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THE COMPARATIVE EFFECTIVENESS OF REWARD AND COMMITMENT APPROACHES IN MOTIVATING COMMUNITY RECYCLING*

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ABSTRACT

The relative effectiveness of commitment and incentive techniques in promoting newspaper recycling was compared. Some homeowners were asked to make a formal, signed commitment to recycle newspapers. Others received tokens exchangeable for back-up reinforcers of goods and services each time they recycled. A combined commitment plus token reinforcer group, and an untreated control group were also included. Following five treatment weeks, all the contingencies were removed during three follow-up weeks. While the Commitment condition was more effective on some recycling measures and the combined Commitment + Token condition was on others, neither group was consistently superior to the other. However, recycling was uniformly greater in both commitment groups than it was in the Token group throughout both phases of the experiment. These findings indicate that commitment techniques have considerable impact in motivating individuals to recycle and that they may be able to overcome some of the limitations often encountered by incentive-based programs in promoting resource conservation.

This study was designed to compare the impact of token reinforcers and personal commitment in promoting resource conservation. It was undertaken in order to test the widely held assumption that a "cost-effective recycling program requires some form of incentive to encourage participation" [1]. We question the necessity of incentives, especially highly attractive extrinsic incentives, in

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promoting resource conservation, in general, and recycling, in particular. At the same time we suggest that behavior influence techniques derived from the minimal justification principle, where incentives play a somewhat limited role and where intrinsic controls are emphasized, may be more effective in initiating and maintaining behavior [2]. In spite of their frequently demonstrated effectiveness, minimal justification techniques have received surprisingly little attention in applied research on environmental problems. We believe this is unfortunate. Thus, this article reflects our conviction that the behavioral interventions generated by this principle deserve far more experimental analysis than has hitherto been the case.

The significance of research designed to encourage recycling has been extensively documented [3]. It is dramatically underscored by the degrading effects that our "throw-away" society has on the ecosystem as tons of waste products are disposed of yearly in this country. For example, in a typical year it has been estimated that Americans discard 30 million tons of paper, 26 billion bottles and 48 billion tin cans [4]. Purcell suggested this is enough trash to fill the Superdome in New Orleans twice a day [5]. Environmental degradation accompanying the disposal of these waste products is not the only high price we pay when they are not recycled. For example, Jacobs and Bailey estimated that it costs in excess of 3 billion dollars a year to dispose of these waste products [5]. In addition, finding land for waste disposal sites is becoming an increasingly serious problem.

It is clear that one of the most effective ways to confront these problems is to recycle waste products, such as paper, glass, and cans. Recycling not only reduces the impact of waste products on the environment, but saves money by saving energy. For example, Burn and Oskamp estimated that recycling aluminum saves over 95 percent of the energy needed to produce it from bauxite ore [7]. At the same time it reduces substantially the air and water pollution normally generated in the production of aluminum.

The first step in promoting recycling is to establish a "reverse-distribution process" [8]. Within this framework, the consumer is at the initiating (recycling), rather than at the terminating (discarding) junction of the distribution process. Most research programs designed to encourage individuals to participate in this recycling process have focused on the use of extrinsic incentives, especially monetary rebates or prizes. For example, Geller, Chaffee and Ingram [9] and Witmer and Geller [10] employed individual and group incentives in order to initiate paper recycling on a university campus. Under their individual contingency, subjects were given a raffle ticket which qualified them to participate in a lottery for a prize each time they recycled. Under their group contingency, the residents of two dormitories competed in a paper recycling contest, with the winning dorm receiving $15. In both studies the individual and group incentives were more effective in promoting recycling than either a baseline [9] or a baseline and information only condition [10]. In a

comparative analysis of incentive contingencies, Jacobs and Bailey found that a lottery for a $5 dollar prize was more effective in promoting household newspaper recycling than an information only, a penny-a-pound and weekly pick-up conditions [6]. Finally, Luyben and Cummings report that their package incentive program which consisted of a lottery and a contest was much more effective in promoting beverage container recycling among residents of college dormitories than a control condition which provided only a prompt and recycling container [11].

However, in spite of this impressive series of positive results (see [11] for review), there are several major problems often associated with incentive programs. First, incentives are not always effective in encouraging individuals to recycle waste products. This is reflected in the relatively low rate of participation in most incentive-based recycling programs. For example, in the Witmer and Geller study only 5.9 percent of the subjects participated in the $15 condition, while only 12.2 percent did so in the raffle condition [10]. Indeed, even in those studies which reported higher rates of recycling, only about a third of the subjects actually participated in the recycling programs. Second, many of these recycling programs were simply not cost effective. For example, Jacobs and Bailey reported that none of their incentive programs generated sufficient revenues from the recycled materials to pay for the total cost of providing the incentives and administering the program [6]. This suggests that the money derived from the waste products which consumers recycle is not sufficient to pay for the very large monetary incentives necessary to induce target behaviors. Finally, perhaps the most serious limitation of most incentive-based programs is that they have almost uniformly failed to produce long-term, enduring changes in recycling behavior. Indeed once the programs are removed, consumers very quickly return to their baseline rates of recycling. For example, Witmer and Geller found that during a three week post-treatment follow-up period their subjects virtually stopped recycling [10]. In short, each of these problems seriously limits the power of incentive programs in promoting recycling in the population-at-large.

