

INCREASING LITTER DEPOSITING THROUGH THE USE OF POSITIVE CONDITIONED REINFORCEMENT*

JEFF COREY

*Department of Psychology
C.W. Post College*

CHARLES D. HAMAD

*Department of Human Development
University of Kansas*

ABSTRACT

When a card saying "Thank You for Disposing of Your Trash" was given contingent upon tray returns in a college cafeteria, tray returns increased above baseline (90% from 68%). Reversal of the contingency resulted in a drop in returns (74%) while reinstatement of the contingency increased the rate (88%). Replacement of the persons who handed out the cards with a sign saying "Thank You for Disposing of Your Trash" and *ad lib.* "Thank You" cards resulted in an intermediate rate of returns (80%).

Environmental degradation such as air pollution, water pollution and litter is having a profound influence on our everyday lives. Recently, restraints on air and water pollution have been extensive whereas litter control has received very little attention. With the annual cleanup cost of litter approaching one billion, the development of practical utilitarian litter control procedures is essential.

Positive reinforcement techniques applied to environmental problems have been successful in producing decreases in the rate of littering behavior [1-6]. Burgess, Clark, & Hendee found that giving patrons of a movie theater litter bags with instructions as to

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their use resulted in a disposal rate of 50 per cent while incentives of 10¢ or a free movie ticket resulted in a 95 per cent of the litter being deposited [7].

Similar results have been obtained in a forest campground [8] using toys and trinkets, in a zoo [9] where people were given tickets redeemable for soda, in a U.S. Forest Service area [10] where participants could receive cash payments or a chance in a lottery, in a low income housing project [11] using monetary reinforcement and in a youth correctional facility [12] using monetary reinforcement.

The cost of the incentives in these studies have been relatively high, ranging from \$3.00 for twenty-six participants [13] to \$280.00 for approximately eighty-eight participants [14]. While it appears to be the case that a high enough incentive can change the rate of littering behavior, this solution could become economically unfeasible if applied on a large scale. Thus the purpose of the present study was to investigate the possibility that a token reinforcer with no concrete backup could be used to increase the rate of trash disposal in a large population at a student center cafeteria.

Method

SUBJECTS AND SETTING

Two connected dining rooms in a new student union building served as the setting for the study. Students, faculty, and staff members carried food on trays from the service area to the dining rooms and had the choice of depositing their used tray in a receptacle located in a wall near the exit from both rooms. The subject population was constantly changing from day to day, but approximated 150.

PROCEDURE

If a customer returned a tray to the wall receptacle, this was counted as a customer replacement. If a member of the working staff returned a tray, this was counted as a staff replacement.

Data were collected each week day from 12 noon to 1 pm (except on days indicated in Figure 1). Five minutes before the session began and right after the session ended all of the unreturned trays in the entire union building were counted. An unreturned tray was defined as a tray which was not directly in front of someone. By subtracting the post-hour tray count from the pre-hour

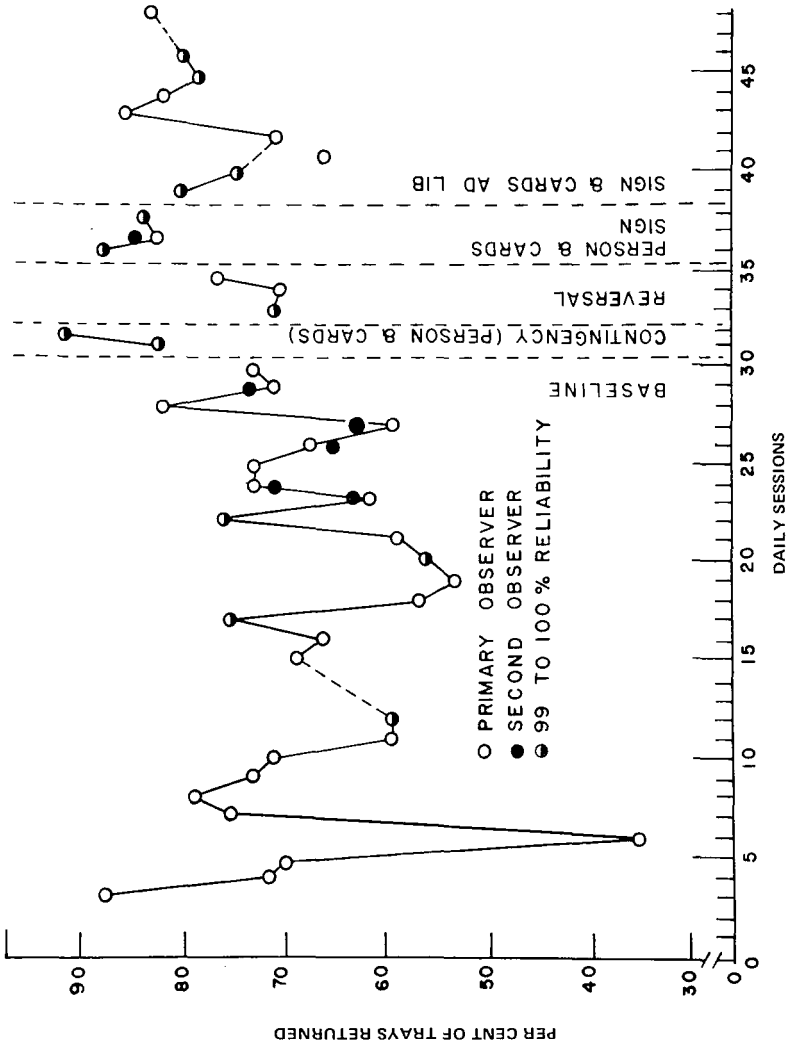


Figure 1. Mean daily percentage of trays appropriately returned by customers as a function of the experimental conditions. Data collected by the primary observer are indicated by the unfilled points, while independent observers collected the data represented by the filled points.

