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THE INFLUENCE OF ANTECEDENT REINFORCEMENT AND DIVERGENT MODELING CUES ON PATTERNS OF SELF-REWARD [1]

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The present experiment was designed to test the hypothesis that the effect of models' self-reinforcement contingencies on the self-reinforcing behavior of observers will be partly determined by their antecedent success and failure experiences and performance discrepancy from the comparison models. Groups of children underwent a series of success or failure experiences following which they were exposed to either a superior model adopting a high criterion for self-reward, an inferior model displaying a very low standard for self-reinforcement, an equally competent model exhibiting a moderately high self-reward criterion, or they observed no models. Children in the inferior-model condition displayed a considerably higher frequency of self-reinforcement at low performance levels and greater magnitude of self-reward than Ss who had been exposed to more competent models adopting higher criteria for self-reinforcement. In accord with social comparison theory, children rejected the self-imposed reinforcement contingencies of the superior model and adopted a lower standard commensurate with their achievements. The effects of antecedent success-failure experiences were found to be dependent upon treatment conditions and level of performance.

The voluminous investigations of reinforcement processes have been confined, with few exceptions (Bandura & Kupers, 1964; Kanfer & Marston, 1963a, 1963b; Marston, 1965; Mischel & Liebert, 1966), to situations in which an agent adopts a particular criterion with respect to a performer's behavior, and dispenses reinforcers to him contingent upon the occurrence of desired responses. A highly important, but less well understood, reinforcement phenomenon characteristic of humans is evident in situations in which a person imposes a particular response-reinforcement contingency on his own behavior, and self-administers reinforcers which are under his own control on occasions when he attains or surpasses the self-prescribed standards of achievement. The latter event is analogous to providing a rat in a Skinner box with a generous supply of delectable pellets which he self-administers following commendable bar-press performances, but denies himself when he judges his attainments to be substandard.

In a previous investigation of the determinants of self-reinforcing responses (Bandura & Kupers, 1964), it was found that children's patterns of self-reward and self-punishment closely matched those of models to whom they had been exposed. Subjects who observed models adopting a high criterion for self-reinforcement utilized positive reinforcers sparingly and only when they achieved relatively high levels of performance, whereas children who had observed low-standard models rewarded themselves generously even for minimal performances.

There are several factors that might account for the surprisingly precise matching of the models' patterns of self-reinforcement obtained in the preceding study. First, the scores on the particular task employed did not have much absolute significance and consequently, they provided the subjects little basis for judging what might constitute an inadequate or a superior performance independent of some reference norm. Even if relevant normative data were available, since

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both the subjects' and models' performances varied widely the children had no reliable basis for evaluating their own abilities. Thus the combination of performance ambiguity and instability would tend to enhance the potency of the models' standard-setting and self-reinforcing responses.

Under conditions of greater performance stability, the effect of a model on the self-reinforcing behavior of an observer is likely to be determined, in part, by the discrepancy in ability between the participants, and by the observer's history of positive and negative reinforcements with respect to achievement behavior. In order to investigate systematically the influence of the later variables and their interaction on the social transmission of self-reinforcement patterns, an experiment was conducted in which groups of children underwent a series of success or failure experiences on a variety of achievement tasks. Following the differential treatments, one fourth of each group was exposed to a model adopting a high criterion for self-reward and performing the experimental task at a consistently superior level relative to that of the children; one fourth observed a model displaying a very low standard for self-reinforcement and performing at an inferior level; one fourth watched an equally competent model exhibiting a moderately high self-reward criterion, while the remaining subjects served as a no-model control group. After exposure to their respective models, the children in all conditions received the same pattern of scores on the modeling task, and the performances for which they rewarded themselves were recorded.

In the case of performances for which objective, nonsocial criteria of adequacy are lacking, the achievements of others serve as the only standard against which meaningful self-evaluations can be made. According to social comparison theory (Festinger, 1954), persons tend to select reference models who are similar in ability, and to reject those who are too divergent from themselves. It was, therefore, predicted on the basis of the latter theory that subjects would adopt the self-reinforcement contingencies of the model whose ability or competence was similar to their own. On the other hand, observers whose performances are comparatively low and markedly discrepant from a model's achievements would tend to view the comparison person as too divergent in ability to serve as a meaningful model for self-evaluation. Accordingly, it was hypothesized that children who had been exposed to the superior model would reject his high criterion for self-reinforcement and adopt a lower standard commensurate with their own achievement level. This rejection process would be reflected in a pattern of self-reinforcement equivalent to that adopted by children in the condition involving the equally competent model, whose criterion for self-reward corresponded to the modal performance of all subjects.

