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ABSTRACT

The purpose of this study was to examine self-reinforcement as an agent of behavior change with children who were deficient in desired attention behaviors. Twenty three first and second grade school children were taught through external reinforcement procedures to raise their level of attention on a simple discrimination task. Subjects in one group were then taught to manage their own reinforcement contingencies and their performance was compared with that of a group continued on external reinforcement and a group for which reinforcement was discontinued. Results showed that groups receiving reinforcement performed at higher levels than the no reinforcement group. Self-reinforcement maintained discrimination behavior at as high a level as external reinforcement with no decrement in discrimination accuracy. Some greater initial resistance to extinction was evidenced in the self-reinforcement group as compared to the other groups. No differences in generalization of attentive behavior were found. (Author)

Self-Reinforcement vs. External Reinforcement in Behavior Modification With Children[1,2]

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The purpose of this study was to examine self-reinforcement as an agent of behavior change with children who were deficient in desired attentive behaviors. Twenty-three first and second grade school children were taught through external reinforcement procedures to raise their level of attention on a simple discrimination task. Ss in one group were then taught to manage their own reinforcement contingencies and their performance was compared with that of a group continued on external reinforcement and a group for which reinforcement was discontinued. Results showed that groups receiving reinforcement performed at higher levels than the no reinforcement group. Self-reinforcement maintained discrimination behavior at as high a level as external reinforcement with no decrement in discrimination accuracy. Some greater initial resistance to extinction was evidenced in the self-reinforcement group as compared to the two other groups. No differences in generalization of attentive behavior were found.

The present study involves the examination of self-reinforcement in the production and maintenance of behavior change. Self-reinforcement refers to the situation in which an individual acts as the executor of reinforcing events to himself. As Skinner (1953, pp. 237-238) has pointed out, this process presupposes that the individual has the power to self

[1]This paper is an extended version of a brief report published in Developmental Psychology, 1970, 3, 147 - 148.

[2]The report is based on a doctoral dissertation submitted to the Department of Psychology, Northwestern University. The author wishes to express his appreciation to Lee B. Sechrest and Kenneth I. Howard for their assistance and support as dissertation advisors. This research was supported by the Institute for Juvenile Research of Chicago and made possible by the cooperation of the principals and teachers of St. Callistus, Notre Dame an Our Lady of Pompeii Schools of Chicago. An earlier and abbreviated form of this paper was presented at the 77th Annual Convention of the American Psychological Association, Washington, D.C., 1969.

reinforce at any time, but that he does so only after meeting certain contingencies. This study represents an attempt to test the effects of this general procedure on the acquisition, extinction, and generalization of behavior with a view toward the application of the procedure in behavior modification technology.

While research in self-reinforcement has dealt primarily with the acquisition of patterns of self-reward, few studies have explored the behavioral effects of self-managed reinforcement, and none has adequately examined its efficiency in modifying problematic behavior. Marston & Kanfer (1963) found that self-reinforcement procedures maintained verbal discriminations learned under external reinforcement conditions whereas extinction procedures resulted in a significant decline in correct discriminations. Bandura & Perloff (1967) found that both self-managed and externally managed reinforcement maintained effortful motor behavior in children at higher levels than no reinforcement or non-contingent reinforcement. Though still leaving many questions unanswered, these studies suggest that self-reinforcement procedures can serve to maintain behavior in the absence of external controls. Thus, the studies indicate that self-reinforcement may provide a useful paradigm for the study of self-control. In addition, it is suggested that self-reinforcement may provide a potentially useful addition to applied behavioral technology for several reasons. First, self-reinforcement procedures could eliminate the need for an external observer and reinforcement executor. Second, such self-management could conceivably yield constancy of contingency management across situations. Finally, self-reinforcement may yield superior results in terms of greater resistance to extinction and greater generalization of behaviors previously under such control.

