

*FACILITATING PAPER RECYCLING:  
EFFECTS OF PROMPTS, RAFFLES, AND CONTESTS<sup>1</sup>*

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The effects of prompts and reinforcement to promote paper recycling were compared in six university dormitories. For a Prompt condition, residents were urged to recycle paper for ecological reasons via flyers distributed to each room. For a Raffle contingency, residents were given one raffle ticket for every pound of paper brought to a collection center. For a Contest contingency, two dorms were paired and the dorm whose residents delivered the most paper won \$15 for its treasury. Contingency awareness was strengthened via a flyer placed under the door of each resident's room. Flyers alone had little effect in increasing paper-recycling behaviors, but the raffle (substantially) and the contest (somewhat) increased the amount of paper brought to a dorm's recycling center. Students whose rooms were closest to the collection center showed the greatest participation. Removal of the reinforcement contingencies resulted in a return to baseline levels.

DESCRIPTORS: contingencies, group and individual; priming, prompt, ecology, recycling programs, community setting, community-based treatment, university students

Ecological imbalance from the accumulation of waste materials has grown slowly and undesirable consequences remain remote for most people (Pirages, 1973). Even simple programs for handling environmental problems rarely get widespread support. For example, voluntary recycling programs have been set up in many communities, but even the most effective projects reduce solid waste by less than 1% (Hall and Ackoff, 1972). In 1973, 130 million tons of refuse were collected in the United States ("U. S.

Finds A Rich Resource: The Nation's Trash Pile", 1974). Although much of this material could have been reused, recycling requires a "reverse-distribution process", whereby the consumer becomes the first rather than the last link in the distribution process (Margulies, 1970). The present study was designed to study applications of behavior technology to initiate a paper-recycling process. Since paper makes up about 50% of environmental litter (Finnie, 1973), paper-recycling programs both reuse waste paper and reduce litter.

In an earlier application of reinforcement contingencies to promote paper recycling, residents of university dormitories were given a lottery coupon for delivering at least one sheet of paper to a collection room during a raffle contingency (Geller, Chaffee, and Ingram, 1975). For a contest condition, two dormitories were paired and the dormitory residents who collected the most paper in a week won \$15 for their treasury. The amount of paper collected during the raffle and contest contingencies was equivalent and markedly greater than that collected during baseline conditions.

Given apparent widespread concern for ecology among college students, prompting alone

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might significantly increase paper recycling. Geller *et al.* (1975) announced each contingency by means of posters displayed on the bulletin boards of each dorm floor. Thus, results of low participation in that study may have been due to ineffective prompting; perhaps few residents attended to bulletin-board announcements and, therefore, most were not aware of the recycling program. Hence, the low participation was possibly due to a lack of contingency awareness, rather than a lack of contingency effectiveness. A more comprehensive prompting procedure was implemented in the present study by delivering written announcements of the recycling program to every dormitory room.

In addition to comparing paper-recycling behaviors following prompting with those due to a procedure combining both prompting and reinforcement techniques, the present research also compared the behavior effects of two reinforcement methods: an individual contingency that provided a raffle coupon for each pound of paper delivered and a group contingency that provided \$15 for the treasury of one of two dorms whose residents collected the most paper in a week. In the raffle condition of the Geller *et al.* study, a raffle ticket was given for each paper delivery, regardless of the amount of paper delivered. This resulted in individuals making numerous, repeated deliveries each day with small amounts of paper. The raffle contingency of the present study emphasized the quantity of paper delivered by offering the dorm resident one raffle coupon per pound of paper delivered. Thus, greater amounts of delivered paper but fewer deliveries were expected in the present study than were observed in the prior program. The present research examined proximity effects by recording the room numbers of residents making paper deliveries and comparing distances to the collection site.

## METHOD

### *Subjects and Setting*

The residents of four male and two female dormitories on the campus of Virginia Polytech-

nic Institute and State University served as subjects. A room on the first floor of each dorm had been designated as a paper collection center by the Campus Committee for Ecological Rebalance (REBAL). REBAL collected the paper every two weeks and sold it to a paper mill for \$15 a ton.

