

INFLUENCES ON ATTITUDE-BEHAVIOR RELATIONSHIPS

A Natural Experiment With Curbside Recycling

GREGORY A. GUAGNANO *is an assistant professor of sociology and Director of the Northern Virginia Survey Research Laboratory at George Mason University. He received a Ph.D. in ecology from the University of California, Davis. His current research interests include the political economy of resource control, the social psychology of environmental concern, and resource conservation behavior.*

PAUL C. STERN *is Study Director of the Committee on the Human Dimensions of Global Change and the Committee on Risk Characterization at the National Research Council. His current research interests include the formation of social attitudes about environmental conditions and the values and beliefs underlying public support for environmental policies.*

THOMAS DIETZ *is a professor of sociology at George Mason University and past president of the Society for Human Ecology. He received a B.G.S. from Kent State University and a Ph.D. in ecology from the University of California, Davis. His current research interests include the human dimensions of global environmental change and models of cultural evolution.*

ABSTRACT: A simple model was tested in which attitudinal factors and external conditions act in combination to influence behavior. The model predicts that behavior is a monotonic function of attitudes and external conditions and that the strength of the attitude-behavior relationship is a curvilinear function of the strength of the external conditions, with extreme values setting boundary conditions on the applicability of attitude models. The model also allows for interactions in which perceived costs enter into the attitudinal process. Evidence is taken from a natural experiment in recycling in which collection bins for curbside pickup had been provided to 26% of 257 survey respondents. Consistent with the model, main effects of attitudes and external conditions were found, as was an interaction effect in which the Schwartz norm-activation model predicted recycling behavior only for households without bins. Interactive models such as the one developed here can yield better policy-relevant analyses by clarifying the relationships between external and internal influences on behavior change.

Social science takes two very distinct approaches to the study of behavior. A subculture of social and cognitive psy-

ENVIRONMENT AND BEHAVIOR, Vol. 27 No. 5, September 1995 699-718
© 1995 Sage Publications, Inc.

chologists advances knowledge by studying behavior as a function of processes internal to the individual, whereas subcultures of economists and applied behavior analysts advance knowledge by studying behavior as a function of external factors. Few scientists, however, try to integrate these two classes of independent variables into a model of behavior change. The results of this situation are evident in theory and practical application. Theories from these distinct perspectives tend to view individuals as either atomistic agents autonomous of social structure or automata programmed by forces beyond their comprehension or control. Practical problems arise when policymakers try to apply social science to change behavior. Scientists who emphasize internal processes advocate interventions such as education and persuasion as the best way to change undesirable behaviors and motivate desirable ones. Scientists who emphasize external factors advocate interventions such as regulations or taxes to change behavior. Whichever group succeeds in gaining influence, the policies fall short because they neglect the critical insights provided by the other perspective.

There are many reasons that narrow analyses of both varieties fail. For instance, boundary conditions may exist beyond which the causal variables critical to one approach have little effect on behavior, or the causal variables featured by the different approaches may interact in various ways. Thus science and policy require a socioeconomic theory of behavior that incorporates both external conditions and internal processes.

One strategy for making such an accommodation would be for attitude theories to specify external boundary conditions for their applicability. But as Bagozzi (1992) has noted, attitude-behavior theorists have not adopted this strategy: "the theo-

AUTHORS' NOTE: We wish to thank Linda Kalof and Jacqueline Callaghan for helpful assistance and comments. The research for this article was supported in part by the Northern Virginia Survey Research Laboratory and National Science Foundation Grant Nos. SES-9211591 and SES-9224036. Correspondence regarding this article should be sent to Gregory A. Guagnano, Department of Sociology and Anthropology, George Mason University, Fairfax, VA 22030.

ries are non-contingent in the sense that attitudes, subjective norms and intentions are presumed to function in all contexts, and no conditions are specified within the theories to explain when the components do or do not apply" (p. 201).

