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MODIFICATION OF SELF-IMPOSED DELAY OF REWARD THROUGH EXPOSURE TO LIVE AND SYMBOLIC MODELS [1]

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In a comparative test of the relative efficacy of live and symbolic models for modifying delay-of-reward behavior, groups of children with marked preferences for either immediate but less valued rewards, or more valuable delay reinforcers, were assigned randomly to 1 of 3 experimental conditions. 1 group observed live models who exhibited delay behavior that was counter to the children's pattern; a 2nd group was presented essentially the same modeling cues except in symbolic verbal form; while a 3rd group had no exposure to any models. Changes in Ss' delay-of-reward behavior were measured immediately following exposure to the modeling procedures, and reassessed approximately 1 mo. later within a different stimulus situation. Both live and symbolic models produced substantial modifications in delay-of-reward behavior within the immediate social-influence setting, but the changes induced in high-delay children through exposure to symbolic models were less stable over time.

Theory and research relating to the process of internalization and the development of self-control have been largely confined to resistance to deviation and the occurrence of self-punitive or restitutive responses following transgression (Aronfreed, 1964). Equally important and perhaps even more prevalent behavioral manifestations of self-control are the manner in which persons regulate the self-administration of highly rewarding resources over which they have control (Bandura & Kupers, 1964; Kanfer & Marston, 1963), and their willingness to defer immediate rewards in favor of delayed, more highly valued reinforcers (e.g., Mischel & Gilligan, 1964; Mischel & Metzner, 1962).

In recent years there have been numerous investigations into behavioral manifestations of willingness to defer immediate gratification. These studies have typically employed a research paradigm in which subjects are confronted with real choices between immediately available but less valued rewards, as opposed to delayed but more valuable reinforcers (e.g., Mahrer, 1956; Mischel, 1958, 1961c). Results from this procedure provide evidence that delay responses are relatively stable, tend to increase with age, and are systematically related to other theoretically relevant variables usually subsumed under "ego-strength" constructs (e.g., Mischel, 1961b, 1961c, 1965). It has likewise been demonstrated that delay responses can be increased by direct training through raising the probability that the delayed reward is forthcoming (Mahrer, 1956; Mischel & Staub, 1965), or by decreasing the delay interval (Mischel & Metzner, 1962). Relevant data are lacking, however, on the effects of social-learning variables that might be expected to play an influential role in the establishment of delay-of-reward behavior.

It is generally assumed that the acquisition and maintenance of the various forms of self-controlling responses are primarily achieved either through direct aversive stimulation (Aronfreed, 1964), or by means of complex intrapsychic mediational processes when immediate gratification is unavailable (Freud, 1946). Directly experienced rewarding and punishing response consequences are undoubtedly important factors in the development and maintenance of self-controlling responses. However, a number of recent studies have demonstrated that response inhibition (Bandura, 1965; Bandura, Ross, & Ross, 1963;

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Walters, Leat, & Mezei, 1963) and the contingent self-regulation of reinforcers (Bandura & Kupers, 1964; Bandura & Whalen, 1966; Marston, 1965; Mischel & Liebert, 1966) can be readily transmitted vicariously without the mediation of direct reinforcement. In accord with the theory of vicarious learning, it is plausible to hypothesize that self-imposed delay of reward is likewise influenced by the delay patterns displayed by social models. Indeed, some suggestive evidence for the influence of parental modeling in the development of children's willingness to delay rewards is provided in a study by Mischel (1958) who found that children from the Trinidadian Negro subculture, in which immediate self-reward is the prevailing gratification pattern, displayed a greater preference for immediate rewards than children of Trinidadian Indians, who characteristically exhibit self-denying delayed-gratification behavior.

