

*EFFECTS OF A TOKEN REINFORCEMENT SYSTEM
ON JOURNAL RESHELVING*

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A token reinforcement program involving two levels of token value and backup reinforcers to increase journal reshelving behavior in a large university library was experimentally evaluated. Results showed that instructions (in which signs asked users to reshelve journals) had no impact. By contrast, token reinforcement contingent on reshelving behavior led to a marked increase in journals reshelfed. A return to instructions-only conditions, when data were corrected for library usage, showed an increase in unreshelfed journals over the token reinforcement period, though the increase was not to baseline levels. For the next 11 months, library staff maintained a modified token program. Follow-up data collected after that interval showed that number of unreshelfed journals remained markedly lower than levels at baseline and the first instructions-only period, though they were slightly higher than at the token reinforcement period. Token reinforcement of the variety employed in this study constitutes an efficient, economical means of changing the behavior of library users who fail to reshelve books and journals.

DESCRIPTORS: library, journal reshelving, token reinforcers, library staff, users

In the last few years, operant researchers have begun to turn from preoccupation with efforts to remediate individual behavior problems to attempts at environmental redesign and remediation. Improvements in pollution control (Burgess, Clark, and Hendee, 1971; Clark, Burgess, and Hendee, 1972; Kohlenberg and Phillips, 1973; Powers, Osborne, and Anderson, 1973), bus ridership (Everett, Hayward, and Meyers, 1974), classroom racial integration (Hauserman, Walen, and Behling, 1973), job performance (Hermann, de Montes, Domínguez, Montes, and Hopkins, 1973; Pierce and Risley, 1974), and job finding (Jones and Azrin, 1973) have resulted from the systematic application of operant principles to environmental design.

The present study took place in a novel setting for environmental redesign, a library, and con-

sisted of an experimental analysis of environmental factors affecting the reshelving behavior of bound journals by graduate and undergraduate students at a branch library of Rutgers University.

Failure to reshelve volumes is and has been a significant problem for libraries; in fact, it has been described as the single most time-consuming aspect of the entire circulation process (Kaiser, 1964). The buildup of journals causes problems both for a busy library staff and for the library user who needs ready access to the journals. One analysis of book reshelving at a public library (Benford, Burkhalter, Ehrnstrum, and Hoag, 1968) revealed a significant delay between the time volumes were taken off the shelves by users and the return of those volumes to the shelves by the staff. The same study also reported that these volumes had to undergo a large number of handling operations during the sorting-reshelving process, with a resultant cost of 22¢ to reshelve a single journal volume.

When asked, the Rutgers University Library staff quickly identified a backlog of unreshelfed journals in its branch library as one of its continuing major problems; to confront it, a token reinforcement system similar to that described in Everett *et al.* (1974) was implemented. A novel

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element in the study design was that it informed journal readers of newly-instituted contingencies of reinforcement, then gave them free access to tokens and journals without further constraints. The practical import of a study of the utility of this "honor system" becomes clear when one considers the cost in time and salaries of having to hire additional personnel to reshelve backlog.

METHOD

Subjects and Setting

The study was conducted during the Spring semester of 1975 in the Library of Science and Medicine (LSM) of Rutgers University. The university population at that time was composed of approximately 26,500 undergraduate and graduate students and 2200 faculty members, with an additional 290 medical students and 200 faculty and staff members of the Rutgers Medical School also using the LSM. The third floor of the LSM houses bound journals and circulating books. The present study investigated the reshelving of bound journals on this floor only.

Procedure

The experiment, which lasted seven weeks, was conducted seven days a week during the operating hours of the LSM. Baseline data on reshelving and library use were gathered over an initial 13-day period. Baseline data on the dependent measure, number of bound journals not reshelved each day, were derived as follows: first, a staff member counted the number of journals—but not books—that were unshelved just as the library opened each day. Staff members received the following instructions on how to take this count:

"You are to start at the photoduplication machines and circle the perimeter of the floor (where all the study areas are located). All volumes lying on chairs, desks, copying machines, etc., are to be counted if they are journals. If anyone happens to be working at a spot with a number of journals on the table, you are not to count these journals."

Staff members were taken individually around the floor by the supervisor the first time they took the count. Added to this count was the number of journals the staff had reshelved the day before. Staff who reshelved journals during the day kept careful records of the number of journals reshelved; they were also instructed not to reshelve any journals that could not be counted by the procedure for the morning count (that is, they would not ask whether a person was finished with a journal(s), in order to give that person every chance to reshelve the journal). All other floors of the library were also checked for journals during the morning count; any found were included in the total.