We have attempted to avoid these limitations by drawing on an alternative social influence strategy based on the minimal justification principle [2]. This principle emphasizes the importance of modest rather than highly attractive external justifications in controlling behavior. For example, Lepper's recent formulation suggests that " . . . the use of seemingly less powerful techniques of social control . . . has proved more effective under certain conditions, in producing subsequent behavior . . . in the later absence of further controls and the agent who administered them. Conversely, the use of unnecessarily powerful, functionally superfluous social control procedures . . . appears to decrease later internal controls when external constraints are subsequently minimized."

This formulation is based on current research which distinguishes between the internal and external control of behavior. According to recent social

psychological evidence, behavior can be influenced most effectively by applying moderate, rather than extremely powerful external incentives. Early evidence in support of this proposition was derived from the experimental analysis of dissonance theory [12] and more recently from experimental tests of attribution theory, including studies of overjustification effects [13] and social compliance techniques [14].

These investigations have generated several propositions which challenge traditional formulations of behavior control. These include, for example, the following claims: 1) A person's interest in a desirable activity, as well as the frequency and quality of their performance may be undermined by inducing them to engage in that activity for an extrinsic incentive [13]; 2) Strong prohibitions for engaging in a desirable activity can increase, rather than decrease, an individual's desire to engage in that activity [15]; 3) Superfluous constraints and threats for undesirable behavior can increase, rather than decrease, the likelihood that an individual will engage in that activity [16]; 4) The effectiveness of behavior change techniques will diminish as incentives become more attractive or threats become more severe [12]; 5) Inducing an individual to comply with a request can be more readily obtained with weak, rather than strong external pressures [14].

In attempting to account for these effects, most investigators have stressed the importance of an individual's attributions about the causes of their behavior [17]. Within this framework it is speculated that individuals will be more likely to attribute their behavior to external sources with increasingly salient extrinsic justifications for their performance. And conversely, they will be more likely to infer that they are intrinsically motivated or that their performance reflects their own attitudes and beliefs when external justifications are weaker and less salient. Thus, the introduction of an external incentive, such as a monetary reward, may discourage some individuals from even initiating a behavior which is perceived to be controlled by this source. Further, individuals who are performing a response may very quickly stop doing so once this external constraint is removed, for they have come to believe that they only engaged in the activity to obtain the incentive. On the other hand, in the presence of much weaker, less salient justifications, an individual may be much more likely to attribute the causes of behavior to their own convictions and, thereby, be much more motivated to begin performing the response and to continue doing so, when the original justifications are no longer present.

Thus, this account suggests that highly attractive external incentives may never lead to long lasting changes in recycling behavior because they do not permit the individual to develop sufficiently powerful internal mechanisms of control—mechanisms which would lead them to value recycling waste products permanently and, in turn, encourage them to continue to recycle when the incentives are no longer available. Further, this account suggests that if moderate levels of external justification can be employed to promote recycling,

individuals may be more likely to perceive their behavior as intrinsically, rather than extrinsically motivated. This shift in the perceived source of motivation may be critical in maintaining recycling behavior even when these low-saliency justifications are removed. In short, this emphasis on the development of internal mechanisms of control generated by moderate justifications for behavior is central to the minimal justification principle. It implies that techniques of social control which foster these changes will be extremely effective in promoting and sustaining changes in behavior.

Several of these minimal justification techniques involve variations of either single or multiple request social compliance procedures. In the single request procedure individuals are simply asked to make a commitment to engage in a particular behavior [18], such as participating in a neighborhood recycling program. In the multiple request procedure, such as the foot-in-the-door technique [19], this target commitment is preceded by a smaller request, such as answering a short questionnaire on recycling. Both procedures have been reported to be extremely effective in encouraging individuals to engage in a variety of resource-conserving behaviors [20]. Moreover, these behavioral changes have occurred in the absence of any explicit external justification, such as a monetary or token reinforcer. Indeed, there is some reason to believe that such incentives may actually undermine the impact of these minimal justification techniques [21].

