FREE-TIME AS A REINFORCER IN THE MANAGEMENT OF CLASSROOM BEHAVIOR¹

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Six subjects, comprising one class at a school for the deaf, were given reinforcement consisting of time free from school work for remaining seated in the classroom. As a result, the frequency of leaving their chairs was sharply reduced. A second procedure presented free-time not contingent on remaining seated. Little change was seen in the already lowered response rate. An extension of the time required to be seated with corresponding reduction in the number of daily free-time periods did not reduce the effectiveness of the procedure. A one-day observation after six weeks indicated that the procedure was still effective. A one-day contingency reversal, requiring subjects to leave their chairs at least once during each seated period in order to receive free-time, substantially raised the frequency of out-of-seat responses.

Recent studies have indicated that classroom behavior of humans can be successfully manipulated given proper application of the controlling environmental contingencies. Homme, C. de Baca, Devine, Steinhorst, and Rickert (1963) reported that preschool nursery children would engage in the low-probability behaviors of sitting quietly and looking at a blackboard if those behaviors were intermittently followed by the opportunity to engage in higher-probability behaviors such as running or shouting. Thomas, Becker, and Armstrong (1968) showed that disruptive behavior in the classroom can be manipulated as a function of teacher's behavior. They further suggested that one important classroom management device is the use of approval for appropriate behavior.

The usefulness of the token economy has also been proven in the classroom. Wolf, Giles, and Hall (1968) demonstrated that overall achievement gains could be nearly doubled in a remedial classroom, using a token reinforcement system, over what was achieved in the regular classroom without the token system. Wolf *et al.* (1968) estimated the average cost of their token system at \$250 for each of the 16 students for a year. Other investigators have produced gains in specific academic areas utilizing token systems. For example, Staats and Butterfield (1965) produced a large number of

reading responses in a non-reading juvenile delinquent. The cost for that subject was \$20.31 over 40 hr of work. Staats, Minke, Goodwin, and Landeen (1968) extended Staats' earlier work to 18 junior-high aged subjects. Reading responses were strengthened over 38.2 hr of training at a cost of approximately \$22 per subject. In both studies, significant achievement gains in reading resulted.

Birnbrauer, Bijou, Wolf, and Kidder (1965) in their work with institutionalized retardates showed that the token economy need not be expensive to be effective. Extrapolation from their data, which indicate an average payoff of 5¢ per week per student for a regular school year, would suggest a financial cost of less than \$20 for back-up reinforcers. In an extension of their earlier work, these same investigators were able to strengthen academic behavior within a similar token system. The costs averaged approximately \$7 per student for the 15 students in the class over 1 yr (Birnbrauer, Wolf, Kidder, and Tague, 1965).

Studies utilizing the token economy have demonstrated its usefulness in education. However, in many cases the cost of providing back-up reinforcers is outside the financial ability of most institutions without special funding. In addition, most school administrations oppose paying their students for learning. The classroom management techniques propounded by Homme and Becker indicate that much behavior can be modified in the classroom without a token economy and its cost.

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The present study illustrates a behavior management technique that can be used to control behavior in the classroom with no financial cost to the institution involved.

METHOD

A teacher approached the experimenter regarding her class's behavior. She was experiencing problems in maintaining students' attention. Discussion indicated that a major difficulty was the occurrence of behavior incompatible with academic behavior: students were often out of their chairs while the teacher was teaching. The teacher reported that this was disruptive to the entire class. Attempts to reseat students meant interruption of the teacher's presentation until calm was restored. The strong possibility existed that the behavior of students leaving their seats was being maintained by the time away from school work it provided.

Subjects

Six girls at the New Mexico School for the Deaf ranged in age from 11 yr 8 months to 13 yr 8 months; they were grouped in one class because of poor school achievement and less than average intelligence.

Table 1

Subjects	Age	Achievement*	I.Q.**	Hearing Loss
1	12-10	2.1	74***	Severe
2	13-8	2.0	63	Severe-Profound
3	13-3	2.5	62	Severe-Profound
4	11-8	2.4	65	Profound
5	13-4	2.1	53	Profound
6	12-10	2.1	53	Severe

*Stanford Achievement Test (Elementary).

**Leiter International Performance Scale (1948 revision) except as noted.

***Wechsler Intelligence Scale for Children (Performance Scale).

Table 1 contains a complete description of the subjects. None of the girls was described by the staff as a behavior problem.

The class was in session in the same room from 8:05 A.M. until 12:10 P.M. Monday through Friday with no scheduled recess. A once-weekly session in the school library provided the only regular occasion on which a

scholastic activity took place outside the classroom. Physical education, home economics, and other activities took place in the afternoon elsewhere on campus.