REBAL had promoted paper recycling in all campus dormitories for more than 16 months before the start of this study by maintaining one 76 by 86 cm recycling poster on the bulletin board of each dorm floor. The posters indicated the location of the collection room and the times that the room would be open (*i.e.*, 5:30 to 7:30 p.m. Monday through Friday).

### *Contingencies*

All dorms began the experiment with a two-week Baseline condition. For the next three weeks, two dorms received a Prompt condition, two received a Raffle contingency, and two received a Contest contingency. During the last three weeks, the prompting and reinforcement procedures designed to facilitate paper deliveries were removed from all six dorms in a Follow-up condition equivalent to Baseline. The dorms were paired as follows: (a) one male and one female dorm, each having a capacity of 333 students, received the Prompt condition; (b) one male and one female dorm, each having a capacity of 180 students, received the Raffle contingency;<sup>2</sup> (c) one R.O.T.C. male dorm and one civilian male dorm, each having a capacity of 333 students, received the Contest contingency. All dorms were filled approximately to capacity.

For the Baseline and Follow-up recordings the situation was exactly as it had been, except that a REBAL poster appeared on the collection-room door and a data recorder sat in the collection room from 5:30 to 7:30 p.m. Monday through Friday, recording the amount of paper delivered by each person. In addition, the data recorders kept track of the amount of paper brought to the

<sup>2</sup>A coin was flipped to determine which dorm-pair would receive the raffle contingency (the pair with 333 students per dorm or the pair with 180 students per dorm) and which would receive only a prompt.

collection room and left in front of the door at times other than the prescribed collection period (*i.e.*, from 7:30 p.m. on a given day until 5:30 p.m. the next day).

On three consecutive Sundays, following two weeks of Baseline recording, identically designed flyers describing the appropriate contingency for the week were distributed under the door of each dorm room. The message for the Prompt condition read:<sup>3</sup>

**\*\*RECYCLE PAPER\*\***

YOU CAN HELP TO:

PRESERVE OUR NATURAL RESOURCES  
PROTECT THE ENVIRONMENT  
SAVE TREES

ALLEVIATE THE PAPER SHORTAGE

BRING ALL RECYCLABLE PAPER  
(INCLUDING THIS SHEET)

TO COLLECTION ROOM ON FIRST FLOOR

MONDAY – FRIDAY

5:30 – 7:30 p.m.

During the raffle contingency the written message was:

**\*\*RAFFLE\*\***

WIN PRIZES EACH WEEK!!

1 COUPON PER POUND OF PAPER

BRING ALL RECYCLABLE PAPER  
(INCLUDING THIS SHEET)

TO COLLECTION ROOM ON FIRST FLOOR

MONDAY – FRIDAY

5:30 – 7:30 p.m.

A LIST OF PRIZES AND RULES IS  
POSTED ON COLLECTION ROOM DOOR

The Raffle rules explained that residents would receive one coupon for every pound of recyclable paper brought to the collection room on weekdays from 5:30 to 7:30 p.m. The 10 prizes raffled off each week had been donated by 24 local merchants and ranged in value from

\$3 to \$20. The prizes were grouped so that each week's total value was approximately \$80.<sup>4</sup>

For the contest flyers the message was:

**\*\*CONTEST\*\***

BETWEEN BRODIE HALL

AND VAWTER HALL

THE DORM THAT BRINGS IN  
THE MOST RECYCLABLE PAPER  
EACH WEEK

WILL WIN \$15.00

BRING ALL RECYCLABLE PAPER  
(INCLUDING THIS SHEET)

TO COLLECTION ROOM ON FIRST FLOOR

MONDAY – FRIDAY

5:30 – 7:30 p.m.

DETAILS ARE POSTED ON  
COLLECTION ROOM DOOR

The contest rules, an expansion of the information given in the flyer, were posted on the collection room door of the two dorms involved.<sup>5</sup>

*Personnel and Procedure*

The data recorders were undergraduate students fulfilling a requirement in a behavior modification course taught by the second author. Advanced undergraduate psychology majors were collection-center managers and supervised the data recorders' daily procedures as partial fulfillment of an undergraduate research course. All paper was weighed at the end of the 2-hr period by both individuals. To ensure reliability of measurement, weekly weighings were taken by the authors. The discrepancy between the daily and weekly totals ranged from zero to six pounds, with the largest discrepancy being 0.8% of the total weekly poundage.