It is important to point out that each of these techniques entail an explicit commitment on the part of an individual to engage in a specific action. Thus, they should be clearly distinguished from procedures in which the strength of an individual's commitment is simply assessed or where there is only an implied commitment to perform an act. For example, following the introduction of an electrical utility price increase, Heberlein and Warrnier found that consumers who were committed to reducing their electricity consumption were more likely to do so than those who were not [22]. However, it should be clear that the commitment process induced by the rate increase was an implicit product of that change and not one which was manipulated directly. Likewise, Shippee and Gregory found that small commercial enterprises were more likely to reduce their consumption of natural gas if they were committed to this behavior than those who were not [23]. However, the subjects in this study never made an explicit commitment to conserve. Rather, they had merely agreed to have their names listed in the local newspaper as participants in the project. Shippee and Gregory assumed that this experimental manipulation increased their commitment to conserve natural gas. In short, our conception of commitment goes well beyond the implied processes studied by these and most other investigators [24]. Namely, we define commitment as a formal, explicit and public pledge to engage in a specific target behavior.

While this technique has successfully promoted a variety of prosocial [25, 26] and resource-conserving behaviors [27,28], only a few investigators have

attempted to apply it to recycling. For example, Scott reported that the foot-in-the-door technique, where individuals were first asked to put a small recycling sign in their window and then to help address envelopes to be used in a recycling campaign, led to more compliance than simply asking them the second, target request or offering them a monetary payment for agreeing to the first request [29]. Arbuthnot, et al. reported that compliance with their target request to recycle waste products was a gradually increasing function of the number of prior recycling-related requests which their subjects had received [19]. Unfortunately, in both of these studies recycling behavior was never directly measured. Scott did not actually ask her subjects to recycle, nor did she ever measure the impact of her recycling campaign and Arbuthnot et al. assessed recycling by means of a telephone survey in which self-reported estimates of recycling behavior were obtained. In order to avoid these difficulties we recently undertook an investigation which directly assessed the impact of a minimal justification technique on recycling [18]. In this study we also attempted to identify some of the variables which enhance the effectiveness of minimal justification interventions employing commitment techniques. For example, while most studies of commitment merely ask subjects to engage in a target behavior, we speculated that we could make this commitment even more effective by asking them to formally sign a statement affirming their pledge.

To investigate the impact of these two commitment procedures on newspaper recycling, we compared an informal commitment condition, where subjects were simply asked to make a verbal commitment to recycle newspapers with a formal commitment condition, where they actually signed a commitment statement ("In the interest of conservation, I commit my household to participating in this newspaper recycling project for two weeks.") We found that both commitment conditions increased the frequency of recycling, as well as the total amount of newspaper recycled well above the information only control. Both of these effects were enhanced under the formal commitment condition. Above all, individuals who had signed the recycling statement continued to recycle during the follow-up period, even though they were no longer bound by their original pledge. In contrast, those who had only made the verbal pledge did not maintain their prior gains in recycling. The maintenance of recycling in the formal commitment condition was a particularly important outcome of this study. It contrasts with the outcomes of most incentive-based interventions which have been characterized by an abrupt cessation in recycling once the incentives are withdrawn. Further there was a very high rate of subject participation in this formal commitment condition with almost all of the households participating in both the intervention and follow-up phases of the study. In short, both of these outcomes suggest that formal commitment techniques may be especially promising in overcoming some of the difficulties encountered when incentive-based techniques are invoked to promote recycling.

In the present study we sought to extend these findings by directly comparing the relative impact of commitment and incentive techniques in promoting household recycling. Our objective was to clarify the relationship between these two methods of social control and to determine, if and under what conditions, one is more effective than the other. In addition, we also attempted to determine if a combination of these two procedures enhances or detracts from the independent effects of each. In the commitment conditions we asked individuals to make a formal, signed pledge to recycle their newspapers for a period of five weeks. These subjects were compared to those in an incentive condition who received a token exchangeable for back-up reinforcers good for purchases at local merchants each time they recycled their newspapers. A combined commitment plus token reinforcer condition, as well as an untreated control group were also included. A five week intervention period was followed by a three week follow-up period, during which all of the contingencies were removed. On the basis of this comparison we hoped to identify the independent, as well as the interdependent effects of these two behavioral change strategies.

METHOD

Subjects and Setting

The subjects in this study were fifty-nine middle to upper-middle class households in a homogeneous neighborhood in Portland, Oregon. In order to minimize contact between the households assigned to the different groups, the streets in this neighborhood were randomly assigned to one of the conditions prior to recruitment, with all the households on that street considered eligible for the study. Each recruiter (5 undergraduates) with the exception of the second author were blind to the hypotheses of the study. Approximately 80 percent of the recruited households were not recycling at the start of the project, with the remaining 20 percent evenly distributed between conditions.

Materials

A data card was kept for each household, listing its address, condition, and household number. During each week of the experiment, information was also recorded indicating whether or not the household recycled, as well as the weight of recycled newspapers. Whenever a household recycled, their bag(s) of newspapers were weighed and marked with a decal which identified its condition and household number. During the initial contact with the recruiter, a member of each participating household was asked to respond to a short questionnaire which was designed to assess the household's attitudes towards conservation and recycling.

