EFFECTS OF EXTERNAL-REINFORCEMENT ON THE SELF-REINFORCING BEHAVIOR FOLLOWING MODEL OBSERVATION

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The present study was designed as an attempt to make clear the implication of the effects of modeling on self-reinforcement. In two experiments children played a game with self-reinforcement after observing either a stringent model, or no model and/or a neutral model. In the game half of each group received lenient external-reinforcement which rewarded them. The standards for self-reinforcement exhibited by each subject were recorded. The results indicated that children exposed to a stringent model adopted higher standards for self-reinforcement than those exposed to a control model, but both groups were similarly influenced by the lenient external-reinforcement.

Many studies (e.g., Bandura & Kupers, 1964; Bandura & Whalen, 1966; Bandura, Grusec, & Menlove, 1967) on acquisition and change of self-reinforcing behavior through modeling have demonstrated that subjects who had observed a model exhibiting a high standard for self-reinforcement showed a higher standard for self-reinforcement than their counterparts. Thus, it has been suggested that the modeling procedures have an effect on the acquisition, or change, of self-reinforcement pattern.

In recent years, however, there have been a few studies suggesting that the effects of such modeling procedures may be simply attributed to teaching the child that there are certain "rules" or "norms" by which a particular novel game is played (Masters & Driscoll, 1971), or that subjects in many studies of imitation may be imitating observed behaviors simply in response to the demand characteristics of the experimental situation (Grusec & Skubiski, 1970; Grusec, 1972). According to Grusec (1972), for the child placed in an unusual situation, the model's behavior may provide information about what ought to be done there; and the child may behave in conformity with such information.

In contrast to these results, Lepper, Sagotsky and Mailer (1975) found the substantial persistence to the effects of exposure to self-reinforcement model and the generalization of these effects to a new game. They believe that the data indicate, at the very least, that children were able to abstract an appropriate general rule from the model's performance.

These results suggest the inadequacy of theoretical accounts which suggest that exposure to models displaying a high standard of self-reinforcement teaches children nothing more than a set of rules or norms for playing a game; those data should probably not be construed as definitive evidence of a process of internalization.

According to Bandura and Kupers (1964), it is supposed that once the self-reinforcing behavior is well established, the whole processes become relatively in-
dependent of external-reinforcement and the specific contingencies of the original training situations. If the modeling procedures make a contribution to internalization of the self-reinforcing behavior, subjects who observed a self-reinforcement model are more independent of external-reinforcement than those who did not observe such a model. Generally, when a man evaluates his own performance, the self-evaluation tends to differ from the other's evaluation (e.g., Bandura, 1971, 1977).

On the other hand, in the studies involving the use of demand characteristics to explain the phenomena of interest (e.g., Grusec & Skubiski, 1970; Grusec, 1972), subjects were given a set of statements about what ought to be done in the situation. The assumption underlying these studies was that acquisition and change of self-reinforcing behavior through modeling are simply the results of demand characteristics. Subjects exhibiting a high standard for self-reinforcement after observing a stringent model would have perceived the expectations that such behaviors should be done in the situation. Furthermore, if subjects were given the new information that the expectations which they had perceived were inadequate, they might change the original expectations and behave in a different way; subjects exposed to a stringent model will also be able to adjust their own standards toward more lenient ones.

Thus, when subjects having observed a stringent model were given more lenient positive external-reinforcement that would spoil the expectations that they should behave stringently, subjects would easily change their behaviors to be more lenient. On the other hand, if the modeling procedures have made any contribution to the internalization of self-reinforcing behavior, subjects will not so easily change their behaviors to be lenient.

In our studies, children participated in a game in which the scores were controlled by the experimenter. Under stringent model condition, the model rewarded himself on trials in which he reached or exceeded the standard, and he displayed self-denial and self-critical behavior on trials in which he failed to meet the adopted standard. In a control model condition, children observed no model (Experiment I) or a neutral model (Experiment II). After exposure to their respective model condition received a set of scores and the performances for which they rewarded themselves were recorded. In the second session, children received a set of scores, and lenient social reinforcements on the particular trials on the lower standard than the ones for self-reinforcement in the first session.

It seems likely that children exposed to a stringent model would exhibit a higher standard for self-reinforcement than the children in a control model condition. If the children exposed to a stringent model were imitating the observed behaviors simply because of demand characteristics, when they were given the lenient external-reinforcement they would change their standards lenient more easily than children in a control model condition.