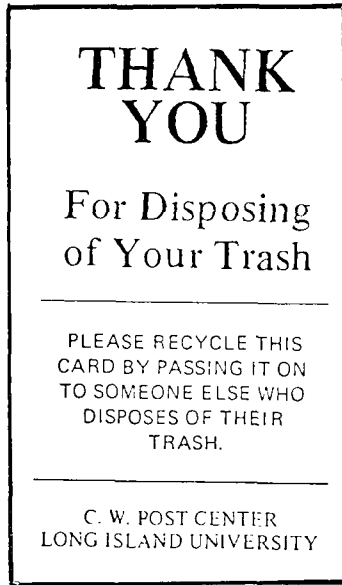


Figure 2. The "Thank You" card.

tray count and recording separately the number of customer and staff replacements, the total number of trays returned by the customers and the staff for that hour was determined.

EXPERIMENTAL CONDITIONS

Baseline 1—For twenty-eight days, the total number of trays returned by either customers or staff were recorded with no intervention by the experimenters. No observations were made on days thirteen and fourteen (Figure 1).

Contingency 1—All persons returning their trays were given a pink card saying "THANK YOU FOR DISPOSING OF YOUR TRASH—PLEASE RECYCLE THIS CARD BY PASSING IT ON TO SOMEONE ELSE WHO DISPOSES OF THEIR TRASH" (Figure 2). The grammatical error in the message was purposefully inserted to avoid the use of the pronouns "his" or "her". The cards were distributed by a male and female experimenter standing at each side of the receptacle. After a tray was pushed into the receptacle, a card was given to the customer. Although only returned trays were recorded, a card was given to anyone who deposited any waste in either the receptacle or a trash basket located near the receptacle.

Reversal—For three sessions there was a return to baseline conditions. Customer and staff returned trays were recorded.

Contingency 2—The procedure for the next session (day 36) was the same as in the first reinforcement session, with either the male or female giving cards. The next two sessions were the same as the first session; in addition, a sign saying “THANK YOU FOR DISPOSING OF YOUR TRASH” was placed on the wall directly above the trash receptacle.

Contingency 3—For the next eight sessions, only the sign and a plexiglas holder containing the cards next to the receptacle were present. Above the card holder was a small sign saying “TAKE ONE”. No observations were made on day forty-seven (Figure 1).

OBSERVER RELIABILITY

Interobserver agreement was measured on eighteen out of a total of forty-five days of the study on pre-post hour tray counts as well as customer and staff replacements by one of eight independent observers. During the pre-post tray counts, two observers walked side-by-side and counted used trays independently. Customer replacements were counted by two observers out of view from each other. Staff returned trays were counted by one observer as well as by the staff-person who picked up the trays on the other side of the receptacle.

Results

The percentage of customer-returned trays as a function of experimental conditions is presented in Figure 1. The mean return rate during baseline was 68 per cent; during contingency 1, 90 per cent; reversal, 74 per cent; contingency 2, 88 per cent; contingency 3, 80 per cent. One data point during contingency 3 (day 41) was not considered in the mean since the presence of over 200 additional customers (high school students visiting the campus) required additional staff and a correspondingly high rate of staff returns.

Interobserver agreement was calculated by dividing the number of agreements by the number of agreements and disagreements. Observer reliabilities were separately calculated for pre-post tray counts (90% agreement, range 67 to 100%) and the staff-customer tray counts (97% agreement, range 90 to 100%). These reliabilities are plotted in Figure 1, where the filled circles represent

percentages derived solely from the counts totaled by the various independent observers.

When cards were handed out contingent upon the return of a tray or trash, 622 cards were given out, forty-one refused, and two returned. When the card holder was in place, 202 cards were taken by customers. The total cost of the 824 cards was \$7.00.

Discussion

The present study supplements the literature on the control of littering behavior by demonstrating that a low cost token with no known backup reinforcer can effectively increase the rate of trash returns. The highest rates of trash returns in this study were observed in the conditions where people gave the "Thank you" cards contingent upon depositing trash. However, some control was demonstrated when the cards were made available to customers *ad lib.* in the presence of the sign saying "Thank You for Disposing of Your Trash" and "Take One". The "Thank You" sign had previously been present when the cards were handed out by people. Perhaps, more "errorless" control could have been transferred to the sign if the people had gradually spent less time handing out cards each day. Other possibilities for decreasing personnel costs could include gradually attenuating the contingency between card receipt and trash disposal or automating the dispersal of "Thank You" cards.

A technology of behavior for use in litter abatement must necessarily be cost effective. The use of positive reinforcement in litter control studies has been encouraging. One approach to reducing costs has been through the use of lotteries where fixed scheduled rates of reinforcement operate independent of subject participation [15, 16]. Another approach to reducing operating costs of litter control programs has been through the use of specific antecedent stimuli that precede the opportunity to litter [17-19]. The present study represents a different approach to reducing operating costs though the use of a valueless token reinforcer delivered contingent upon appropriate litter disposals. The technology of behavior that emerges from these research efforts will undoubtedly be a combination of all or some of these.

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Direct reprint requests to:

Jeff Corey
Department of Psychology
C.W. Post College
Greenvale, New York 11548