

A VARIABLE INFLUENCING THE PERFORMANCE OF GENERALIZED IMITATIVE BEHAVIORS^{1,2}

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This research attempted to demonstrate some of the conditions that would influence the performance of generalized imitative behaviors in young children. Two experiments were conducted. The results of Exp. I indicated that generalized imitative behaviors can be very durable; only one of three subjects was influenced by a variety of reinforcement-like procedures. Control over the behavior of all three subjects was obtained when a setting event involving the presence or absence of the experimenter was systematically varied. A second test of this variable was carried out in Exp. II. Results showed moderate to strong control over non-reinforced imitations in four preschool children.

The concept of imitation has been considered a cornerstone of child development for some time. This term has been used both to describe and to explain a child's acquisition of behaviors exhibited by parents, siblings, and peers. In recent years, a series of studies on imitation (Baer and Sherman, 1964; Metz, 1965; Lovaas, Berberich, Perloff, and Schaefer, 1966; Baer, Peterson, and Sherman, 1967; Peterson, 1968) have demonstrated and explored a phenomenon called generalized imitation. As Brigham and Sherman (1968) pointed out, generalized imitation may refer to (1) the performance of a response the first time it is presented by the experimenter and on which the subject has received no previous training, or (2) the continued performance of a response for which the subject has never received reinforcement. Just why these responses appear and continue to be performed, is not altogether clear. However, Baer *et al.* (1967), as

well as others, have suggested that the property of being similar to a model may function both to produce and to maintain generalized imitations. Peterson (1968) attempted to test whether this dimension of similarity of response between subject and model was responsible for the performance of non-reinforced imitations. This test was carried out by teaching a retarded child a series of non-imitative responses, interspersing them among a series of imitative behaviors, while reinforcing imitations only. Results of this study showed that the non-imitative responses were also displayed without reinforcement. Thus, it was concluded that similarity *per se* was not necessary for the performance of unreinforced behaviors.

Bandura (1968) argued that discriminative difficulties may account for the performance of non-reinforced imitations. He suggested that since only a small percentage of imitations are reinforced, it may be difficult for a child to discriminate reinforced from non-reinforced behavior. If this were true, we might expect that a subject presented with repeated demonstrations of an unreinforced imitation would cease performing such a behavior. This was indeed the case in the subject studied in the study by Peterson (1968). However, this explanation seems questionable because the study also showed that these previously extinguished imitations would still be performed when interspersed with reinforced responses.

Reinforcement appears to be one factor whose role in imitation is somewhat clearer. Baer and Sherman (1964), and Baer *et al.*

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(1967) demonstrated that reinforcement given for some behaviors did function to maintain an entire class of imitations. When reinforcement was withdrawn, both previously reinforced and non-reinforced imitations declined; when reinforcement was again presented, all of these behaviors, including those not reinforced, returned to their previous levels. These results suggest that non-reinforced imitations were indirectly under the control of reinforcement. The two sets of imitative behaviors may thus be conceptualized as a functional response class.

Although attempts to study the role of similarity in the maintenance of generalized imitation have yet to produce a role for this variable it seems plausible that other, perhaps similar conditions, could be involved in the maintenance of unreinforced imitations. The present study was an attempt to explore generalized imitation in young children further and to identify variables that might play a role in its performance.

EXPERIMENT I

METHOD

Subjects and Apparatus

Two boys and two girls served as subjects. They ranged in age from 4 yr, 8 months to 5 yr, 2 months. The youngest child, a girl, did not complete all aspects of the study and her data are not included. All of the subjects were drawn from a preschool nursery class operated by the University of Illinois, and would probably be considered average or above in intellectual and social-motor skills.