**Experiment I**

The first experiment was designed to examine the effects of reinforcement on the self-reinforcing behavior following the model observation.

**Method**

**Design and subjects.** A 2 (Stringent and No model) × 2 (Lenient and No external-reinforcement) × 2 (Sessions 1 & 2) mixed design was used (Table 1). The subjects were 64 children whose ages ranged from 4:01 to 6:11 with a mean of 5:08. The children in each age level were subdivided into male and female subjects and randomly assigned to one of four experimental groups consisting of eight boys and eight girls. All subjects could understand the concept of the number from
TABLE 1
Summary of the experimental design

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Model</th>
<th>Session 1</th>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-ER</td>
<td>16</td>
<td>Stringent model</td>
<td>SR</td>
<td>SR+ER</td>
</tr>
<tr>
<td>M-NER</td>
<td>16</td>
<td>Stringent model</td>
<td>SR</td>
<td>SR</td>
</tr>
<tr>
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</tr>
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<td>16</td>
<td>No model</td>
<td>SR</td>
<td>SR</td>
</tr>
</tbody>
</table>

Note. SR indicates self-reinforcement and ER indicates external-reinforcement.

1 to 10 at least, and they could evaluate themselves and reward themselves with a large trophy at self-reinforcement levels that ranged from a score of 4 to 9.

A male adult served as a model. None of the subjects were acquainted with either the model or the experimenter.

Apparatus and experimental setting. A sort of the bowling apparatus was used in this experiment. The equipment consisted of a rubber ball with about 20 cm in diameter, ten bowling pins made of plastic, a screen with about 150 cm high, ten cards that were used to inform the children of the number of bowling pins felled by the rubber ball, and large and small trophies made of cardboard that were used as reinforcers.

In the experimental setting shown in Fig. 1, subjects rolled and rebounded the rubber ball against the wall of the room, so that the rubber ball could attack and fell some bowling pins. The bowling pins were out of subjects’ sight, so they were informed the number of bowling pins felled by the rubber ball, and large and small trophies made of cardboard that were used as reinforcers.

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The experimenter stood behind the screen and controlled the number of pins. When the ball did not reach any pins, the subject tried again. The subject being informed the score rewarded himself with a large trophy and shouted “Banzai!” only when he felt that the score deserved a positive evaluation. Whereas, when the subjects felt that the score did not deserve a positive evaluation, he took a small trophy.

Procedure. A male assistant brought the children individually to the experimental room in the kindergarten, and introduced him to the male experimenter. The experimenter instructed the subject how to play the bowling game and the subject tried a few trials, then he was confirmed that the number of pins felled by the ball always agreed with the score shown in the card. The assistant sat and manipulated the sound that the ball struck pins behind the screen during the subject’s test trials, except model observation because the assistant served in the role of a model.

In this training session, the children who could understand the concept of the number and evaluate themselves, and showed the standards for self-reinforcement ranged from 4/10 to 9/10 were selected out as the subjects.

In the observation, the subjects in the model condition observed a stringent model. When the model reached or exceeded a score of 8, he self-evaluated positively saying, “That’s a good score. I deserve the large trophy for that high score.” And he took the large trophy and shouting, “Banzai!” In contrast, on trials in which he failed to meet the adopted criterion of 8, the model took the small trophy and remarked self-critically, “That isn’t a good score. That does not deserve the large trophy.” Consequently, the model played seven trials and obtained the sequence of scores, namely, 5, 3, 6, 8, 4, 9 and 7. The subjects in the no model condition did not observe the model.

In the first session, all subjects played the game and obtained the following scores on seven trials: 6, 4, 8, 3, 5, 7 and 9. On each trials, they were instructed that they self-evaluated those scores and the scores for which they rewarded themselves were recorded.

In the second session, subjects played the
game and obtained the sequence of scores as same as that in the first session. When each subject obtained scores that did not come up to the standard in the first session, before he self-reinforced, the experimenter gave the lenient external-reinforcement to half of subjects: "I deserve the large trophy for that high score, but how do you feel?" For example, when a subject adopted the criterion of 6 in the first session, he would be given the lenient external-reinforcement on the trials with the scores of 5 and 4. However, subjects with low standards (5/10, 4/10) were given an external-reinforcement for one lower performance level than the standard in the first session, because the extremely lenient external-reinforcement would not seem natural. Consequently, subjects were given one or two external-reinforcements. The numbers of external-reinforcement were equated between the groups. Then, subjects self-evaluated their performances. Other subjects self-evaluated their performances without external-reinforcement. The scores for which they rewarded themselves were recorded.