Had the behavior of peer models been employed as the standard for self-evaluation, one would presuppose from social comparison theory that subjects might similarly reject the self-imposed reinforcement contingencies of an inferior model. However, evidence that achievements which match or exceed positively evaluated low performances by adults tend to be regarded by children as highly commendable and worthy of reward (Bandura & Kupers, 1964), suggests that upward discrepancies from adult models result in enhanced self-evaluation, rather than rejection of the model. Consequently, it was predicted that following low performances, children in the inferior-model condition would display a significantly higher incidence of self-rewarding responses than subjects in the equally competent and superior-model conditions. Children in the three modeling treatments were not expected to differ in the frequency of self-reinforcement associated with moderately high and superior performances. Since, however, moderately high scores are likely to be evaluated as only marginally commendable achievements by children exposed to competent models, but as meritorious attainments by children who have observed an inferior adult model, it was hypothesized that relative to the former groups, subjects in the latter condition would engage in a higher magnitude of self-reward following high-level performances.

There is some research evidence (Stotland & Zander, 1958) that persons who have undergone failure experiences lower their

evaluation both of the quality of their original performances and of closely related abilities. On the assumption that low self-evaluations are accompanied by reduced self-reinforcing behavior, it was expected that subjects in the failure condition would exhibit a lower frequency and magnitude of self-reward than children who had experienced repeated success.

METHOD

Subjects

The subjects were 80 boys and 80 girls ranging in age from 8 to 11 years, drawn from the Los Angeles and Inglewood School Districts.

Three adult males served as experimenters, and a male and a female adult played the roles of models.

Success-Failure Treatment

In the initial phase of the study each child was randomly paired with a same-sex partner. While accompanying the children to the experimental room, the experimenter introduced himself as a college student who was conducting a normative study of the physical skillfulness and reasoning ability of both children and adults. He explained that children were tested simultaneously in order to expedite collection of the data, and that, for similar reasons, adults also would be participating at the same time and place.

After the experimenter had randomly assigned one of the pair to the success condition and the other to the failure group, the partners performed alternately on the same three tasks. Several different tasks varying considerably in content were employed so as to produce a relatively generalized success or failure effect. Since the experimenter, in fact, controlled the scores, it was possible to ensure that children in the success condition performed significantly better on the series of trials than those in the failure treatment. In order to control for the possibility that a child might discount the achievement disparity as being a function of a chance idiosyncratic matching, the subjects were provided with fictitious normative data that corroborated the situationally produced differential outcomes. In addition, at the conclusion of the three tasks, the consistent discrepancies in the performances of the two children were further underscored by a summary evaluation highlighting their differential achievements relative to each other and to the normative group.

The first task, which supposedly measured physical strength, consisted of a wooden box on the front of which was mounted a dial with numbers ranging from 0 to 30. The subjects were led to believe that when they pulled the handle attached to the box, the number that registered on the dial provided a measure of their physical strength. But actually the scores were predetermined and controlled by the experimenter by means of a rheostat located at the back of the apparatus. Children in the success condition gained a total of 40 points based on two trials, subjects in the failure group obtained a combined score of 25, and the normative achievement for children of their age was presented as 30 to 35 points.

The second task was introduced as a test of problem-solving ability. The task utilized four stimulus items and a deck of response cards, each containing geometric figures varying in number, shape, and color. The children were instructed to figure out which dimension, or combination of dimensions, was the crucial one, and then to sort the deck of response cards under the four stimulus items. Since the children received no immediate feedback concerning the accuracy of their sorts, and considering also that several classifications would be correct, the subjects had no means of evaluating their performances.

On the latter task, children in the failure condition were informed that they received a score of 24 points; in the success condition, 36 points. The experimenter then added that most children obtained 30 points.