Of course, students of attitude-behavior relationships invoke an implicit theory of boundary conditions in their choice of behaviors to examine and contexts in which to examine them. And some mention of contextual effects is evident in classic attitude theory. Fishbein (1979), for example, posited that demographic and other "external variables" can affect behavior indirectly (and only indirectly) through their effects on beliefs, motivations, and other internal factors. The relationships are not specified, however.

Another strategy would be to specify ways in which external circumstances influence attitudinal processes. Attitude theory is moving slowly in this direction. For instance, modifications of the theory of reasoned action take account of limited individual control over behavior (Ajzen, 1991; Bagozzi, 1992; Bagozzi, Baumgartner, & Yi, 1992; Bagozzi & Warshaw, 1990), thereby recognizing that the outside world may affect action indirectly through an individual's perception of efficacy. Similarly, Fazio (1990) has noted that the opportunity to act can influence attitude-behavior relationships. Such contributions give a causal place to the external world as perceived, but they make no explicit place for the kinds of external conditions and possibilities behaviorists and economists believe are important determinants of behavior (Olson & Zanna, 1993).

AN A-B-C MODEL OF BEHAVIOR

The model presented here incorporates the relationships of external conditions, attitudes, and behavior and involves the strategies for integrating internal processes and external conditions. This model is a simplification of a more complete causal scheme outlined by Stern and Oskamp (1987), who proposed that environmentally relevant action is an outcome of a series of causally linked external and internal factors,

such as physical structures, social institutions, and economic forces (external) and general and specific attitudes and beliefs, information, and behavioral intentions (internal). The simplified model posits that actions or behaviors (B) are associated with attitudes (A). The attitudes can range from extreme negative positions, associated with behaviors a person would perform only under coercion, to extreme positive positions, associated with things a person would usually do unless coerced otherwise. Actions also have external conditions (C) associated with them. External conditions are conceived of broadly to include all external sources of support or opposition to behavior, whether physical, financial, legal, or social. They can range from extremely negative (unpleasant or barriers) to extremely positive (pleasant or supportive).

The model postulates that, in a population of individuals, there are distributions of A and C for any behavior, and the prevalence of the behavior in that population will reflect those distributions. Other things being equal, behaviors that are difficult, expensive, or inconvenient for most members of the population (negative C) will result in the action being relatively rare, whereas those associated with strong positive conditions (positive C) will be very common. And, other things being equal, behavior strongly favored by the attitudes (positive A) of most of the individuals in a population will result in action that is quite prevalent, whereas behavior strongly opposed (negative A) will be associated with action that is rare.

The critical element in the model developed here is that the effect of A and C on behavior depends on the values of A and C relative to each other rather than the value of either by itself. Thus comparing A and C in a population provides insights into how variation in either may explain behavior change. Figure 1 illustrates this point. The diagonal line, defined by the formula $A + C = 0$, demarcates the presence from the absence of behavior. Behavior is present whenever $A + C > 0$ (combinations of A and C above the line) and missing when $A + C < 0$ (combinations of A and C below the line). The success of any strategy designed to either induce or curtail behavior will depend on the magnitude of the absolute value of the sum of A and C (mathe-