The individual contacted in each of the commitment conditions signed a written form stating "Our household has been informed of the guidelines for participating in the Reed College Neighborhood Recycling Project (NRP). We are aware that this is a non-profit organization, and that any funds raised will be used to encourage and support recycling projects. We commit ourselves to participating in this project for 5 weeks." This form was cosigned by one of the recruiters and was in carbon form, allowing both the household and the recruiter to keep a copy. Each household in a token reinforcement condition received a "Coupon Guide Book" which explained the conditions under which the coupons were to be distributed and how they could be redeemed. Participating merchants had agreed to give subjects in the study significant discounts on purchases with the redeemed tokens. They did so without cost to the experimenter, but in the interests of advertising and promoting recycling among local residents. The coupons in the booklet were color-coded by condition, in order to permit identification on this basis at the end of the study.

On the final day of the intervention period, all of the subjects received a letter which stated that they were no longer bound to their commitment to recycle and/or that coupons would no longer be awarded for recycling. At the same time, they were informed that because "the project has been such a success," the experimenters would continue to pick up recycled newspapers in the regular manner for three more weeks. The households were also provided with a list of these collection dates.

Procedure

The study extended over eight weeks, beginning with a five-week intervention period and ending with a three-week follow-up period. During the intervention phase, the following four conditions were implemented:

Control – Subjects ($N = 15$) in this group were simply asked if they would like to participate in the recycling project. Accordingly, the individual(s) who was initially contacted in each such household was exposed to the following standard request:

"Hello, my name is ——— . I am a member of the Reed College Neighborhood Recycling Project. We are a non-profit organization trying to initiate recycling. We are starting a program where people collect their newspapers for recycling, and we gather them each week on Saturday. We plan to do this for five weeks to see how it works. Would you be interested?

We are asking people to put their week's worth of newspapers in a paper or plastic bag, and to put them on their front porch. We are starting next Saturday, and here is a list of the other pick-up dates.

By the way, we are asking people to answer a brief recycling questionnaire. Would you please? (They were given the questionnaire and thanked for filling it out.) We will be picking up the newspaper at around 3 or 4 p.m."

Commitment – In addition to the standard request to participate in the recycling project, the subjects ($N = 15$) in this group were asked to confirm their pledge to recycle newspapers by signing the commitment form. After the subjects had completed the questionnaire, the recruiter said:

"And will you sign this (showing them the commitment form) to show your commitment to the project? We are doing this to see how many people are seriously interested in the project. We will be picking up the newspapers around 3 or 4 p.m."

Token – The subjects ($N = 14$) in this group were given a token each time they recycled newspapers during this phase of the experiment. This information was conveyed to the subjects by the recruiter who, after the initial opening statement said:

"Each time your household recycles you'll get a coupon redeemable at local merchants. Here (handing them the guide book) is a coupon guide book for you to see which merchants are participating in the project. We plan to do this for five weeks to see how it works. Would you be interested?" Thereafter, the recruiter continued with the standard request.

Commitment + Token – This condition combined the intervention techniques described for each of the previous experimental groups. The recruiter first described the token procedure and then, if the subjects ($N = 15$) expressed interest, followed this shortly thereafter with the request to sign the commitment form.

During the next five Saturdays, each household was checked from 3 to 4 p.m. to determine if newspapers had been placed on the front porch or in a prearranged alternative area. If they had, the bags were collected and marked with one of the decals listing both the condition and household identification numbers. Each additional bag of recycled newspapers was tagged in the same way. When it was appropriate, the tokens were delivered at this time. The newspapers were then taken to the collection vehicle and the recycling information was recorded on each household's data card. After completing the entire neighborhood collection, the newspapers were taken to a storage area, sorted according to condition and weighed. The decals on the bags of newspapers were then cross-checked with the data cards to insure that all of the bags had been recorded correctly.

On the fifth and final pick-up day of the intervention period, a letter outlining the end of the token and/or commitment condition was left at each household. These letters also explained that the pickups would continue for three additional weeks, with the date of each pick-up clearly noted. There was no personal contact with the subjects at this point in the experiment; the envelope containing the letter was left in the mail slot or between the screen and front doors of each household.

At the end of the follow-up period an additional recycling questionnaire was delivered to each household in the same way as the follow-up letter. This questionnaire was identical to the one administered during recruitment, with two additional questions—the first concerned any time the household might have been unoccupied during the course of the project, whereas the second assessed the extent to which each member of the household knew about the project. Subjects were requested to return the questionnaire in an enclosed stamped-addressed envelope. Any household which did not do so was contacted in person. Approximately three weeks later a debriefing letter which explained the purpose of the project and the various conditions was delivered to each household.