The present study provided a test of the efficiency of self-reinforcement as an agent of behavior change. In this study, school children who were deficient in appropriate attentive behaviors were taught through external reinforcement procedures to raise their level of attention on a simple discrimination task. Ss in one group were then taught to manage their own reinforcement contingencies (SR group). Results in this group were compared with results in two other groups, one of which was continued on external reinforcement (ER), and one in which the reinforcement of attentive behavior was stopped (No Reinforcement--NR). The dependent variable was the level of attention maintained in the conditioning and post-conditioning phases. Following the final conditioning session and the final extinction session, the children were tested for generalization of attentive behavior in their classrooms.

The research was designed to test four central hypotheses:

Hypothesis 1: Self-reinforcement can maintain desired behaviors in individuals in whom these behaviors have been deficient.

Hypothesis 2: Self-reinforcement can maintain these desired behaviors as well as external reinforcement.

The results of the Marston & Kanfer (1963) and Bandura & Perloff (1967) studies indicated that self-reinforcement procedures could maintain behavior at higher levels than no reinforcement or non-contingent reinforcement. In addition, the results of the Marson & Kanfer (1963) and Kanfer & Marston (1963) studies indicated that self-reinforcement procedures could

maintain behavior at the level to which it had been previously conditioned by external reinforcement. In the present study, all subjects were able to achieve a high rate of performance as well as a high accuracy level because the task was always sufficiently simple to permit 95% to 100% accuracy if attended to properly. Thus, is was predicted that self-reinforcement would maintain the same level of performance as external reinforcement.

Hypothesis 3: Behaviors maintained by self-reinforcement will show greater resistance to extinction than behaviors maintained by external reinforcement.

Hypothesis 4: Behaviors maintained by self-reinforcement will show greater generalization across settings than will behaviors maintained by external reinforcement.

Hypotheses 3 and 4 were based on assumptions concerning the development of self-evaluation as a secondary or conditioned reinforcer. In the present study, self-reinforcement always occurred as part of a chain of responses which had terminated in reinforcement. Skinner (1938) has suggested that any response which follows another in a chain of behavior can reinforce the preceding responses secondarily. Other writers have since speculated about the role of "response produced stimuli" in behavioral chains but due to the difficulty in specifying the nature of such complex stimuli, conclusionson this point have been difficult to reach. Kelleher (1966) has presented experimental evidence, however, which indicates that, "patterns of responding were developed and maintained by scheduled presentations of stimuli that had preceded primary reinforcement." He concluded that these stimuli were effective conditioned reinforcers. It is important to note that the stimuli in these studies were not "response produced." The adequacy of the present formulation of self-reinforcement rests on the assumption that these findings will hold for "response produced" stimuli in a chain of behavior.

In order to outline the application of this general working hypothesis in the present study, it is necessary to present some procedural details. Reinforcement was delievered to the subjects by a small box containing a counter and tone signal. The children understood that the points scored on the counter were backed by candy and toy rewards. In the ER condition, the experimenter activated the apparatus after each correct response by the subject. In the SR condition, the child was instructed to activate the apparatus himself by means of a foot pedal after each correct response. Thus, in the SR condition, a chain of responses was established. Correct discrimination was followed by foot press which was followed by the tone and counter advance (reward signal). It was hypothesized that additional covert mediating responses (CMRs) were also established, having occurred between the discrimination and the pedal press. These mediating responses could have included self-evaluation (e.g., "that was right"), self-direction (e.g., "push the pedal"), and self-praise (e.g., "good"). If this occurred, a response chain of three or more units would have been established as follows:

Discrimination ⟶ CMR ⟶ Press ⟶ Reinforcement

In external reinforcement, it was believed that no such consistent response chain would have been extablished. Thus in the ER condition, external

reinforcement would have directly followed the discrimination response:

Discrimination ⟵ Reinforcement

In extinction, the press response was no longer available for SR subjects and reinforcement was no longer possible for either group. For SR subjects, however, it was thought that the CMRs would continue to be made and would serve as conditioned reinforcers for the discrimination responses. The CMRs would continue to occur because they had been reinforced. The CMRs would serve to reinforce discriminations for two possible reasons. First, any CMR regularly associated in the chain terminating in reinforcement should become a secondary reinforcer. Second, certain classes of CMRs could have generalized reinforcing properties. For example, self-praise and positive self-evaluation could well be generalized reinforcers. Thus, the behaviors established by SR procedures should persist in extinction because they would continue to be reinforced by the covert mediating responses. Behaviors established by ER should extinguish more quickly, because they should not be as systematically reinforced in this manner. It is important to note here that the present formulation does not restrict the development of CMRs to the SR condition. It is only suggested that the SR conditioning program should encourage the development of a more or less consistent set of self-evaluative CMRs which could serve as reinforcing stimuli.

If covert mediating responses were strongly established in conditioning, these CMRs would presumably be generalized to the classroom test situation in which the same stimulus materials were employed. Thus, greater generalization of attentive behavior was predicted for the SR group. In short, hypotheses 3 and 4 were based on the hypothesis that the self-reinforcement procedures employed would serve to establish covert self-evaluation as a secondary reinforcer which would serve to retard extinction and enhance generalization.

Method

Subjects:

Twenty-three first and second grade boys enrolled in parochial schools within the city of Chicago were selected for the experimental procedures. These Ss were drawn from six separate classrooms in three schools. All sample schools were within a one-square-mile area and the children came from homes usually described socio-economically as "lower-middle" to "lower" class. Any children who were believed to be brain-damaged or who were known to be under psychiatric care were not included. Children were selected from each class for treatment on the basis of teacher recommendations and the degree of inattention displayed on a laboratory discrimination task.

Experimental Setting:

The experiment was conducted within each of the three schools in a room provided by the school. In order to create some of the distractions

which make attentive behavior difficult in the classroom, a tape recorder was used to play children's songs during all experimental phases. In addition, many toys were placed on desks surrounding the S's desk. The toys were well within the reach of the S. The S was seated in a school desk chair in all phases but was free, at all times, to leave it. During all conditioning phases, E was seated a bit behind and to the right of S.

Apparatus:

An apparatus was used to signal reward to the Ss and to keep a total of points earned. This equipment, consisting of two battery-operated tone signals and two battery-operated counters, was contained in a small metal box. The reward signal box was placed on the child's desk throughout all conditioning phases in all experimental conditions. One counter window was visible to the Ss and the associated counter-signal combination could be activated either by E using a hand switch or by Ss in the SR group using a foot pedal. The other counter-signal device was operated only by E using a hand switch in training SR Ss. The associated counter window was mounted on the side of the box and was not visible to the Ss. Each pulse moved the counters one digit and sounded the tone signals.

Material:

The experimental task used to provide the measure of attention was a 4-choice match-to-sample task using symbols as stimuli. Twenty such problems were presented on an 8½ x 11" paper and the child was instructed to circle the correct symbol in each problem. Two levels of this task were available. The simplest level involved single symbol units, and a more difficult level employed units of two symbols. The child was tested at the level at which he could attain a high level of success. Ten unique pages of such problems were made at each difficulty level. In each 15-minute session given over the course of the entire experiment, the Ss were given a set number of these pages arranged in random order. In the baseline period, Ss were given six pages (120 problems) and in all subsequent sessions they were given 10 pages (200 problems). The number of completed problems in each session provided the measure of attention.

To provide a test of transfer, or generalization of the effects, Ss were given the task of crossing out all the 5's on pages of random numbers. The numbers were typed on 8½ x 11" paper with a space between each number and double spaces between each line. For first grade children, numbers were in primary type; for second grade children, numbers were in regular pica type. The number of correct digits marked in each testing provided the dependent measure.

Procedures:

The present study required the selection of children who demonstrated inattention to the experimental task. Selection procedures began by requesting each classroom teacher to submit a list of 10-12 boys in the class who were inattentive in school. E then took 6-12 of these children, depending on class size and available time, for screening on the discrimination task. In the screening period, E tested each child individually with

the two alternate levels of the discrimination task for five minutes on each level to determine at which level the child could complete more than 25 but less than 45 problems at 95% accuracy. The highest difficulty level at which this criterion was met was used in all subsequent sessions. During this screening period, children were promised candy rewards for achievement. Only one child of the 54 tested failed to meet criterion on at least one level. Further selection was made on the basis of performance in the baseline period.

