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Teaching the Concept of *Precycling*: A Campaign and Evaluation

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ABSTRACT: *Precycling*, or purchasing wisely to reduce waste, is the EPA-preferred way to conserve resources and extend landfill life. A 3-month campaign of radio, television, and in-store advertising was effective at teaching the concept of precycling. After the campaign, telephone interviews indicated that 16% of the sample could correctly define the term, a 9% increase over the first survey. The survey results indicate that at least 65,000 citizens of Salt Lake County had probably learned the concept from the ad campaign. Given that the term had not come into popular use at the time of the advertising, it is unlikely that individuals had learned the term from another source. Furthermore, there was a significant association between seeing the ads and correctly defining *precycling*.

Precycling is a concept that refers to the reduction of household garbage by making smart shopping choices. Consumers can help solve the garbage problem by buying products with little or no packaging, reusing products, buying products packaged in recycled materials, and buying products that are recycled or packaged in containers that can be recycled locally.

The U.S. Environmental Protection Agency (EPA) was one of the first entities to emphasize the need for precycling. In response to growing national concern about the solid-waste disposal crisis, the EPA developed *integrated waste management* as a national strategy for addressing the municipal solid-waste problem (1989). The strategy is based on the following principles: (a) that waste management should be viewed holistically and over time, (b) that waste managers should be as concerned about waste generated when products are manufactured and transported as they are about disposal after use, (c) that household and industrial hazards should be removed from the waste stream and handled separately, and (d) that composting and recycling should be viewed as integral aspects of waste management rather than as separate processes.

EPA cites precycling as the preferred method of integrated solid-waste management because it cuts waste at its source. Trash is eliminated before it is created. Effective source reduction slows the depletion of environmental resources, prolongs the life of available waste management facilities, and can make combustion and landfilling of wastes safer in the short and long term by removing toxic constituents. Precycling is the cornerstone of the EPA plan for a simple reason: If you do not create or buy an item in the first place, you do not have to figure out how to dispose of it later. At the time of our research, precycling was known primarily to active environmentalists and experts in the field and had not received much attention in the mainstream press. An important question, then, was how to teach the general public this new concept.

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The purpose of our project was to evaluate the extent to which shoppers acquired knowledge about precycling from television, radio, and in-store advertising and whether that knowledge was translated into self-reported precycling behavior. The advertising campaign was part of a larger Salt Lake City and Salt Lake County–wide waste-reduction program begun in the late 1980s. This larger campaign included educational programs in elementary and middle schools; free curbside pickup of newspapers, with the proceeds going to the Salt Lake City urban forestry office; neighborhood drop-off sites as well as limited curbside pickup programs for aluminum, tin, cardboard, and glass; and biannual curbside pickup of compostables, such as leaves or Christmas trees (see Werner et al., 1992, for more details). Within this context, we introduced the advertising campaign.

An ongoing issue in advertising and advertising research is how to measure the effectiveness of a campaign: Is the focus on sales, recall versus recognition of an advertisement, ability to link an ad to a product, or brand name recognition, among other indices? Given that it is so difficult in naturally occurring settings to link advertising and knowledge—much less advertising and purchasing behaviors—many researchers depend on laboratory research or field experiments to gauge potential rather than actual impacts (Mitchell, 1993; Norris, 1990; Ogilvy & Raphaelson, 1991). In contrast, our project provided an unusual opportunity to evaluate an advertising campaign. Given that precycling was a fairly new concept and was unlikely to be learned from other domains, we were able to evaluate the impact of advertising on learning and self-reported behavior. Thus, we used what Chemers, Goza, and Plumer (1979) referred to as a "psychological isotope." Much like radioactive isotopes that are injected into the body and used to reveal problems on particular sites (e.g., radioactive iodine for x-rays of the thyroid), a psychological isotope is information selectively introduced into the population to see how far its influence spreads.

We developed the advertising campaign in conjunction with a local television station and a major regional grocery chain. The ads were broadcast both on television and on radio and were supplemented with an in-store circular. The ads focused only on educating viewers about *precycling* by defining the term, showing examples, and highlighting special sale prices for two precycling products per advertisement. We based the campaign on such basic persuasion and education principles as (a) people need to be motivated to care about an issue, (b) the message can both create concerns and build on those that exist among viewers, (c) an optimal level of concern (or fear) is one that motivates viewers to process the content of the message rather than leading them to focus on the concern itself (we used humor to achieve this level), (d) a clear solution should be provided for concerns raised in the advertisement (e.g., precycling reduced solid waste and preserved the landfill), and (e) multiple exposures in more than one context increase retention of the message (McGuire, 1969; Petty & Cacioppo, 1981).

