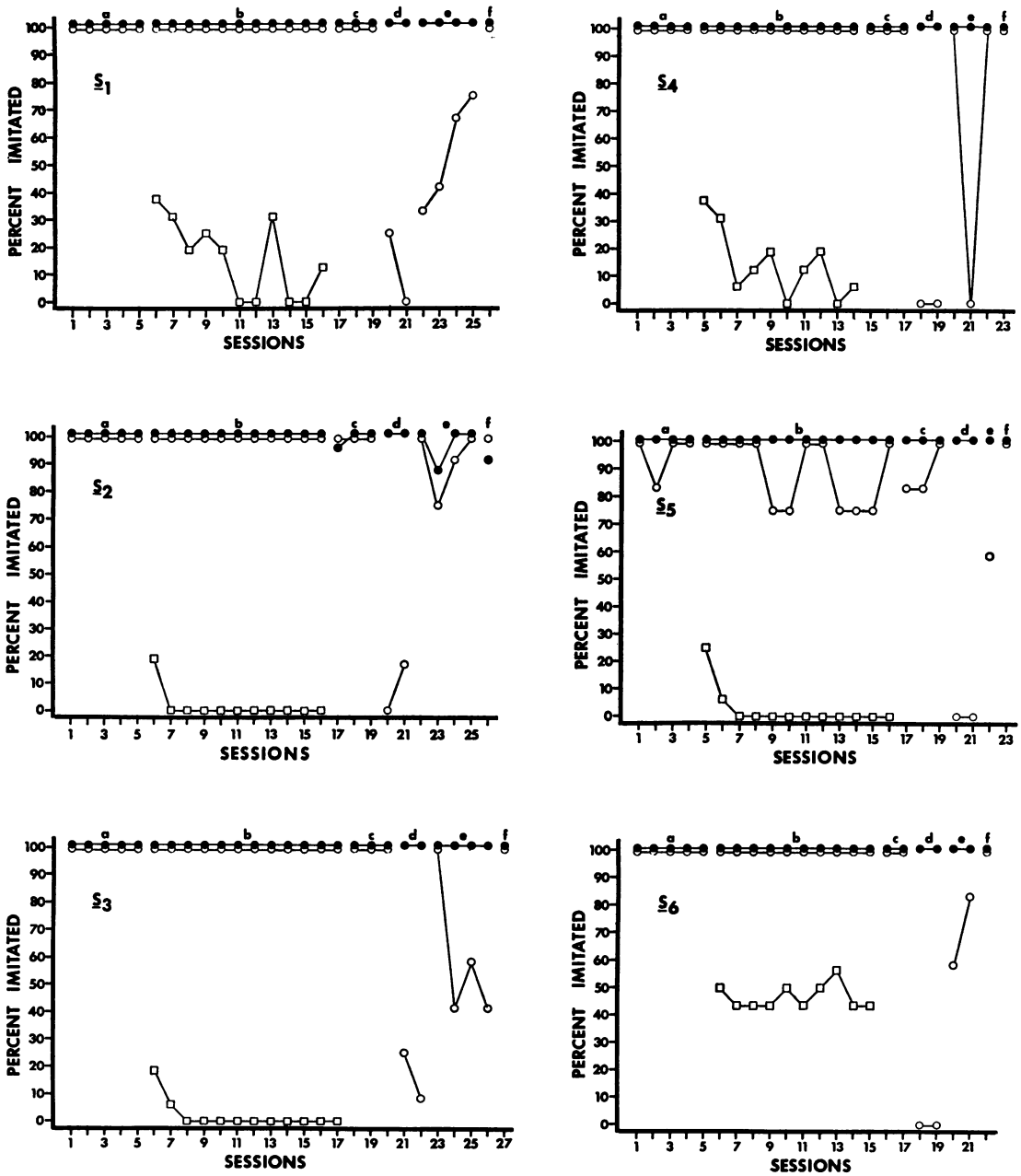

Fig. 1. Percentages of responses imitated by each subject. Closed circles are the percentages of singly presented S^D responses imitated. Open circles are the percentages of singly presented S^Δ responses imitated. Open squares are the percentages of S^Δ responses imitated on the choice trials. (a) single presentations only; (b) single choice presentations; (c) single presentations only; (d) "don't do S^Δ" instructions; (e) "don't care if you do S^Δ" instructions; (f) no special instructions.