The experiment consisted of 18 repeated sessions over the period of approximately one month. Each session was of 15 minutes' duration and given on consecutive days except for weekends, holidays, and days of illness of individual Ss. In general, each S was run at approximately the same time each day.

The 18 sessions were divided into six periods. In each period some part of the treatment procedures changed for one or more groups. A diagram of the experimental design is given in Table 1.

Table 1

Experimental Design: Treatments by Period and Group

Group	Period							
	1	2	3	4	Transfer Test	5	Transfer Test	6
ER	Baseline	ER	ER	ER		Ext.		ER
SR	Baseline	ER	SR Train	SR		Ext.		SR_1
NR	Baseline	ER	ER	NR		Ext.		NR_1

Period 1. Period 1 consisted of four sessions in which baseline data were obtained. Each session in every period was preceded by a 90-second period in which S was encouraged to play with the available toys. E then seated S and gave him six pages of problems, saying:

> I am going to leave you alone with these problems today so that you can do them. There will be no candy or prizes for doing them. Your job is to do as many of them as you can.

E then left the room, returning at the end of the 15-minute period.

Baseline data were used to select Ss for subsequent treatment procedures. The screening session had provided an estimate of the child's capability on this discrimination task. Any S who completed fewer than 2/3 of the problems of which he had been judged capable in the final two baseline

sessions or the average of any three sessions was included in the sample. Of 53 children tested, only 23 qualified for inclusion in the study. This procedure identified 19 first grade children from four separate classrooms and four second grade children from two separate classrooms. The first 16 Ss so selected were divided by school grade and randomly assigned to conditions. The last eight subjects were assigned to conditions by restricted randomization procedures in order to produce greater similarity of groups in terms of baseline performance.

Period 2. Period 2 consisted of two sessions in which all children received external reinforcement for doing discrimination problems. During this period, the reward signal box was placed on the child's desk and E sat behind and to the right of S. E activated the reward signal box after each correct response by S. The points were backed up by M&M candy rewards (6 points yield 1 M&M) which were delivered to the child at the end of the school day. Points were also backed by small toy rewards which were typically earned about every third or fourth session during reinforcement periods. The schedule for toy rewards depended on the child's potential for doing the problems as established in screening. Thus, each child was required to earn 10 times the number of points earned in screening for each toy reward. At the end of each session in which reinforcement was used, E checked off the points earned by S on a page containing boxes to represent points. The goal was marked on the page so as to give S a visual representation of points earned and points needed for the next toy. S was introduced to the first session by the following statement:

> We are going to play a game with this work today. Every time you do one of these problems right I will give you a point on this box (example). See the points count up in the window. The points are good for candy and toys. You will win some candy every day we play this game and toys on the day you earn enough points in the game. You can win any of these toys. Your job is to get as many points as you can so you will win more candy and toys. If you do a problem and I don't signal a point, just go on to the next problem. Don't erase your answer. Remember, I won't get mad at you if you don't do this work, but doing it is the only way to win the candy and the toys. You may go ahead.

The instructions in subsequent sessions of this period were essentially similar but somewhat abbreviated.

Period 3. In period 3, consisting of two sessions, external reinforcement procedures were continued for the ER and NR groups. The SR group was trained in self-reinforcement procedures. In this condition, S was told to press the foot pedal activating the reward signal after each correct answer. He was told to press the pedal only after correct responses and given a mild admonition not to cheat. S was also told that after each correct SR, E would activate the auxilliary reward signal indicating that that point would be counted. Thus, incorrect SRs were not counted toward back-up rewards in this training period and Ss were given feedback as to the correctness of SRs.