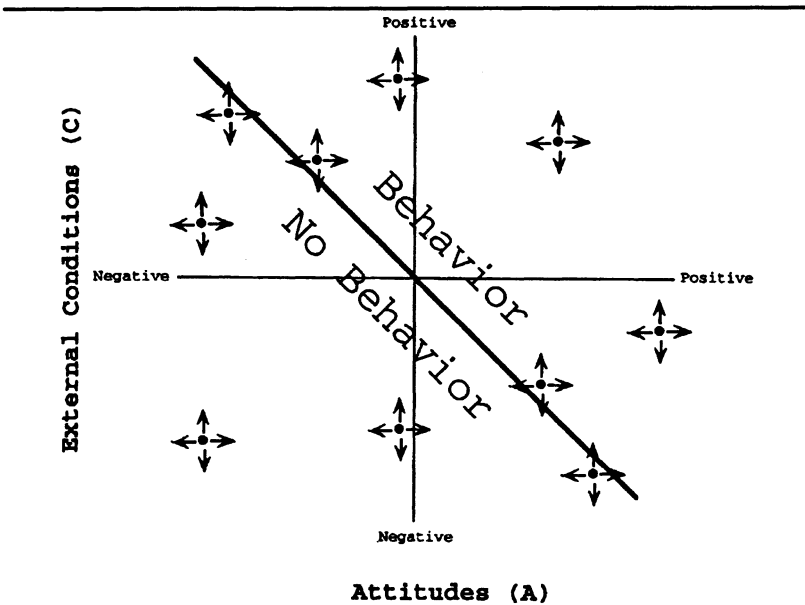


Figure 1. A-B-C Model

matically, $|A + C|$). When this absolute value is small, shifts in either A or C may act to move a particular combination of A and C across the diagonal line, thus resulting in behavior change. But, if $|A + C|$ is substantial, modest change in either A or C will not result in behavior change because it may not be enough to shift the combination across the line. Thus success of any intervention strategy will be greatest when $|A + C|$ is close to zero (lying near the diagonal in Figure 1).

The model predicts a context in which the effectiveness of educational or information programs intended to change A or regulatory and incentive programs intended to change C may have less to do with the size of the intervention than with the relative distributions of A and C in the population. For example, if a behavior is so constrained that no one has a strong enough attitude to overcome the external barriers or so easy to do that everyone's attitude is strong enough, variations in A will have no predictive value for B . If $|A + C|$ is near zero, however, greater behavioral effects will be realized from any given

variation in attitude within the group. The same logic applies to the effects of a change in external conditions of a particular magnitude. The present investigation dichotomized all the independent variables as extrinsic (*C*) or intrinsic (*A*) and does not address the full range of possible internal or external factors (see Gardner & Stern [in press] for a more complete discussion of these factors). This simplification permits the testing of the following general predictions: (a) Behavior is a monotonic function of *A* and of *C*. These are main effects of attitudes and of external conditions familiar from attitude theory (for *A*) and economics or behavioral theory (for *C*). (b) The strength of an attitude-behavior relationship (i.e., the predictive value of attitudes for behavior) is a curvilinear function of *A* and of *C*, having its highest values where $|A + C|$ is near zero. This is an interaction effect where the main effect of attitudes on behavior depends on external conditions, with the effect of attitude approaching zero when external conditions are very strongly positive or negative.

The second prediction means that at the extreme, external conditions impose boundaries on attitude theories. These theories lose predictive value as external conditions increase in strength and become more predictive of behavior. Under external conditions that are less extreme, attitudes gain causal efficacy in explaining actions.

ATTITUDES AND CONDITIONS IN THE PSYCHOLOGICAL LITERATURE

The idea that external conditions can affect attitude-behavior relationships has received some attention in attitude theory. The research programs on minimal justification and overjustification in cognitive dissonance theory (Fazio, Zanna, & Cooper, 1977) and on the effects of intrinsic and extrinsic motivation (Deci, 1975) include studies demonstrating the effects of material incentives on attitude-behavior relationships. However, most of this research focuses on the sequelae of behavior that results from, or is attributed to, internal processes versus external conditions, rather than the roles

internal and external variables play in influencing the behavior in the first place. The concept of psychological reactance (Brehm, 1966) addresses the latter issue by suggesting that perceived coercion can produce a psychological response that tends to counteract the direct effect of the coercion.

Other psychological literature addresses internal and external independent variables. For instance, research on the justice motive shows that people sometimes vote for policies they see as fair, even when such policies would cost them materially (e.g., Tyler, Rasinski, & Griffin, 1986). This sort of question is also central to research on altruism and on proenvironmental behavior. However, none of these lines of research has been systematic in addressing the general question of how these external conditions and attitudinal processes combine to influence behavior.