In the first session of Phase D, *i.e.*, immediately following the instruction not to imitate S^Δ responses, four subjects failed to imitate any of the S^Δ responses. The other two subjects imitated S^Δ responses on only 25% of the S^Δ trials. All S^D responses continued to be modelled by every subject. It is important to note that for all but one subject (S_5), this was the first time that a singly presented S^Δ failed to be imitated. It is also interesting to note

that S_6, who previously gave no evidence of discriminating S^D from S^Δ responses either in the choice or single-presentation procedures, also ceased performing every S^Δ imitation immediately after being instructed not to imitate them.

The second instructional manipulation (Phase E) resulted in a partial return of S^D imitations for every subject. As with the instructing of Phase D, it did not seem to matter which experimenter (the S^D experimenter or the S^Δ experimenter) gave the instruction.

The final session constituted Phase F. In this session, no specific instructions other than the "Do this", before each trial were given. However, unlike previous sessions, both experimenters were present throughout the session. Under these conditions all subjects imitated every S^Δ response.

DISCUSSION

The results are clearly incompatible with the "discrimination" and "reinforcement scheduling" explanations of generalized imitation. Although every subject imitated all or nearly all S^Δ responses when no reinforced alternative was available, all but one subject reliably performed the S^D imitations when given the opportunity to select which responses to imitate. Similarly, every subject stopped imitating the S^Δ responses when instructed not to imitate them.

The effects of the instructional manipulations were dramatic and clearly replicate previous findings (Steinman, 1970). When told not to imitate non-reinforced responses, the children immediately stopped performing them. Given more ambiguous instructions, *i.e.*, "We don't care. . . . Do what you want", many non-reinforced imitations returned. Finally, when no instruction was given, except the "Do this" before each trial, the children imitated every non-reinforced response—as they had under these conditions in the earlier phases of the study.

Although the study was not designed to evaluate the "conditioned reinforcement" explanation of generalized imitation, the data do seem to have some relevance for that interpretation. If the child discriminates S^Δ responses as occasions for non-reinforcement, as the results of the choice procedures and the instructions indicate, then imitating the S^Δ responses should not be reinforcing. Indeed, stimuli that are discriminated as occasions for non-reinforcement have been found to develop either neutral or aversive properties (*cf.* Terrace, 1966; Rilling *et al.* 1969), rather than reinforcing properties. Thus, behaving like the model on these occasions is unlikely to be positively reinforcing.

The procedure of having the two models paired with either reinforcement or non-reinforcement had no effect on the child's imitative behavior. The experimenter who modelled only S^Δ responses was just as effective in maintaining the child's imitative behavior as was the S^D experimenter on the single-presentation trials. The fact that reinforcement was obtained only when the child behaved like the S^D experimenter was not sufficient to reduce the control exercised by the S^Δ experimenter.

It is possible that the differential pairing procedures were simply insufficient to overcome the child's pre-experimental history regarding compliance with adult commands. More extreme manipulations of the S^D experimenter's controlling properties may be necessary. For example, if a child were given a pre-imitation history with an experimenter in which the experimenter consistently instructed the child to do unpreferred, effortful, or penalized tasks, subsequent attempts to produce non-reinforced imitations might prove less successful. Similarly, if the child were penalized (*e.g.*, response cost or timeout) for S^Δ imitations, the penalties should interact with the social stimuli maintaining the behavior and thereby reduce the frequency of S^Δ imitations. By varying response cost parametrically, the strength of the variables maintaining S^Δ imitations could be scaled. Several of these manipulations are currently under investigation by the author.