Period 4. Period 4 consisted of four sessions in which the differential treatments were put into full effect. In the ER condition, external reinforcement continued as before. In the SR condition, SR procedures continued but all SRs whether accurate or inaccurate were counted toward

back-up reinforcers. E was present but completely uninvolved in the operation of the reward apparatus. Each ER subject was yoked to an SR subject, so that each ER subject received the same proportion of reinforced correct responses as the yoked SR subject gave himself. In the NR condition, S was informed that there would be no more rewards for doing the problems. E remained with S and the reward signal box remained on S's desk during these sessions.

Period 5. Period 5 consisted of four sessions and was essentially a reinstatement of the baseline (period 1) conditions. After the standard initial 90-second play period, each S was left alone with the discrimination problems which he had been instructed to do. This period provided the extinction data and will be referred to as the extinction (Ext.) period.

Period 6. Period 6 consisted of two sessions and involved the partial reinstatement of the differential treatment procedures used in period 4. In the SR condition, E reviewed the rules of self-reinforcement for each S and required him to do three problems with appropriate self-reinforcement in order to demonstrate his knowledge of the procedure. All Ss were able to do this without further instructions. E then left the room after instructing S to do the problems with appropriate self-reinforcement. In the ER group, E reviewed the rules of external reinforcement for each S and required him to do three sample problems. The formal session then began, with E remaining in the room and operating the reward signal box. In the NR condition, E reviewed the requirements of the discrimination task and required each S to do three sample problems. E then left the room after instructing the S to do the problems. In the NR condition, the reward signal box was placed on S's desk, but could not be operated.

Transfer tests. Tests of transfer, or generalization, were given after period 4 and after period 5. The classroom teacher administered these tests by first giving each S 20 pages of discrimination problems. S was told that this was his desk work for the day and that there would be no prizes for doing it. This material was collected after 30 minutes. After a 15-minute rest period, the teacher then gave the S pages of random numbers, instructing him to cross out all the 5's. This material was collected in 15 minutes. These testing procedures were followed on both testing occasions.

Results

A screening test was given to determine the appropriate difficulty level of the discrimination task and to provide an estimate of potential for each S. The analysis of variance of the screening scores for the sample Ss at the appropriate difficulty level revealed no significant differences between groups ($F = .13$, $df = 2, 20$).

The mean number of correct responses (CRs) for each group in each of the 18 sessions is presented in Figure 1. The CR scores in each period were analyzed separately by repeated measures analysis of variance. The proportions of correct responses/total responses (TRs) were summed over sessions in each period and analyzed by the Kruskal-Wallis one way analysis of variance by ranks (Siegel, 1956). This analysis provides comparisons of accuracy of performance in each group during each period.