RESULTS

Questionnaire

In general, both the first and second administration of the questionnaire indicated that the subjects in this experiment held highly favorable attitudes towards resource conservation, including recycling and newspaper recycling in particular. There was virtually no change in their attitudes between the first and second administration of the questionnaire, nor were there ever any differences between the groups on these measures. The post-experimental questionnaire also revealed that most household members knew about the recycling project and that almost every household was occupied during each weekend throughout the study.

Intervention Recycling

Table 1 documents the frequency and percentage of recycling responses, as well as the weight of recycled newspapers for each condition during the intervention and follow-up phases of the experiment. This table indicates there were sizable differences between the groups on each of these measures. For example, during the intervention period, each of the treatment groups recycled much more frequently than the Control group. Both the Commitment and Commitment + Token groups recycled two and one-half times more than the Control group, while the Token group recycled exactly twice as often as the Controls. An omnibus chi-square analysis of the frequency of participation during the intervention period revealed that the groups differed significantly on this measure $\chi^2\,(3, N = 59) = 15.9, p < .01$. Further, a series of planned pair-wise comparisons between the groups indicated that the Commitment [$\chi^2\,(1, N = 10) = 12.32, p < .01$], Token [$\chi^2\,(1, N = 29) = 5.3, p < .05$], and Commitment + Token [$\chi^2\,(1, N = 30) = 12.32, p < .01$] conditions differed significantly from the Control condition. However, none of the treatment groups differed significantly from each other on this measure.

Table 1. Frequency, Percentage and Weight Measures of Recycling

		Frequency and Percentage of Recycling Responses		*Weight of Recycled Newspapers (Lbs.)*	
Group	*N*	*Intervention*	*Follow-Up*	*Intervention*	*Follow-Up*
Control	15	12 (16%)	9 (9%)	145	137
Commitment	15	32 (42.6%)	12 (26.7%)	628	180
Token	14	24 (34.3%)	7 (16.6%)	378	137
Commitment + Token	15	32 (42.6%)	19 (42.2%)	631	278

Table 1 also indicates that a similar pattern of results held for the weight of recycled newspapers during the intervention period. This measure does not reflect the dedicated efforts of a few zealous recyclers in each condition, but rather relatively consistent and equal amounts of recycling by all of the participating households within each condition. As Table 1 indicates, all of the treatment conditions recycled more newspapers than the Controls during this phase of the experiment. The Commitment and the Commitment + Token conditions recycled four and one-half times more newspaper than the Controls, while the Token group recycled two and one-half times more. An overall analysis of variance of the weight of recycled newspapers revealed that the groups differed significantly during the intervention period, $F(3, 55) = 3.61$, $p < .02$. A series of planned pair-wise comparisons on this measure indicated again that the Commitment [$F(1, 28) = 13.8, p < .001$], Token [$F(1, 27) = 4.2, p < .05$], and the Commitment + Token [$F(1, 28) = 6.6, p < .016$] groups differed significantly from the Control group. There were no other differences between the groups on this measure.

Follow-Up Recycling

Table 1 also indicates that the subjects in those conditions which included commitment manipulations continued to recycle their newspapers during the follow-up period. The Commitment and Commitment + Token groups were the only two groups which recycled more often than the Controls, while the Token group actually dropped below the Controls, during this phase of the experiment. In addition, these data show that the Commitment + Token condition was the only group which recycled more than two times as often as the Control group, whereas in the intervention period, all three treatment conditions had recycled more than twice as often as the Controls. A chi-square analysis of the overall frequency of participation during this phase revealed that there was a significant difference between the groups on this measure, $\chi^2 (3, N = 59) = 8.72, p < .05$. The Commitment + Token group was the only one to

differ significantly from the Control group, $\chi^2(1, N = 30) = 5.52, p < .05$. The Commitment + Token group also recycled significantly more often than the Token group during this phase of the experiment $\chi^2(1, N = 29) = 7.16, p < .01$.

Table 1 reveals that a somewhat similar pattern of results held for the weight measure. Only the Commitment and the Commitment + Token groups recycled more paper that the Control group during the follow-up period, whereas all three treatment conditions had done so during the intervention period. Subjects in the Commitment + Token condition recycled twice as much newspaper as subjects in the Control group, while those in the Commitment condition recycled slightly over one and a quarter more pounds than the Controls. However, the magnitude of these differences was smaller than previous comparisons, and neither the overall analysis of variance nor any of the planned pair-wise comparisons was significant.

Households Recycling At Least Once

Table 2 lists the number and percentage of households in each condition that recycled their newspapers at least once during the intervention and follow-up periods, as well as when these two phases of the experiment were combined. This measure makes it possible to evaluate each condition in terms of the scope or breadth of its influence among subjects, rather than simply in terms of the overall impact on participation levels. These data indicate there were marked differences between the conditions on this measure.