Results and Discussion

Twenty-four external-reinforcements were given to both M-ER and N-ER conditions. Results were analyzed in terms of minimum standards for self-reinforcement, the number of subjects who made lenient their standards for self-reinforcement and their total frequencies of self-reinforcement.

Mean standards of self-reinforcement in each condition summarized graphically in Fig. 2. Since the variances of all conditions were homogeneous (F max = 2.36, df = 8/15, p > .05), a 2 × 2 × 2 analysis of variance (Winer, 1971) was used. Results of the analysis show that the main effect of model condition (F = 43.90, df = 1/60, p < .01) and the interaction between the external-reinforcement condition and the sessions (F = 7.57, df = 1/60, p < .01) were significant.

As predicted, children who observed a stringent model adopted a higher criterion for self-reinforcement than their counterparts.

The interaction between the external-reinforcement condition and sessions reflected that children who did not receive the lenient external-reinforcements made their standards for self-reinforcement stringent (M-NER: t = 2.45, df = 15, p < .05, one-tailed; N-NER: t = 1.90, df = 15, p < .05, one-tailed) while the children who received the lenient external-reinforcements did not shift their standards for self-reinforcement.

However, the fact that the three-factor interaction was not significant reveals that the effects of the external-reinforcement did not differ between two model conditions. This is suggested also by the facts that neither the difference between the number of subjects who made their standards for self-reinforcement lenient in M-ER condition (5/16) and N-ER condition (8/16) was significant, nor the one between the frequencies that the subjects made their standards for self-reinforcement lenient in M-ER (7/24) and N-ER (11/24) conditions was. Though the facts may suggest the adequacy of the interpretation that the children may adopt a high criterion for self-reinforcement simply in response to the demand characteristics of the experimental situation, the following questions may be involved. First, the amount of external-reinforcements given to two ER conditions might be relatively small. Secondly, the amount of external-reinforcements given to each subject was
not equal. Thirdly, a question may involve the relatively wide range of subjects' ages. Finally, there may be a question whether it is adequate to regard the high criterion for self-reinforcement that the subjects adopted in the stringent model condition as the results of model observation.

In order to clarify these questions, the second experiment was set up. Subjects in the second experiment were the 6-yr. children. The self-reinforcement levels that the children had before observing model were measured in order to assess the effects of model observation from the treatment condition. The self-reinforcement in the second experiment differed from that in the first experiment. That is, the children evaluated their performances: "very good," "good," and "so bad." Since there will be three levels of self-reinforcement in the experiment; the same amount of external-reinforcement, particularly the one of "very good," can be given to all subjects without the undesirable effects of approaching to the extremely lenient reinforcement.

**Experiment II**

The second experiment was designed to replicate and extend the Experiment I in order to assess more clearly the effects of external-reinforcement on the self-reinforcing behavior following the model observation.

**Method**

*Design and subjects.* A $2 \times 2 \times 2$ factorial design was, again, employed in the second experiment. Forty-eight subjects, of which 20 were boys and 28 were girls, were selected from a bigger sample of 101 children. Their ages ranged from 5:11 to 6:11 with a mean of 6:04. The subjects were assigned to four groups on the basis of their ages and their self-reinforcement levels. All the subjects could understand the concept of the number and evaluate themselves, and their self-reinforcement levels of "very good" ranged from a score of 6 to 9 and those of "good" ranged from a score of 4 to 6.

The model in the second experiment was presented through the TV monitor showing the same adult model as in the first experiment. None of the subjects were acquainted with either the model or the experimenter or the assistant.

*Apparatus and experimental setting.* The bowling apparatus and the experimental setting were similar to those of Experiment I. A videotape set consisting of a TV monitor (Toshiba color television monitor 14-M248) and a VTR (Toshiba cassette video-tape recorder KV-4100) was used to present the model. In addition, not only large and small trophies were used as positive self-reinforcers but also "X" mark as a negative reinforcer. Other equipment were identical to those employed in Experiment I.