Procedures

Baseline measurement. The overall procedure followed the standard single-organism, ABA design where each subject was her own control. Before instituting modification procedures, the frequency of occurrence of students leaving their seats was measured over five days. All data were recorded by the teacher on special data sheets, divided by subject, into successive time periods from 8:05 A.M. to 12:00 noon. The length of these periods was arbitrarily established at 15 min with each period separated from the former one by 5 min.

Response definition. The response was easily defined. A subject attaining an upright position without teacher permission constituted an out-of-seat response. Construction of the one-piece chair-desks made it impossible to assume this position within the plane of the chair-desk. Hence, a subject was literally out of her seat before the response criterion was met. (Without the help of elaborate timing apparatus, it was not feasible to measure the time spent seated; hence, the use of an easily definable response, the converse of remaining seated.) In "emergencies", an out-of-seat response was allowed with teacher permission. Sharpening pencils, getting a drink of water, going to the restroom and the like were allowed only on "free" time.

The teacher continued her usual policy with respect to all other negative behavior throughout the study. Generally, this involved verbal reprimands, turning a student's chair-desk toward the wall, or taking the student to the principal's office. These consequences generally followed severe disobedience, foul language, or temper outbursts.

Reliability. Responses were also recorded by the experimenter and a supervising teacher on separate occasions. The supervisor was largely unaware of the nature of the project. She was given a chart identical to the teacher's, told how the response was defined, and asked to note instances of the behavior when she visited the classroom during her regular observation periods. Generally, the length of the supervisor's stay was for one or two of the seated segments. The experimenter also occasionally re-

corded response occurrences. A total of 15 seated segments over the course of the study was observed by the supervisor or the experimenter in which the six subjects were present. Over these 90 observations the teacher's record was compared with the supervisor's or the experimenter's. Reliability was computed by dividing the sum of agreements and disagreements between teacher and observer into total agreements. In this way, reliability was checked in each phase of the study on approximately 18% of the days the study was in effect. On none of the 90 observations did the teacher's record differ from that of the supervisor or the experimenter.

First free-time contingent period. To begin the modification, the teacher presented the following instructions to the class at 8:05 A.M.: "From now on we will be doing something new. I want you all to sit in your chairs. You must not leave them without asking me. If you can do that, you will be given five minutes of your own time at 8:20."

The teacher announced each successive free-time period as it occurred. If the teacher was engaging in a formal presentation to the class, this presentation was halted during the free-time period. If a student left her seat during a seated segment, the teacher said: "You forgot, no break." Otherwise, her presentation of the ongoing seat work was continued.

Free-time was restricted to the interior of the classroom with the exception of trips to the restroom or water fountain. The subjects were not forced to get up during free-time periods if they did not want to. Those who had not earned the free-time were required to remain seated and working and not allowed to interact with their peers during that period. At the end of a free-time period, the teacher indicated that it was time to begin again and when the next free-time period would come. Five days were completed under this condition.

Free-time non-contingent period. To start this period the teacher presented the following instructions at 8:05 A.M. of the eleventh day: "I want you all to sit in your chairs. You must not leave them without asking me; but if you forget, you will still be given your break." In this section of the study if a student left her seat during a seated segment, the response was noted but the teacher said nothing and the class activity continued.

Five days were allowed under this condition.

Second free-time contingent period. The second modification period began immediately after the non-contingent free-time condition was terminated. To reinstate modification conditions the teacher repeated the set of instructions delivered in the first modification period. Thirty-five days were recorded under these conditions.

Pursuant to another modification in the class, a point system for completion of academic work was introduced on Day 28. Within this system, the subjects could earn check marks and gummed stars on a chart, and were occasionally given a field trip outside of school time. In all other respects the class was conducted as usual.

Third free-time contingent period. The teacher noted that the students did not always use all of their free-time periods. That is, for one or two of these periods each day some students would remain seated and perhaps working. Thus, it was thought likely that an increase in seated time and a corresponding decrease in the number of free-time periods would not lessen the effectiveness of the procedure. Beginning on the fifty-first day of the study at 8:05 A.M., the teacher presented the following instructions to the class: "Starting today we will work until 8:30 before we take our break. Remember you must not leave your chairs without asking me. If you can do that, you will be given five minutes of your own time at 8:30."

For the remainder of the study seated segments were 25 min in length. Free-time periods remained 5-min long; however, lengthening each seated segment by 10 min reduced the number of free-time periods per morning from 12 to 8.

Post-check. Approximately six weeks after the termination of data collection, a single day's post-check was made. The contingencies of the third free-time contingent period had been left in effect by the teacher throughout the intervening time.

Contingency reversal. In the week following the post-check the teacher was asked to reverse the response requirement for a single day. At 8:05 A.M. that day she presented the following instructions to the class: "Today we will do something different. If you remain seated, you will not be allowed to take your break. You

must get out of your seat at least once each period in order to have your break."