For example, during the intervention period, while all of the experimental conditions were superior to the Controls, the Commitment condition was clearly the most effective in this respect, as 47 percent more of the households in this group recycled at least once than was the case in the Controls. In comparison with the Controls the Commitment group was followed in turn by the Commitment + Token group (27%) and the Token group (17%). A chi-square analysis of these data revealed there was a significant difference between the groups during this period $\chi^2(3, N = 59) = 12.34, p < .01$. Separate pair-wise comparisons revealed that the Commitment group was the only one to differ significantly, $\chi^2(1, N = 30) = 6.23, p < .05$, from the Controls on this measure.

Table 2. Number (and Percentage) of Households Recycling At Least Once

	Control	*Commitment*	*Token*	*Commitment + Token*
Intervention	6 (40%)	13 (87%)	8 (57%)	10 (67%)
Follow-Up	4 (27%)	7 (47%)	5 (36%)	8 (53%)
Overall	8 (53%)	14 (93%)	9 (64%)	10 (67%)

Table 3. Tokens Received and Redeemed

Condition	*Tokens Received*	*Tokens Redeemed Number (Percentage)*	
Token	24	18	(75%)
Commitment + Token	32	9	(28%)

During the follow-up period, all of the treatment conditions continued to promote a greater degree of participation than the Controls, with 26 percent more of the households in the Commitment + Token group recycling at least once, while there were 20 percent more such subjects in the Commitment group and 9 percent more in the Token group. However, a chi-square analysis of these differences fell short of being significant. Finally, when the two phases of the experiment were combined, the Commitment condition was clearly the most effective in encouraging the greatest number of households to recycle at least once. While an overall chi-square analysis of this combined measure was also not significant, planned pair-wise comparisons revealed that the Commitment condition differed significantly from the Controls on this measure, $\chi^2\,(1, N = 30) = 5.65, p < .05$.

Token Redemptions

Table 3 lists the number of tokens received by the households in the Token and Commitment + Token groups, as well as the number and percentage of tokens that the subjects in these groups redeemed. This measure permits an unobtrusive assessment of the importance of incentives for the subjects in these two groups. At the same time, it provides some evidence on the degree to which the token reinforcers might have played a role in influencing their recycling behavior. These data indicate that while the Commitment + Token group received more tokens, they actually redeemed many fewer than the subjects in the Token condition. The households in the Token condition redeemed 75 percent of the tokens they received, which is more than two and one-half times the redemption percentage (28%) of the Commitment + Token condition. A chi-square analysis of this difference indicated that the Commitment + Token group redeemed significantly fewer coupons than the Token group $\chi^2\,(1, N = 29) = 10.3, p < .01$.

DISCUSSION

On balance, the findings from this study indicate that no single treatment technique was uniformly more effective in promoting newspaper recycling than any other. For example, in terms of the frequency and weight measures, the

treatment groups performed in a relatively similar fashion during the intervention period. On the other hand, during the follow-up period, some differences emerged, with the Commitment + Token condition generally the most effective on this measure. However, in terms of the number of households recycling at least once, the Commitment condition was clearly the most effective. For example, during the intervention period, 87 percent of the households in the Commitment group recycled at least once, followed in turn by 67 percent in the Commitment + Token group and 57 percent in the Token group. In short, while the combined Commitment + Token condition was more effective on some recycling measures and the Commitment alone condition was on others, neither group was consistently superior to the other.

In addition, these results provide no evidence to support the belief that incentives are required to promote recycling [1]. Incentives were clearly not necessary to induce subjects in the Commitment condition to recycle their newspapers. And while they were sufficient to promote recycling in the Token group, they never led this group to out-perform either of the two commitment groups. Indeed, during the follow-up period, the Token group actually recycled less frequently than the Control group. Furthermore, even when tokens were added to the commitment manipulation, they rarely facilitated performance.

It is clear from these findings that in both of the conditions that employed a commitment manipulation, the overall occurrence of recycling was uniformly greater than it was in the token condition. While these differences were not always statistically significant, they were relatively large. For example, when commitment was employed alone, 30 percent more households recycled during the intervention period and 11 percent more did so during the follow-up period than was the case when only tokens were provided for recycling. These differences are far from small, and in terms of their practical implications they suggest that it may be more effective to have individuals commit themselves to performing a behavior than to reward them for doing so.

This conclusion should be viewed in the context of two previous comparisons between these techniques in promoting resource conserving behaviors. In the first individuals who formerly did not ride the bus were asked to make a non-binding personal commitment to take one round trip a week on an urban bus system [30]. The rate of ridership in this condition was indistinguishable from an incentive condition where individuals were provided with an unlimited number of free bus tickets, with both of these interventions producing significantly greater ridership than was the case in an untreated control condition. In the second, Katzev and Johnson compared these two techniques in a study of residential energy conservation [27]. Some of the homeowners in this experiment were asked to sign a written commitment to reduce their electricity consumption by 15 percent. Others were exposed to a multiple-request commitment procedure in which this target request was preceded by a short energy conservation questionnaire. These two groups were compared to

an incentive only condition where individuals were offered a highly attractive monetary rebate for conserving electricity. During the two week conservation period, the three groups which included a commitment manipulation conserved more electricity and contained many more conserving individuals than was the case in the control condition. Although the magnitude of these effects was not great, there were a large number of individuals in each of the commitment conditions who actually conserved electricity. Across each of these conditions approximately 74 percent of the subjects reduced their consumption of electricity below their baseline usage. In contrast only 31 percent of the subjects in the incentive conditions did so .