*Procedure.* The procedure of Experiment II was also similar to that of the first experiment. After subjects were brought individually to a experimental room in a kindergarten and were informed of how to play the bowling game, they tried to play the game. On pre-observation trials, each subject played the game and obtained some scores and self-reinforced with either large or small trophy or "X" mark. Thus, original self-reinforcement level of each subject was measured. Consequently, only subjects whose self-reinforcement levels met the above-mentioned conditions were selected out, and were randomly assigned to one of the model conditions. Subjects in each model condition were instructed to watch the television while the experimenter prepared a following game. In a stringent model condition, subjects observed a model playing the bowling game and self-reinforcing in various situations of obtaining the scores; 7, 5, 9, 6, 8 and 10. When he obtained a score of 10, he rewarded himself with the large trophy and a verbal, positive, self-evaluation: "That's a very good score. I deserve the large trophy for that high score." "Banzai!" When he obtained a score of 9, he did it with the small trophy and a verbal positive self-evaluation: "That's a
good score. I deserve the small trophy for that high score." And weakly said, "Banzai." When he obtained a score of either 7, 5, 6, or 8, he remarked self-critically and took the "X" mark. In a control model condition children observed the identical model reading a picture book.

In the first session, after model observation all children played the bowling game and self-reinforced with either large or small trophy or "X" mark. The scores they rewarded themselves with either large or small trophy were recorded.

In the second session the sequence of scores was the same as the one in the first session. As in Experiment I, half of subjects in each model condition were given lenient external-reinforcements. For example, in the first session a subject rewarded himself with a large trophy when he obtained scores of 8, 9 and with a small trophy at scores of 6 and 7, in the second session he was rewarded by the experimenter with verbal positive evaluation at scores of 6 and 7; "That's a very good score, I think. How do you feel?" And at scores of 4 and 5; "That's a good score, I think. How do you feel?" In cases of two children with low standard for "good" (i.e., 3) in the first session, the suitable lower score (i.e., 2) will be given after the aforementioned set of scores in the second session.

The other half subjects in each model condition played the game and rewarded themselves without any lenient external-reinforcement. As in the first session, the performances for which each subject rewarded himself with either large or small trophy were recorded. The main measures are two minimum standards for two self-reinforcement levels.

Results and Discussion

First, the original self-reinforcement levels of "very good" and "good" were separately analyzed on a 2(sex)×4(experimental conditions) factorial design, the variances of eight cells were homogeneous both on "very good" (X²=8.74, df=7, p>.05) and on "good" (X²=5.28, df=7, p>.05). The results of the analysis of variance on two minimum standards for two levels of self-reinforcement showed that neither each main effect of sex and condition nor the interaction between these factors were significant. Consequently the data of male and female subjects in each condition were analyzed together in the following analyses. Means of each self-reinforcement level in three test periods are presented graphically in Fig. 3.

Effects of model observation. A 2(model condition)×2(self-reinforcement levels)×2(pre-observation test and session 1) factorial design (Winer, 1971) was employed in this analysis. Table 2 summarizes the results of the analysis of variance of means of standards for each self-reinforcement level in all conditions. It is found that the main effects of model conditions, self-
reinforcement levels, and test periods are all significant. The three-factor interaction is also significant and this means that while children in neutral model condition kept up their standards for each self-reinforcement level, the children exposed to a stringent model changed their standards for self-reinforcement level of "very good" to be stringent but did not change their standards for self-reinforcement level of "good." That is, modeling effects were found only on self-reinforcement level of "very good."

One of the possible interpretation of the fact that observing a stringent model did not change the standard for self-reinforcement level of "good" is suggested by Bandura and Whalen (1966). They found that the model's high standard for self-reinforcement was hardly adopted by the observer in the case that the model's performance was superior and his standard for self-reinforcement was high. That is, children in this experiment might not adopt the model's high standard for self-reinforcement level of "good" because the model's performance was superior and the standard for self-reinforcement of "good" was very high.

Another possible interpretation is that children could not imitate the model's behavior because the learning of the model's behavior was not sufficient for them, that is, the model's behavior was too complex for pre-schoolers to understand through only one observation.