Given the pretest–posttest design, we used a methodology designed to obviate or eliminate third variables as rival explanations for any differences between the pre- and posttests (Campbell, 1969; Cook & Campbell, 1979). First, we used a structure that allowed little time between the pretest, advertising, and posttest. Second, we ascertained that the precycling idea was not widely available from other sources prior to our campaign. We checked for articles in newspapers and magazines as well as programs on radio and television and found none on precycling. Although two other recycling campaigns on television occurred at about the same time as ours (one for aluminum can recycling and another from the Environmental Defense Fund), neither used the term nor referred to the concept of precycling. Third, interviewers used systematic probes to elicit specific definitions and examples of precycling. Thus, we were able to distinguish between ideas that had and had not been presented in the ads so that we could discriminate between material that had and had not been learned from these messages. Finally, we linked knowledge about precycling to the advertising campaign by asking whether people who actually saw the ads were more likely to provide the correct definition.

Method

Advertisements

The basic information ad lasted 30 sec and featured a family of two adults and two children in a living room. The parents expressed their concerns about uncontrolled waste in a room filled with typical household trash that eventually covered the children with nonrecyclable and nonreusable goods. Thus, the goal of the ad was to personalize the problem, enable the audience to visualize it, induce them to accept responsibility, and prepare them to hear the personal solutions that filled out the rest of the commercial. The balance of the commercial presented a simple definition of precycling, "Reduce waste by thinking ahead when you buy," and five examples (i.e., use cloth grocery bags, buy concentrates, buy from bulk bins, buy fruits and vegetables without an extra plastic bag, and buy economy sizes to save packaging). We supplemented the commercial with five "donuts," or additional ads that highlighted two particular precycling purchase choices that were currently on sale at the sponsoring grocery store (e.g., large packages, instructions on how to identify packages made from recycled materials, household paper products made from recycled paper, and instructions on how to identify locally recyclable plastics and suggested products). We highlighted two to four products each week, for a total of 10 distinct precycling products.

The basic ad appeared a total of 127 times during the 12 weeks of the campaign. The 30-sec donut ads appeared during the middle 6 weeks of the campaign, an average of 2 to 3 times throughout the day, for a total of 105 times. The ads appeared regularly during news shows (morning, early, and late evening) and during other popular shows (talk shows,

soap opera, major movies). Survey data of viewership from this period were available only for news programming; they indicated that the news programs during which these ads appeared were the second most popular in Utah, watched overall by 33% of the viewers who watched television news (University of Utah Survey Research Center, 1992).

Radio ads were identical in verbal content and occurred a total of 240 times during the 12-week campaign period. In addition, in-store shopper's guides were available during October and November in participating Salt Lake County grocery stores.

Survey

The survey was conducted by the University of Utah's Survey Research Center, an academic survey center that uses random-digit dialing and professional interviewers engaged in ongoing training and supervision (Waksberg, 1978). We used a simple pretest–posttest design and collected the first wave of data between October 3 and 20, 1991. The ad campaign ran between October 7 and December 29, 1991, and the second wave of data collection occurred between January 16 and 23, 1992. Scheduling problems caused the advertising campaign to begin before the initial survey could be completed, so the survey was not conducted on an entirely naive population. We used many of the survey questions from a similar survey in Boulder, Colorado (City of Boulder, 1991).

Self-Reported Recycling and Precycling

Survey respondents indicated whether they recycled aluminum, newspapers, plastic and tin, and estimated what percentage of their neighbors recycled (see Table 1). Three sets of items measured precycling behaviors (see Table 2). The interviewers asked first about grocery bags, and then whether the respondents purchased each of five kinds of items (no/yes). If the respondents said yes, the interviewers asked how frequently they did so on a 5-point scale (1 = *never*, 5 = *always*). The research question was whether these self-reported precycling behaviors increased after the advertising campaign. To protect the experiment-wise error rate, we specified that the precycling frequency data would be analyzed only if there were a significant increase in the simpler no/yes question. The convergent, or advertising-based, items were reusable grocery bags, recyclable containers, containers from recycled materials, bulk foods, and concentrated products. Discriminant, or non-advertising-based, items were single-serving containers and preference for paper or plastic bags.

