

REMEDICATION OF NEGATIVE SIDE EFFECTS OF AN ON-GOING RESPONSE-COST SYSTEM WITH CHRONIC MENTAL PATIENTS¹

DAVID W. DOTY, TITUS MCINNIS, AND GORDON L. PAUL

STATE UNIVERSITY OF NEW YORK AT ALBANY AND
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Response-cost procedures within a token economy with extremely regressed residents excluded many residents from access to positive reinforcement. Procedures allowing residents to "purchase eligibility" to obtain backup reinforcers through contingent payment on standing fines, combined with proportional fine payoff schedules contingent upon time without new fines, increased payment on fines, reduced incidence of new fines, and increased utilization of backup reinforcers. These modifications removed adverse side effects while retaining the benefits associated with response costs. Failures or adverse effects of elements of token systems should not occasion abandonment of token economies, but rather encourage their continual evaluation and modification.

Although little has been written about the nature of response costs applied within token economies, the typical procedure consists of immediate withdrawal of tokens (fines) as a consequence of specified inappropriate behavior. When fine payment is delayed (due to lack of tokens or refusal), the normally available range of backup reinforcers is usually restricted until the fine has been paid off. The latter procedures, hopefully, reinforce payment on the fine as well as contribute to reduction of the undesirable target behaviors. While few systematic studies have yet appeared, the latter response-cost procedures have been effective in reducing the frequency of undesirable behavior when the magnitude of the cost significantly taxed the availability of backup reinforcers (Burchard and Barrera, 1972; Kazdin, 1972; Upper, 1973).

Negative side effects of such response-cost

procedures were observed within a token economy, one of three programs of a long-term project evaluating the comparative effectiveness of institutional treatments for severely disabled, chronic mental patients. Specifically, following a decision by the State Department of Mental Health, which considerably restricted the use of seclusion for timeout procedures, the incidence of inappropriate behavior and fines continually increased with proportionally decreasing rates of fine payment. The net effect, within the established response-cost system, was that many residents accumulated standing fines with payment at such a low rate that they were excluded from access to backup reinforcers (except one meal per day). Since the controlled evaluation of the token economy in competition with other treatment programs presumes availability of the latter reinforcers for shaping and maintaining appropriate behaviors, a serious research problem, as well as clinical and humanistic concerns, existed. The latter problem was addressed in the present study by allowing residents with standing fines to "purchase eligibility" to spend tokens for backup reinforcers by making an additional payment on the fine. It seemed that eligibility to purchase backup reinforcers contingent upon a fine payment might

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both increase fine payments and return residents to full program participation (and access to backups) without sacrificing response costs for inappropriate behaviors.

METHOD

Subjects and Setting

Twenty-eight chronic mental patients (half male, half female), constituting the total population residing on the social-learning unit (one of three groups) of the parent project, were between the ages of 24 and 58 yr, had been institutionalized an average of nearly 20 yr, and were all diagnosed schizophrenic. At the time of transfer to the present unit, nearly 3.5 yr earlier for the majority, they were among the most debilitated of institutionalized mental patients, with excesses in bizarre and combative behavior and exceptionally low levels of verbal, self-care, or other adaptive behaviors (Lentz, Paul, and Calhoun, 1971; Paul, Tobias, and Holly, 1972). Only two were on psychotropic drugs during the present study, and they were receiving the minimal dosage needed to control injurious behavior (see Paul *et al.*, 1972).

Subjects resided on a 28-bed, coeducational, locked unit. Clinical staffing ratios were comparable to those in public mental hospitals, with the day shift composed of two mental health technicians ("change agents") and one intern psychologist, the evening shift of two change agents and a floating LPN who shared responsibility of another unit within the parent project, and the night shift of two change agents. A single supervising psychologist and administrative nurse directed both the social-learning unit and an adjacent unit housing the milieu program of the parent project (Paul, 1969). All staff underwent intensive program-specific training, demonstrated reliability in performance before work in the program, and both staff and residents were continually assessed by trained observers (Paul and McInnis, 1974; Paul, McInnis, and Mariotto, 1973).