Effects of lenient external-reinforcement. For each subject in a stringent model conditions, the lenient external-reinforcements were given twice both for level of "very good," and for that of "good" except for three subjects in a stringent model condition and two subjects in a neutral model condition.

A 2(model condition)×2(external-reinforcement condition)×2(sessions 1 and 2) factorial design (Winer, 1971) was separately used on two self-reinforcement levels, and the results of the analysis of variance of the standards for each self-reinforcement level were presented in Table 3. The results of the analysis of variance for both two self-reinforcement levels were similar to each other except that the interaction between model condition and sessions at the self-reinforcement level of "very good" did not reach the significant level. Though both the three-factor interactions were not significant, it is interesting that, on the self-reinforcement level of "good" in which modeling effects were not found in session 1, not only the main effect of model condition but also the interaction between model condition and session were significant.

Further analysis concerning the effects of external-reinforcement were tried to gain more informations of differences between a stringent and a neutral model condition with lenient external-reinforcement. Summary of analyses on external-reinforcement is shown in Table 4.
These results of analysis of variance and further analyses indicated a relatively congruent tendency that though the effects of external-reinforcement between a stringent and neutral model conditions do not differ from one another on self-reinforcement level of "very good," they do differ from each other on self-reinforcement level of "good" and the effects of external-reinforcement in a stringent model condition are not so strong as in the neutral model condition.

**GENERAL DISCUSSION**

Results of Experiment I and those of self-reinforcement level of "very good" in Experiment II indicate that children exposed to a stringent model adopted higher standards for self-reinforcement than children exposed to no or neutral model, but both children exposed to a stringent model and no or neutral model were not differently influenced by lenient external-reinforcement. On the other hand, results of self-reinforcement of "good" in Experiment II indicate that children exposed to a stringent model did not adopt higher standards for self-reinforcement than those who exposed to neutral model, children in the stringent model condition were not so influenced by lenient external-reinforcement as children in the neutral model condition.

The former results may not always permit us to affirm the claim that subjects in modeling experiments may be imitating observed behaviors simply in response to the demand characteristics of experiment situation (Grusec & Skubiski, 1970; Grusec, 1972). Moreover, it seems that the latter results may prevent from us concluding that subjects in modeling experiments may be imitating simply in response to the demand characteristics. Should the children in a stringent model condition simply imitate in response to the demand characteristics, they had to adopt higher standards for self-reinforcement of "good." Additionally, if the result in which they did not do so may be attributed to the failure of learning, there must be a similar influence on the children exposed to a neutral model. Therefore, the result that they did not do so seems to be attributed to the superiority of model's performance and higher standard for self-reinforcement of "good," as proposed by Bandura and Whalen (1966). If so, the result that children exposed to a stringent model were not influenced so strongly may be attributed to the possibility that they might abstract a rule of the self-reinforcing behavior, for example, that the standard of self-reinforcement should not be made lenient so easily.

Finally, the present study did not pursue the self-reinforcement pattern of change through modeling in terms of persistence or generalization, but might be regarded as the test of the modeling effects on the other aspect, so to say, the aspect of self-control in self-reinforcing behavior. Thus, the results of the present study may imply that exposure to a stringent model, in such an experimental situation, may have an

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**Table 4**

Summary of results of further analyses

<table>
<thead>
<tr>
<th></th>
<th>&quot;Very good&quot;</th>
<th>&quot;Good&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of covariation</td>
<td>$F(1/44) = 0.30$</td>
<td>$F(1/44) = 2.45$</td>
</tr>
<tr>
<td>Number of subjects who made their standards lenient</td>
<td>$\chi^2(1) = 7.49$</td>
<td>$\chi^2(1) = 4.29^{**}$</td>
</tr>
<tr>
<td>Frequency of standards that were made lenient</td>
<td>$(6/12 : 6/12)$</td>
<td>$(4/12 : 10/12)$</td>
</tr>
<tr>
<td></td>
<td>$\chi^2(1) = 0.09$</td>
<td>$\chi^2(1) = 5.18^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(9/24 : 8/24)$</td>
<td>$(6/21 : 15/22)$</td>
</tr>
</tbody>
</table>

** $p < .05$,  *** $p < .01$
effect on changing observer's standard for self-reinforcement or self-reinforcement pattern, but may have, if any, little effect on internalization of the aspect of self-control in self-reinforcement.

REFERENCES


(Received Dec. 14, 1978)