Taken together this evidence provides further support for the belief that minimal justification strategies and commitment techniques, in particular, have considerable impact in motivating individuals to conserve environmental resources. The commitment procedure has been particularly effective in overcoming several of the limitations of incentive-based interventions. First, it has not been characterized by a low level of subject participation. For example, in the current study a very high percentage of subjects in the commitment condition participated in the recycling project. In fact, 30 percent more Commitment subjects recycled their newspapers at least once than was the case in the Token group. Second, the commitment technique is not expensive. Indeed, the way in which we were able to apply it in the current study was extremely cost-effective. At the present-day price of used newsprint, we collected enough money from the newspapers recycled by subjects in the Commitment group to more than amply cover the cost of administering this intervention.

Finally, and perhaps most important, individuals do not stop conserving resources after they are no longer formally bound to the commitments they had made. In many respects the maintenance of responding following commitment interventions is perhaps the single most significant result of the experimental analysis of this technique. It was first noted in an important study reported by Pallak, et al. on the role of minimal justification techniques in promoting household energy conservation [28]. In this study of residential energy consumption during a winter and summer season, homeowners were asked to make an informal private or a public commitment to conserve energy by signing a consent form to participate in the study. Those in the public commitment condition agreed to have their names listed in media publicity about the research, while those in the private commitment condition understood they would not be personally identified with the study. These investigators found that individuals in the public commitment condition used significantly less natural gas and electricity than those in the private condition. Above all they found that the public commitment procedure led to long-lasting, sustained reductions in energy consumption throughout the lengthy twelve month follow-up period, even though the subjects knew any possibility of public recognition had long ended.

Similar findings have been reported in other investigations of commitment. For example, Bachman and Katzev reported that approximately one-third of the non-bus riding individuals who had made a commitment to ride the bus twice a week were still riding at least once a week during the follow-up period [30]. Pardini and Katzev found that subjects who had signed a formal statement committing their household to participate in a newspaper recycling project continued to recycle during the follow-up period, even though they were no longer bound by their original commitment [18]. And in the current study, newspaper recycling was maintained following the intervention period only in the two conditions where commitment was manipulated. The performance of individuals in the Commitment + Token group was most impressive in this respect. The level of recycling maintained by the individuals in this group during the three week follow-up period was virtually indistinguishable from what it had been during the intervention period. These instances of maintenance following commitment procedures are especially noteworthy when contrasted with the abrupt cessation of responding once reinforcers are withdrawn from most incentive-based programs. Indeed, in commenting on the role of commitment in promoting energy-related behaviors, Stern and Aronson have recently concluded [31]: "The results of these studies are extremely provocative: they suggest that once a person believes he or she is publically committed to saving energy, he or she adopts behaviors that can last much longer than the public commitment itself."

While these findings are promising, there are a host of unanswered questions about the impact of commitment techniques. For example, under what conditions are these techniques most effective? Unfortunately, at the present time it is difficult to specify these conditions precisely. However, we do know that making commitments public, written and voluntary can enhance their impact. The little evidence we do have suggests that when any one or more of these conditions are absent commitment techniques will not be nearly as effective. For example, in a study of residential electricity consumption Becker asked individuals to commit themselves to a difficult conservation goal (e.g., a 20% reduction in electrical energy usage) [32]. However, Becker employed a fairly weak commitment manipulation in which homeowners were only asked to make an implicit, verbal agreement to the conservation goal. As a result his commitment condition did not lead individuals to save much electricity, unless they were also provided with feedback about their performance. Even then, the commitment manipulation was not effective when the conservation goal was a much easier one (e.g., a 2% reduction in electricity usage.)

Accounting for the impact of commitment techniques is another issue which is currently unresolved. Perhaps commitments are influential because of an aversive contingency in which individuals fear the disapproval of others for failing to adhere to the pledges they have made. This is especially the case when they are public. Or perhaps commitments make resource conservation a highly

salient process and, therefore, less easily ignored whenever an opportunity to conserve is available. Or as the attributional account suggests, perhaps individuals who have made commitments come to believe they are genuinely concerned about resource conservation and, as a result, will try to engage in the sorts of behaviors which are consistent with this self-perception. Unfortunately, there is simply no evidence at the present time which permits us to choose between these alternatives.

