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THE EFFECT OF VICARIOUS REINFORCEMENT ON IMITATION IN TWO SOCIAL-RACIAL GROUPS

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2 experiments were performed in which young boys observed a male model exhibit aggressive behavior. In the first experiment, Head Start boys who observed a model who received considerable verbal positive reinforcement imitated significantly less than subjects who observed a model who received no reinforcement. The second experiment replicated certain portions of the first experiment but with University Laboratory School boys. The results showed that subjects who observed the reinforced model imitated more, but not significantly so, than subjects who observed the nonreinforced model. The Laboratory School subjects in the positive vicarious reinforcement condition imitated significantly more than their counterparts from Head Start. These results were discussed in terms of past history of reinforcement for imitation which may be linked to racial or socioeconomic variables.

This paper reports two experiments, the second of which was executed because of unexpected results in the first experiment.

EXPERIMENT I

The significance and function of vicarious reinforcement has emerged as a central concept in modeling theory and research. Many of the studies on vicarious reinforcement have compared positive, negative, and no reinforcement conditions and have not systematically varied rate of reinforcement (Flanders 1968). Other studies have shown that modeling increased

The first experiment is based upon a master's thesis carried out by the junior author under the direction of the senior author. The authors are grateful to Robert Dolliver, Jerry Fryrear, and Algimantas Shimkunas for their constructive suggestions, and to Cheryl Esser, Jon Krapfl, Noel Maze, and Carol Thomas for their assistance in other phases of this work. Authors' address: Department of Psychology, University of Missouri, Columbia, Missouri 65201.

as a function of the rate of vicarious reinforcement. However, since these studies (Bisese 1966; Mausner & Block 1957; Rosenbaum, Chalmers, & Horne 1962; Rosenbaum & Tucker 1962) also involved direct reinforcement of the subject for imitating the model, they did not provide information about the effect of rate of vicarious reinforcement in the absence of direct reinforcement. Marston and Kanfer (1963) found that modeling in a group situation decreased as a function of the decreased proportion, rather than the absolute number, of reinforced vicarious responses.

A number of variables associated with the social attractiveness of the model, namely, subject-model similarity (Rosekrans 1967), model status, and model nurturance (Flanders 1968), have been found to increase imitation.

The present experiment investigated the effect of rate of vicarious reinforcement to an aggressive model on imitation under conditions of no direct reinforcement. Also, by varying the description of the model, the effect of model attractiveness on imitation was explored. A description of the model's status, interests, and activities was assumed to effect the perception of high or low model attractiveness. Children observed a model, who was described in one of two ways, perform aggressive acts toward an inflated clown. The model received either no reinforcement (NR), reinforcement for every other aggressive action (IR), or continuous reinforcement after every aggressive action (CR).

Since the present experiment used lower-class subjects and nearly all previous research has been based upon middle- and upper-class subjects, a no-model control group was included to permit an assessment of the amount of imitation.

Method

Subjects.—The subjects were 35 boys, 4 through 6 years of age. Two 3-year-old subjects were inadvertently included; however, their modeling score was not appreciably different from the average in their particular group. Since the subjects were obtained from a summer Head Start program, they were generally of low socioeconomic standing. Most of the subjects (86 percent) were Negro.

Model films.—The video portion of the film was a copy of that employed by Bandura (1965a). For approximately 5 minutes, an adult male twice performed four specific aggressive acts toward an inflated doll with accompanying verbalizations. Briefly, these acts were: sitting on the doll and punching it in the nose; hitting the doll with a mallet; kicking the doll; and throwing balls at the doll. A more detailed account of these behaviors and the accompanying verbalizations may be found in Bandura (1965a). Because of the verbal reinforcement manipulations in this ex-

periment, the experimenter constructed the audio portion of the film; however, the same verbal aggressive statements contained on the Bandura (1965a) film were utilized. While one video tape was appropriate for all experimental subjects, the reinforcement conditions called for three audio tapes which differed only in amount of verbal reinforcement. No reinforcing statements were contained on the NR tape; alternate acts were followed by verbal reinforcement on the IR tape; and the CR tape depicted verbal reinforcement following each of the eight motor-verbal aggressive behaviors. The reinforcing statements, made by a male and employed alternately, were "That's good," and "That's how to do it, fine." The reinforcer was not visible on any of the films.