The experimenter in this study was a 24-year-old male. The study was conducted in a small room located in the Children's Research Center. The room was carpeted and equipped with a one-way mirror. Furnishings included two tables and three chairs. The sessions were conducted from a small circular table with the experimenter and child seated opposite each other. A black box bolted on the side of the table contained an electrically operated bead dispenser. A small cardboard screen between the subject and the experimenter was used to conceal a stop watch, dispenser switch, and the experimenter's recording of responses. In another corner of the room was a large table with a drawer. On top of this table was a paper bag,

some trinkets, and a few small items used as stimulus materials. On top of the second table was a cup used to measure the number of beads won. The beads were taken from the dispenser tray and placed in the cup at the end of each session.

General Procedure

Subjects were seen once a day, three to five times a week. Sessions lasted 12 to 15 min. In the first session, each child was brought to the room and told: "We're going to play a game and you can win a toy. Pick out one of these toys you would like to win." The child was then shown a variety of 10-cent toys arranged on a table. Once the youngster chose a toy, the remainder were removed from the table. The experimenter then said: "To win this toy you have to fill up this cup with beads," and showed the child a bead. He then showed the child where beads could be obtained, and indicated that the number of beads would be measured at the end of the session. Next he said: "All you have to do to win beads is listen to what I say and look at what I do." The experimenter then said, "Do this", and modeled a behavior. The behaviors modeled may be found in Table 1, which contains a list of responses randomly drawn from a larger pool of behaviors and used as imitative stimuli throughout the study. Each time an imitative response was performed, the child received a bead from the dispenser and at the end of the session all the beads were placed in the cup. The cup was small enough so that every subject was able to fill it to the top during the first session. Toys were exchanged for a full cup of beads at the end of the session. A larger cup was used thereafter. This larger cup could be filled with marbles after five sessions of perfect performance. Toys available after the first session ranged in value from 25 cents to one dollar.

Each session consisted of 36 trials. A trial involved a command, "Do this", the modeling of one of a pool of 12 behaviors, and the opportunity for the subject to imitate. Trials were timed with a stopwatch and were spaced so that a new trial began every 20 sec. Generally, the 36 trials in each session consisted of a randomly selected sequence of the 12 behaviors listed in Table 1. Responses that received no consequences, however, were not introduced until Session 2 with two subjects and until

Table I
Responses Employed in Exp. I and II

1. Tap chest with hand
2. Extend arm
3. Put hands on ears
4. Tap arm of chair
5. Open door
6. Put hands over eyes
7. Tap wall
8. Walk with arm over head
9. Close desk drawer
10. Climb on chair*
11. Put paper bag in desk drawer*
12. Put magic marker in desk drawer*

*A response that was not followed by consequences.

Session 5 with the third. Thereafter, these responses were selected from the pool so that such behaviors would not occur twice in succession. Each of the no-consequence responses occurred four times each during a session. "Do this", was the only command given the subjects and preceded every demonstration.

A list of all procedures applied (but not to all subjects) follows:

(1) *Consequences*. During this portion of the experiment, the experimenter modeled one of the pool of 12 behaviors every 20 sec. Correct responses on 24 of the 36 trials were followed by beads. Correct imitations on the remaining 12 trials were not. After the first session, beads were exchanged for a chosen toy. Thereafter beads were exchanged only when the larger cup had been filled.

(2) *No consequences*. When this procedure was in effect no beads or back-up toys were given to the child.

(3) *Differential consequences*. During this period, any behavior that was not a correct imitation was followed by a bead. As before, however, 12 of the 36 responses received no consequence.

(4) *No "do this"*. In this portion of the study, the command "Do this" was no longer given; no beads or back-up toys were available.

(5) *Delayed consequences (20 sec)*. At this point, consequences (beads) were given 20 sec after the experimenter modeled the response, if the subject made no response, or 20 sec after any response on the part of the subject. As before, no beads or back-ups were given for 12 of the 36 responses. A new trial was initiated after a bead was delivered, or, if no consequence occurred, 20 sec after the experimenter's demonstration.

(6) *Differential consequences (20 sec) plus "good"*. This procedure involved a continuation of the previous one with one addition. The experimenter told the child "good" as each bead was delivered.