It is often mistakenly assumed that vicarious or imitative learning is essentially limited to younger age groups and to stimulus situations in which real-life models exhibit, intentionally or unwittingly, the desired social-response patterns. While undoubtedly much observational learning is fostered through exposure to live models (Bandura, 1962, in press; Bandura & Walters, 1963), once a person has developed an adequate verbal repertoire, increasing reliance is generally placed on symbolic models presented in the form of oral or written behavioral descriptions, pictorial displays, or through a combination of verbal and pictorial devices. The influence of verbally presented normative models in shaping and controlling social behavior has been abundantly documented in the research in experimental social psychology (Berg & Bass, 1961; Hovland, Janis, & Kelley, 1953). There have been, however, no systematic comparative studies of the relative magnitude and stability of changes in social behavior as a function of exposure to real-life and symbolic modeling cues. Consequently, the present investigation studied the relative efficacy of both live and verbally presented symbolic models in modifying children's delay-of-reward behavior.

In the experiment reported in this paper children who exhibited predominantly either delayed-reward or immediate-reward patterns of behavior were assigned randomly to one of three treatment conditions. One group of children observed live adult models who exhibited delay-of-reward responses counter to the group's self-gratification pattern; a second group was similarly exposed to a model displaying the opposite delay-of-reward behavior with the exception that the modeling cues were presented in written form, while a third group had no exposure to any models. Immediately following the experimental procedures the children's delay-of-reward responses were measured in the absence of the model. In order to test the generality and stability of changes in delay behavior, the subjects were reassessed by a different experimenter in a different social setting approximately 1 month after completion of the experimental phase of the study.

It was predicted that the modeling procedures would alter the children's delay-of-reward behavior in the direction of their model's response dispositions. Since an actual performance is apt to provide substantially more relevant cues with greater clarity than can be conveyed by a verbal description, it was also expected that live models would prove more efficacious than symbolic models in modifying children's self-imposed delay tendencies.

The maintenance of response patterns established through vicarious experiences is highly dependent upon reinforcement-related variables (Baer & Sherman, 1964). In view of the absence of any information concerning the naturalistic reinforcement contingencies that were operative during the relatively long period of time elapsing between the post-exposure and the generalization test phases of the experiment, no predictions were advanced regarding group differences based on the terminal assessment.

METHOD

Subjects

The subjects were 60 boys and 60 girls selected from the fourth and fifth grades of three elementary schools in the Stanford vicinity.

Design and Procedure

Preexperimental assessment of delay-of-reward responses. In the initial phase of the experiment

approximately 250 children were administered in their classroom groups a series of 14 paired rewards, in each of which they were asked to select either a small reward that could be obtained immediately, or a more valued item contingent on a delay period ranging from 1 to 4 weeks. The group administration (Mischel & Gilligan, 1964) proceeded in the following manner: Children were provided individual booklets containing on each page a brief description of a given set of paired objects and the associated time interval. After the experimenter had displayed both rewards and explained the temporal contingency, the children were instructed to record their choice, and to turn the page in preparation for the next set of items. The subjects were also advised to choose carefully and realistically because in *one* of the choices they would actually receive the item they selected, either on the same day or after the prescribed delay period, depending upon their recorded preference.

Half of the sets of paired rewards involved small amounts of money (e.g., $.25 today, or $.35 in 1 week), while the remaining items included edibles (e.g., small bag of salted peanuts today, or a can of mixed nuts in 2 weeks), children's magazines, and various play materials (e.g., small rubber ball today, or a large rubber ball in 2 weeks).

From the total pool of subjects those falling in the extreme top and bottom 25% of the delay-score distribution, computed separately for boys and girls, were selected for the succeeding phases of the experiment. The *low-delay* group consisted of 60 children, 30 boys and 30 girls, who displayed a marked preference for immediate reward (mean percentage of immediate choices = 83); in contrast, the group of 60 *high-delay* children exhibited a consistent pattern of delay behavior (mean percentage of delay choices = 93). The subjects in each of these two groups were then randomly assigned to one of three treatment conditions, with 10 boys and 10 girls in each subgroup (Table 1).

Experimental treatments. Approximately 4 weeks elapsed between the initial assessment of the children's delay behavior and the experimental phase of the study. Two female experimenters, each working with a different male and female model, conducted the experimental treatments.