Procedure.—Subjects were randomly assigned to a control group or one of six experimental conditions, the latter consisting of three levels of vicarious reinforcement and two levels of model attractiveness.

The experimental subjects were brought individually to the viewing room where half of the subjects in each of the reinforcement conditions were given the instructions for high model attractiveness. The model was described as a big man who drives a big car and likes to play ball and watch Batman on television.

All other subjects in each of the three reinforcement conditions were given instructions designed to induce low model attractiveness. The model was described as a small, weak man who preferred to sleep rather than to play ball.

After viewing one of the three films (depending upon the reinforcement condition), the subject was escorted to an adjacent room which contained the objects used by the aggressive model in the film (Bandura, 1965a) and an assortment of other toys. The experimenter told the subject that he would have to leave the room for a few minutes and invited the subject to play with the toys. The control subjects did not view the film but were escorted directly to the testing room. Thereafter, their procedure was the same as that for the experimental subjects.

The subject was left in the testing room for 10 minutes, during which time his behavior was observed through a screen and scored by a person unfamiliar with the experiment. The subject's behavior was recorded by the observer for motor and verbal imitation of the model's behavior at 5-second intervals. Only one rater was employed because interscorer agreement has been nearly perfect in previous research (Bandura, 1965a).

The measure of imitation was the total number of motor and verbal imitative acts scored every 5 seconds.

Results

When the data did not meet the assumptions of parametric statistics, appropriate nonparametric statistics were used.

CHILD DEVELOPMENT

Table 1 gives the mean imitation scores of the experimental groups for the reinforcement conditions and the control group for motor imitation (MI), verbal imitation (VI), and total imitation (TI).

TABLE 1
MEAN MOTOR, VERBAL, AND TOTAL IMITATION SCORES FOR THE
REINFORCEMENT GROUPS AND THE CONTROL GROUP:
HEAD START SUBJECTS

Group	MI	VI	TI
Reinforcement groups:			
NR.....	30.4	5.9	36.3
CR.....	10.9	2.8	13.7
IR.....	10.0	3.2	13.2
Control group.....	2.4	0.0	2.4

In order to test for modeling effects, the control group was compared with the three experimental groups pooled on TI. The Mann-Whitney *U* test resulted in a *Z* of 2.22 ($p < .02$), thus supporting the expectation that subjects would imitate the behavior of the model.

A 2×3 analysis of variance (ANOVA) was performed on the TI scores with two levels of model attractiveness and three levels of reinforcement. While the high model attractiveness group obtained a higher mean (24.80) than the low model attractiveness group (17.33), the resulting *F* of 1.03 was clearly not significant. Nor were model attractiveness and reinforcement interaction effects obtained ($F < 1$).

The main effect for reinforcement was significant ($F = 4.28$; $df = 2,26$; $p < .05$). Specific comparisons with Duncan's multiple-range test showed that the NR group obtained a significantly ($p < .05$) higher TI score than either the CR or IR groups. A one-way ANOVA on the effects of reinforcement on MI resulted in an *F* of 5.76 ($df = 2,27$), which was significant ($p < .01$). Comparisons with the Duncan's test again showed the NR group to imitate significantly ($p < .01$) more than either the CR or IR groups. A Kruskal-Wallis on the VI scores indicated no significant vicarious reinforcement effects ($H = 2.16$).

Discussion

This experiment demonstrated that children of lower socioeconomic class imitated the aggressive behavior of an adult model. The findings concerning model attractiveness suggest that the primarily verbal descriptions of the model had little effect on the imitative behavior of young boys of low socioeconomic class. The model film depicting aggressive behavior was probably a much more powerful stimulus than the description of the model.