Existing Program

Due to the nature of the resident population, a tight, "fixed" token economy was established for the duration of the parent project in order to prevent inflation and to provide a unit-wide system that was practical within limited staffing levels. Tokens (color-coded plastic slips) were given at predetermined times for specified behaviors (*e.g.*, one token for appearance, available three times daily; one token for attendance, and one token for participation at each scheduled activity). Individualized shaping procedures were incorporated within the fixed economy in two ways: for behaviors in which "action effects" could be observed (*e.g.*, appearance, maintenance of bed and area), terminal performance was broken down into subtargets. Each resident who performed at "terminal level" received a "terminal token". Residents performing at less than terminal level were prompted for specific subtargets, and received a "shaping token" if the subtarget or better was accomplished. For behaviors that involved ongoing chains, or complex interactive skills, a "shaping chip" was used for immediate reinforcement of component behaviors. Shaping chips were exchangeable for a token at the end of the period, and had no further value. Social reinforcement and behavioral specification was always to be paired with disbursement of chips and tokens. Food reinforcers were paired with shaping chips early in the training sequence for several behaviors.

Token charges were also fixed within the entire economy, with few readjustments. All facilities, goods, and services were included within the system to capitalize on both primary and existing secondary reinforcers as backups. Without tokens, the only goods and facilities available were space in the common living area during "free time", a bed in an austere "free dormitory", minimum required clothing, and one "medical meal" per day consisting of a nourishing but tasteless blend available to residents whose medical condition called for it. Idio-

syncratic reinforcers were included through an order system for goods and services and through allowing purchase of time in specific locations for the performance of high-frequency behaviors.

When the present study began, maximum token earning capability was 144 tokens per week for 26 residents, and 159 tokens per week for two residents. Meals required 84 tokens per week (three at breakfast, five at lunch, four at dinner). Other popular consumable backups included cigarettes (three tokens per pack) and coffee (one token per cup). Passes were available at a minimum of three tokens for 2 hr, with longer passes and cash requiring proportionately greater expenditures. Other facilities and services (*e.g.*, TV, privacy) were available at a cost of one or two tokens per hour, with weekly rental of private rooms, special furniture, *etc.*, also available for token rental.

Response costs, in the form of token fines, were applied contingent upon specified inappropriate behaviors: use of goods or facilities without token payment resulted in a fine of double the normal token cost (usually a fine of two to four tokens); "intolerable behaviors" that interfered with the rights of others (*e.g.*, creating a fire hazard, attacking staff or residents) resulted in a fine of 25 tokens. Thus, the response costs clearly taxed the availability of backup reinforcers. Before invoking a fine, prompts were given for the impending negative consequence if finable behaviors were in process, limited to once per functional period (45 to 60 min) for the same behavior in order to prevent undue attention to inappropriate behavior, and incompatible adaptive behaviors were regularly prompted and reinforced. Nonfinable inappropriate behaviors were ignored. If a finable behavior did occur, the resident was informed of the consequence, including concrete specification of the offense, and matter-of-factly escorted to a timeout (seclusion) room. The resident remained in timeout, ineligible to receive tokens or other reinforcers, for the remainder of the functional period (20 min minimum) for "reg-

ular" fines, or for the remainder of the next functional period (65 min minimum) for intolerable behaviors. Return from timeout was contingent upon an absence of inappropriate behavior for the last 15 min of the timeout period.

Upon the occurrence of a fine, the responsible staff member recorded the details of behavior, the setting, the consequence, and the charge for review by the program director. Fine payments were specifically requested at the time of application and upon release from timeout. If a resident failed to pay off a fine immediately, (s)he was placed on "restricted" status until the fine was paid. Restricted status allowed all token-earning activities to continue, but with no exchange of tokens for backup reinforcers, with the single exception of purchasing the noon meal, until the fine was paid off.

The above procedures had been in effect since inception of the program, with the duration of timeout being constant for 14 months before the present study. "Restricted status" for standing fines had also been in effect since the beginning of the program, with the exception of the "purchased-eligibility" procedure being experimentally evaluated with a limited target (as a component of sampling-exposure procedures for utilization of evening off-unit facilities) for the 11 weeks immediately preceding the present investigation (McInnis, Himelstein, Doty, and Paul, *in press*). At the beginning of the present study, 75% of residents possessed standing fines for a full week, and were therefore neither making adequate progress in paying off fines, nor gaining the potential benefits of access to the full range of backup reinforcers.