A count of the number of people exiting from the building, taken from an electric counter, was collected each day. Fifteen-minute interval counts were also taken at the main entrance to the third floor at 9 am, 11 am, 1 pm, 3 pm, 5 pm, and 7 pm in order to relate overall library usage to journal floor usage.

At the beginning of the study's second phase, the first instructions-only period, 61 cm by 61 cm signs were placed at 15 locations throughout the third floor of the library. They read, simply, "Please Reshelve Journals" in 7.6-cm letters. This phase of the study also lasted 13 days.

When the token reinforcement period of the study began, 91.5 cm by 61 cm signs explaining the experimental contingencies newly in force were posted at three locations on the third floor of the LSM; signs from the instructions-only period remained. The new signs read:

"Free Food, Movies, Photoduplication, and More. For each bound journal you reshelve, you are entitled to a blue token. Blue tokens can be found in boxes throughout the floor. Then exchange blue tokens for red tokens at the centrally-located table. The red tokens then can be used to obtain various items. Check the token exchange list for details."

A token exchange list, giving information about backup reinforcers—the cost of each in tokens, where they could be obtained, the exchange ratio

of blue for red tokens (which was 1:1), and the rules for obtaining backup reinforcers with red tokens—was placed next to each sign.

Before the tokens were introduced, several university businesses had agreed to accept tokens in exchange for their goods and services. At the same time, a termination date one week after the end of the token reinforcement period was set, after which tokens would no longer be accepted. This date was posted in the LSM and announced on the token exchange sheets. The tokens, modelled after those used by Everett *et al.* (1974), but of two denominations, were wallet-sized cards printed on blue and red paper. Backup reinforcers, given for specified quantities of red tokens, included movie tickets, hamburgers, cigarettes, photoduplication services within the library, bowling games, use of pool tables, items from a sweet shoppe, and chances on a \$25 raffle.

Blue tokens were placed in shoe boxes at five locations about the floor. A table, set up at the main entrance to the third floor and in view of two of the shoe boxes, permitted exchange of blue tokens for red tokens. Users were told that this procedure was necessary to keep exact records of the number of tokens given out. It was also hoped, however, that this intermediary step, involving a human monitor, would prevent wholesale compromise of what was otherwise strictly an honor system. Token exchange sheets, as well as a sign-up sheet for the \$25 raffle, could also be obtained at this table. It was staffed by one person during most library hours. When it was not so staffed, a sign was posted asking users to keep their tokens until a later time. This phase lasted 14 days.

The fourth and final phase was the second instructions-only period, which lasted 12 days. When it began, the three large signs explaining the experimental contingencies were removed, blue tokens became unavailable, and the third-floor table was removed. A sign was placed where the table had been, informing holders of blue tokens that they could exchange them at the Periodicals desk during the ensuing week.

Periodicals staff recorded the number of red tokens given out during this period.

Questionnaires were distributed at the entrance to the third floor of the LSM during the last two days of this final phase. They were returned to the experimenter via a box located just inside the entrance to the third floor.

At the 11-month followup, the procedure used to collect reshelving data was the same as it had been during the study itself. New staff members were briefed explicitly by their supervisors about the counting procedure. A check of the floor at this time revealed that all 15 signs from the instructions-only period had remained posted. During the 11 months between completion of the final phase of the study and collection of followup data, library staff had administered a modified token reinforcement program themselves. It provided for free photoduplication for journal users who reshelved their journals and then obtained and submitted tokens for doing so.

Reliability of Measurement

Reliability checks on the dependent measure were scheduled at least three times during each phase of the study and twice during the followup period. To this end, an individual not employed by the LSM, as well as the library employee against whose regular count it was to be compared, took initial unshelved journal counts in the morning. The number of journals reshelved in a day by a given staff member (only one staff member reshelved at a time) was also counted independently. (Since the staff member first took unshelved journals to sorting shelves and then reshelved them by filling a hand cart, this two-step procedure could easily be observed by an independent counter.) Staff members who reshelved journals remained unaware of this reliability check; they responded negatively when asked at the end of the study whether they had known of it. A Pearson product-moment correlation coefficient of 0.87 linked the regular and reliability counts for the four experimental phases. A mean difference in counts of 2.1 journals per day was obtained by averaging the abso-

