

VICARIOUS REINFORCEMENT AND IMITATIVE LEARNING¹

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The present experiment was designed to study the influence of response-consequences to the model on the imitative learning of aggression. Nursery school children were assigned randomly to 1 of the following groups: aggressive model-rewarded; aggressive model-punished; a control group shown highly expressive but nonaggressive models; and a 2nd control group which had no exposure to models. The children were then tested for the incidence of postexposure imitative and nonimitative aggressive responses. Children who witnessed the aggressive model rewarded showed more imitative aggression and preferred to emulate the successful aggressor than children in the aggressive model-punished group who both failed to reproduce his behavior and rejected him as a model for emulation. Control over aggression was vicariously transmitted to boys by the administration of aversive stimuli to the model, and to girls by the presentation of incompatible prosocial examples of behavior.

It is becoming increasingly apparent that social learning cannot be adequately explained in terms of direct reinforcement principles. New social responses may be acquired or the characteristics of existing response hierarchies may be considerably modified as a function of observing the behavior of others and its response consequences without the observer's performing any overt responses himself or receiving any direct reinforcement during the acquisition period (Bandura, 1962). The amount of learning exhibited by the observer can, in fact, be as great as that shown by the reinforced performer (McBrearty, Marston, & Kanfer, 1961). The study reported in this paper is one in a series of experiments of learning through imitation designed to bring a wider range of social learning phenomena within the scope of behavior theory.

It is a common assumption in theorizing about vicarious or imitative learning that

this mode of response acquisition is based essentially on a process of covert instrumental conditioning in which the observer acquires responses imitatively by performing covertly the behavior exhibited by a model (Logan, Olmsted, Rosner, Schwartz, & Stevens, 1955; Maccoby, 1959). It is further assumed that the occurrence of vicarious learning phenomena is contingent on the administration to the performing model reinforcing stimuli which the observer presumably experiences as vicarious reinforcements (Hill, 1960; Mowrer, 1960). Some evidence that direct and vicarious reinforcement may, in fact, function analogously is provided by studies demonstrating that when a model is punished in the presence of an observer, the latter acquires conditioned emotional responses even though he himself receives no aversive stimulation (Barnett & Benedetti, 1960; Berger, 1962; Haner & Whitney, 1960), and that vicariously conditioned fear responses mediate avoidance reactions or response inhibition (Walters, Leat, & Mezei, 1963). Similarly, observation of a model performing responses for which he is positively reinforced may be expected to produce disinhibition, and positive incentive learning in the observer, thus facilitating the occurrence of imitative behavior (Bandura & Walters, 1963; Mowrer, 1960). In order to test systematically the possible influence of vicarious reinforcement on imitative learning,

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an experiment was conducted in which imitation of aggression was studied as a function of rewarding and punishing consequences to the model.

Nursery school children were randomly assigned to one of the following groups: aggressive model-rewarded, aggressive model-punished, a control group shown highly expressive but nonaggressive models, and a second control group which had no exposure to the models. In accordance with the theory of vicarious reinforcement, it was predicted that children who observe a model amass highly desired reinforcers through aggressive behavior will display more imitative and non-imitative aggression than children who see the model punished for exhibiting aggressive responses. Evidence that mere exposure to aggressive models augments an observer's expression of aggression (Bandura, Ross, & Ross, 1961, 1963; Lövaas, 1961; Mussen & Rutherford, 1961; Walters, Llewellyn-Thomas, & Acker, 1962), suggests that the model-punished condition is likely to produce both eliciting and inhibitory effects and consequently, the outcome will be partly a function of which of the two effects predominate. Since, however, the model was administered relatively severe physical punishment, it was predicted that the model-punished group will display less nonimitative aggression and no more imitative aggressive responses than the control group children who had no exposure to aggressive models.

METHOD

Subjects

The subjects were 40 boys and 40 girls drawn from the Stanford University Nursery School. They ranged from 38 to 63 months, with a mean age of 51 months.

The boys and girls were randomly assigned to one of the two experimental or control groups. The models were two adult males presented to the children by means of 5-minute film sequences projected on a glass lenscreen in a television console.

Procedure

The experimenter met the child in the nursery school and invited him to play in her toy room. On the way to the room the experimenter informed the child that first she had to complete some paper work in another office during which time the child could watch a televised program. As

they entered the office the experimenter seated the child and then ostensibly tuned in a program on the television console situated approximately 5 feet directly in front of the child. The experimenter occupied herself busily in a far corner of the room while the child viewed the filmed performance.