Definitions of Precycling

The interview was organized so that respondents first described their recycling and purchasing (i.e., precycling) behaviors and only then were given an opportunity to define precycling. Although responding first to the list of precycling behaviors may have suggested a definition and invalidated that aspect of the survey, we chose this sequence for three reasons. First, by asking about both recycling and purchasing behaviors, we obscured the link between specific questions and the term precycling. Second, using this form of questioning in surveys both before and after the campaign allowed us to test for an increase in correct answers rather than simply measuring correct answers after the campaign. Third, we considered that the alternative, to ask for a definition first and then to ask about specific behaviors, would have resulted in an inflation of these estimates, resulting in a worse problem than the potential problem of cueing respondents to a definition of precycling.

The interviewers first asked whether the respondents knew what precycling was:

> There is a new term in the field right now, and that term is *precycling*. That's spelled "P" "R" "E" cycling. Do you know what "precycling" means?

Those who said yes were asked to provide the definition:

> In your own words, could you tell me what *pre*cycling means to you?

The interviewers were not given a definition of precycling, were trained to record the definition verbatim, and used only the systematic probes for followup. They made no comment about the definition's accuracy.

Correct answers contained an element of planfulness or choice in purchasing decisions and waste-reduction behaviors (e.g., reusable grocery bags, recycled packaging). We assigned answers grades of A (3 points), B (2 points), C (1 point), and E (0 points), depending on completeness and accuracy. Examples of A answers were as follows:

> Before going to the grocery store, I bring my own bag, and I buy products with little or no packaging—I buy bulk, concentrated, and items that are biodegradable or recyclable.
>
> Buy things that are recycled and have less packaging.
>
> You plan ahead so that you can recycle things.

B answers were usually incomplete or did not specifically indicate prepurchase plans to recycle; these included definitions such as

> things that can be recycled easily
>
> planning on recycling
>
> items which have been recycled

C answers were vague, but still represented waste management:

> accommodating a method for recycling
>
> used before

Examples of incorrect (graded E) answers were:

> the warm up time before you bicycle
>
> buy something that doesn't have to be recycled
>
> preparing [materials] for recycling.

Two raters discussed these definitions extensively and then made independent judgments; disagreements were resolved in favor of the senior rater. Interrater reliability on

TABLE 1. Demographic Characteristics and Recycling Behaviors

Reported data	October (n = 198)	January (n = 216)
Demographic characteristics		
Sex (%)		
Female	52	52
Male	48	48
Marital status (%)		
Married	59	62
Divorced	15	11
Widowed	7	6
Separated	1	2
Never married	18	19
Average age (yr)	42 (range: 18–91)	43 (range: 18–83)
Employed full time (%)	63	63
Ethnicity (%)		
Caucasian	88	95
African American	3	1
Hispanic	4	1
Asian American	1	1
Native American	2[a]	2
Religion (%)[b]		
Latter-day Saints	59	54
Protestant	13	8
Catholic	6	10
Other	9	12
No preference	14	16
Recycling behaviors		
Percentage of recycling *sometimes/usually/*or *always*		
Newspapers	63	61
Plastics	36	26
Aluminum[c]	74	71
Tin	29	22
Estimated % of neighbors who recycle	28	26

Note. The survey was conducted by the University's Survey Research Center. For some items, respondents used 5-point scales to indicate their answers (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*). To convert these scores to "percentages saying yes," we treated *sometimes*, *often*, and *always* as "yes" responses. Given that respondents could omit items, the above percentages are usually based on fewer than the total number.

[a]An additional 2% reported ethnicities of Pacific Islander or mixed heritage. [b]Some percentages may not sum to 100 because of rounding. F values are provided only for values that differed between the 2 time periods. [c]$F(1, 333) = 3.49$, $p < .06$.

the 61 definitions in the Salt Lake County area was quite high, $r(59) = .96$.

Awareness of Advertising

To determine whether respondents had heard or seen precycling advertising or linked the concept to any particular grocery store, the interviewers first provided an example, "One method of *pre*cycling is to buy products that are packaged in recycled material or products that have very little packaging." The interviewers subsequently asked separate questions on whether the respondents had seen or heard any television or radio advertising on precycling and whether any particular grocery store promoted precycling.

Data Analysis

We adjusted the data to better approximate the population of Salt Lake County, and we analyzed the weighted scores using independent t tests and chi-square statistics (comparable analyses of unweighted scores yielded essentially similar effects). Most items could be answered no/yes, and

these were scored 0/1 for analysis (Lunney, 1970; Rosenfeld & Rosnow, 1984).

Results

In general, respondents reported high rates of recycling newspapers and aluminum and lower rates for plastics and tin. There was no change over time except for a marginally significant drop in recycling of plastics, possibly related to the fact that some local recycling firms began refusing to accept plastics during this period.