When arriving at the collection room at 5:30 p.m., the collection-center manager and data

<sup>4</sup>An illustration of the raffle announcement that listed the prizes is available from the second author on request.

<sup>5</sup>An illustration of the poster that described the contest rules is available from E. Scott Geller on request.

<sup>3</sup>Illustrations of the actual flyers will be furnished on request to E. Scott Geller.

recorder immediately weighed any extraneous paper (*i.e.*, any paper that had been left at the collection site since the previous collection period) and recorded the results. The data recorder collected all paper brought to the room, obtained the room number of each person delivering paper, and kept the day's paper separate from other paper in the room. For the Raffle condition, the data recorder weighed each student's paper in his presence and then gave the participant one raffle coupon for each pound of paper delivered. One half of each raffle ticket, containing the name and room number of the resident, was deposited in a raffle box; the other half of the coupon was retained by the resident.

## RESULTS

### *Pounds of Paper*

Figure 1 depicts the amounts of paper delivered daily to each collection room from 5:30 to 7:30 p.m. The largest amount of paper delivered on any day was 488 pounds by the female dorm during the Raffle; this dorm's largest Baseline value was 86 pounds. The largest poundage for males in the Raffle condition was 193 pounds, as contrasted with this dorm's largest Baseline quantity of 18 pounds. In the Contest contingency, the male civilians delivered a high of 482 pounds on the ninth day of Contest, whereas the high for the R.O.T.C. dorm was only 71 pounds, delivered on the eleventh day of Contest. The contest dorms had almost identical Baseline levels, the civilian dorm reaching a high of 23 pounds and the R.O.T.C. dorm reaching a high of 15 pounds. The Prompt condition appeared to have relatively little influence; the quantity of paper delivered increased from a Baseline high of 20 pounds to only 21 pounds on the ninth day of prompting for females and from a high of three pounds in Baseline to a peak of 15 pounds during prompting for males.

The three-week follow-up period resulted in an immediate and marked drop in pounds of paper delivered during the critical hours by residents of the female raffle dorm (*i.e.*, from 488

pounds on the last day of Raffle to 31 pounds for the first day of Follow-up). For the male raffle dorm, daily pounds of paper delivered from 5:30 to 7:30 p.m. decreased at a more gradual rate, increasing from a daily high of 52 pounds in the third week of Raffle to 80 pounds on the first day to Follow-up, and then dropping to zero pounds by the third day of Follow-up.

After the Contest weeks, paper delivered from 5:30 to 7:30 p.m. decreased for both contest dorms (*i.e.*, for civilians the poundage changed from a high of 60 pounds in the third Contest week to 30 pounds on the first day of Follow-up week, and for the cadets from 71 pounds to one pound). The amount of paper delivered during the critical hours in the two prompt dorms increased slightly during Follow-up, reaching a daily high of 50 pounds for females and 35 pounds for males.

Some relatively consistent sex differences can be observed in the results from the two pairs of male/female dorms. For the dorm-pair given the Prompt treatment, females delivered more paper than males in all but one week of the study. Similarly, for the raffle dorm-pair, females were consistently higher during Baseline and Raffle, although males delivered more paper than females during Follow-up.

During the Contest contingency, there were pronounced between-dorm differences in amounts of paper delivered. The civilians delivered more paper than the cadets during all three weeks of the contest, although the weekly totals for the civilian residents decreased over the three contest weeks (*i.e.*, Week 1 = 742 pounds, Week 2 = 637, Week 3 = 144). It is noteworthy that several civilians verbalized to the data recorder that they were determined to win each contest in order to help finance weekend dorm parties. Indeed, the males described the parties that took place after each contest and each party was attended by an estimated 100 dorm residents. Such parties are not permitted in the military-style R.O.T.C. dorm.