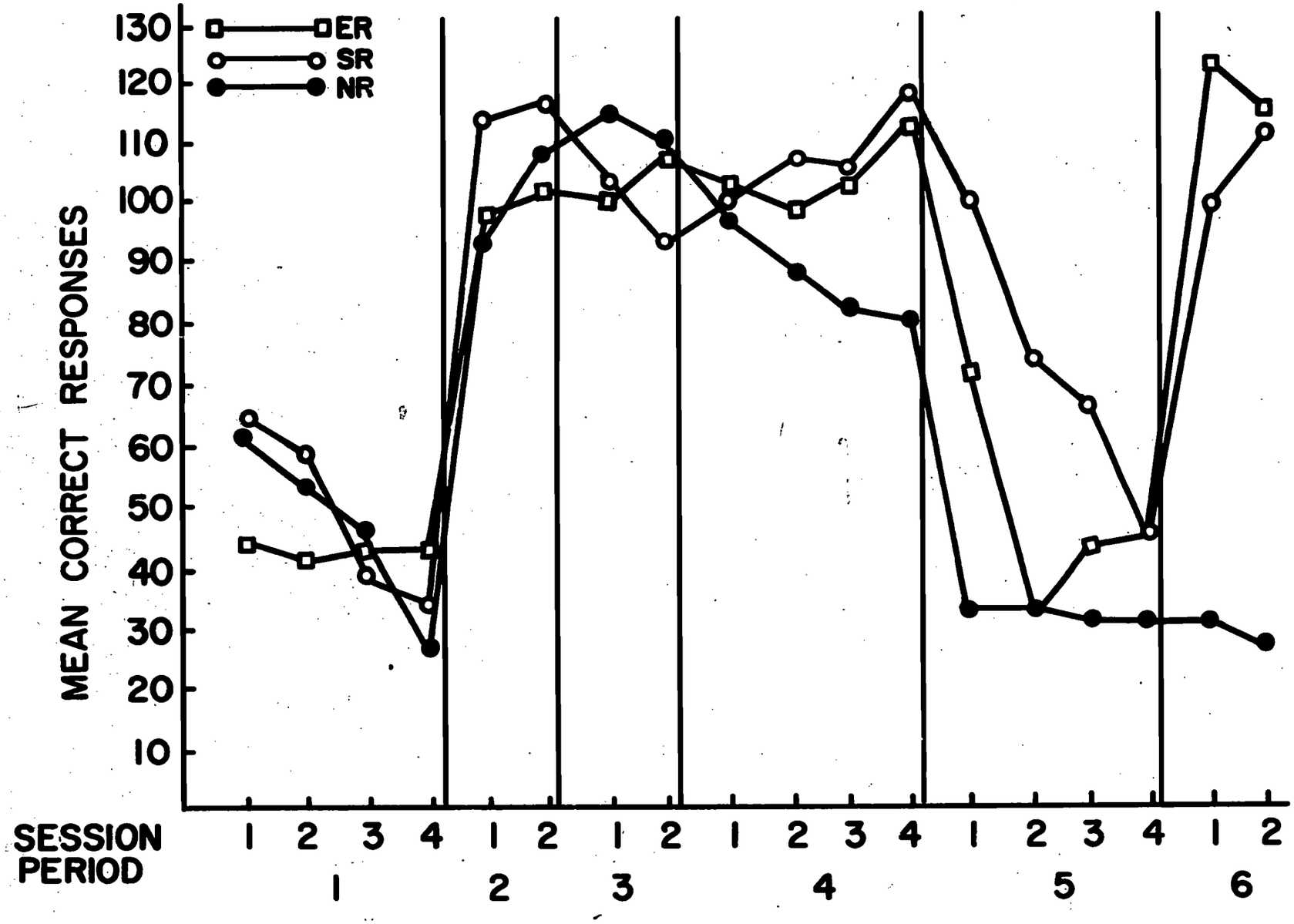

Figure 1

Mean Correct Responses for each group in each session.

Periods 1-3. The experimental design required reasonably uniform behavior over groups in the first three periods of the study. The analyses of variance for these periods revealed no significant differences between groups in the number of CRs in periods 1-3. In period 2, however, the variances of CRs were heterogeneous (F_{max} = 11.47, df = 7 $p<.05$) because the range of scores in the NR group was more restricted than in the other two groups. The accuracy of the discriminations was very high through all periods (97-98%) and there were no differences between groups on the variable. The accuracy of self-reinforcement in period 3 for the SR group was quite high. The mean of the SR/CR proportion was 1.030, SD = .036. Thus, the results for periods 1-3 showed that all groups were essentially similar before being exposed to differential treatment procedures except with respect to smaller variance in the CR scores of the NR group in period 2.

Period 4. Differential reinforcement procedures were put into full effect in period 4. The analysis of CRs revealed a significant groups X trials interaction (F = 3.10, df = 6, 60, $p<.05$). Referral to Fig. 1 shows that both the ER and the SR groups tended to increase slightly in CRs over trials while the NR group tended to decrease somewhat in CRs over trials. Thus, the NR group seems to have shown a slow rate of extinction in this period in which E remained to supervise S's behavior. The combination of these two trends appears to be responsible for the interaction effect. It is clear that SR maintained attentive behavior as well as ER. There were no significant differences in the accuracy of responses in this period (H = 3.98, df = 2) and the overall accuracy proportion remained at a high level (Mean = 9.68, SD = .081). The mean accuracy of SR in this period, as reflected in the proportion of SR/CR, was 1.009, with SD = .031. This seems to reflect a fairly high level of accuracy in self-reinforcement for these Ss, with little or no cheating in administering SR.