The position that comes closest to the one presented here is that of Derksen and Gartrell (1993). They examined the way variation in the ease of recycling changes the effect of attitudes on that behavior, and argued for the importance of examining "social context" (defined operationally as the presence or absence of curbside recycling bins) in studies of proenvironmental behavior. The model presented here also focuses on recycling and builds on the Derksen and Gartrell analysis by offering a more precise theory of how intrinsic and extrinsic conditions affect behavior. However, it is different in that it considers the possibility of interaction between intrinsic and extrinsic conditions and suggests that recycling, because it usually involves individual costs and collective benefits, is best conceptualized as a problem in the activation of altruistic moral norms rather than as a direct function of general environmental concern.

ATTITUDES, CONDITIONS, AND RECYCLING

Research on recycling offers an excellent example of the separation of traditions that focus on extrinsic or intrinsic influences on behavior. In the former tradition, focus has been on external forces such as prompts and reinforcements (Ingram

& Geller, 1975; Jacobs & Bailey, 1982-1983; Reid, Luyben, Rawers, & Bailey, 1976; Witmer & Geller, 1976). Most of these studies concentrated on how to increase participation in recycling with extrinsic incentives for initiating participation (De Young, 1984). For example, Geller, Winett, and Everett (1982) concluded "that a cost-effective recycling program requires some sort of incentive to encourage participation" (p. 152).

In contrast, other researchers emphasized the roles played by environmental attitudes (Humphrey, Bord, Hammond, & Mann, 1977) and self-perception (Arbuthnot et al., 1976-1977) without examining external factors. Some recent investigations concluded that while external factors such as incentives may be effective at initiating behavior, continued participation requires "intrinsic motivation" (De Young 1985-1986, 1986; Katzev, 1989; Katzev & Pardini, 1987-1988; Pardini & Katzev, 1983).

The investigation presented here examined the predictive value of Schwartz's (1968a, 1968b, 1970, 1977) norm activation theory in a field setting in which a natural experiment varied the external conditions of household participation in recycling of glass, aluminum, and plastic wastes. The expectation was that a supportive extrinsic condition, in this instance, the increased convenience of recycling, may directly affect behavior and also interact with the processes that link altruistic attitudes to behavior.

Actions to protect the environment provide an interesting example for Schwartz's norm activation theory. Such actions nearly always involve collective goods and thus are likely to be affected by altruism. The theory has been applied with success to studies of energy conservation (Black, Stern, & Elworth, 1985; Stern, Black, & Elworth, 1983), political action to support the environment (Stern, Dietz, & Black, 1986; Stern, Dietz, & Kalof, 1993), willingness to pay for environmental protection (Stern, Dietz, & Kalof, 1993), leaf burning (Van Liere & Dunlap, 1978), and the voluntary purchase of unleaded gasoline (Black & Heberlein, 1976). With respect to the present investigation, Hopper and Nielsen (1991) applied a version of the Schwartz norm activation model to recycling and found it to be a significant predictor of behavior.

The Schwartz model posits that for an individual to act altruistically, she or he must be aware of negative consequences for others (usually abbreviated *AC*) of a state of affairs and ascribe responsibility (*AR*) to individuals like herself or himself who, by their action or inaction, can create or prevent such states. When people hold *AC* and *AR* beliefs, they experience a sense of obligation to act to prevent harm (an altruistic personal norm).

The expectation that guided this investigation is that a curvilinear relationship exists between external conditions and the efficacy of the Schwartz model. In contexts where action is either extremely difficult or extremely easy, variation in *AR* should not produce variation in altruistic behavior. The Schwartz model should predict behavior in intermediate external conditions. Thus external conditions are expected to determine the efficacy of altruism.

The model tested here uses data from a survey completed in Fairfax County, Virginia, in March 1991, at a time when the county was in the middle of implementing a curbside recycling plan. To encourage county residents to recycle glass, aluminum, and plastic waste, the county provided blue plastic bins for pickup of these materials on normal trash removal days. At the time of the survey, 26% of the county households had been provided with bins. Others who chose to recycle were still required to provide their own recycling collection containers and to transport their materials for recycling to county-operated drop-off centers. De Young (1990) found that, while general attitudes toward recycling are strongly positive in U.S. populations, the chief barrier to behavior seems to be inconvenience. Other research suggests that changing the external conditions to achieve fairly simple reductions in inconvenience, such as by establishing regular curbside pickups of recyclable material, can result in sizable behavior change (De Young, 1984; Gitlitz, 1989). Thus the Fairfax County situation presented a quasiexperimental design to test the effect of a specific external condition.