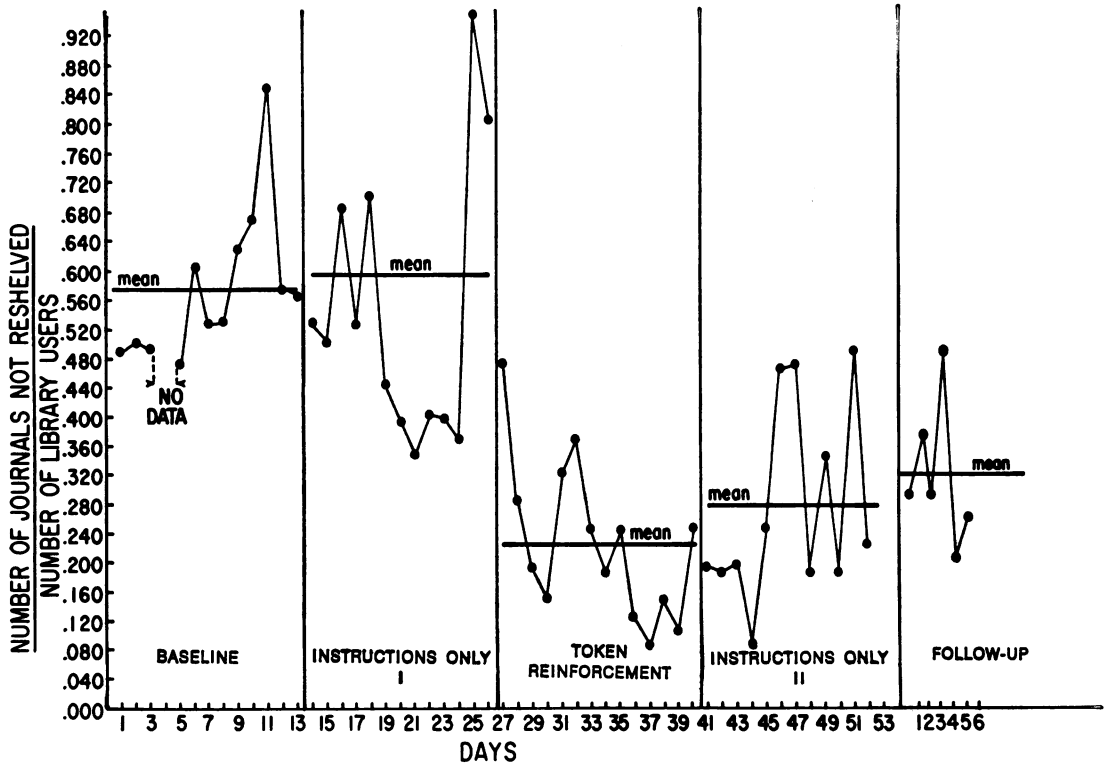


Fig. 1. Daily count of unreshelved journals corrected for library use.

lute differences between the two counts. During the followup period, perfect reliability across the two checks was obtained.

An estimate of the number of journals reshelved incorrectly was also obtained from the LSM staff during the study, since it was obviously important to know whether journals were being reshelved correctly. It was regular procedure for the library staff to check journal shelves for incorrect reshelving, so that the entire floor would be covered about once a month. After checking for accuracy of reshelving during the study period, staff members reported no noticeable difference in number of misshelved journals before and during the token phase.

RESULTS

Figure 1 shows the daily number of journals not reshelved across the four phases of the experiment and the followup period, corrected for

number of journal users. In this regard, it was assumed that the best indicator of number of persons using the journals was number of people coming to the library. To define the points on Figure 1, number of journals not reshelved in a day was divided by number of users who exited from the library on that particular day.² The figure shows that this mean corrected ratio increased slightly from baseline to the instructions-only period, then dropped markedly during the token reinforcement period. The ratio then increased slightly again during the final instructions-only period, as well as over the followup interval. Mean daily number of journals not reshelved during the four phases of the study (uncorrected for library use) was 485 for baseline,

²The count for overall library use correlated 0.76 with the count for third-floor use. Since the third-floor count did not include Saturdays, Sundays, or several other days, however, the overall library use count was employed as the corrective factor.

476 for the first instructions-only period, 209 for the token reinforcement period, and 199 for the second instructions-only period. At followup, mean number of unreshelved journals was 255, with a high count of 323 and a low count of 214.