The third task was structured as a measure of psychomotor dexterity. The apparatus consisted of a cylindrical can with holes in the top, and small plastic straws on a tray positioned under the holes. The goal was to pull the straws out of the holes using a pair of tweezers, without touching the sides of the holes. A buzzer system was devised so that, instead of signaling whenever the tweezers made contact with the metal, it sounded whenever the experimenter pushed a concealed button. Children in the success condition obtained a total of 35 points. Once again, subjects in the failure treatment were less successful, receiving only 20 points. The experimenter concluded the game with his normative statement, "Most boys [girls] of your age get 30 points."

At the completion of all three tasks, children who underwent the series of failure experiences were informed that their total score of 69 points was relatively low compared both to their partner's score and to the normative score of 95, whereas subjects in the success condition were told that their combined score of 111 points represented a meritorious performance.

Modeling of Self-Reinforcement Contingencies

Following the success and failure treatments, the model made his appearance. The experimenter invited the children to rest while the model took the first turn on the next task—a miniature bowling game—which provided the means for displaying the model's competence level and his adopted criteria for self-reinforcement. Since in the previous study (Bandura & Kupers, 1964), sex of the model had no differential effects on self-rewarding behavior, there was no attempt to manipulate this variable in the present study. All children observed same-sex models.

The bowling apparatus consisted of a 3-foot runway bounded at the far end by vertical fiberboard shields. Seven jewel lights, labeled with numbers ranging from 5 to 20, were mounted in two staggered

rows on the front shield. The subjects were informed that whenever a bowling ball hit a target (purportedly behind the fiberboard shield) the corresponding light would flash on. Since there were no visible targets, the children could not evaluate their performances independently of the flashing scoreboard. Moreover, high and low numbers were placed in adjacent positions, so that any score seemed plausible no matter where the bowling ball actually rolled. The experimenter controlled the flashing scoreboard via a remote monitor so that the models performed identically within each condition, and all children received the same pattern of scores.

Before commencing the modeling trials, the experimenter called the participants' attention to a bowl of assorted candies near the starting point of the alley within easy reach of the bowler. He explained that this energy-building food was supplied for their benefit, that they should help themselves whenever they wished, and that if they did not feel like eating all the candy during the session they could save it in the paper cup provided. A variety of candies was utilized as positive reinforcers in order to avoid satiation effects.

The model then played 12 bowling games consisting of three balls per game, while the children observed. In the *superior model high-criterion condition,* the model obtained scores ranging from 25 to 60 points and rewarded himself with candy and positive self-evaluative verbalizations only when he obtained or exceeded a score of 40. After these high-score performances he treated himself to candy and commented approvingly, "I deserve some candy for that high score . . . That's great! That certainly is worth a treat." By contrast, on trials in which he failed to meet the adopted criterion of 40, he refrained from taking candy and remarked self-critically, "No candy for that . . . That does not deserve a treat."

In the condition involving the *equally competent model displaying a moderately high criterion* for self-reinforcement, the performance scores ranged from 15 to 40, with the adopted standard being 25 points. Except for the lower self-imposed criterion, the self-rewarding and self-punitive responses were identical in form and frequency to those in the superior-model condition. On trials in which the model obtained or exceeded a score of 25 points, he rewarded himself with candy and commented self-approvingly, while on trials in which he performed below the minimum standard he denied himself candy and engaged in self-critical behavior.

In the inferior-model low-criterion condition, the model's scores ranged from 5 to 25 and the self-administration of material and verbal reinforcers was made contingent on obtaining a score of 15 points or higher.

It should be noted that for the purposes of the present experiment, criterion level and competence had to be covaried. That is, a superior model could not adopt a low standard for self-reinforcement unless he obtained low scores which would thereby reduce his competency; conversely, in order for the inferior model to display high criteria for self-reward, it would have been necessary to convert him into a more competent performer. While the effects of self-imposed contingencies and competence can be evaluated independently, it was neither feasible nor particularly meaningful to do so for the phenomenon investigated in this study.

In all model conditions there was some slight variation in magnitude of self-reward. Models treated themselves to one piece of candy for criterion-level scores, two pieces for performances slightly above their adopted standard, and three for scores exceptionally high relative to this standard.