The total quantities of paper delivered during the critical hours was 147 pounds for the Prompt

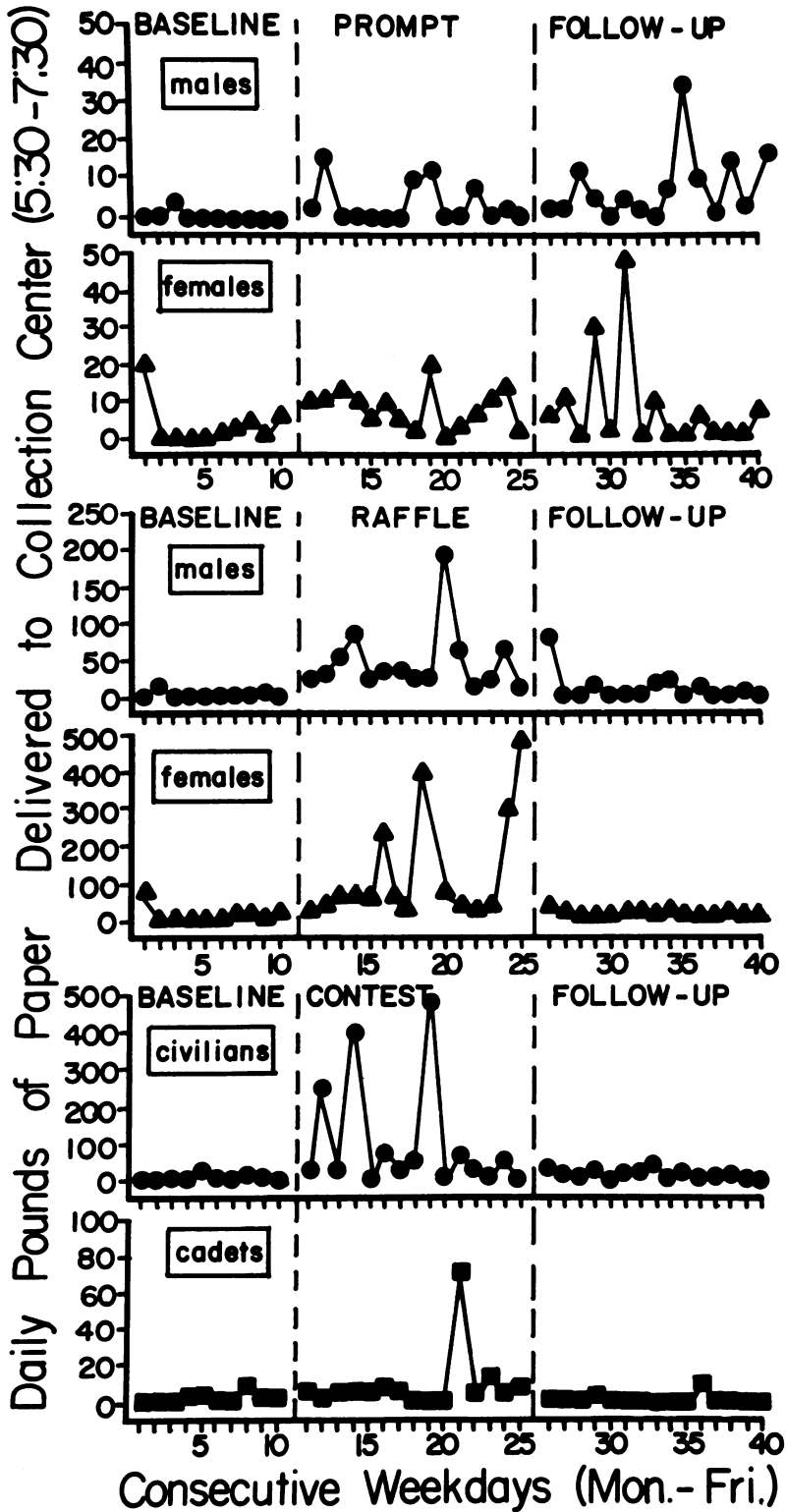


Fig. 1. Pounds of recyclable paper delivered daily to each dorm collection room.

condition, 2459 pounds for the Raffle contingency, and 1633 pounds for the Contest contingency. Extraneous paper (*i.e.*, paper delivered at times other than between 5:30 and 7:30 p.m.) totalled 193 pounds for the Prompt condition, four pounds for the Raffle contingency, and 293 pounds for the Contest contingency. Thus, the Raffle and Contest conditions promoted delivery of markedly greater amounts of paper during the critical collection hours than did the Prompt condition.