(7) *Pre-delivery*. In this case the subject was given all the beads before the session began.

(8) *Experimenter absent*. The child was told: "Today we're going to play the game a little differently than before. I'm going to do things like before, but then I'm going to leave the room. I don't want you to do anything until I leave the room." The experimenter then said, "Do this", modeled the response as before, and left the room. If the subject did not perform in the experimenter's presence on the first trial, the experimenter, upon re-entering the room, told him he was correct. Such feedback was not given on subsequent trials. If the child attempted to initiate imitative responses before the experimenter could leave the room, he was reminded: "Remember, don't do anything until I leave the room." In some cases this instruction was repeated several times. No other comments were made. No instructions were given after this session. The general procedure involved the experimenter entering the room, walking to the center, in front of the subject, saying "Do this", modeling the behavior, turning, leaving the room, and closing the door behind him. During this time the subject's behavior was recorded by one or more observers behind the one-way glass. The experimenter then waited 10 sec, re-entered the room and modeled the next response. It should be noted that the time it took for the experimenter to leave the room plus the 10-sec wait allowed the subject the same amount of time to respond as in the previous procedure when the experimenter modeled a new response every 20 sec.

(9) *Experimenter present*. The subjects were given no instructions. The experimenter said "Do this", and modeled a response every 20 sec. He remained in the room at all times. No consequences were dispensed during this procedure.

RESULTS

On 21 occasions, a second observer, seated behind the one-way glass, also scored the child's behavior for imitation. Reliability checks were spaced in such a way as to sample each change in procedure. Reliability was computed by

dividing the number of trials where both experimenter and observer agreed that imitation occurred by the number of agreements plus disagreements. Reliability ranged from 94 to 100% with a mean of 99%. Responses were scored as imitative if the child duplicated the topography of the experimenter's behaviors, *e.g.*, put his hand over his eyes or used an object in the same way, *e.g.*, closed the desk drawer. In addition, the response had to occur before the next imitative stimulus was initiated. If a subject displayed a correct imitation as the experimenter was leaving the room, that response was included in the data.

Figures 1, 2, and 3 show the effects of the various procedures on the performance of imitative behavior. Figure 1 shows the behavior of Subject S1. During the first four sessions, all imitations were followed by consequences; imitations that received no consequences were introduced in the fifth session. For the remainder of the baseline period, this subject performed all imitative responses at a high level. Delayed consequences (20 sec) were introduced in Session 12. This procedure did not appear to have an appreciable effect on the percentage of imitations performed. Just before Session 16 began, pre-delivery was instituted; the subject was given the usual number of beads earned before the session commenced. This procedure continued through Session 23. Subject S1's behavior during this period became less stable,

but approximately 84% of all imitations (on the average) were still performed. In Sessions 23 through 25, delayed consequences were again employed, this time with the addition of praise ("Good"). Nevertheless, imitations were performed at a high frequency during these sessions. In Sessions 26 through 30, all consequences were removed. No praise, beads, or back-up toys were dispensed, yet the rate of imitations remained high. The use of differential consequences began in Session 31. Any response that was not a correct imitation, or a failure to respond, was immediately followed by a bead. Despite this change in procedure, imitations continued to be performed as before. From Sessions 37 through 50, the experimenter left the room and remained out of the room for 10 sec immediately after modeling a response. No consequences were dispensed for any behavior during this period. Subsequently, all imitative behaviors began to decline. In Session 51, the procedures were altered so that now, after modeling the behavior, the experimenter stayed in the room (no consequences were dispensed). While this procedure was in effect, the per cent of imitations performed increased markedly.