Building on the work of Derksen and Gartrell (1993), the hypothesis tested here was that the attitude-behavior relationship will interact with a strategy to reduce inconvenience (e.g.,

curbside pickup) and attenuate the explanatory power of the attitudinal effects. More specifically, the predictive value of the Schwartz model was expected to distinguish participants from nonparticipants in recycling programs where recycling is moderately inconvenient but have less predictive value when recycling is very convenient. Thus the strength of the attitude-behavior relationship was hypothesized to be different for households that had been provided bins and those that had not, because the inconvenience of taking recyclable materials to a drop-off center represents an external condition or barrier that the provision of bins changes.

METHOD

SUBJECTS

Data were collected by telephone interviews with 257 residents of Fairfax County, Virginia, in March 1991. Phone numbers were selected by random-digit dialing, and respondents within the household were selected by the "next birthday" method (Salmon & Nichols, 1983). A conservative estimate of the response rate is 45%, which is typical of telephone surveys. The sample had a mean age of 42.2, a mean number of years of education of 15.7, and had a median income between \$60,000 and \$80,000. This indicates that the sample was representative of the population demographics for the county. Complete data were available for 180 respondents.

MATERIALS AND PROCEDURE

The survey instrument contained 124 questions assessing demographic characteristics (16 items), general environmental attitudes (46 items), community behavior (26 items), self-reported recycling activities (26 items), and the concepts in the Schwartz model (10 items).¹ Attitude items used a 4-point Likert-type scale. Nine items describing attitudes toward recycling were factor analyzed using a principal-factors solution and oblimin rotation. The results displayed in Table 1

TABLE 1
Factor Pattern Matrix in the Assessment of the
Primary Factor Structure for Recycling Attitudes

<i>Item</i>	<i>Factor 1 PC</i>	<i>Factor 2 AC</i>
Finding room to store recyclable materials is a problem	.7074	
The problem with recycling is finding time to do it	.7067	
Storing recyclable materials at home is unsanitary	.6578	
Storing recyclable materials at home is unsafe	.5776	
Recycling drop-off centers are too far away	.5254	
Recycling substantially reduces the use of landfills		.7085
Recycling conserves natural resources		.6510
Recycling won't make much difference in the quality of the environment		-.5895
Recycling creates jobs		.5569
Eigenvalues	2.5710	1.4411
Standardized alpha for the factor	.6537	.5522

indicate two factors, representing perceived external barriers to recycling (*PC*) and awareness of consequences of recycling (*AC*). Ascription of responsibility to oneself for recycling was measured with a single item. Scales were created by summing the standardized individual item scores, reversing the scoring for items that had negative correlations with the factor being measured. High scores on the resulting scales indicated a prorecycling stance by the respondent. Table 1 presents the scale reliabilities, whereas the scale intercorrelations are presented in Table 2.

A factor analysis of self-reports of participation or nonparticipation in recycling eight materials (glass, aluminum, plastic, car batteries, motor oil, clothing, newspapers, magazines) produced three factors. One included glass, aluminum, and plastic (the materials to be put in the blue bins); one included newspapers, magazines, and clothing; and one, car batteries and motor oil. Because the curbside recycling program was targeted at voluntary recycling of aluminum, glass, and plastic, this study used only those behaviors in the analysis.² For each material, responses were scored a 1 for participation and 0 for nonparticipation. This study used a standardized scale of self-reported recycling participation involving glass, aluminum, and

TABLE 2
**Intercorrelations of Recycling Attitudes,
 Bin Possession, and Reported Participation in Recycling**

<i>Variable</i>	<i>PC</i>	<i>AC</i>	<i>AR</i>	<i>Recycle</i>
Bin	.0719	.0977	.0224	.3826**
Personal costs (<i>PC</i>)	—	.1971*	.2647**	.1884*
Awareness of consequences (<i>AC</i>)		—	.3178**	.1207
Ascription of responsibility (<i>AR</i>)			—	.2863**
Reported recycling				—

NOTE: $N = 180$.