Children in the *control group* similarly participated in the success-failure session and the test for self-rewarding behavior, except that they had no intervening exposure to a model.

Measurement of Self-Rewarding Responses

After the model completed his 12 trials, the experimenter described to him the tasks the children had participated in before his arrival. The experimenter then offered to work with the model on the latter tasks, explaining to the children that in order to expedite matters, two other adults would play the bowling game with them. The children then performed the bowling task simultaneously in separate rooms with the new experimenters. The subjects were tested separately by adults who were not present during the success-failure and the modeling phases of the study in order to remove any situational pressures on the children to adopt the model's patterns of self-reinforcement. In order to control for any possible experimenter influences, the experimenters were counterbalanced across success-failure treatments, and they had no knowledge of the conditions to which the subjects were assigned.

Before commencing the trials, the experimenter replenished the candy supply, and repeated the instructions conveying considerable permissiveness for self-reward. The children then performed 18 trials of three balls each. Their scores ranged from 10 to 60 points, according to a prearranged program. Therefore, the size and sequence of scores was identical for all children, regardless of model condition.

For the purpose of testing the hypotheses, the performance levels were divided into four critical categories, which coincided with the modeled criteria for self-reward: 10, 15–20, 25–35, and 40–60. Since no model rewarded himself for scores of 10, and in order to maintain the competence differentiations, only two 10-point trials were included. The remaining trials were about equally distributed among the other three score categories. The particular sequence of scores was randomly determined except for the limitation that the three highest performances (50, 55, and 60) occurred at the end of the sequence in order to preserve the competence disparities. That is, had the extremely high scores been placed early in the serial order, the children in the superior-model condition might have judged themselves to be equally competent; conversely, the children who had observed the model displaying moderately high performances would have viewed

TABLE 1

MEAN NUMBER OF SELF-REINFORCED TRIALS AS A FUNCTION OF TREATMENT CONDITIONS AND PERFORMANCE LEVEL

Experimental groups	No-model control				Model conditions											
					Inferior model				Equally competent				Superior model			
	10	15–20	25–35	40–60	10	15–20	25–35	40–60	10	15–20	25–35	40–60	10	15–20	25–35	40–60
Success																
Boys	0.4	1.6	1.5	1.0	1.4	5.6	4.7	4.5	0.6	3.7	4.3	3.9	0.7	2.1	3.3	4.6
Girls	0.5	1.6	1.7	1.3	0.8	4.9	4.4	4.5	0.3	2.1	4.4	3.8	0.3	2.1	4.0	4.6
Total	0.5	1.6	1.6	1.2	1.1	5.3	4.6	4.5	0.5	2.9	4.4	3.9	0.5	2.1	3.7	4.6
Failure																
Boys	0.9	3.0	2.6	1.6	0.5	4.2	3.9	4.0	0.6	2.2	3.1	2.8	0.9	2.8	2.9	4.2
Girls	0.6	2.7	2.3	1.5	0.4	3.8	3.5	3.1	0.5	2.6	4.5	3.8	0.6	2.5	3.3	4.0
Total	0.8	2.8	2.5	1.6	0.5	4.0	3.7	3.6	0.6	2.4	3.8	3.3	0.8	2.7	3.1	4.1
Combined subgroups	0.6	2.3	2.0	1.4	0.8	4.6	4.1	4.0	0.5	2.7	4.1	3.6	0.6	2.4	3.4	4.4

themselves as superior. The three high scores at the end of the series were primarily included to furnish additional data regarding magnitude of self-reinforcement at levels of achievement that clearly exceeded the minimum criteria adopted by the models in all experimental conditions.

The experimenter recorded the trials for which the children rewarded themselves with candy, the total number of reinforcers taken on each self-reinforced trial, and the frequency of positive and negative self-evaluative verbalizations.

After each child completed the 18 bowling trials, the two partners met again and were readministered the success-failure tasks in order to neutralize the effects of the experimental manipulations. This time the two children received similar scores and were highly praised for their performances and thanked for their participation.

RESULTS

Frequency of Self-Reinforcement

Table 1 shows the mean number of self-reinforced trials displayed by subjects in the various experimental and control subgroups. The obtained differences were evaluated by the Kruskal-Wallis test for 10-point performances, and by a three-way analysis of variance for the remaining score categories, with modeling cues, success-failure conditions, and sex of subjects serving as the three independent variables.