The significantly higher imitation in the NR group than the CR and IR groups could stem from variables causing increased imitation in the NR group and/or variables causing little imitation in the CR and IR groups. Two possible explanations are offered here.

The first explanation is based upon the relation between schedule of reinforcement and rate of extinction. A number of studies (Kass 1962; Kass, Beardshall, & Wilson 1966; Lewis & Duncan 1956, 1957) have found that learning with low rates of positive direct reinforcement was more resistant to extinction than was learning under higher rates of positive reinforcement. In the present experiment, as in most other studies on vicarious learning, the measure of imitation was obtained in an extinction situation. Therefore, subjects in the NR group, having received no explicit reinforcement, should have been more resistant to extinction than the IR and CR groups. In order to explore this possibility, the number of imitative responses for the NR, IR, and CR groups was calculated for the first 4 minutes and the last 4 minutes of the 10-minute play period. The decrease in the NR group was only 30 percent, compared with 85 percent for the CR group and 97 percent for the IR group, and offers some support for this explanation.

The second explanation focuses on the limited imitation in the IR and CR groups and on the socioeconomic, and particularly the racial, composition of the sample. The subjects, 86 percent of whom were Negro, observed a white model in an experiment conducted by a white experimenter. Perhaps these Negro subjects had learned that imitating certain behavior, such as aggression performed by a white adult, may have consequences quite different or even opposite from the positive reinforcement obtained by the white model. Thus, positive consequences to a white model may be a cue for negative consequences to a Negro if he should imitate the model's behavior.

EXPERIMENT II

The major purpose of Experiment II was to clarify the results of Experiment I concerning vicarious reinforcement by replicating certain aspects of Experiment I with a white University Laboratory School population of similar age. Similar results concerning the effect of vicarious reinforcement on imitation in Experiment II would add to the generality of the findings in Experiment I and perhaps additionally suggest that vicarious learning under high reinforcement conditions is subject to rather rapid extinction. On the other hand, if the results in Experiment II contrast to Experiment I, racial and socioeconomic variables would emerge as important considerations.

A second purpose of Experiment II was to compare the relative effects of continuous vicarious reinforcement, vicarious reinforcement after

the model had performed all the aggressive behavior, and no vicarious reinforcement. Some research (Bandura 1965a; Walters & Parke 1964) has obtained no differences in imitation between subjects who observed a model positively reinforced and subjects who observed a model not reinforced. Bandura (1965b) has suggested that these results occurred because socially disapproved behavior is usually punished; thus, when a model exhibits disapproved behavior (e.g., aggression), no consequences, by contrast, have reinforcing effects. However, Rosekrans (1967) failed to obtain differences in imitation of socially approved behavior between subjects who observed a model receive no consequences or positive consequences. She suggested that the effects of giving the reinforcing consequences only at the end of the entire sequence of model behavior may well not generalize to the whole sequence of behavior. Since Bandura (1965a) and Walters and Parke (1964) gave the model reinforcement only at the end of the entire sequence of model behavior, their research is also subject to the point made by Rosekrans.

The present experiment investigated the relative effects of observing a model receive no reinforcement (NR), continuous reinforcement (CR), or reinforcement at the end of the behavior sequence (ER) on the subsequent imitation of aggressive behavior among white children.

Method

Subjects.—Thirty white boys, 4 through 6 years of age, were obtained from a University Laboratory School. The parents of most of these children are of middle or upper socioeconomic class.

Model films.—The NR and CR films were the same as those employed in Experiment I. The ER film was the same as the NR film but included the following reinforcing statements at the end of the film: "You did real fine Mr. Rocky. Good for you. That was real good. You really beat up Bobo."

Procedure.—Subjects were randomly assigned to the NR, CR, or ER group. The procedure was the same as for Experiment I except that the instructions to the subjects were reduced to the following: "I've got some nice toys for you to play with, but first let's watch a TV film showing a man whose name is Rocky."