In the Aggressive Model-Rewarded condition, Rocky, the aggressive model, encounters Johnny who is playing with his highly attractive collection of toys. Rocky asks to play with some of the articles but is refused. He then exhibits the following sequence of aggressive responses: he strikes Johnny several times with a rubber ball; he kicks an inflated plastic doll about the room; and shoots darts at Johnny's cars and plastic farm animals. Following this display of aggression, Rocky stumbles as he steps over a pile of toys, Johnny sits on him and attempts to spank him but is quickly overpowered. Rocky then strikes Johnny with a baton, lassoes him with a hoola hoop, and pulls him forcefully to a far corner of the room. Throughout the filmed interaction, Rocky's aggressive acts were accompanied by numerous distinctive aggressive verbalizations. The final scene shows Johnny seated dejectedly in the corner while Rocky is playing with the toys, serving himself generous helpings of 7-Up and cookies, and riding a large bouncing hobby horse with gusto. As the scene closes, Rocky packs the playthings in a sack and sings a merry tune, "Hi ho, hi ho, it's off to play I go," as he departs with the hobby horse under his arm and the bulging sack of loot over his shoulder. A commentator's voice announces that Rocky is the victor.

The film shown to the children in the Aggressive Model-Punished condition was identical in all respects with the one presented to the model-rewarded group except that the social-interaction sequence was slightly rearranged so that the aggressive behavior shown by the model resulted in his being severely punished. The scene in which Johnny attempts to spank Rocky was inserted at the end of the film and extended so that Rocky is thoroughly thrashed by Johnny. As soon as he succeeds in freeing himself, Rocky flees to a corner of the room where he sits cowering, while Johnny places his toys in the sack and walks away. The announcer comments on Rocky's punishment.

Children in the Nonaggressive Model-Control group observed the two males engage in vigorous but nonaggressive play with the aggressive stimulus objects. Since observation of models playing actively with particular articles may reduce inhibitory responses and enhance the observer's interest in the same or similar stimulus objects, this control group provided a partial check on the influence of activity level and the stimulus enhancement factor (Crawford & Spence, 1939), on the performance of aggressive responses. The models in the control film threw the ball to each other by bouncing it off the wall; they used the guns as a low hurdle in a jump game; they danced with the plastic doll, and rolled and twirled the baton and hoola hoop.

Children in the second control group had no prior exposure to models.

Test for Delayed Imitation

After observing the models, the children were tested in a different experimental situation designed to assess the incidence of postexposure imitative and nonimitative aggressive responses. The experimental test room contained a baton, two 5-foot Bobo dolls, three balls, a hoola hoop, and a lasso, dart guns, cars, and plastic farm animals, all of which could be used by the children to reproduce the models' aggressive response patterns. A variety of toys which tend to elicit predominantly non-aggressive responses were also provided. These included a blackboard, a doll house equipped with furniture and a doll family, three cotton-stuffed dolls, and a set of building blocks. In order to control for any variation in behavior due to position of the stimulus objects in the room, the play material was arranged in a fixed order for each of the test sessions. It was necessary for the experimenter to remain in the room during the experimental session since the pretest revealed that the children exhibited some anxiety about being left alone in the room for a relatively long period of time and tended to leave before the termination of the session. However, the experimenter minimized any influence that her presence might have on the children's behavior by busying herself with paper work at a desk in the far corner with her back turned to the room and thereby avoided any interaction with the children.

Each child spent 20 minutes in the test room during which time his behavior was rated in terms of predetermined response categories by judges who observed the session through a one-way mirror in an adjoining observation room. The 20-minute session was subdivided into 5-second intervals by means of an electric timer, thus yielding a total number of 240 response units for each child.

One rater scored the test sessions for all 80 children. In order to provide an estimate of interscorer reliability, the responses of 11 children were scored independently by a second observer. Neither of the raters had knowledge of the treatment conditions to which the children were assigned. Since the raters simply recorded the frequency of occurrence of clearly defined specific classes of responses, interscorer reliabilities were high, the product-moment coefficients being in the .90s.