Children in all groups rewarded themselves relatively infrequently following 10-point scores, and did not differ in this respect. At succeeding performance levels, however, both modeling cues and the interaction of modeling and antecedent reinforcement variables were important determinants of self-reinforcing behavior. These differences are shown graphically in Figures 1 and 2.

Low performance level. Analysis of the frequency of self-reinforcement associated with 15–20 point scores reveals a highly significant modeling effect ($F = 13.73$, $p < .001$), and a Models × Reinforcement interaction ($F = 3.37$, $p < .05$), indicating that the success-failure experiences had a differential impact on the various groups. This significant interaction effect was primarily due to the fact that prior failure decreased self-

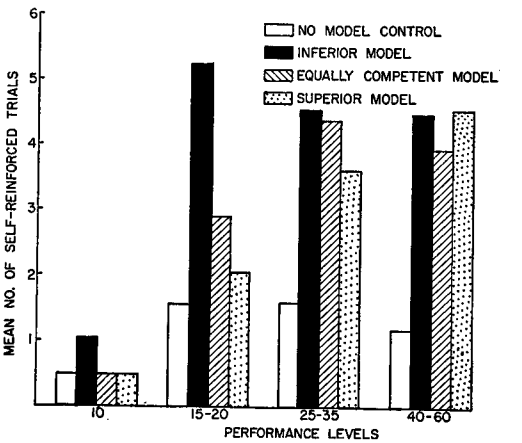

FIG. 1. Mean number of self-reinforced trials as a function of treatment conditions and performance level by subjects in the success condition.

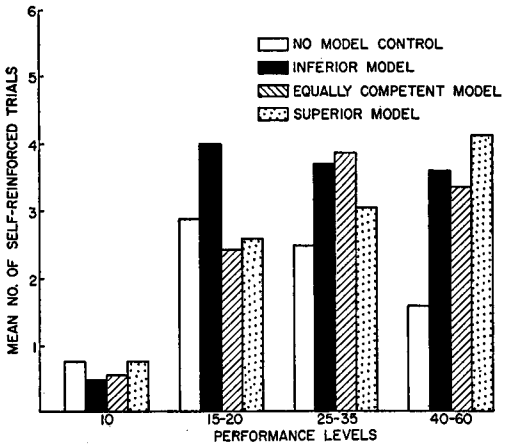

FIG. 2. Mean number of self-reinforced trials as a function of treatment conditions and performance level by subjects in the failure condition.

reinforcing behavior among children in the inferior-model condition ($t = 2.07$, $p < .025$), but increased the incidence of self-reinforcement among children in the control group ($t = 2.07$, $p < .05$).

Further comparisons of pairs of means by the t test reveal that children in the success condition who had been exposed to the inferior model, as predicted, engaged in considerably more frequent self-rewarding behavior than children who had observed either equally competent or superior models, or those in the control group (Table 2). The hypothesis concerning rejection of highly superior models was also confirmed by the finding that children in the equally competent and superior model conditions did not differ significantly in their self-rewarding behavior.

Although the potency of modeling cues noted above was somewhat reduced under conditions of failure, children who had observed inferior models nevertheless showed a higher frequency of self-reinforcing responses relative to the other two modeling groups (Table 2). In accord with results from the success treatment, subjects in the equally competent and superior-model conditions who had undergone failure likewise did not differ significantly.

Moderately high performance level. Analysis of variance of the frequency of self-reinforcement following 25–35 point performances similarly reveals a highly significant modeling effect ($F = 21.37$, $p < .001$), and a Models × Reinforcement interaction ($F = 3.25$, $p < .05$). Consistent with the preceding findings, the interaction reflects a lower incidence of self-rewarding behavior by children in the conditions involving the inferior ($t = 2.01$, $p < .05$), equally competent ($t = 1.30$, $p < .10$), and superior models ($t = 1.30$, $p < .10$), and increased self-reinforcement by controls ($t = 1.89$, $.10 < p < .05$) as a function of failure experiences.