Procedure

In an attempt to increase the incidence of fine payments and utilization of available backup reinforcers, the following modifications in the response-cost procedure were experimentally introduced: (1) residents with standing fines could purchase any goods, services, or use of facilities (except for time away from sched-

uled activities) at usual token cost by making an additional payment on their fine immediately before the purchase; (2) concurrently, a "proportional payoff" schedule was introduced that progressively increased the reduction in standing fines per token payment as a function of the length of time without incurring a new fine on the following basis: <2 days, 1:1; 2 to 4 days, 1:3; 5 to 7 days, 1:5; 8 to 10 days, 1:10; 11 to 14 days, 1:15; >14 days, 1:20. Thus, if four days had elapsed without a new fine, a one-token payment on the standing fine would reduce the debt by three tokens, a one-token payment after two weeks without a new fine would reduce the debt by 15 tokens, *etc.*

The above modifications of the response-cost procedure were evaluated over a 20-week period in which a two-week continuation of the usual procedure (baseline) was followed by six weeks of experimental procedure, a four-week return to baseline, and reintroduction of experimental procedure for eight weeks. Each change in condition was announced in a unit-wide meeting and existing conditions reiterated to residents at each opportunity to spend tokens. Data on incidence of fines incurred, fine payment, and utilization of reinforcers were obtained from the ongoing records of the parent project. During the present investigation, accuracy of recording token exchanges and incidence of fines exceeded 99% agreement, and the average reliability of clinical staff on criteria for disbursing tokens yielded a phi coefficient of 0.92. Of all staff interactions with residents during the present study, 95% were programmatic, as determined by approximately 100 ten-minute time-samples per week on the Staff-Resident Interaction Chronograph (SRIC) by trained observers, with an average intraclass reliability of 0.96 (see Paul *et al.*, 1973).

RESULTS

The average weekly incidence of fine payment is presented in Figure 1, which reveals that both experimental periods resulted in im-

mediate increases in average number of fine payments per week with trends over time towards continued increases in rate of payment as the purchase eligibility procedure continued. Differences between experimental and baseline periods, in which no immediate reinforcement for fine payment occurred until fines were reduced to zero, were highly significant (Mann-Whitney $U = 0$, $p < 0.001$). Parallel analyses on the weekly incidence of fines incurred found a slight but statistically significant reduction in the incidence of fines (Mann-Whitney $U = 19$, $p < 0.05$) during experimental periods ($M = 9.52$ and 9.45 , respectively for I and II) as compared to baseline periods ($M = 10.15$ and 10.08 , respectively). Unlike the rate of fine payment, the weekly rate of fines incurred was relatively flat for baseline conditions and the first experimental period. A downward trend was apparent for incidence of fines during the second experimental period, with the average incidence of fines per resident during the last week being 8.96. However, the average weekly incidence of intolerable behavior *per se* ranged between 3.04 and 5.54 per resident and was not affected by experimental conditions manipulated in the present study (Mann-Whitney $U = 28$, $p > 0.10$). Thus, the modified response-cost procedure produced strong effects on incidence of fine payment and was beginning to produce desired effects on the incidence of finable behavior, but did not affect the incidence of intolerable behaviors.

The extent to which the purchased-eligibility procedure served to increase utilization of backup reinforcers was examined separately for consumable items and for facilities and services. The average weekly incidence of purchase of consumables (meals, snacks, coffee, cigarettes, canteen items) is presented in Figure 2. As with fine payments, significantly higher utilization of consumables was evident during experimental periods as compared to baseline periods (Mann-Whitney $U = 0$, $p < 0.001$). However, unlike the data on incidence of fine payment, purchase of consumables was relatively stable during each