* $p < .05$; ** $p < .01$.

plastic. Possession of a bin was included as a 0-1 dummy variable with 1 indicating a household reported having a county-supplied bin. As mentioned, the county had provided bins to 26% of the households in our sample.

METHODS OF ANALYSIS

Analysis was conducted by regression to estimate the path model (see Figure 2) implied by Schwartz's theory. All parameters in the model were estimated using bootstrapped standard errors (see Dietz, Frey, & Kalof [1987] and Dietz, Kalof, & Frey, 1991 for a complete discussion of this technique). Each variable was regressed on those hypothesized to influence it in order to estimate a set of causal paths. As in previous research, our model places *AR* as the direct causal antecedent of behavior (the intervening variable, *personal norms*, was not measured directly), and *AC* as antecedent to *AR*. The perceived cost variable (*PC*) has been treated in two different ways in the literature: either as antecedent to *AC* (Black, Stern, & Elworth, 1985) or as causally parallel to *AC*, on the argument that *PC* reflects a cost-benefit calculus based on egoistic values and *AC* represents an altruistic one (see Stern et al., 1993). Both path models yielded essentially the same results from the standpoint of the issues central to the present analysis, so only the model with *PC* antecedent to *AC* was analyzed.

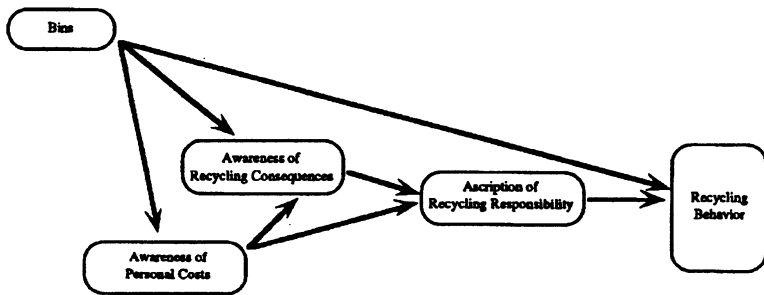


Figure 2. Causal Model of Relationships of Incentives, Attitudes, and Reported Recycling

Significance of interaction effects was assessed using *t* tests and measured the effects of the presence of a bin on the strength of predictive relationships in the attitudinal model.

RESULTS

Possession of a bin was not significantly related to any demographic variable except age (a negative relationship, $F = 8.54$, $p = .004$), so the natural experiment was not biased in any apparent way. Because the demographic variables were not related to the measures of ascription of responsibility, awareness of consequences, or personal costs at conventional significance levels, they are not considered further.

The path model accounted for 25% of the variance in the index of recycling behavior (see Table 3). Ascription of responsibility exerted a significant, direct effect on recycling behavior ($t = 4.0$, $p < .001$), as predicted by the Schwartz model. Neither awareness of consequences of recycling nor perceived personal costs had a significant direct effect on recycling behavior, holding other variables constant ($t = -0.0$, $p > .98$; $t = -1.0$, $p > .32$, respectively), but they had significant direct effects on ascription of responsibility ($t = 4.3$, $p < .001$; $t = -2.2$, $p < .03$). The effects of awareness of consequences were consistent with the predictions of the Schwartz model. Rather than affecting recycling behavior directly, perceived

TABLE 3
Path Model Estimates Using Unstandardized Regression Coefficients

Independent Variable	Dependent variable			
	Recycling	Ascription of Responsibility	Awareness of Consequences	Personal Cost
Ascription of responsibility	.36 ** (.08)	—	—	—
Awareness of consequences	-.01 (.07)	.30 ** (.07)	—	—
Personal costs	-.08 (.06)	-.13 * (.06)	-.22 ** (.07)	—
Bin	.82 ** (.13)	-.04 (.14)	.28 * (.13)	-.27 * (.13)
Bin \times AR interaction	-.30 * (.12)	—	—	—
Intercept	-.32 (.09)	.01 (.07)	-.06 (.07)	-.06 (.07)
R^2	.25	.12	.07	.01

NOTE: Numbers in parentheses are bootstrapped standard errors.