Figure 2, which shows the behavior of Subject S2, reveals that imitations that did not receive a consequence were introduced in the second session. Both consequence and no-consequence imitations were frequently dis-

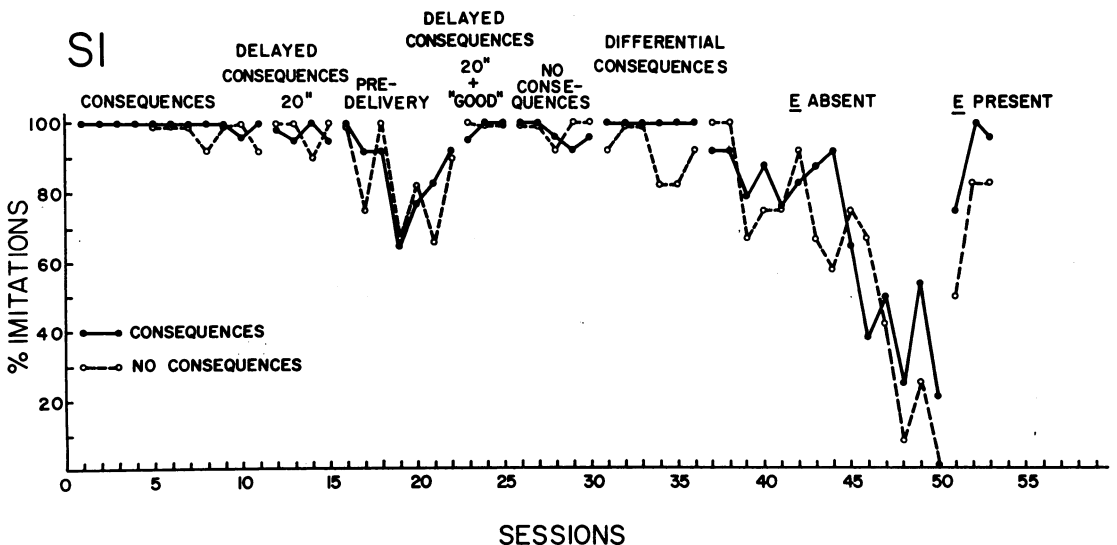


Fig. 1. The effects of consequences, no consequences, and the experimenter's presence on the performance of two types of imitations.

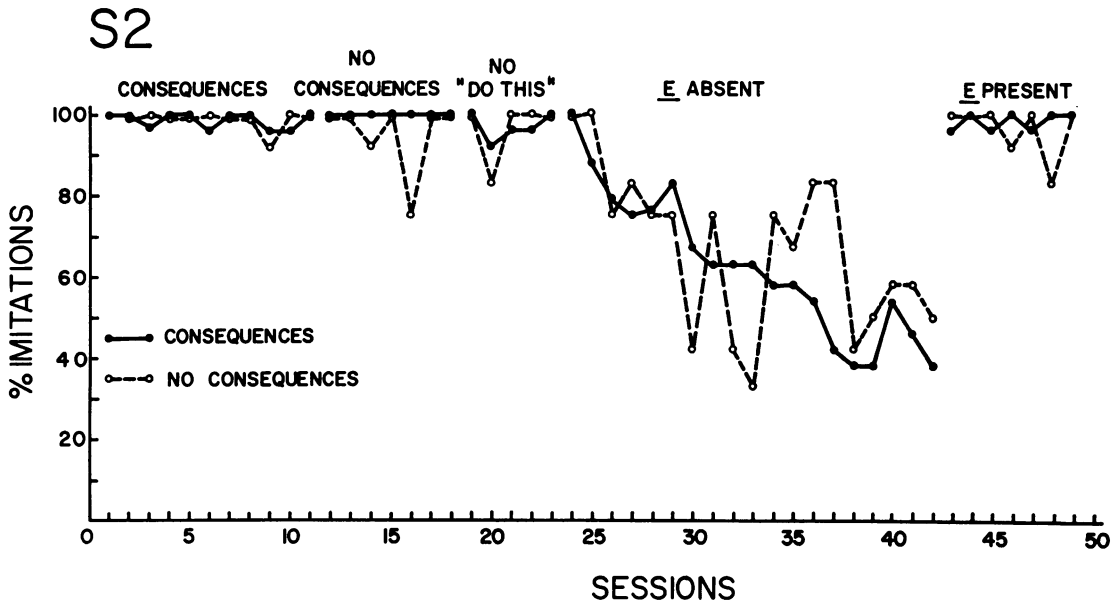


Fig. 2. The effects of consequences, no consequences, commands, and the experimenter's presence on two sets of imitative behaviors.