RESULTS

Figure 1 shows the rate of out-of-seat responses for each subject under the different procedures. The different procedures are separated by the vertical dashed lines. Omitted data points comprise days when a given subject was absent.

Before the reinforcement contingency was introduced (Days 1 to 5) the students engaged in slightly more than one out-of-seat response per 15-min segment. After the modification procedure was introduced, responding decreased sharply (Days 6 to 10). During the first

free-time contingent period, only 0.08 responses took place per student in the average 15-min period. That is, a response occurred approximately once each 30 min. The difference between baseline and first modification periods was highly significant ($t = 47.35$; $p < 0.001$ one-tailed).

While the shapes of premodification baselines were dissimilar for the six subjects, Fig. 1 shows that the effect of the procedure, a sharply reduced response rate, was similar for all.

When free-time periods were awarded non-contingently (Days 11 to 15), little change was noted in the lowered response rate (Fig. 1).

Making free-time periods again contingent on remaining seated produced another de-

Fig. 1. The average number of out-of-seat responses for each subject per class segment for each day of the study.

crease in the frequency of the response. The difference between the free-time non-contingent period and the second free-time contingent period was significant ($t = 1.86$; $p < 0.05$ one-tailed).

Free-time periods contingent on remaining seated for 15-min segments were left in effect through Day 50. Inspection of the individual performances (Fig. 1) indicates that fewer responses occurred as that point was approached.

On Day 51 the seated segments were lengthened to 25 min. It can be seen that no responses occurred on 15 of the 16 days recorded under this procedure. On Day 62 (points "a" in Fig. 1), one student told two others that it was time for a break, when in fact it was not. These two responses were the only instances of out-of-seat behavior during this condition.

On the day of the post-check six weeks later, no responses were observed during the entire morning.

Approximately one week after the post-check the contingency was reversed. On that day, 25 responses occurred. This was a rate of one response approximately every 8 min, as compared to no responses for the entire morning during the post-check.

DISCUSSION

Reinforcing behavior that is compatible with learning would seem possible by offering brief periods of free-time from the learning environment. In this study, the amount of in-seat behavior was increased by making time away from school work contingent on remaining seated for specified periods of time.

Several alternative explanations could account for the effectiveness of the free-time periods as reinforcers in this study. No experimental manipulations were made which would favor one explanation over another.

If the aversiveness of the regular classroom environment is granted (Skinner, 1968), the presentation of free-time may have constituted an escape conditioning procedure. That is, by remaining seated for a given period of time, the subjects could escape seat work and the teacher's formal presentation for a 5-min period, while those who had been out of their seats in the preceding segment had to continue working.

On the other hand, the free-time periods afforded the subjects the opportunity to engage

in positively reinforcing activities such as obtaining a drink of water, talking with classmates, or talking with the teacher about favored subjects; the free-time periods may, therefore, have been positive reinforcers. If that was in fact the case, the present procedure constituted operant conditioning of desirable classroom behavior by positive reinforcement.

Finally, the present results can be explained in terms of the Premack reinforcement principle. That principle states that one event is capable of reinforcing another event if the reinforcing event has a higher probability of occurrence and its occurrence is made contingent upon emission of a lower-probability behavior (Premack, 1959). In the present study, the high-probability behavior (*i.e.*, reinforcing event) was non-academic behavior which could be emitted during the free-time period contingent upon prior emission of the lower-probability behavior of remaining seated for a given time.

The possibility exists that the students came under instructional control when procedural changes were instituted. This is unlikely, however, in view of the fact that instructions were presented only once at the beginning of each procedural change. Hence, long-term maintenance of the behavior was probably due to the modification procedures.

The lack of clear change in the response rate when free-time (*i.e.*, reinforcement) was presented non-contingently may have been due to "adventitious" reinforcement. At the start of that procedure (Day 11), all subjects had attained nearly perfect performances in remaining seated to obtain free-time. That is, more in-seat behavior was occurring than its converse, out-of-seat behavior. Hence, at free-time presentation the behavior most likely to be occurring was in-seat behavior and, therefore, remaining seated may have been adventitiously maintained in strength by the subsequent presentation of the non-contingent free-time. The literature presents a similar case with pigeons (Herrnstein, 1966).

The use of the point system to increase academic output that began on Day 28 may have contributed to keeping the subjects seated. However, inspection of Fig. 1 shows that in the 10 days before Day 28, nearly 80% of the 60 subject-days in that period contained no out-of-seat responses.

In terms of financial outlay, the study provided a "cost-free" technique for managing classroom behavior available to most teachers. At the end of the study, total free-time per day equalled 40 min—a time approximately double a standard recess in the public school—but seemingly a reasonable payment to maintain the behavior of a special population. Although not attempted in the present study, it is conceivable that a further lengthening of the time required to be seated, and consequent reduction in the number and total daily duration of free-time periods, could have been successfully implemented.

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