In order to help create the set that the two phases of the experiment were unrelated, the teachers announced to their classes that a new group of experimenters from Stanford University would be conducting a similar, but independent, project concerned with object preferences of different groups of both children and adults.

The subjects were brought individually from their classrooms to the experimental room where the experimenter explained that the adults had been invited to appear at the school, since it was difficult on weekdays to see them in their various places of employment. To insure that the model was endowed with adequate prestige, the adults were described as recent college graduates. All children

TABLE 1

SUMMARY OF THE EXPERIMENTAL DESIGN

Experimental group	Phase 1 Assessment of preexperimental delay behavior	Phase 2 Experimental treatments	Phase 3 Posttreatment measurement of delay behavior	Phase 4 Test for the generality and stability of delay behavior
High delay				
I (N = 20)	Administration of 14 paired rewards (Set A)	Live model exhibits an immediate-reward pattern	Administration of 14 paired rewards (Set B)	Administration of 14 paired rewards (Set A)
II (N = 20)	Same	Symbolic model of immediate-reward pattern presented in written form	Same	Same
III (N = 20)	Same	No model present	Same	Same
Low delay				
IV (N = 20)	Same	Live model exhibits a delayed-reward pattern	Same	Same
V (N = 20)	Same	Symbolic model of delayed-reward pattern presented in written form	Same	Same
VI (N = 20)	Same	No model present	Same	Same

who were assigned to the experimental treatments observed same-sex models.

For children in the *live-model* condition, the adult entered shortly after the child was seated and introduced himself to the experimenter and to the subject. In order to further increase credibility, the experimenter described the choice procedure to the model in considerable detail as though he were a naive subject. The instructions stated the objects would be presented in pairs and in each case the subjects were to select either a less valued item that could be obtained immediately, or a more valued object conditional on a specified delay period. The participants were also informed that they would in fact receive 1 of their 14 choices.

On the pretext of the model's "busy schedule," the experimenter first administered the items to the model while the child waited for his turn. The model's paired rewards included such adult-appropriate items as chess sets, paperback books, hi-fi magazines, gourmet candy bars, jars of instant coffee, and monetary choices. Although the items differed from those subsequently administered to the children, the delay intervals necessary for attaining the more valuable rewards were similar in both sets of items. During the modeling phase the experimenter displayed each pair of items to the model who then indicated his choices verbally.

With high-delay children, the model consistently selected the immediately available rewards and in several instances commented briefly, according to a prearranged script, on the benefits of immediate self-reward (e.g., "Chess figures are chess figures. I can get much use out of the plastic ones right away.") In addition, after the fourth item, the model casually summarized his immediate-gratification philosophy of life as follows: "You probably have noticed that I am a person who likes things now. One can spend so much time in life waiting that one never gets around to really living. I find that it is better to make the most of each moment or life will pass you by." While the model periodically extolled the virtues of immediate self-gratification, he carefully refrained from deprecating delay behavior; otherwise, it would be impossible to determine whether any changes in the children's behavior were a function of positive modeling of immediacy, or the modeling of negative attiudes toward postponement of gratification.

With low-delay children the procedure was identical to that described above except the model consistently selected the more valued delayed rewards. The model likewise commented periodically on the virtues of self-imposd delay (e.g., "The wooden chess figures are of much better quality, more attractive and will last longer. I'll wait two weeks for the better ones."), and expounded his postponement-of-gratification philosophy of life in the following manner: "You have probably noticed that I am a person who is willing to forego having fewer or less valuable things now, for the sake of more and bigger benefits later. I usually find that life is more gratifying when I take that carefully into account."

In both of the above experimental treatments, the models departed immediately upon completion of the choice task so as to remove situational pressures on the children to adopt the models' self-rewarding dispositions.

In the symbolic-model condition, the experimenter explained to the child that the adult who was scheduled for the same time had to leave early and consequently, he had already made his selections. In addition, the subject was told that children and adults are typically seen simultaneously to expedite matters; therefore, in order to keep the conditions as similar as possible for all participants, he would first be shown the paired items that were administered to the adult together with his recorded preferences and comments. The child was then handed the answer booklet in which were written both the model's choices and accompanying philosophy-of-life commentaries. The experimenter then exhibited each choice pair sequentially while the subject read the corresponding verbal accounts of the model's behavior.