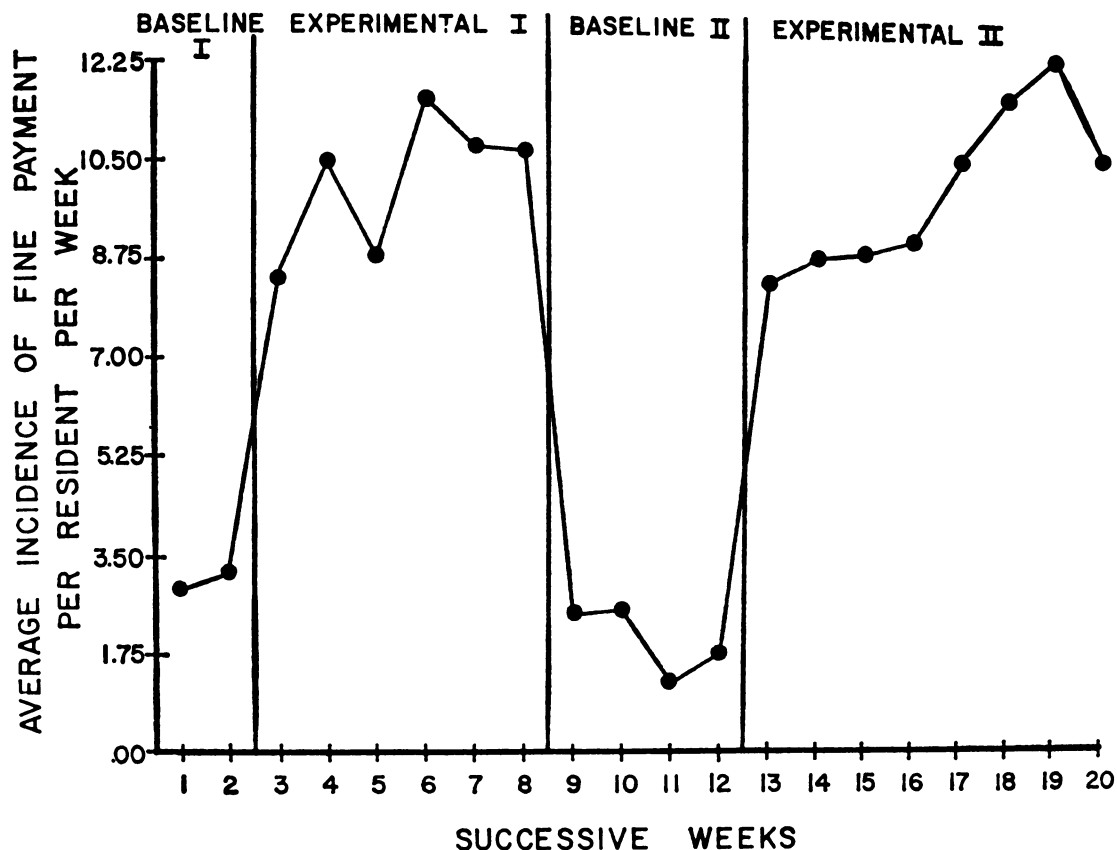


Fig. 1. Average incidence of fine payments for residents with standing fines under conditions in which less than total fine payments served only to reduce fines (baseline) and conditions in which eligibility to purchase other backup reinforcers could be obtained by an additional fine payment (experimental).

experimental period, showing no trend toward increasing or reducing purchases over time. Baseline I conditions for utilization of facilities and services did not exist, since the McInnis *et al.* (*in press*) sampling-exposure procedures had already influenced a portion of these backups. Analyses of the incidence of purchase of facilities and services over both sets of experimental weeks and Baseline II weeks found exact parallels with incidence of purchase of consumables, with experimental weeks ($M = 18.18$) showing stable rates at significantly higher levels (Mann-Whitney $U = 1$, $p < 0.002$) than baseline weeks ($M = 14.48$).

Although the chronicity of subjects and stability of previous behavior suggested that major changes in overall level of functioning would not be forthcoming in the short time period of

the present study, two questions were of interest regarding trends: (1) whether the greater utilization of backup reinforcers was having any effect on overall appropriate behavior, and (2) whether reduction of the long-term aversive properties of standing fines involved in the experimental procedure might lead to an increase in inappropriate behavior. Since such global classes of behavior are subject to many potential sources of influence beyond those manipulated in the present study, the latter questions were investigated by comparing the relative change of the experimental group with that of a parallel group of the parent project which received treatment with the same staff, activity focus, facilities, and assessment instrumentation. Two proportional scores were obtained from the clinical frequency records of the parent project for