Despite their own high recycling rates, respondents estimated that only one fourth of their neighbors recycled (see Table 1). This finding suggests that respondents thought of their own recycling as unique and did not realize the extent to which recycling had become commonplace.

Knowledge of the Precycling Construct

Between October and January, there were increases in the number of people attempting a definition and in the accuracy of those definitions (Table 2). The increase in the number of people attempting a definition was marginally significant; however, the more important question of increased knowledge was clearly significant. An analysis of the graded responses indicated that the average grade improved

TABLE 2. Precycling Definitions and Behaviors

Question	October	January	*F*	*df*	*p* <
Do you know what precycling means?					
Yes	27 (14%)	36 (21%)	3.13	1, 333	.08
Percentage of respondents giving correct definition (graded A or B)	7	16	6.38	1, 333	.01
Advertising					
Have you seen TV ads that promote precycling?—% yes	34	41			
Have you heard radio ads that promote precycling?—% yes	12	21	4.59	1,324	.03
What percentage of time do you					
use your own grocery bag?	9	7			
request a plastic bag?[a]	53	60			
request a paper bag?[a]	41	37			
Percentages who say that they purchase					
from bulk food bins	66	67			
concentrated products	74	74			
products in recycled packaging	90	90			
products in recyclable containers	93	94			
items in single-serving packages.[a]	56	60			
Of those saying *yes* to above, the percentage who *sometimes/usually/always* purchase					
from bulk food bins	73	70			
concentrated products	88	85			
products in recycled packaging	88	88			
products in recyclable containers	92	89			
items in single-serving packages.[a]	65	62			
Which grocery store actively promotes precycling? (in percentages)					
Target chain	7	17	4.37	1,164	.04
Chain A	8	5			
Chain B	9	9			
Chain C	46	37			
Miscellaneous	31	32			

Note. Some percentages may not sum to 100 because of rounding. *F* values are provided only for values that differed between the 2 time periods.
[a]Indicates a discriminant item, one not addressed in the advertising campaign.

from 0.20 to 0.38 before and after the advertising, $F(1, 333) = 4.37$, $p < .04$. For simplicity, we present these results in Table 2 as the percentage of "correct" answers (grades of A and B combined). Although only a small percentage of respondents provided correct answers at each time period, the increase from 7% to 16% of the participants was significant. Furthermore, given that the advertising overlapped for 2 weeks with the preliminary survey, the correct responses during the pretest were probably based on the early days of the campaign and not on an outside source. At the time of the campaign, there were about three fourths of a million people in Salt Lake County. Translating survey percentages into numbers of people means that every 1% equals about 7,260 people. The 9% increase translates into about 65,000 more county residents who could correctly define precycling after the campaign (the 16% total represents almost 116,000 people who could correctly define precycling by the campaign's end).

In addition, chi-square analyses at Time 1 indicated no association between accurately defining and hearing or seeing precycling advertising, whereas a significant chi-square at Time 2 indicated that people who gave an accurate definition were more likely to say that they had seen television ads about precycling, $\chi^2(1) = 9.71$, $p < .001$ (a comparable chi-square for radio advertising was not significant, $\chi^2(1) = 1.35$, $p > .20$). Although in a single study, causal inferences are always tenuous, the specificity of the definition, the significant association between seeing television ads and providing the correct definition at Time 2, and the absence of other large-scale, local sources of this information did converge to support the idea that the campaign was successful in educating many people about the concept of precycling.

Finally, the particular grocery store that sponsored these ads appeared to have benefited as well. Before the ad campaign, 7.5% of Salt Lake County residents identified the store as a sponsor of precycling; afterwards, 16% did so.

Precycling Behavior

The advertising campaign targeted five particular precycling activities and three discriminant items. As indicated in Table 2, most of the five behaviors were reported to occur at a high rate before the ad campaign, and none was reported to increase after the ads. In addition, no change occurred in the discriminant items.

Discussion

Precycling commercials—especially those shown on television—may have been effective at educating individuals. Although the actual percentage of respondents who knew the definition was small, we believe that it is important to note that the whole campaign lasted only 12 weeks, that the viewing audience was only a portion of the population, and that the results compare favorably with research indicating that brochures mailed directly to the home have little or no impact (Dennis, Soderstrom, Koncinski, & Cavanaugh, 1990). Also, use of survey sampling methodology allowed us to project from our sample to the total county population, showing that the campaign may have taught the concept to roughly 65,000 people and as many as 116,000.