In the *no-model-present* condition the children were informed that, because of scheduling difficulties, no adult would be present, but in order to insure intersubject comparability the items between which adults ordinarily make choices would be shown. The experimenter then simply displayed the series of paired objects. This procedure was adopted in order to control for any effects that mere exposure to a set of reinforcers might have on children's subsequent delay behavior.

Postexposure assessment of delay behavior. Immediately following the above procedures each child was individually administered his own set of 14 paired items. The rewarding objects in the latter series differed from those employed in the initial phase of the experiment, but the money items were the same since pretesting revealed that subjects were unable to recall the exact amounts and temporal intervals involved. In order to maintain realistic choice behavior on all items, the specific payoff objects were varied randomly among the children. They were thus unable to predict which one of their choices they were likely to receive even if some prior communication between subjects had occurred.

Test for generalization and stalibility of altered delay patterns. Between 4–5 weeks after the experimental treatments all children were readministered the initial set of 14 items within their classroom settings utilizing the same group procedure described earlier. The same experimenter who had conducted the preexperimental measurement of delay responses presided over the follow-up assessment. Considering the relatively long temporal intervals separating the various phases of the study, the variation in experimenters, and the fact that in the terminal assessment children recorded their preferences privately in the context of their natural classroom situation, it was assumed that the follow-up data would provide a

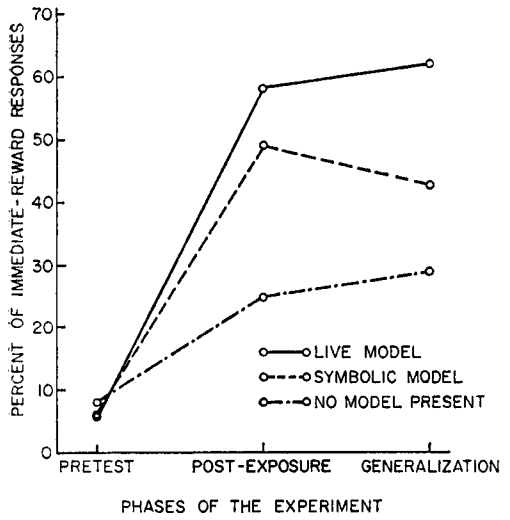

FIG. 1. Mean percentage of immediate-reward responses by high-delay children on each of three test periods for each of three experimental conditions.

particularly stringent test of both the generality and the stability of modeling effects.

Dependent measures. Changes in the subjects' behavior were measured in terms of the relative number of delayed responses produced by the low-delay groups and conversely, the number of immediate responses displayed by children in the high-delay groups at each of the three phases of the experiment.

RESULTS

Figure 1 shows the mean percentage of immediate-reward responses produced by the high-delay children on each of the test periods as a function of treatment conditions.

Analysis of variance of these data (Table 2) reveals that the main effects of modeling and experimental phases are highly significant sources of variance. In addition, the two modeling procedures proved to be differentially effective at the immediate postexposure and the later generalization phases of the experiment.

Further comparisons by the t test of pairs of means across experimental phases (Table 3) show that high-delay children in all three conditions not only altered significantly their delay-of-reward behavior in favor of immediate gratification, but also maintained the response changes long after the experimental interventions.

Moreover, comparisons between groups at each of the test phases (Table 4) reveal that children who had been presented either live or symbolic models differed substantially in their postexposure delay behavior from the no-model controls, with the live-model condition yielding the greatest differences. It should also be noted that while the live and symbolic models were equally effective within the immediate social-influence setting, the changes in delay responses induced by the live model were significantly more stable over time. This is shown in the finding that high-delay children who had observed the live model continued to display in the generalization test a significantly higher level of immediate-reward responses than children in either the symbolic model or the control groups, which did not differ significantly from each other.