Although the social control interpretation of generalized imitation can be offered only speculatively at this time, there is considerable evidence to suggest the utility of its further investigation. For example, several investigators (*cf.* Bandura, 1968; Flanders, 1968) have demonstrated repeatedly that the extent to which a child will imitate a model is a function of the child's pre-imitation history with the model. Adult models who frequently dispense reinforcement are more likely to be imitated than models who have no such history of reinforcement. It is also important to note that

in many of these experiments the imitations are all S^{Δ} imitations, since no direct reinforcement is given for imitating. Similarly, in the present experiment, the marked effectiveness of the instructions not to perform S^{Δ} imitations demonstrated how readily the children can be controlled by social stimuli.

Additional evidence indicating the importance of social stimuli in maintaining imitative behavior (both S^{D} and S^{Δ}) also can be found in a recent study by Peterson and Whitehurst (1970). In one experiment, preschool children developed and maintained S^{D} and S^{Δ} imitative behavior when typical generalized imitation procedures were used. The imitatitve behavior remained throughout several manipulations designed to decrease it [*e.g.*, differential reinforcement of other behavior (DRO) and extinction], but immediately decreased when the adult model left the room just after modelling each response (*i.e.*, before the child had a chance to imitate the behavior). In short, when the adult stopped watching the child's imitative behavior, the behavior extinguished.

The present data and the data from the studies cited above suggest that two controlling systems may be operative simultaneously when generalized imitation procedures are used. One system involves the contingent differential reinforcement specifically being manipulated by the experimenter. The second controlling system is a composite of social setting events derived from the instructions, the S^{D} characteristics of the model, the continued surveillance by the model, and the child's previous history regarding adults, their instructions, and the consequences received when the child has complied or failed to comply with their instructions. Given these two controlling systems, a question arises as to whether either or both are necessary for the development and maintenance of generalized imitation. For example, if a child were first trained to follow instructions in a non-imitative setting, one wonders whether contingent reinforcement would be necessary in subsequent attempts to develop a series of imitative behaviors. Indeed, many studies in the modelling literature have successfully developed imitative behaviors without specifically manipulating consequent reinforcement (*cf.* Bandura, 1968, 1969; Flanders, 1968).

Previous generalized imitation research has assessed the importance of contingent reinforcement through the use of three techniques: (1) attempting to produce imitative behavior before reinforcement operations are instituted (Baer and Sherman, 1964; Metz, 1965; Baer *et al.*, 1967; Lovaas *et al.*, 1967; Peterson, 1968); (2) differentially reinforcing behavior other than the responses modelled, *i.e.*, DRO or non-contingent reinforcement (Baer and Sherman, 1964; Lovaas *et al.*, 1966; Baer *et al.*, 1967; Brigham and Sherman, 1968; Burgess *et al.*, 1970; Peterson and Whitehurst, 1970; Steinman, 1970; Steinman and Boyce, 1970); and (3) discontinuing reinforcement (Baer and Sherman, 1964; Lovaas *et al.*, 1967; Peterson, 1968; Burgess *et al.*, 1970; Peterson and Whitehurst, 1970; Steinman, 1970; Steinman and Boyce, 1970), or scheduling penalties for imitating (Baer and Sherman, 1964).

The first and third procedures, although useful for determining the effect of having reinforcing stimuli in the situation, are not adequate for analyzing the importance of contingent reinforcement. Comparisons between behavior with reinforcement present *versus* reinforcement absent cannot distinguish between the functional properties of reinforcing stimuli acting as setting events, acting as discriminative stimuli, or acting as reinforcers.

The second procedure, *i.e.*, the use of DRO or non-contingent reinforcement procedures, seems more appropriate for the purposes intended. If the imitative behavior is reduced to operant level when the reinforcement contingency no longer is in effect, one has strong evidence that contingent reinforcement is necessary for the maintenance of the behavior.