played during the first 11 sessions. Consequences were removed in Session 12; no beads were dispensed nor were any back-up toys exchanged. During this operation, the per cent of all imitations remained high, but was slightly less stable. In Session 19, the command "Do this" was dropped, yet the child continued to imitate. The Experimenter Absent procedure began in Session 24. A decline in the level of imitations followed; imitations previously followed by consequences went from an average of 96% to 38%, while imitations that never received consequences fell to 50% by Session 42. From Sessions 43 through 49, procedures were altered such that the experimenter now modeled a behavior but remained in the room. During this period, imitations were again performed at a high level.

The behavior of Subject S3 may be seen in Fig. 3. Imitations without consequences were introduced in the second session. Initially, both sets of behaviors were performed at a high level. In Session 12, all consequences were discontinued; imitations, however, continued to be displayed. Using an additional technique to reduce imitations, differential consequences began in Session 18. Any behavior not qualifying as a correct imitation, or the failure to imitate, was followed by a bead. Subsequently, the subject's level of imitative behavior began to

fall and ultimately dropped to zero. Re-introduction of consequences in Session 28 brought a sharp increase in the per cent of imitations performed. These behaviors remained stable over the next several sessions. In Session 35, the experimenter demonstrated a behavior and then left the room. As a result, imitations again declined markedly. Within four sessions, the per cent of imitations performed was 4% or less. When the earlier procedure of modeling, but remaining in the room, was re-instituted in Session 40, both sets of imitative behaviors were displayed an average of 95% and 87% of the next eight sessions respectively.

DISCUSSION

Perhaps the most surprising finding of Exp. I concerns the durability of imitative behaviors. All three subjects continued to imitate throughout despite the application of a variety of techniques designed to weaken the responses. Dropping the command "Do this" and giving all the beads before the session had little effect on the rate of imitations. With Subject S1, even a procedure involving differential consequences and praise did not affect imitative performance. Subject S3's behavior, however, was controlled by differential reinforcement. In this case, this procedure involved the immediate reinforcement of any incorrect