TABLE 2

ANALYSIS OF VARIANCE OF IMMEDIATE-REWARD RESPONSES BY CHILDREN WHO HAD EXHIBITED A DELAYED-REWARD ORIENTATION

Source	*df*	*MS*	*F*
Model (M)	2	134.12	5.37**
Sex (S)	1	0.80	<1
M × S	2	30.42	1.22
Error (b)	54	24.99	
Experimental phases (P)	2	550.59	59.39***
P × S	2	6.15	<1
P × M	4	43.60	4.70*
P × M × S	4	4.17	<1
Error (w)	108	9.27	

* $p < .02$.
** $p < .01$.
*** $p < .001$.

TABLE 3

COMPARISON OF PAIRS OF MEANS ACROSS EXPERIMENTAL PHASES

Treatment conditions	Pretest versus post-exposure test *t*	Pretest versus generalization test *t*	Post-exposure test versus generalization test *t*
Immediate-reward treatment			
Live model	7.13***	7.87***	0.64
Symbolic model	4.76***	4.07***	0.69
No model control	2.77**	3.37**	0.60
Delayed-reward treatment			
Live model	6.96***	4.32***	3.09**
Symbolic model	5.93***	3.41**	1.34
No model control	4.82***	1.99	1.93

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

TABLE 4

COMPARISON OF PAIRS OF MEANS BETWEEN TREATMENT CONDITIONS FOR HIGH-DELAY CHILDREN EXPOSED TO IMMEDIATE-REWARD MODELS

Experimental phases	Live model versus symbolic model	Live model versus control	Symbolic model versus control
Postexposure test	<1	3.41***	2.46**
Generalization test	2.52***	4.22***	1.70

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

The corresponding set of data for low-delay children exposed to models exhibiting a preference for more valued delayed reinforcers is presented graphically in Figure 2.

Analysis of variance of these scores (Table 5) reveals that the children's willingness to delay gratification increased substantially across the phases of the experiment.

Although the overall differences between the three experimental groups were not of statistically significant magnitude, it is evident from supplementary analyses (Table 3) that the two conditions employing modeling procedures were chief contributors to enduring increases in delay behavior. Within-treatment comparisons disclose that both forms of modeling produced highly significant temporary and long-term increases in self-imposed delay of reward. On the other hand, although the no-model control subjects exhibited a temporary change, their subsequently assessed delay behavior did not differ significantly from their preexperimental level. Unlike the findings based on the high-delay children, however, the low-delay subjects were not differentially affected by the live as compared to the symbolic model. Another noteworthy difference between the two sets of data is the finding that experimentally induced immediate-reward responses generally remained more stable over time (see Figure 2 and Table 3) than did self-imposed delay behavior.

DISCUSSION

The results of the present investigation provide further support for the influential role of modeling variables in the social transmission of self-controlling responses. Children who had shown a predominantly delayed-reward pattern displayed an increased preference for immediate and less valued rewards as a function of observing models favoring immediate gratification; conversely, subjects who had exhibited a marked disposition toward immediate rewards displayed an enduring increased willingness to wait for more highly valued delayed reinforcers following exposure to models displaying high-delay behavior.

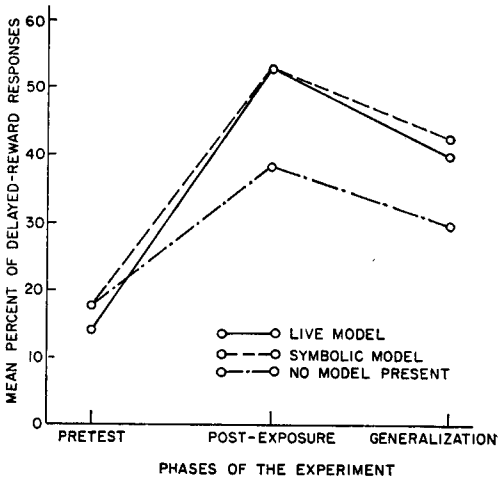

FIG. 2. Mean percentage of delayed-reward responses by low-delay children on each of three test periods for each of three experimental conditions.