The effect that DRO contingencies have on generalized imitation is, at best, unclear. Two studies conducted by the author (Steinman, 1970; Steinman and Boyce, 1970) included various DRO manipulations, *e.g.*, DRO 15-sec, DRO 30-sec, DRO 0-sec, and a condition in which all reinforcers were given at once at the beginning of the session. These procedures had little or no effect on the imitative behavior of the children. Almost every response continued to be imitated. Similarly, Burgess *et al.* (1970) found various DRO procedures to be ineffective in reducing the imitative behavior of two of their three subjects. Various DRO procedures also were found to be ineffective for two or three subjects in Peterson and Whitehurst's (1970) study. Lovaas *et al.* (1966) reported that DRO procedures decreased the

imitative behavior of the autistic children they studied. However, the extent of the decrease and the procedures used to produce the decrease are left unspecified.

Brigham and Sherman (1968) measured the accuracy of the child's imitations, rather than simply recording whether the child imitated or not. When DRO procedures were instituted, the accuracy dropped from 90% to 70%. Although the authors stress the importance of the 20% decrease in accuracy, the 70% retention is, perhaps, more striking.

Baer and Sherman (1964) instituted DRO contingencies on the imitative behavior of two of 11 children studied. The imitative behavior of one child decreased to about half of its previous rate. For the other child, the extent of the decrease was greater. However, for both children, the decreased rates of imitative responding occurred in a rather peculiar manner. Although the DRO contingencies were begun early in a session, they had no effect within that session. Instead, both subjects began the next session at a much lower rate and remained at the same low rate of imitative responding throughout the DRO procedures. Typical extinction curves within and between sessions were not obtained. Similarly, although the DRO contingencies were removed in the middle of a subsequent session, no effect was seen until the beginning of the next session and, again, the new imitation rate began immediately at the start of the session (*i.e.*, without a transition in rate).

The most convincing demonstration of DRO contingencies affecting generalized imitation is in the Baer *et al.* (1967) study. The subjects were three severely and profoundly retarded children. A DRO 30-sec decreased the imitative behavior of one child from nearly perfect imitation (80% to 100%) to no imitative responding. A second child also decreased her imitative behavior from 100% to zero, but not until a DRO 0-sec was used; DROs of 30 and 60 sec had no effect. The third child also decreased her imitative behavior when DRO contingencies were applied, but the decrease was less than it was for the other two subjects.

In summary, the effect of DRO contingencies on generalized imitation procedures differs in the several experiments in which they were used. In some studies (all using normal children as subjects), DRO procedures have had little or no effect on the maintenance of imitative responding. In other studies (Baer *et al.*, 1967), DRO procedures have extinguished previously established imitative responses. And, in still other studies, the effect has been either intermediate or equivocal. With these gross differences in DRO effects, the question of whether direct contingent reinforcement is necessary for the maintenance of imitative behavior must be considered as unanswered at this time. Thus, the contribution of contingent reinforcement for S^D imitations to the maintenance of S^Δ imitations in generalized imitation experiments also is still open to question.

Again, if instructional variables and social setting events are operative within the procedures used in generalized imitation research, the inconsistent effects that DRO contingencies have shown become more understandable. When the manipulated reinforcers are strong and the control exercised by the instructions and other social variables is weak, DRO procedures should be more effective than when the opposite is true. In the Baer *et al.* (1967) study, for example, subjects were deprived of food and food was used as the reinforcer for imitating. Also, these retarded subjects were observed to be relatively unresponsive to instructions and social reinforcers before the experiment; indeed, that is why the subjects were chosen for the experiment. Under these conditions, DRO procedures should be maximally effective because the manipulated reinforcers exert comparatively more control over the subject's behavior than do the social variables and, therefore, changing the reinforcement contingencies should have a more marked effect.

On the other hand, in the studies by Brigham and Sherman (1968), Peterson and Whitehurst (1970), Steinman (1970), and Steinman and Boyce (1970), the normal children were not specifically deprived, nor were they known to be deviant in their responsiveness to social variables. Thus, changing the reinforcement contingencies to a DRO might have had little effect for two reasons: (1) social and instructional control can be strong with young normal children and (2) the reinforcers being manipulated may have been relatively weak. Research concerned with the interaction between reinforcement magnitude and social control is needed to clarify this issue.