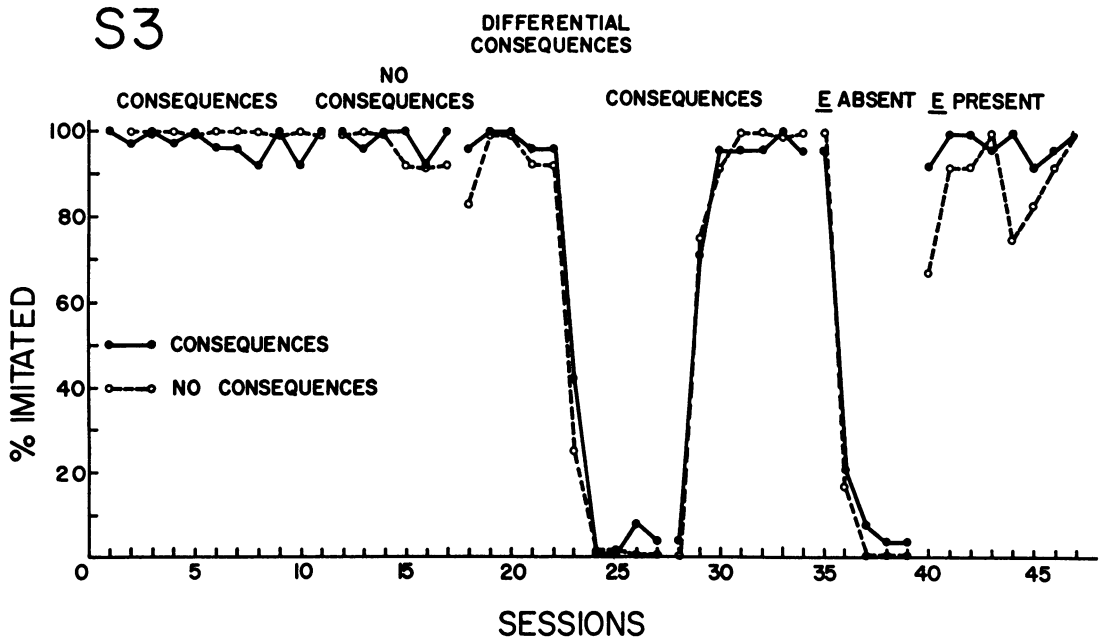


Fig. 3. Per cent of imitations displayed under consequences, no consequences, and in the experimenter's presence and absence.

imitation or the failure to respond. By definition, the beads and the toys that backed them up, did not function as reinforcers for Subjects S1 and S2. This finding is somewhat unusual in that a large number of investigators have used similar stimuli with young children and have found them effective. Thus, the results of Exp. I seem to indicate that the presence of the experimenter immediately before and during the opportunity for the subject to respond may control the subject's response. In all three subjects, the rate of imitations remained high when the experimenter was present. When the experimenter left the room after performing a demonstration, the rate of imitation declined sharply, as much as 50% or more. To clarify further the operation of this variable, the effect of the experimenter's presence on the level of imitation was investigated in a second experiment.

EXPERIMENT II

Experiment II was performed in the same setting as Exp. I. The same individual served as the experimenter. Four children, two boys and two girls ranging in age from 5 yr, 5 months to 6 yr, 8 months, were obtained through casual acquaintance with other sub-

jects used in the first study. The children were picked up at their homes by the experimenter, driven to the laboratory, and tested daily. These subjects appeared to be similar in intelligence and social-motor skills when compared to those in Exp. I, but were slightly older. The set of imitative behaviors used in Exp. I was also used here but was altered during the latter part of the experiment. This alteration involved the elimination of those responses that were audible to the experimenter when he was outside the room. Thus, responses 4, 5, 7, 9, and 12 (Table I) were not demonstrated to Subjects S5, S6, and S7 during a portion of the study. When this procedure was in effect, imitative stimuli continued to be selected from the remaining responses such that the total number of demonstrations remained the same.

The instructions given were similar to those used in Exp. I. Each subject was brought to the experimental room and told: "We're going to play a game. All you have to do to play the game is to listen to what I say and look at what I do." The experimenter said "Do this", and then modeled the first behavior on the list and continued modeling through the 36 trials that constituted a session. In this study, none of the 36 responses was ever followed by conse-

quences. The experiment included a baseline phase during which the experimenter remained in the room, a treatment condition that involved his leaving the room after each demonstration and a final baseline period when he remained in the room. Instructions and procedures under the Experimenter Absent condition were identical to those in Exp. I except the experimenter did not tell the child he was correct after the first trial if he waited to respond when the experimenter left the room. The amount of time between trials in Exp. II was somewhat shorter than that in Exp. I. In this case, a new trial was initiated 10 sec after the experimenter modeled the response. During the Experimenter Absent condition, the experimenter remained out of the room 10 sec before entering and demonstrating another behavior. As before, one or more observers seated behind a one-way glass scored responses during this condition.

RESULTS

On 13 occasions, an additional observer seated behind the one-way glass also scored the child's behavior for imitation. Reliability checks were taken during each change in procedure. Computations were made using the method employed in Exp. I. Reliability ranged from 95% to 100% with a mean of 99%.

Non-imitations were scored if the subject made an incorrect response or did not respond at all. For the subjects in Exp. II, approximately 60% of all non-imitations were incorrect responses while 40% were due to lack of responding. (These data are not available for subjects in Exp. I). For most subjects, the relative proportions of incorrect responses *vs.* no response changed as the Experimenter Absent condition remained in effect. As the overall per cent of imitations declined, the number of occasions when the subject made no response increased.