Results

The mean motor (MI), verbal (VI), and total imitation (TI) scores for the NR, CR, and ER groups may be found in table 2.

An ANOVA indicated that the three vicarious reinforcement groups were significantly different on TI ($F = 3.49$; $df = 2,27$; $p < .05$). Comparisons using the Duncan's multiple-range test showed that the CR

TABLE 2
MEAN MOTOR, VERBAL, AND TOTAL IMITATION SCORES FOR THE
REINFORCEMENT GROUPS: LABORATORY SCHOOL SUBJECTS

Reinforcement Group	MI	VI	TI
NR.....	22.4	2.1	24.5
CR.....	32.1	6.7	38.8
ER.....	15.5	0.5	16.0

group imitated the aggressive model significantly ($p < .05$) more than the ER group but not significantly more than the NR subjects.

The ANOVA on MI failed to reveal significant differences among the vicarious reinforcement groups ($F = 2.60$; $df = 2,27$; $p > .05$). However, comparisons with the Duncan's test again showed that the CR subjects imitated significantly ($p < .05$) more than the ER subjects. The Kruskal-Wallis indicated a trend for group differences on VI ($H = 5.59$; $p < .10$).

Discussion

The results concerning the effect of no vicarious reinforcement on imitation were clearly different in Experiment II from those found in Experiment I. In Experiment I the NR group imitated more than the CR group, whereas in Experiment II just the opposite (although not significantly so) was the case. A number of additional analyses were performed to further clarify the data. The Laboratory School CR subjects were significantly higher than the Head Start CR subjects on TI ($t = 2.79$; $p < .02$) and MI ($t = 2.96$; $p < .01$). Although the Head Start subjects had higher means in the NR condition, they were not significantly different from the NR Laboratory School subjects on either TI ($t = 1.12$) or MI ($t = .88$). These analyses indicate that continuous vicarious positive reinforcement was the key variable which had vastly different effects on the two populations. The findings are consistent with the speculation, presented earlier, that positive reinforcement to a white model may be a cue to a young Negro that he would be punished if he would perform the same behavior. It is likely that some behaviors, for example, heterosexual and aggressive behaviors, would be more subject to this phenomenon than other behaviors.

Uncontrolled variables, such as intelligence and socioeconomic class, may in some way account for the findings concerning continuous vicarious positive reinforcement. It is possible that lower-class children have been negatively reinforced, perhaps by their peers, for imitating the behavior of certain adults (e.g., school teachers) when the adults receive positive reinforcement. It is also possible that giving praise to a model has little reinforcing value for a lower-class observer.

CHILD DEVELOPMENT

The effect of racial variables and vicarious reinforcement on imitation should be investigated while controlling for socioeconomic class. The effects and possible interaction of model race, subject race, experimenter race, race of the reinforcing person, and vicarious reinforcement on imitation will be investigated in a future study.

The reader will recall that rate of extinction was offered as a possible explanation for the low imitation of the CR group in Experiment I. While the CR group in Experiment II imitated more than any group, the question of rate of extinction has heuristic value. Comparisons of the frequency of imitation during the first 4 minutes with the last 4 minutes showed that the NR group declined 33 percent, whereas the CR group declined 52 percent. Thus, in both experiments continuous vicarious reinforcement led to a more rapid rate of extinction during the 10-minute free-play period than did conditions of no vicarious reinforcement. Research on the effects of vicarious positive reinforcement may obtain results greatly affected by extinction and thus give the appearance that it has little effect on imitation.

The second purpose of Experiment II was to shed light on the question of the relative efficacy of conditions of positive vicarious reinforcement and no vicarious reinforcement for the performance of socially disapproved behavior. Consistent with earlier studies (Bandura 1965a; Walters & Parke 1964), the present experiment obtained no significant difference in imitation between either of the vicarious reinforcement conditions and the no reinforcement condition. However, these findings are complicated by the more rapid extinction of subjects trained under continuous vicarious reinforcement.

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