Response Measures

The measure of imitative aggression was obtained by counting the frequency with which the child performed the following matching responses: kicks the Bobo doll, lassoes it or strikes it with a ball or the baton, shoots darts at the cars or plastic farm animals; repeats the specific aggressive verbal responses emitted by the model.

The measure of nonimitative aggression was based on the frequency of occurrence of nonmatching

physically aggressive responses directed toward the Bobo dolls and other objects (e.g., punches or slaps the Bobo dolls, crashes the automobiles, acts out physical attacks toward members of the doll family or toward the animals, etc.); nonimitative aggressive gun play in which the child fires darts at objects other than the cars or animals; and aggressive verbal responses that differ from those expressed by the model.

Model Preference

At the conclusion of the experiment each child who participated in treatment conditions utilizing models, was asked to evaluate the behavior exhibited by Rocky and Johnny, and to select the characters he preferred to emulate. The children's preferences for the two models served as an additional measure of the influence of response-consequences to the model in promoting imitation.

RESULTS

The mean aggression scores for children in the experimental and the control groups are presented in Table 1. Since many of the children, particularly the girls, in the two control groups received zero or very low imitation scores, nonparametric techniques were employed to evaluate the significance of the obtained differences. Results of the Kruskal-Wallis analysis of variance performed on these scores reveal that imitation is significantly influenced by response-consequences to the model (Table 2). Further comparison of pairs of scores by the Mann-

TABLE 1
MEAN AGGRESSION SCORES FOR CHILDREN IN THE
EXPERIMENTAL AND CONTROL GROUPS

Response category	Experimental groups		Control groups	
	Ag- gressive Model- Rewarded	Ag- gressive Model- Punished	Nonag- gressive model	No model
Imitative aggression	15.4	8.4	7.2	5.3
Boys	16.2	7.8	10.0	5.6
Girls	14.5	8.9	4.4	4.9
Nonimitative aggression	59.9	45.2	59.2	56.6
Boys	75.6	45.6	81.7	62.0
Girls	44.1	44.7	36.7	51.2
Total aggression	75.2	53.5	66.4	61.8
Boys	91.8	53.4	91.7	67.6
Girls	58.6	53.6	41.1	56.1

TABLE 2

SIGNIFICANCE OF THE DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS IN IMITATIVE RESPONSES

Response category	<i>H</i>	<i>p</i>	Comparison of pairs of treatment conditions					
			Rewarded versus Punished <i>p</i>	Rewarded versus Non- aggressive <i>p</i>	Rewarded versus Control <i>p</i>	Punished versus Non- aggressive <i>p</i>	Punished versus Control <i>p</i>	Nonag- gressive versus Control <i>p</i>
Imitative aggression	9.69	<.05	<.05	<.025	<.001	<i>ns</i>	<i>ns</i>	<i>ns</i>

Whitney *U* test, show that children who observed the model amass rewards through aggression displayed significantly more imitative aggressive behavior than did children in the other three groups which did not differ from each other in this respect (Table 2).

Not only were the children more inclined to reproduce the behavior of the rewarded model, but they also preferred to emulate the aggressive model more frequently when he secured attractive rewards through physical aggression, than when he was punished for displaying the same behavior, or was simply permitted access to the rewarding resources and behaved in a prosocial manner (Table 3). A chi square analysis of these data provided a value of 19.85 which is significant beyond the .001 level. Although several of the expected theoretical frequencies were less than 5, the extremely high significance level adds to the reliability of these findings.

The prediction that punishments and rewards administered to an aggressive model will have corresponding inhibitory and disinhibitory effects on the observers' performance of nonimitative aggression was only partially confirmed, due primarily to the fact that the boys and girls were differentially

influenced by the behavior of the models and its response consequences. A two-way analysis of variance of the nonimitative aggression scores yielded no significant main effect of treatment conditions but disclosed a Treatments $\times$ Sex interaction effect of borderline significance ($F = 2.71$, $.05 < p < .10$), and a sex difference ($F = 13.27$, $p < .001$). A similar analysis of variance of the total aggression scores also revealed the significant sex difference ($F = 12.68$, $p < .001$) and the Treatments $\times$ Sex interaction effect ($F = 3.18$, $.025 < p < .05$). As shown in Table 1, boys were most inclined to inhibit aggression when they either observed an aggressive model punished, or had no exposure to aggression, whereas, observation of highly expressive or rewarded aggressive models greatly enhanced the boys' aggressive behavior. The finding that these latter two conditions were equally effective in promoting aggression in boys may be partly due to the fact that some of the responses displayed by both the expressive and the aggressive models had many elements in common, e.g., throwing a ball vigorously at an adversary versus throwing a ball at a wall. Both conditions could thus serve to disinhibit and to elicit aggression, particularly in persons for whom such responses are currently dominant in their response hierarchies. On the other hand, in some of the critical responses exhibited by the expressive models, stimulus objects which tend to elicit predominantly aggressive responses were utilized in nonaggressive ways, a form of modeling which may foster the development of incompatible positive responses in observers who present relatively weak aggressive predispositions. Perhaps for this reason, the provision of a nonaggressive model