During the token reinforcement condition, 2316 tokens were distributed; of these, 2123 (92%) were redeemed. Tokens were exchanged most often for hamburgers (33%), followed by photoduplication (26%), cigarettes (20%), bowling, pool tables, and candy (16%), and chances on the \$25 raffle (6%). No reports of any difficulty in the exchange system were received. During the followup period, 2687 tokens were given out, with one token given for every two reshelved journals. Ninety-five per cent of these tokens had been redeemed at followup for photoduplication services, the only backup reinforcer available.

Four hundred questionnaires were passed out at the end of the study; the return rate was 48%. Questionnaires asked users to indicate the frequency with which they reshelved journals on a 1 to 5 scale, with 1 representing "all the time" and 5 "not at all". Mean reshelving score before tokens were instituted was 2.4; mean score after tokens was 1.3. Of users who took tokens, 43% took tokens only some of the time they reshelved. Interestingly, 53% of users who reshelved journals took no tokens at all. Of users who either increased their reshelving behavior or began to reshelve journals only after tokens were available, 95% took at least some tokens. Twenty-five per cent of users responding to the questionnaire reshelved journals other than the ones they used. Users were also asked to judge whether journals were easier to locate after the token system was instituted, on a 1 (much easier) to 5 (not at all) scale. Mean response was 2.9 (somewhat easier). It should be noted, however, that these data were obtained retrospectively.

DISCUSSION

The 14 days of the token reinforcement period were associated, overall, with a marked decrease

in number of unreshelved journals. Because unreshelved journals increased only slightly during the subsequent return to an instructions-only condition, however, one cannot be certain that the increase in reshelving behavior and the advent of tokens were causally linked.

Supplementary data cast light on this important question. First, the last 10 days of the second instructions-only period coincided with final exam period at the university. Students using the library during this time may very well have been using it more as a place to study than as a research facility. Hence, fewer journals might have been taken off the shelves at this time, so that fewer could be reshelved. Second, questionnaire data gathered at the conclusion of the study indicate that many users reshelved journals during the token phase of the study without taking tokens every time they did so, a behavior pattern that might well have continued once tokens were no longer available during the study's final phase. The following questionnaire comment makes a point relevant to this issue: "It seemed (before the token phase began) that the only reason I wouldn't reshelve a journal that I used was because I would forget. The tokens made me more aware."

The token reinforcement phase of the study cost \$213 during the two weeks it lasted. This included costs for initial printing of tokens (\$46), a one-time-only expense. By contrast, the beginning salary for one full-time staff member at the LSM is \$245 every two weeks. It was the opinion of the LSM staff that hiring one such worker would not have cleared the backlog of journals as well as did the experimental procedures. Though a token exchange table on the third floor of the library was staffed during the token reinforcement condition, this is not a necessary part of the token procedure, because token exchange could have taken place at a circulation or periodical desk (as it did after the study terminated). We conclude, then, that the potential cost-benefit ratio of the token reinforcement procedure employed is quite favorable.

We were concerned before the study whether

the "honor system" to be employed to dispense tokens would be abused. In this regard, 2316 tokens were given out over the two-week token period, an average of 165 tokens per day. The mean daily decrease in number of unreshelved journals from the first instructions-only period to the token reinforcement period was 267 journals. Accordingly, while no direct means of determining how much the system was abused is available, comparing the mean daily decrease in unreshelved journals of 267 to the mean of 165 tokens given out daily for the reshelving suggests minimal abuse of the system.

The total number of tokens given out over the 11-month poststudy period was just slightly more than the number given out during the two-week reinforcement period. Even considering that one token was given during the poststudy period for every two journals reshelved, the number of tokens given out during the poststudy period was still substantially less than one might have predicted, especially since reshelving behavior was substantially maintained during this time. What seems most likely to have happened in this instance is that a thinning of reinforcement frequency, combined with retention of other important environmental control elements (signs, staff support and commitment), resulted in maintenance of reshelving behavior at close to earlier levels, even though earlier levels of reinforcement were no longer available.

A criticism leveled at many token economies is their failure to enable positive treatment effects from them to generalize beyond the token economy setting (Kazdin and Bootzin, 1972). This criticism is especially apt in a setting such as a library, where user population changes so regularly. In fact, to maintain appropriate reshelving behavior in such an open-field setting, the reinforcement parameters of the setting would likely have to be permanently changed—reinforcement contingencies such as those employed during the token reinforcement phase of this study would probably have to be enforced permanently. Interestingly enough, on completion of this study, library staff decided to administer a token rein-

forcement system program themselves on a modified basis. This program, continued throughout the year, appears to have been extremely successful, despite the modest investment library staff had to make to implement and maintain it.

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