In conclusion, reinforcement may indeed be necessary for the development and maintenance of imitative behavior. However, more than one source of control can be operative within generalized imitation procedures. To overlook the role that instructions and other social variables may play in these procedures can lead to mistaken and needlessly complicated explanations of generalized imitation. Investigations into the motivating, discriminative, and reinforcing functions of social and instructional variables present in the imitation situation may produce not only an explanation of generalized imitation, but also the technology necessary for its effective use.

REFERENCES

Baer, D. M., Peterson, R. F., and Sherman, J. A. The development of imitation by reinforcing behavioral similarity to a model. *Journal of the Experimental Analysis of Behavior,* 1967, **10,** 405-416.

Baer, D. M. and Sherman, J. A. Reinforcement control of generalized imitation in young children. *Journal of Experimental Child Psychology,* 1964, **1,** 37-49.

Bandura, A. Social-learning theory of identificatory processes. In D. A. Goslin (Ed.), *Handbook of socialization theory and research.* Chicago: Rand McNally, 1968. Ch. 3.

Bandura, A. *Modeling theory: some traditions, trends, and disputes.* Symposium paper presented at the Society for Research in Child Development meetings, Santa Monica, 1969.

Bandura, A. *Principles of behavior modification.* New York: Holt, Rinehart & Winston, 1969.

Brigham, T. A. and Sherman, J. A. An experimental analysis of verbal imitation in preschool children. *Journal of Applied Behavior Analysis,* 1968, **1,** 151-158.

Burgess, R. L., Burgess, J. M., and Esveldt, K. C. An analysis of generalized imitation. *Journal of Applied Behavior Analysis,* 1970, **3,** 39-46.

Flanders, J. P. A review of research on imitative behavior. *Psychological Bulletin,* 1968, **69,** 316-337.

Gewirtz, J. L. Mechanisms of social learning. In D. A. Goslin (Ed.), *Handbook of socialization theory and research.* Chicago: Rand McNally, 1968. Ch. 2.

Gewirtz, J. L. and Stingle, K. G. Learning of generalized imitation as the basis for identification. *Psychological Review,* 1968, **75,** 374-397.

Lovaas, O. I., Berberich, J. P., Perloff, B. F., and Schaeffer, B. Acquisition of imitative speech by schizophrenic children. *Science,* 1966, **151,** 705-707.

Lovaas, O. I., Freitag, K., Nelson, K., and Whalen, C. The establishment of imitation and its use for the development of complex behavior in schizophrenic children. *Behavior Research and Therapy,* 1967, **5,** 171-182.

Metz, J. R. Conditioning generalized imitation in autistic children. *Journal of Experimental Child Psychology,* 1965, **2,** 389-399.

Peterson, R. F. Some experiments on the organization of a class of imitative behaviors. *Journal of Applied Behavior Analysis,* 1968, **1,** 225-235.

Peterson, R. F. and Whitehurst, G. J. A variable influencing the performance of non-reinforced imitative behaviors. *Journal of Applied Behavior Analysis,* 1970, *in press.*

Rilling, M., Askew, H. R., Ahlskog, J. E., and Kramer, T. J. Aversive properties of the negative stimulus in a successive discrimination. *Journal of the Experimental Analysis of Behavior,* 1969, **12,** 917-932.

Steinman, W. M. Generalized imitation and the discrimination hypothesis. *Journal of Experimental Child Psychology,* 1970, **10,** 79-99.

Steinman, W. M. and Boyce, K. D. Generalized imitation as a function of discrimination difficulty and choice. *Journal of Experimental Child Psychology, in press.*

Terrace, H. S. Stimulus control. In W. Honig (Ed.), *Operant behavior: areas of research and application.* New York: Appleton-Century-Crofts, 1966. Ch. 7.

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(Revised 5 August 1970.)