TABLE 3

PERCENTAGE OF CHILDREN IN THE MODEL REWARDED, MODEL PUNISHED, AND NONAGGRESSIVE MODEL GROUPS SELECTING ROCKY OR JOHNNY AS OBJECTS OF IMITATION

Choice of model	Aggressive Model- Rewarded	Aggressive Model- Punished	Nonaggressive model
Rocky	60	20	0
Johnny	5	20	30
No preference	35	60	70

had the greatest inhibitory effect on the girls' expression of aggression, and response-consequences to the model produced little change in their nonimitative aggressive behavior.

DISCUSSION

The results of the present study provide support for the hypothesis that imitation is partly dependent on response-consequences to the model. Children who witnessed the Aggressive Model-Rewarded showed more imitative aggression and preferred to emulate the successful aggressor than children in the Aggressive Model-Punished group who both failed to reproduce his behavior and rejected him as a model for emulation.

A surprising supplementary finding yielded by the postexperimental interviews is that, almost without exception, children who selected the successful aggressive model as their object of imitation labeled his behavioral attributes with strongly negative evaluations, e.g., "Rocky is harsh, I be harsh like he was," "Rough and bossy," "Mean," "Wicked," "He whack people." Similar disapproval was voiced by these children while viewing the filmed sequence. Responses to additional questions concerning Rocky's behavior revealed that success in gaining and controlling rewarding resources provided the primary basis of attraction and not the intrinsic desirability of the model's aggression: "Rocky beat Johnny and chase him and get all the good toys." "He come and snatched Johnny's toys. Get a lot of toys." "No one would ever get the toys from Rocky." "He was a fighter. He got all good toys." The classic example of how children will incorporate into their own behavioral repertoire objectionable but successful modeling behavior was offered by the girl who voiced considerable disapproval during the exposure session of Rocky's having appropriated Johnny's toys. Nevertheless, at the conclusion of the experimental test session—during which time she exhibited much of Rocky's aggressive behavior—she turned to the experimenter and asked, "Do you have a sack here?"

When children state that physical aggression and forceful confiscation of others' pos-

sessions is morally reprehensible, and publicly criticize a model for exhibiting such behavior, but then themselves engage in the attitude-discrepant actions, one would expect the children to experience considerable dissonance (Festinger, 1962). Interestingly, they did not resolve the conflict by enhancing the attractiveness of aggression, rather, they were highly derogatory of Johnny, apparently as justification for Rocky's assaultive behavior. They criticized Johnny for his inability to control Rocky ("He was a cry baby. Didn't know how to make Rocky mind"), for his miserliness ("If he'd shared right in the beginning, Rocky might have played nice. He didn't share"), and typically described him as "Sulky," "Selfish," "Mean," and "Sort of dumb." In the Aggressive Model-Punished condition, in contrast, where Johnny provided considerably more justification for censure since he not only refused to share his possessions but also walloped Rocky, negative evaluations of Johnny were totally absent while Rocky remained "a bad boy."

The model-preference responses of children in the present study are essentially in accord with Zajonc's (1954) finding that children chose a successful leader as their model regardless of the form of behavior he employed to obtain the rewarding outcome. Unlike our nursery school children, however, Zajonc's subjects enhanced the attractiveness of the rewarded model's attributes. If the affiliation oriented leader was successful, affiliative attributes were rated as attractive. In contrast, when the power oriented leader was successful, authoritarian attributes were seen as desirable, although subjects enhanced successful authoritarianism less than successful affiliative characteristics. Possibly Rocky's behavior was too inconsiderate and reprehensible to be rated favorably even though it was highly successful and was reproduced by the children in their own behavior.