TABLE 2

SIGNIFICANCE OF DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS IN FREQUENCY OF SELF-REINFORCEMENT

Performance level	Comparison of pairs of treatment conditions					
	Inferior versus control	Inferior versus equal	Inferior versus superior	Equal versus control	Equal versus superior	Superior versus control
15–20 point performances						
Success	6.05***	3.90***	5.22***	2.15*	1.33	0.83
Failure	1.91	2.65**	2.24*	0.75	0.41	0.33
25–35 point performances						
Success	6.85***	0.47	2.13*	6.38***	1.65	4.73***
Failure	2.95**	0.24	1.42	3.19**	1.65	1.54
40–60 point performances	8.03***	1.35	0.98	6.68***	2.33*	9.01***

Note.—One-tailed tests were employed in instances where a specific hypothesis was being tested; two-tailed tests were applied in evaluating differences between groups for which no predictions were advanced.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

TABLE 3

MEAN NUMBER OF REINFORCERS SELF-ADMINISTERED PER TRIAL AS A FUNCTION OF TREATMENT CONDITIONS AND PERFORMANCE LEVEL

Experimental groups	No model control				Model conditions											
					Inferior model				Equally competent				Superior model			
	10	15–20	25–35	40–60	10	15–20	25–35	40–60	10	15–20	25–35	40–60	10	15–20	25–35	40–60
Success																
Boys	1.2	1.9	2.9	2.5	1.1	1.9	3.1	4.5	1.9	1.7	3.1	3.0	1.1	2.0	2.0	3.3
Girls	1.0	1.5	1.8	1.8	1.5	1.5	2.8	3.9	1.3	1.8	2.8	2.7	1.0	1.0	1.4	2.5
Total	1.1	1.8	2.3	2.2	1.2	1.7	3.0	4.2	1.7	1.8	3.0	2.8	1.1	1.5	1.7	2.9
Failure																
Boys	2.0	3.3	5.8	4.1	1.6	2.0	3.2	4.3	1.2	2.5	3.2	3.9	1.1	1.5	1.9	2.1
Girls	4.0	2.3	2.3	2.3	1.3	1.5	2.1	4.3	1.5	1.3	2.1	2.9	2.0	2.3	2.5	3.9
Total	3.0	2.8	4.2	3.1	1.4	1.7	2.6	4.3	1.3	1.8	2.6	3.3	1.5	1.9	2.2	3.0
Total sample	2.3	2.4	3.3	2.8	1.3	1.7	2.8	4.3	1.5	1.8	2.8	3.1	1.3	1.7	1.9	3.0

As expected at this moderately high level of performance, individual t tests disclosed no significant differences in either success or failure conditions between children who had observed the inferior model and those in the equally competent or superior-model groups (Table 2). Children in all three modeling conditions who had undergone rewarding experiences engaged in significantly more self-reinforcement than did the control subjects. Moreover, children in the inferior-model group displayed a higher incidence of self-reinforcing responses than did subjects who had been exposed to the superior model. Under conditions of failure, however, all group differences were reduced and only subjects in the inferior and equally competent model groups exhibited a higher incidence of self-reinforcement than the control subjects.

Superior performance level. Analysis of variance of self-reinforcing responses occurring after 40–60 point performances yielded a significant modeling effect ($F = 33.13$, $p < .001$), but neither prior reinforcement nor any interactions between the independent variables were statistically significant sources of variation. Thus, at the superior level of achievement subjects in all modeling conditions engaged in a high frequency of self-reinforcement regardless of whether they had previously undergone success or failure experiences (Figures 1 and 2). Further comparisons of pairs of means reveal a higher incidence of self-reinforcement by subjects in each of the treatments involving models compared to the control subjects (Table 2). In addition, children who had been exposed to the superior model were more self-rewarding following meritorious performances than subjects who had observed the equally competent model.

Magnitude of Self-Reward

The mean number of self-administered reinforcers per trial as a function of experimental conditions, sex of subjects, and level of performance is presented in Table 3. Since some of the children never rewarded themselves following performances at a particular level, the number of cases in each cell differed somewhat from group to group. This variation precluded simultaneous analysis of the combination of experimental variables; consequently, separate one-way analyses of variance were calculated for evaluating the effects of modeling cues, prior reinforcement, and sex of subjects at each of the four score categories.