### *Participation*

A paper delivery was defined as a dorm resident delivering at least one 21.6 by 28 cm sheet of paper to the collection room between 5:30 and 7:30 p.m. Monday through Friday. For each dorm, the average number of deliveries was lower during Baseline than during the contingency of the next three weeks. In the Prompt dorms, the males had peaks of one delivery during the third day of Baseline and three deliveries in the first day of Prompt; females had peaks of two deliveries on the eighth and tenth days of Baseline and five deliveries on three occasions in the third week of Prompt. Both raffle dorms showed marked increases in participation as a result of the Raffle contingency; males increased from a daily high of five deliveries on the seventh day of Baseline to eight on two occasions during Raffle, and the number of female deliveries increased from four to 10 across the same period. For the contest dorms, the civilians showed a substantial increase in participation during the Contest (*i.e.*, from a peak of three on the ninth day of Baseline to a peak of 18 on the fourth day of Contest). In the R.O.T.C. dorm, however, participation for these same weeks decreased from three to four deliveries.

A weekly proportion of resident participation was found by dividing the number of individuals from a given dorm who made paper deliveries by the total number of residents in that dorm. The highest proportion of participation occurred for the Raffle condition, reaching peaks of 0.144 during the second Raffle week for females and

during the third Raffle week for males. The highest participation proportions for the Prompt dorms were 0.054 in the third week of prompting for females and 0.018 in the first week of prompting for males. Per cent participation by the cadets exceeded the civilians only during Baseline (*i.e.*, weekly highs of 0.022 *versus* 0.018); during the Contest, participation in the civilian dorm increased to a weekly high of 0.099 for the second contest, compared with the highest proportion of 0.039 for the cadets during the first contest.

### *Proximity*

The room numbers of the agents of the paper deliveries were an indication of the distance travelled to reach the collection site. For this analysis of proximity effects, divisions were determined by floor, and proportion of participants per dorm floor was determined for each condition.<sup>6</sup> During Baseline, the majority of participants in every dorm were first-floor residents. In addition, for each dorm the relative number of first-floor participants decreased as a function of each treatment condition and remained below the Baseline proportions during Follow-up. An increase in participants from dorm floors other than the first floor was particularly apparent during the Raffle contingency for females and during the Contest contingency for civilians. As a result, a chi square test of homogeneity was significant in both of these cases ( $ps < 0.02$ ). Figure 1 shows that the residents of these particular dorms consistently collected the largest quantities of weekly paper during treatment. It is noteworthy that for all but one dorm (*i.e.*, prompt/male) the participation distributions during Follow-up were more similar to the Baseline distributions than were the distributions during treatment conditions.<sup>7</sup>

<sup>6</sup>Preliminary analyses divided each dorm floor into specific sections based on relative walking distance from the collection room, but no consistent within-floor variations were observed.

<sup>7</sup>A table of the proximity data is available on request to the second author.

## DISCUSSION

The positive reinforcement contingencies (*i.e.*, the raffle and contest) prominently increased quantities of paper delivered to dormitory collection rooms above Baseline levels and above the levels observed subsequent to distributions of flyers urging paper-recycling behaviors for the improvement of ecology (*i.e.*, the Prompt condition). However, the percentage of dormitory residents who participated in the recycling program was disappointingly low (*i.e.*, less than 15%). Since every resident was informed of the reinforcement contingency by means of a flyer delivered to his or her room, it is reasonable to assume that most dorm residents were aware of the treatment condition. Thus, low participation in the paper drive was not due to a lack of contingency awareness as speculated by Geller *et al.* (1975), but rather to a lack of contingency effectiveness.