Figure 4 shows the behavior of Subject S4. During Sessions 1 through 6 the experimenter modeled responses, but remained in the room at all times. No consequences followed any behavior. The subject displayed correct imitations an average of 98% of the time in this phase. Beginning in Session 8, the Experimenter Absent procedure was instigated. As a result, the per cent of imitations performed dropped to less than 10% in the next six sessions. In Session 14, the experimenter again re-

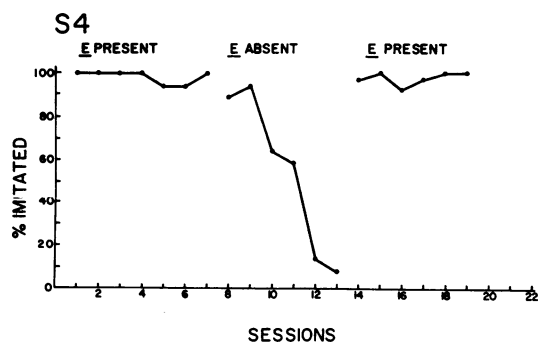


Fig. 4. The effects of experimenter's presence and absence on the performance of generalized imitative behaviors.

mained in the room after modeling a response. Under this condition, the average rate of imitations returned to its former level of 98%.

The effects of the above procedures on Subject S5 may be seen in Fig. 5. While the experimenter was present, the subject displayed maximal performance of imitations. When the Experimenter Absent condition was instituted in Session 7, the per cent of imitations declined slowly. By Session 24, the frequency of imitations was some 40% lower than that under the Experimenter Present condition. Points A to B indicate the period where those responses that could be heard outside the experimental room were removed from the response pool.

Despite this change, Fig. 5 does not indicate that the elimination of audible responses had a strong effect on imitative performance. Although the overall average (71%) during this period is lower than that of the previous sessions (89%), these differences could easily be the result of the cumulative effect of additional sessions.

The performance of Subjects S6 and S7 may be seen in Fig. 6 and 7. Both subjects

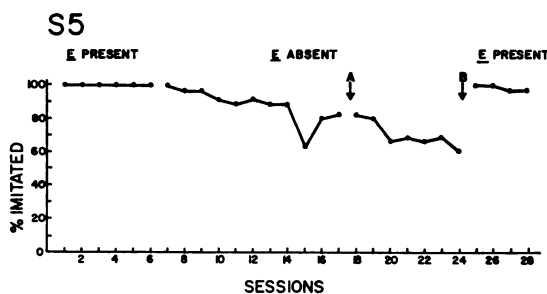


Fig. 5. Per cent of generalized imitations displayed in the experimenter's presence and absence.

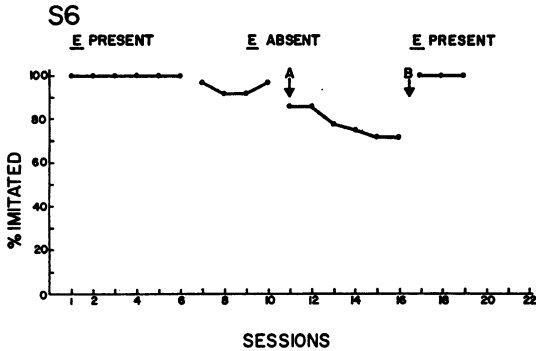


Fig. 6. The effects of experimenter's presence and absence on the performance of generalized imitative behaviors.

showed a high level of imitations during baseline when the experimenter was present. When the experimenter left after each demonstration, the subjects showed only a small decline in the number of imitations displayed, about 6% on the average. When those responses that were audible outside the experimental room were eliminated (Section A to B), a further decline resulted. Average performance for S6 during this period was 78%, a 22% drop from baseline; for S7 the average was 85%, a 15% reduction from baseline. Whether these findings were due to the elimination of audible responses or part of a gradual trend was not determined. When the experimenter remained in the room during the final three sessions with S6 and S7, imitations were again displayed at their maximal levels.