Contrary to prediction, there were no significant differences in the magnitude of self-reward as a function of prior success-failure experiences and, except for greater amount of self-rewarding behavior displayed by girls at the moderately high level of achievement ($F = 9.42$, $p < .001$), no sex differences were

obtained. However, the modeling variable, as hypothesized, proved to be a significant source of variance.

Subjects in all modeling conditions rewarded themselves sparingly for 10 and 15–20 point performances, and did not differ in this respect. On the other hand, exposure to models of varying degrees of competence produced differential amounts of self-rewarding behavior in subjects at the moderately high (25–35) level of performance ($F = 5.28$, $p < .01$). Additional subgroup analyses by the t test reveal that children who had observed the inferior model engaged in a greater amount of self-reinforcement than those who were exposed to the superior model ($t = 2.33$, $p < .025$). Moreover, control-group subjects rewarded themselves more generously for attainments at this level than those in conditions involving the superior ($t = 3.71$, $p < .001$) and the equally competent ($t = 2.97$, $p < .01$) models.

A highly significant modeling effect ($F = 5.60$, $p < .01$) was also obtained at the 40–60 level of achievement. Subjects who had observed the inferior model exhibited a higher magnitude of self-reward than children who had observed either the superior model ($t = 3.37$, $p < .001$), the equally competent model ($t = 3.01$, $p < .01$), or had no exposure to modeling cues ($t = 3.48$, $p < .001$).

It will be recalled that the models rewarded themselves with one piece of candy for criterion-level scores, two pieces for performances slightly above their adopted standard, and three for scores exceptionally high relative to this criterion. The fact that some subjects never rewarded themselves following certain scores precluded analysis of within-subject variations in magnitude of self-reward as a function of performance level. It is evident from Table 3, however, that each of the modeling conditions yielded a positive monotonic relationship between achievement level and magnitude of self-reward; by contrast, subjects in the control group did not show much variation in this respect.

Frequency of Verbal Self-Reinforcement

Since the incidence of verbal self-reinforcing responses was relatively low, the subgroup data were combined across performance levels and evaluated by the Kruskal-Wallis one-way analysis of variance, and the Mann-Whitney U test.

The results reveal a significant modeling effect ($H = 8.32$, $p < .025$), and a marked sex difference ($z = 2.94$, $p < .01$). Further comparisons show that, relative to the control group, subjects exposed to the inferior ($z = 1.69$, $p < .05$), or the equally competent models ($z = 1.66$, $p < .05$), exhibited more self-reinforcing verbal behavior. No differences were found, however, either between the superior model and control groups, or among the three modeling conditions.

It is of interest that, although boys displayed a greater amount of verbal self-reinforcement than did girls in treatment conditions involving the inferior model ($z = 2.07$, $p < .05$), the equally competent model ($z = 1.99$, $p < .05$), and the control group ($z = 2.59$, $p < .01$), they did not differ significantly in this respect when exposed to the superior model.

DISCUSSION

The findings of the present study provide considerable evidence for the influential role of social comparison processes and modeling cues in the development of self-reinforcing patterns of behavior. Subjects in the control group, who were provided no comparison models, showed neither a discriminative pattern of self-reinforcement nor increasing magnitudes of self-reward as a function of incremental performances. On the other hand, children in the modeling conditions displayed distinct patterns and magnitudes of self-reward that differed in predicted directions.

Children in the inferior model condition engaged in a considerably higher frequency of self-reward following relatively low performances than subjects who had been exposed to more competent models adopting higher criteria for self-reinforcement. In the case of moderately high and superior attainments, no differences of note were obtained among the groups of experimental subjects in the frequency with which they rewarded themselves with candy. At these high levels of performance, however, children who had observed the inferior model were more generous in their self-reward, indicating a higher

evaluation of the quality of their performances.