For the Raffle contingency, virtually all paper was delivered to the collection room between 5:30 and 7:30 p.m. when the coupon reinforcers were available, indicating that the Raffle was the motivating factor for those few individuals who did make paper deliveries. As expected, the contingency of giving one coupon per pound of paper resulted in a greater volume of paper per visit, and virtually eliminated the repeated visits observed by Geller *et al.* (1975). A substantially greater amount of paper was collected during the raffle of the present study than during the raffle of the previous study. However, the percentage of resident participation during raffle contingencies was similar for both studies, indicating that the larger paper quantities in the present study were due to greater individual effort. The increased numbers of prizes per raffle in the present study (*i.e.*, 10 *versus* four) probably influenced the differences.

The Contest contingency produced results directly opposite to the investigators' hypothesis that a group contingency would be more effective in an R.O.T.C. dorm, whose residents frequently act as a unit, than in a civilian dorm with

no obvious group structure or unity. Perhaps the Contest contingency was more effective in the civilian dorm because certain residents of this dorm specified a method for spending the contest winnings that implied a common group reward. Specifically, the money from each contest was used to procure beer for weekend parties in the dorm. Such parties are not permitted in the R.O.T.C. dorm and, therefore, the between-dorm comparisons were biased by the fact that the \$15 was translated into a group reinforcer for the civilians but not for the cadets. Perhaps the decreasing amounts of paper collected by the civilians over the three contest weeks was due to an increasing realization that the cadets were not providing competition.

Prompting alone was clearly the least effective intervention technique. Although most dorm residents should have become aware of a worthwhile ecology program through the prompting procedure, few individuals took the trouble to participate. Whereas there was some increase in both participation and amount of paper delivered during prompting, the changes were not substantial. Hence, the present study indicates that community ecology programs should at least offer individuals the possibility of receiving a tangible reward in return for their ecology-improving behaviors.

The relative convenience of the desired behavior is certainly an important factor determining the efficacy of ecology-promoting procedures. For example, prompting procedures alone were sufficient to augment the probability of an ecology-improving response when the response merely required the selection of drinks in returnable rather than throwaway containers (Geller, Farris, and Post, 1973; Geller, Wylie, and Farris, 1971) or the disposal of a handbill in a convenient location (Geller, 1973, 1975; Geller, Witmer, and Orebaugh, *in press*). In the present study, prompting not only had little influence on the relatively inconvenient behavior patterns of carrying recyclable paper to a collection room, but the probability of making paper deliveries was usually highest when the response was most

convenient (*i.e.*, when the resident's room and the collection room were on the same floor).<sup>8</sup>

In conclusion, the procedures and results of the present investigation illustrate practical and effective procedures for promoting a reverse-distribution process that could be easily refined for community-wide application. For example, community collection centers could offer raffle coupons for particular quantities of recyclable commodities; and, as a result of the present study (and that by Geller *et al.*, 1975), the authors predict that community merchants would donate raffle prizes in return for the "good will" and publicity accompanying their support of a community ecology project. In addition, recycling contests between civic and/or church groups could be organized, and prize money could be procured from the sale of collected paper or aluminum to recycling plants. However, voluntary programs such as these are by no means sufficient. Mandatory programs such as municipal ordinances requiring the separate collection of paper and incentives for industry to use recycled paper are possible long-range solutions to the recycling problem. Whatever programs are implemented, individual cooperation is important and projects such as those presented here could help to initiate and maintain the appropriate behaviors. Although the market for recycled paper is at present low, aluminum is in great demand for recycling and the procedures outlined here are easily generalizable to that and other commodities.<sup>9</sup>

<sup>8</sup>Since residents with rooms on the same floor as the collection room were more likely to pass by the collection room with a REBAL poster on its door, the observed proximity effects may have been due in part to systematic prompting differences among dorm residents.

<sup>9</sup>By the end of the present study, the return for recyclable paper had dropped from \$15 to \$12.50 per ton, and at the time of preparing the revision of this manuscript there was no market for recyclable paper in Southwest Virginia.

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