Period 5. In period 5, all groups experienced the reinstatement of baseline conditions. Fig. 1 reveals that the extinction data is in the predicted direction (i.e. SR > ER > NR in number of CRs). Preliminary tests of CR data indicated, however, that the variances within groups were heterogenious in this period (F_{max} = 12.54, df = 7, $p<.01$), and a logarithmic transformation was performed on the data in order to attain greater equality in variances.

This analysis of the transformed data revealed that the main effect treatment differences were not significant. A planned comparison between the ER and SR period means was not significant (t = .84, df = .18). A significant sessions effect was found (F = 5.11, df = 3, 60, $p<.01$), reflecting the general decline in performance of all groups over sessions. Analysis of the extinction data by individual session indicated, however, that differences in performance occurred in the first two sessions of this period. In extinction session 1, the SR mean was significantly greater than the NR mean ($p<.01$) with no other comparisons yielding significance. In the second extinction session, a significant difference was found between SR and ER performance (t = 2.42, df = 80, $p<.02$) and a difference approaching significance between SR and NR performance ($p<.10$). These results indicated some superiority of performance for the SR group in the initial stages of extinction.

There was no significant difference between groups on the accuracy of discriminations in period 5 ($H = 1.151$, $df = 2$). The overall CR/TR proportion mean in this period was .908 with $SD = .208$.

Period 6. In period 6, Ss experienced a partial reinstatement of differential reinforcement procedures. The alteration in this period consisted of the removal of E in the SR and NR conditions during the experimental sessions. Two ER subjects could not be run in this final period due to their absence from school. The CR means in this period were clearly in the predicted direction but preliminary tests revealed heterogeneity of within group variances ($F_{max} = 9.47$, $p<.05$) with variances proportional to means. A logarithmic transformation was performed on the data producing greater homogeneity of variance ($F_{max} = 1.86$, $df = 7$). This analysis revealed a significant treatments effect ($F = 27.47$, $df = 2, 18$, $p<.001$). A planned comparison between the SR and the NR means was significant at the .001 level ($t = 4.26$, $df = 18$). Multiple comparisons using Duncan's New Multiple Range Test showed that the ER mean was also significantly higher than the NR mean ($p<.001$). ER and SR means did not differ significantly. While analysis of the accuracy data yielded a significant H at the .05 level ($H = 7.64$, $df = 2$), examination of the raw proportion data revealed that the ranking procedures used in this analysis tended to exaggerate some very minimal differences. The highest accuracy mean was 99.5%, the lowest 98.2%. Differences of this magnitude are of little importance. The mean of the CR/TR proportion in this period was .953 with $SD = .162$. The mean of the SR/CR proportion was 1.153 with $SD = .358$.

Transfer tests. A pretest was given on the digit test to determine whether groups were similar on this measure before treatment. The analysis of this pretest data revealed no significant differences between groups ($F = .56$, $df = 2, 20$). None of the post-treatment transfer tests yielded any significant differences between groups.

Discussion

The present study was designed to test four central hypotheses. The first hypothesis stated that self-reinforcement could maintain desired behavior in individuals in whom these behaviors had been deficient. Testing this hypothesis involved the comparison of the self-reinforcement group with the no-reinforcement group in both periods in which differential reinforcement procedures were used (periods 4 and 6). In both periods the SR group mean was higher than the NR group mean and in the reinstatement period (period 6) it was significantly so. Although the overall mean differences were not significantly different in period 4, the tendency of the NR group to extinguish over trials while the other two reinforcement groups tended to improve in performance produced a significant groups x session interaction. These results seem to demonstrate that self-reinforcement procedures can maintain behavior--that self-reinforcement procedures can have reinforcing properties.