Although in all subgroup comparisons the live model produced changes of greater magnitude than those induced by the verbally presented symbolic model, both forms of

TABLE 5

ANALYSIS OF VARIANCE OF DELAYED-REWARD RESPONSES BY CHILDREN WHO HAD EXHIBITED AN IMMEDIATE-REWARD ORIENTATION

Source	*df*	*MS*	*F*
Model (M)	2	25.34	1.61
Sex (S)	1	34.68	2.20
M × S	2	12.67	<1
Error (b)	54	15.75	
Experimental phases (P)	2	305.58	46.30***
P × S	2	17.44	2.64
P × M	4	9.80	1.48
P × M × S	4	3.89	<1
Error (w)	108	6.60	

*** $p < .001$.

modeling procedures were essentially equally efficacious within the immediate social-influence setting. With high-delay children, however, the symbolic model yielded relatively weaker long-term effects. There are several possible explanations for the fact that similar long-term differences between modeling conditions were not obtained based on findings from low-delay subjects. This discrepancy may partly reflect the effects of differential reinforcement contingencies characteristically associated with high- and low-delay behavior. In social training in our culture self-imposed delay-of-reward behavior is actively modeled, encouraged, and generously rewarded by socialization agents, whereas immediate self-gratification is negatively reinforced on many occasions. To the extent that adoption by high-delay children of immediate self-gratification responses requires some reduction of previously established inhibitions, it would be expected that actual observation of a moderately prestigeful adult exhibiting low-delay behavior would have stronger disinhibitory cue value than a verbal description of his responses. This factor, if operative, would suggest that predictions about the relative efficacy of live and symbolic models should consider not only the number and clarity of modeling cues associated with different modes of presentation, but also the possibly greater inhibitory or disinhibitory influence of performances by live models.

An alternative explanation, and one that accounts for other obtained differences, is in terms of the temporal variations in reinforcement invariably associated with immediate- and delayed-reward responses. There is considerable empirical evidence that behavior can be more effectively maintained by immediate reinforcement than by delayed rewards (Renner, 1964). Consequently, self-imposed delay behavior, which is accompanied by less favorable reinforcement conditions, would be harder to establish and even more difficult to maintain in the absence of intervening positive reinforcements. This interpretation would help to explain both the greater stability of changes in immediate- compared to delayed-reward behavior among subjects in the no-model conditions, and the larger decrement in delay responses among subjects whose behavior was being altered in the direction of delayed gratification. It will be recalled that, of the three groups in the latter condition, only the live-model treatment yielded a statistically significant decrement in terminal delay behavior. Although subjects in the latter group continued to exhibit a higher level of delay behavior than they displayed in the preexperimental phase, nevertheless difficulty in maintaining the newly acquired behavior in the prolonged absence of the model, reduced the possibility of obtaining significant differences between modeling conditions. These overall findings point to the necessity for supporting newly established self-control behavior, particularly when it is associated with less optimal reinforcement conditions as in the case of self-imposed denial of readily available rewarding resources.

The results of this study also provide an interesting contrast between traditional psychoanalytically based theories of personality and those derived from principles of social learning. According to the psychoanalytic theory of delay behavior (Freud, 1946; Singer, 1955), aroused impulses press for immediate discharge of tension through overt motoric activity. As a function of repeated association of tension reduction with goal objects, and development of greater ego organization, absence or imposed delay of satisfying objects results in the substitution of hallucinatory satisfactions, and other thought processes that convert free cathexes into "bound cathexes." The capacity to delay or inhibit motor discharge by substituting cathected ideational representations presumably reflects the gradual shift from primary-process activity to reality-oriented secondary-process thinking.

The psychoanalytic approach thus leads one to seek determinants of delay behavior in terms of hypothetical internal events in the form of ego organizations and energy-binding ideations. In contrast, social-learning theory, as illustrated in both the findings of the present experiment, and those to which reference was made earlier, views manipulable social-stimulus events as the critical determinants of self-controlling behavior.

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