The finding that successful villainy may outweigh the viewers' value systems has important implications for the possible impact of televised stimulation on children's attitudes and social behavior. The present experiment involved only a single episode of aggression

that was rewarded or punished. In most televised programs the "bad guy" gains control over important resources and amasses considerable social and material rewards through a series of aggressive maneuvers, whereas his punishment is generally delayed until just before the last commercial. Thus children have opportunities to observe many episodes in which antisocially aggressive behavior has paid off abundantly and, considering that immediate rewards are much more influential than delayed punishment in regulating behavior, the terminal punishment of the villain may have a relatively weak inhibitory effect on the viewer. Further investigations are therefore needed in which the number and timing of positive and negative reinforcers administered to the model are varied systematically.

It is generally assumed in psychoanalytic theory that threat by a punitive agent is the primary motivating force in "identification with the aggressor" (Freud, 1946; Freud, 1924, 1948; Mowrer, 1950). Data from this study, however, demonstrate that the success of the model's behavior is a crucial factor in determining the degree to which an aggressive pattern of behavior will be reproduced by the observer. On the basis of the response-consequences interpretation of modeling effects, it would be predicted that if the behavior of an aggressive model is highly successful in producing social and material rewards, the child will identify with the aggressor, even though he may dislike the attributes of the model. If, on the other hand, the aggressor's behavior fails to gain power and control over important resources, or actually brings punishment, identification with the aggressor will not occur. It is probable, therefore, that fear of a punitive or threatening agent is usually an irrelevant rather than an instigating factor in the identification process.

The findings based on the total aggression scores suggest that control over aggressive behavior can be vicariously transmitted through the influence of models, either by the administration of aversive stimuli to the model, or by the presentation of incompatible prosocial examples of behavior. The obtained differential effects of prosocial and punished

deviant models on the control of aggression by boys and girls may be partly interpretable in terms of the dominance of aggressive responses in the subjects' behavioral repertoires. Thus, for boys, in whom physical aggressive responses are typically strongly established (Goodenough, 1931; Hollenberg & Sperry, 1951; Johnson, 1951; Sears, 1951; Yarrow, 1948), exposure to a punished model effectively inhibited the boys' aggressive behavior, whereas observation of highly expressive or rewarded aggressive models produced substantial disinhibitory effects. By contrast, girls, who generally exhibit little physical aggression in their social behavior, were not influenced in their overall expression of aggression by prior exposure to the aggressive models, regardless of whether they were rewarded or punished, while exposure to nonaggressive models produced decrements in aggressive responses.

The implication of the above findings is that in cases where aggression is strongly inhibited or only weakly established, the provision of models demonstrating incompatible prosocial behavior may be highly effective in the acquisition and maintenance of self-control, whereas aversive consequences to the model may be necessary in order to produce inhibition of highly dominant responses.

In evaluating the results of response-consequences to the model on imitative learning, it is important to distinguish between learning and performance. When a person observes an exhibited sequence of responses, it is highly improbable that the vicarious acquisition of these responses is suspended until the occurrence of response-consequences at the termination of the behavioral sequence. Nor does a theory of imitation which requires the matching responses to occur and to secure positive reinforcement before they can be learned, appear to be entirely satisfactory in accounting for the acquisition process. More likely, matching responses are learned on the basis of contiguous association of sensory events. The anticipation of positive or negative reinforcement, however, may augment or reduce the probability of the occurrence of the observing responses which are essential ingredients of imitative learning, and response-consequences either to the model or

to the observer may be important influences on the performance of imitatively learned responses. Indeed, some indication that the obtained differences in imitative aggression between children in the model-rewarded and the model-punished groups reflect primarily a difference in performance rather than in learning, is provided in the postexperimental interviews. When children who witnessed the Aggressive Model-Punished were asked to evaluate Rocky's behavior, they often described the entire sequence of aggressive acts with considerable accuracy. Obviously, they had acquired the cognitive equivalents of the model's behavior although, this learning was not translated into the corresponding overt motoric responses. In order to determine the relationship between acquisition and performance of imitation responses, a study is now underway in which children who have witnessed rewarded and punished models are tested for delayed imitation, following which they are offered highly attractive incentives to reproduce the behavior of their respective models. It is expected that both sex differences and model-consequence differences will disappear under the positive incentive condition.

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