The second hypothesis stated that self-reinforcement could maintain desired behaviors as well as could external reinforcement. Testing this hypothesis involved the comparison of the results of the ER and SR groups in both periods in which differential reinforcement procedures were used

(periods 4 and 6). Fig. 1 and data analyses are clear in showing that differences between groups were very minimal and non-significant, thus supporting the second prediction. These findings for period 6 are of special importance because E was not present in the SR condition but was present in the ER condition. Presumably, the presence of E would tend to increase attentive behavior and thus put the SR group at a serious disadvantage. The fact that this advantage was not realized may be very important for the application of self-reinforcement procedures for clinical or educational purposes. The corroboration of both these hypotheses indicates that, under certain conditions, self-reinforcement procedures could be used for effective behavior modification without any apparent differences in results from those obtained with external reinforcement.

Related to these findings are those involving the accuracy of discrimination behavior and self-reinforcement behavior. The accuracy of the discrimination behavior was generally very high regardless of reinforcement procedure. For the most part, children in the SR condition were very accurate in dispensing SRs after only minimal training. The task used in the present study was designed to permit close to 100% accuracy, however, and it should be recognized that a high level of SR accuracy could have been attained simply as a result of Ss emitting an SR after each response whether correct or not. Thus, the high SR accuracy only means that these subjects engaged in very little obvious "cheating" in dispensing SRs. The accuracy results taken as a whole indicate that, under certain conditions, SR can be appropriately administered by young children and that SR can maintain simple cognitive behavior at a high rate without decrements in the accuracy of that behavior.

The third hypothesis stated that self-reinforcement would produce behavior more resistant to extinction than would external reinforcement. While the overall analysis of the extinction period data did not reveal any differences between groups, separate analyses of the first two extinction sessions provided some support for this hypothesis. Although not conclusive, these results suggest that training in self-reinforcement retarded extinction in its initial stages. This lends some support to the hypothesis regarding the role of covert self-reinforcement as a conditioned reinforcer. It should be noted, however, that the present experiment was not designed as a critical test of this particular hypothesis and rival hypotheses for the resistance to extinction finding may be quite plausible.

The fourth hypothesis stated that behaviors maintained by self-reinforcement would show greater generalization than would behaviors maintained by external reinforcement. The transfer test data did not support this hypothesis. The performance of Ss on these tests was highly variable. The conditions of post-test presentations were also quite variable and on several occasions tests were incorrectly presented to Ss in the classroom. In general, there were too many powerful uncontrolled variables involved in the transfer tests to obtain very meaningful results. In addition, it will be apparent that generalizations of this kind would be one of the more complex and far reaching effects of self-reinforcement. Thus, such an effect would be most difficult to produce and probably would require more extended and lengthy procedures than those used in the present study.

It seems clear that the finding suggesting greater resistance to extinction following self-monitored reinforcement is important and worthy of extended study. In considering directions for further research, it seems relevant to consider those variables which might have enhanced resistance to extinction within the present paradigm. Perhaps the most obvious consideration involves the length of training in self-reinforcement. While training in SR was considerably greater in the present study than in any previous research, longer training might have produced more stable and enduring patterns of self-reinforcement. Other considerations involve the scheduling of reinforcement and factors related to the discrimination of extinction. In the present study, the extinction period was labelled as such for Ss and it followed a CRF schedule. These factors would presumably facilitate the discrimination of the extinction condition and conceivably reduce the impact of any conditioned reinforcers. The final, and perhaps most important consideration, involves the fact that no attempt was made in the present study to produce or sustain any particular class of covert behavior which might continue to serve as a reinforcing stimulus. In future studies it would be well to require overt verbal statements of apparent reinforcing value to occur in the response chain leading to reinforcement. In this procedure, the same verbal statement could be repeatedly associated with reinforcement and presumably it would then be more likely to occur again under similar curcumstances and serve as a conditioned secondary reinforcer. Further research in conditioned self-reinforcement is now in progress with some of the procedural changes suggested by the present results and considerations.

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