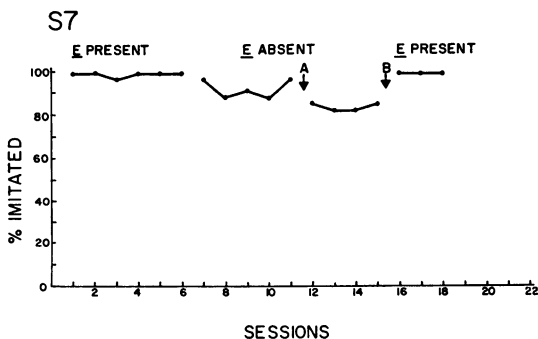


Fig. 7. Per cent of generalized imitations displayed in the experimenter's presence and absence.

GENERAL DISCUSSION

The findings of both experiments strongly suggest that the presence of the experimenter

can affect the performance of non-reinforced imitative behaviors. These results also suggest that the experimenter's presence may be classified as a setting event (Kantor, 1958). A setting event is an antecedent environmental change that alters the probability of a large number of subsequent responses. Although setting events are often described in terms of deprivation or satiation operations, it should be apparent that a variety of conditions could also have similar effects (Bijou and Baer, 1961).

In addition, the presence of the experimenter appears to fall within a set of variables that have been labeled "demand characteristics" (Orne, 1962). Demand characteristics refer to those discriminative stimuli or setting events present in an experimental situation which influence a subject's behavior in addition to the experimental variables under study. It seems possible that demand characteristics (setting events) could operate in competition with other experimental variables. This may be the case whether the experiment is in the laboratory or an applied setting. Although no specific tests were performed in this study, the presence of the experimenter may have overridden the influence of the beads and toys used to modify the level of imitation in Exp. I. Data from Subject S3 appear to suggest that reinforcers (beads) and the presence of the experimenter may have been in competition for control of the subject's behavior. When a differential reinforcement procedure (in the presence of the experimenter) was employed with this subject, the level of imitation declined. However, when the beads were withdrawn in a prior procedure, the level of imitation remained high, suggesting that the presence of the experimenter was maintaining the behavior, in the face of what might have been "functional" extinction. While it is clear that the presence of the experimenter did control the behaviors of S1 and S2, competition between variables cannot be seen because the beads (and toys) could not be defined as reinforcers for these subjects.

It is also possible that the experimenter presence variable may have played a surreptitious role in other studies of imitation. For example, in the study by Baer *et al.* (1967) one subject did not respond to a variety of DRO procedures, despite the use of what was appar-

ently a powerful reinforcer (food). It is possible that the presence of the experimenter contributed to the difficulty with this subject. In addition, experimenter presence may have influenced results reported by Parton (1967), who failed to obtain control over imitations using praise as a contingent event.

In summary, it would appear that in order to control the performance of generalized imitative behaviors, at least three variables must be considered. These include: (1) setting events such as the presence of the experimenter, instructions (Steinman, 1969) as well as characteristics of, and consequences applied to, the model (Miller and Dollard, 1941; Bandura and Walters, 1963); (2) discriminative stimuli involving the demonstration of a specific response (Peterson, 1968); and, (3) consequences such as reinforcement (Baer *et al.*, 1967). Further research on the role of these variables with special emphasis on the influence of setting events may obviate the need to consider inferential explanations such as "stimulus similarity" or "failure to discriminate" in attempting to account for the performance of unreinforced imitations. This is not to say, however, that these variables might not be important in the development of imitation or in its maintenance in other settings.

Although the generality of the present findings has not been explored, it seems possible that experimenter presence effects may not be limited to studies of imitative behavior only. Such effects could conceivably exist in almost any situation where one person is present to observe another's response. To the degree that experimenter presence effects can be isolated and manipulated or combined with other techniques, increased control over a variety of behaviors may result.

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