With the single exception that subjects in the superior-model condition displayed a slightly higher frequency of self-reinforcement at the highest performance level than children who had observed the equally competent model, the latter two groups yielded equivalent patterns and magnitudes of self-reward. Thus, in accord with social comparison theory, children who had been exposed to the superior model rejected his self-imposed contingencies of reinforcement and adopted a lower criterion. This outcome is somewhat analogous to familial circumstances in which the offspring of eminent parental models set themselves comparatively low standards of achievement and self-reward. It is evident from informal observation, however, that under similar conditions many children do adopt their parents' high aspirations and stringent patterns of self-reinforcement. To further elucidate this problem, the influence of social-learning variables that have been shown to enhance modeling effects will be investigated for the purpose of specifying the conditions under which the self-reinforcing behavior of superior models will be adopted or rejected.

Self-administration of positive reinforcers following highly marginal or undeserving performances is likely to generate negative self-reactions. Consequently, self-rewards may be more sparingly dispensed in achievement situations that fail to provide objective, nonsocial criteria of what constitutes a worthy performance. It is perhaps for this reason that, in most of the intergroup analyses, control subjects displayed a lower incidence of self-reinforcement than did children in the modeling conditions. Marston (1964) has similarly demonstrated that subjects engage in less self-rewarding behavior on ambiguous than on structured tasks, but are more inclined to reward themselves when their responses correspond to those exhibited by another person in the ambiguous situation. These findings further highlight the importance of social comparison in self-reinforcing processes.

Predictions regarding the effects of antecedent success or failure were only partially confirmed. Although in each of the modeling conditions subjects who had undergone failure experiences generally rewarded themselves less frequently than their successful counterparts, only the differences in the group exposed to the inferior model were of statistically significant magnitude. On the other hand, control subjects who had experienced failure displayed a higher rate of self-reinforcement at low and moderately high levels of performance than did children in the success condition.

The latter finding, which is in a direction contrary to prediction, suggests that under certain circumstances self-gratification may primarily serve a therapeutic rather than a self-congratulatory function. That is, after a person has undergone stressful failure experiences he may treat himself to a play, movie, savory dinner, nightclub or televised entertainment, or engage in other types of rewarding activities for the purpose of reducing aversive stimulation generated by failure. Such temporary suspension of self-reinforcement contingencies represents a culturally sanctioned therapeutic practice that is frequently noted in naturalistic situations. In view of the fact that the self-rewarding test situation constituted an additional self-evaluative achievement task for subjects in the modeling conditions, it is perhaps not surprising that they continued to adhere to equally or even more stringent self-reinforcement contingencies under conditions of failure as compared to success.

Superior attainments outweighed the effect of reinforcement history as evidenced by the fact that subjects in all modeling conditions exhibited equally high rates of self-reward following high scores, regardless of whether they had previously met with success or failure: Nor did the control subjects differ in this respect at similarly high levels of achievement. It is apparent from the foregoing interactions of failure with performance level and adequacy, as defined by comparison models, that the effects of antecedent reinforcement of achievement behavior on self-rewarding tendencies are considerably more complex than was originally assumed.

It should also be noted that somewhat different patterns of relationships were obtained depending upon whether material or verbal reinforcers were employed as dependent

measures. Of particular interest is the finding that boys and girls differed significantly in frequency of verbal self-reinforcement, but not in the incidence and magnitude of self-administered material rewards. These differential results may be due partly to the fact that verbal self-reinforcements, which involve positive and negative self-evaluative responses, are a closer reflection of a person's self-esteem than the consumption of food reinforcers. Findings of studies conducted by Pauline Sears [3] show that boys tend to evaluate themselves more favorably on motor skills than do girls. Hence, differential self-evaluative predispositions, if operative in relation to the performance task employed in the present experiment, may partly explain the obtained sex differences. The fact that exposure to the superior model, the most potent condition for generating low self-evaluations, diminished boys' self-reinforcing verbal behavior, accounts for the absence either of sex differences within the latter treatment, or of a significant differentiation between subjects in the superior model and control groups.

Although the foregoing results provide some support for the modeling hypothesis, no relationships were established between failure experiences and verbal self-reinforcing responses. Suggestive evidence that predispositional and concomitant stimulus variables may have differential impact on verbal and material self-rewards indicates the necessity for distinguishing in future research between different classes of self-reinforcing responses.

[3] "The Effect of Classroom Conditions on the Strength of Achievement Motive and Work Output on Elementary School Children," progress report to the United States Office of Education, Cooperative Research Project No. 863, Stanford University, 1963.

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