We did not see much change, however, in self-reported behavior, a finding that is consistent with other research on conservation behaviors in which simply informing people of behavioral opportunities has less impact on behavior than programs that combine information with incentives, ease of performance, or behavioral commitment (Geller & Winnett, 1982; Werner et al., 1992). One methodological question that is always asked when there is a failure to reject the null hypothesis is whether the measures were sufficiently sensitive to detect effects if they occurred (Greenwald, 1975). In this regard, two of the key behavioral items had such high base rates that changes would have been difficult to detect (purchasing items in recyclable and recycled packaging). By measuring both "do you," and "if you do, how often," however, we used fairly sensitive probes that should have detected changes in behavior if they occurred. Future research might consider ways of increasing measurement sensitivity, such as increasing the reliability of measurement by focusing on the most recent purchasing behavior, for example, "The last time you went shopping, . . ." In addition, asking questions about personal sacrifices might tap behaviors more sensitively, such as "How often do you avoid purchasing an item because the container cannot be recycled?" We also believe that it might be useful to measure actual purchasing choices as more direct evidence of behavioral changes (City of Boulder, 1991).

The problem of how best to connect new knowledge to attitude change and new behaviors should not be ignored. During the campaign itself, the store encouraged learning and behavior change by targeting specific products. This probably was an effective way to teach about precycling and enable shoppers to build new memory structures so that the new information would be accessible in the future (Baker, 1993; Fazio, 1986, 1990). However, no specific mechanisms existed to facilitate a long-term change in behavior or to connect shopping behavior with other source reduction behaviors (e.g., developing an interconnected "list" of source reduction techniques, such as avoiding disposable products at fast-food and take-out restaurants). Future work should address this need to take newly learned information and behaviors and embed them into a stronger network of related information and behaviors. One emerging approach is to connect new ideas to habitual behaviors. For example, Hormuth (1990) suggested that people would be most successful at recycling if they embedded recycling behaviors into their ongoing streams of behavior (e.g., rather than piling up aluminum cans to be crushed, crushing them as they were disposed). Precycling changes would also be most enduring if they became part of habitual purchasing and shopping behaviors.

The survey points to two specific areas where advertising might be beneficial. First, public officials might consider letting people know that recycling is a widespread

activity. This might encourage more people to recycle because it conveys ideas about social appropriateness as well as letting others know that recycling is "doable." There may be some danger in "diffusion of responsibility," or the belief that "everyone else is doing it, so I don't need to," so this would need to be anticipated and counteracted (e.g., with statements such as "Do your part" or "Everyone needs to recycle").

The survey revealed that very few people reported using reusable grocery bags. To some extent, this reflects not only a lack of awareness and possibly a belief that waste from plastic grocery bags is not a problem, but also some constraints. Anecdotal explanations for not using reusable bags are varied, such as (a) available cloth bags are too small for typical grocery loads, (b) forgetting to carry bags to the store, and (c) taking a sufficient number of bags is inconvenient. In addition, when reusable bags were first introduced, customers found it discouraging that the clerks did not recognize these as grocery bags. One easy way to increase the use of reusable bags is for stores to begin charging for the bags rather than paying people to bring in a bag. Comments by members of the grocery industry indicate that this is unlikely in the near future. Thus, an advertising campaign that might be appropriate would emphasize the unnecessary use of resources, the trash problems of extra bags, and the ways of making it a habit to take the bags to the grocery store. At the store, signs in the parking lot or at the entrance might remind people to bring their bags inside.

Although some stores now pay customers 5¢ for bringing in their own bags, this is not a cost-effective or long-term solution. As many studies have shown, behaviors in response to payment do not become internally motivated, but stop once the reward is removed. Grocers who begin paying customers to bring their bags would need to continue to do so. In contrast to monetary rewards, social rewards have been effective at increasing and maintaining other environmental behaviors, and they might also be applied to this issue (Cialdini, 1985; Cook & Berrenberg, 1981). For example, grocers may begin offering to contribute money to recycling projects rather than paying the customer directly. By making the reward more abstract and socially motivated, customers may begin to develop internal reasons for reusing grocery bags. Educating grocery clerks to be more enthusiastic and give social recognition rather than money when customers bring in reusable bags might also help perpetuate the behavior.

Although the study demonstrated an increase in knowledge after an advertising campaign, an experimental evaluation of the techniques used in the advertising was beyond the scope of our project. That is, we did not compare different ads for their effectiveness or try to determine exactly why this campaign may have been effective. Future research, however, could evaluate the assumptions that guided the development of this campaign and consider ways of increasing advertising and educational effectiveness.

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