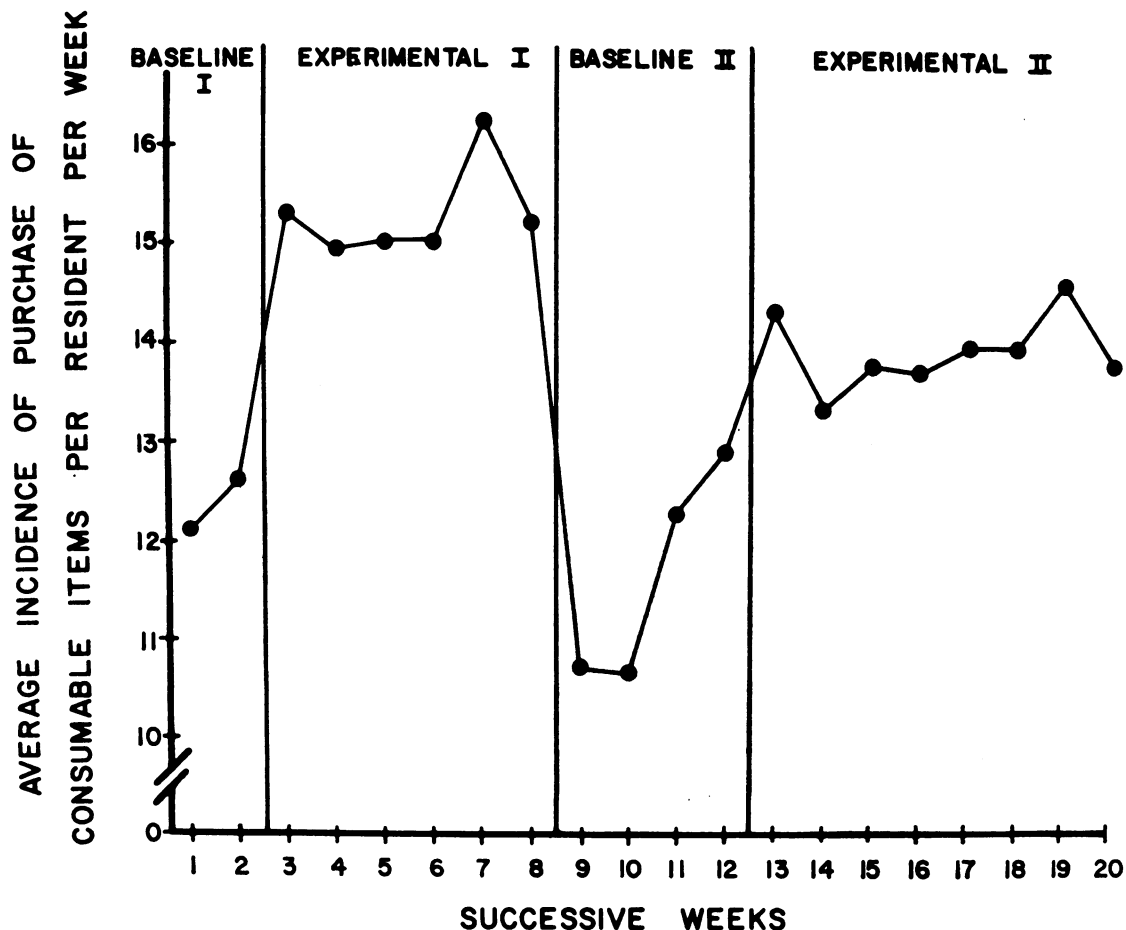


Fig. 2. Average incidence of consumable purchases under conditions in which standing fines allowed purchase of only regular meals (baseline) and conditions in which eligibility to purchase all consumables could be obtained contingently by an additional fine payment (experimental).

subjects in both groups over each week of the current study: the Appropriate Behavior Index—the ratio of all “terminal” level (*i.e.*, “normal”) performances of self-care, interpersonal skills, and instrumental role behaviors to the opportunity to perform, and the Inappropriate Behavior Index—the ratio of all incidents of failure to respond to scheduled stimuli or of specified “active” inappropriate behavior to functional periods at risk (opportunity). The average reliability (ϕ) of component frequencies entering into both scores was 0.92.