It is also important to try to account for the limited impact of the incentives observed in this, as well as other studies of resource conservation. Although the token condition in the present study was generally more effective than the control condition, this was not the case on all of the measures we employed. For example, the Token group did not differ from the Control group in terms of the frequency of recycling during the follow-up phase. Nor did they differ significantly from the controls in terms of the number of households which recycled at least once during either phase of the experiment. Further, in terms of the relative ranking of the three treatment groups, the Token group was uniformly the lowest on each of the recycling measures we employed. Other investigators have also reported that attractive incentive programs have very little, if any, impact on resource conservation [27,33-35].

Why is this the case? We know the tokens employed in the current study were appealing, since individuals in the token condition redeemed approximately 75 percent of those they received. We also know the subjects in this condition continued to believe in the value of recycling, since their attitudes about recycling did not change between the pre- and post-experimental administration of the recycling questionnaire. In the absence of any direct evidence, we can only speculate that perhaps the incentive condition we employed was not especially salient. Thus, it may have diminished only slightly the subjects motivation to recycle newspapers. Perhaps a stronger incentive condition, such as a monetary reinforcer, would have constituted a more salient incentive and would have had even greater impact. Indeed, just such monetary reinforcers were provided in each of the studies which have also documented the limited impact of incentives on resource conserving behavior.

This interpretation may also clarify the joint effect of commitment and incentives observed in the present study. There was nothing in our study to indicate that tokens undermined the motivation of individuals in the Commitment + Token condition to participate in the recycling project as predicted by attribution theory. Indeed, on most of the measures, we employed this condition was every bit as effective, if not more so than the Commitment only condition. Thus, we found no evidence to support Zuckerman et al.'s claim that the commitments individuals are induced to make with the foot-in-the-door technique are undermined by incentives [21]. But is is important to point out that Zuckerman et al. also offered a monetary incentive to individuals for initially complying to the small request. This suggests that monetary

incentives, in contrast to token reinforcers, may be viewed by individuals as an "overly sufficient" justification for engaging in behavior which they already consider desirable.

Because we consider the token reinforcers employed in the present study as a moderate justification for behavior, we do not believe they ever seriously threatened the subjects commitment to recycle and that, as a result, they responded to the joint influence of these two factors by validating their commitment to participate in the project. Indirect evidence in support of this conjecture is provided by the unobstrusive measure of the number of tokens redeemed by subjects in the two groups eligible to receive them. Recall that individuals in the Token group redeemed 75 percent of those they received, while only slightly over 25 percent were redeemed by individuals in the Commitment + Token condition. This is a sizable difference. It suggests that subjects who had made a commitment to recycle tended to discount the importance of the tokens in monitoring their behavior and, as a result, participated in the project because they believed in the value of recycling and thought it was important to do on its own, rather than any extrinsic, merits.

From a pragmatic standpoint, the success of the commitment interventions employed in the current study suggests they may have considerable social policy implications for motivating a large population of individuals to conserve resources. Encouraging individuals to begin this task by making a small commitment to recycle a household product can often times act as a catalyst for initiating and sustaining further conserving acts. Unfortunately, most social policy programs begin by making relatively large, global requests of consumers, without recognizing the importance of first establishing the basic components of these target behaviors, as well as creating situations where consumers can commit themselves to undertake these acts.

For example, once individuals make a commitment to recycle newspapers, they may be more likely to recycle additional products, such as glass, metals and other paper products. Once they begin to undertake these additional actions, the benefits of doing so may diffuse throughout a variety of other areas. This may make them more likely to also recognize the importance of conserving household energy, reducing their automobile fuel consumption and weatherizing their home. The key to fashioning social policies which have this kind of influence is to structure them so that individuals will naturally and of their own choosing be led to undertake those first, small steps. Once they do, they may quite readily be led to adopt more and more conserving actions. And when a similar process spreads across a large population of individuals, it can exert a significant impact on the conservation of natural resources.

In summary, applying commitment techniques in this way may open up a number of new possibilities for generating substantial changes in recycling behavior across a large population of individuals. These applications may further confirm the value of the minimal justification principle in promoting

resource conservation. Commitment techniques utilize relatively moderate justifications for behavior and can be readily distinguished from those employing strong external justifications. Our findings suggest these techniques may be every bit, and often times, more effective than incentive techniques. Although we can only speculate, perhaps the process of making a commitment to recycle leads individuals to attribute the causes of their behavior to their own internal convictions, rather than to any external pressures imposed upon them. This, in turn, may lead them to develop their own reasons for recycling and, as they begin to take steps in that direction, to appreciate the value of conservation in general and the importance of continuing to do so on their own. If this is the case minimal justification techniques, especially those employing commitment procedures, might go a long way toward overcoming the limited effectiveness of current conservation strategies and, as a result, contribute to the increasing occurrence of more enduring and widespread resource conserving behaviors.

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