During the first experimental period, the token economy group showed steady increases from baseline in the Appropriate Index, while the comparison group decreased, with a resulting

mean difference of 5.4% change in appropriate behavior during the last two weeks of the period. Changes between groups approached significance (Mann-Whitney $U = 8$, $p < 0.066$). On return to baseline after the first experimental period, both groups showed drops in the Appropriate Index, to a mean difference of 3.33%, with the drop of the experimental group being significantly greater (Mann-Whitney $U = 0$, $p < 0.014$). The latter drop for the token economy group was a reversal of an increasing trend, while that of the comparison group was a continuation of a downward trend. Reintroduction of experimental conditions again produced an increase in the Appropriate Index for the experimental group, while the comparison group

continued to decrease. The latter change between groups during the second experimental period was highly significant (Mann-Whitney $U = 5$, $p < 0.001$), with a mean difference of 4.00% during the last two weeks favoring the experimental group. Thus, a trend toward relatively greater improvement in overall appropriate behavior did accompany increased utilization of backups for the experimental group during both experimental periods, and the trend was reversed when backups again became restricted, on return to baseline.

Between-group changes in trends for the Inappropriate Index were significantly different for both the first (Mann-Whitney $U = 6$, $p < 0.032$) and second (Mann-Whitney $U = 0$, $p < 0.001$) experimental periods, with mean differences during the last two weeks of both periods favoring the token economy group (3.10% and 8.60%, respectively). However, no significant differences were obtained between groups on return to baseline (Mann-Whitney $U = 7$, $p > 0.40$), with both groups remaining essentially stable. Although the experimental group showed slight reductions in inappropriate behavior, the major factor contributing to significantly different trends during experimental periods was a steady increase in the Inappropriate Index for the comparison group. Thus, contrary to concerns that the experimental procedure might have increased overall inappropriate behavior, the combined response-cost system and increases in appropriate behavior appear to have held inappropriate behavior at a relatively stable rate.

DISCUSSION

Procedures involving the purchase of eligibility to obtain backup reinforcers through contingent payment on standing fines, combined with proportional payoff schedules contingent upon time without new fines, significantly overcame negative side effects of usual procedures for dealing with unpaid fines in a token economy with extremely low-functioning mental

patients. Patients were returned to active exposure to the overall program without modifying the rules or criteria for response costs, token charges, or token earnings within the fixed economy. The experimental procedure also significantly increased the incidence of payment on standing fines, and indicated that reductions in some classes of finable behaviors were beginning to occur. The entire response-cost timeout procedure did not appear to be weakened as a means of controlling inappropriate behavior, and overall appropriate behavior covaried with utilization of backup reinforcers. The long-term effects of incorporation of the present experimental procedures into the ongoing token economy will be assessed on completion of the parent project.

An experimental functional analysis of the components of the response-cost procedure, and of the modifications introduced in the present study, were precluded both by staffing limitations and by the design of the parent project. Such detailed analyses are desirable for the further determination of the effective ingredients in token systems with specified patient populations and classes of target behaviors. The failure of the current manipulations to influence the incidence of intolerable—primarily aggressive—behavior seems especially worthy of future investigation. Given the history of aversive stimulation this group of subjects had received through usual medical procedures (*i.e.*, nearly half had previously received electroconvulsive shock therapy, and about a quarter had received insulin shock and hydrotherapy), it is not surprising that the relatively benign manipulations of the present study had little effect in reducing physical altercations. In fact, the increases in such behavior over the 14-month period before the present study appeared to result primarily from the administrative restrictions that drastically reduced the use of timeout in seclusion as a consequence for such behavior. The reintroduction of extended seclusion for physical assault has been accomplished and will be reported for both social-learning and milieu

programs when the parent project is completed. Initial impressions suggest that the latter procedure did again reduce intolerable behaviors.

Since token economies are under scrutiny from many directions (*e.g.*, Wexler, 1973), it is worth noting that the practical problem dealt with here is one that could lead to nonsignificant or negative treatment results in other token programs on comparison to competing treatment systems. As Kazdin (1973) pointed out, any given negative effect should not be cause for indictment of token economies in general, since this treatment approach is multifaceted. Isolated negative effects should be cause for programmatic self-correction, leading to continued improvement in treatment procedures, rather than out-of-hand rejection of what appears to be one of the few promising treatment systems for those chronic patients who have failed to respond to all previous attempts by mental health professionals.

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