* $p < .05$; ** $p < .01$.

personal costs acted indirectly, as indicated in Figure 2, through the direct effects on awareness of consequences ($t = 3.1$, $p < .003$) and ascription of responsibility. This suggests that rather than trading off norm-valued choices directly against their personal costs, people take perceived costs into account within the norm-activation process. Similar findings were reported by Black, et al. (1985).

The strongest evidence about the effects of external conditions came from analysis of the effect of the presence of a recycling bin in the household. Possession of a bin had a significant direct effect on recycling behavior, increasing the rate of recycling by .82 SDs ($t = 6.3$, $p < .001$). It also entered into the norm-activation process. Although it had no direct effect on ascription of responsibility ($t = -0.3$, $p > .76$), it had significant effects on both awareness of consequences and perceived personal cost ($t = 2.2$, $p < .03$; $t = -2.1$, $p < .04$). These

findings demonstrate that extrinsic conditions influence behavior directly and indirectly through the personal beliefs that drive the Schwartz model.

The key hypothesis of the present argument concerned an interaction. It was hypothesized that extrinsic conditions affect the predictive power of the Schwartz model. This hypothesis is best tested by the $\text{Bin} \times \text{AR}$ interaction effect on behavior, an effect that was significant ($t = 2.3, p < .03$).³ The regression coefficient describing the effect of ascription of responsibility on recycling for households without a bin was .36 (i.e., the AR coefficient when the interaction term is zero), indicating that, for each one standard deviation increase in ascription of responsibility, those households were about one-third standard deviation higher on the recycling scale. But for households with a bin, the effect of ascription of responsibility was reduced to .06 (the sum of the effect of AR , .36, and the interaction term, $-.30$), indicating that a standard deviation change in AR produced a relatively minuscule increase in recycling compared to those without a bin.

DISCUSSION

The Schwartz model was very effective at predicting behavior for households without bins, but had virtually no predictive value for households with bins. This interaction is consistent with the theoretical model, and the direction suggests that the effect of providing bins is to remove a major barrier to action consistent with preexisting attitudes. The data suggest that the respondents did, in fact, have strong prorecycling attitudes. The mean score on the AC scale, which measures beliefs about several benefits of recycling and thus provides a rough indicator of attitude toward the act, was 14 on a scale from 4 to 16.

As would be expected from the fact that curbside pickup makes recycling more convenient, having a bin acted to decrease the perceived personal cost of recycling. More important for our theory, having a bin increased the awareness of the social and environmental consequences of recycling, an aware-

ness that is essential for activating personal norms for recycling. In short, external conditions affected attitudinal processes independently of their direct effect (which is larger in this instance) on behavior.

Derksen and Gartrell (1993) reported an opposite effect: Their general measure of environmental concern had an effect only for families who lived in single-family dwellings and had a bin. Because of the differences in the distributions of bins and the measures of key attitudinal variables, it is difficult to determine why opposite effects were found here. Derksen and Gartrell offered no hypothesis regarding the direction of effects. If the difference is not to be attributed to design differences in the two studies, which were substantial, the theory presented here suggests that either the disadvantages of recycling in Edmonton, Alberta, were greater or the attitudes toward recycling were less favorable than in Fairfax. If this were the case, the provision of a bin in Edmonton would have made external conditions favorable enough to encourage attitudinal effects, whereas in Fairfax, the provision of a bin would have made them so favorable that nearly everyone recycled regardless of attitudes.

It should be noted that the findings regarding the direct and indirect effect of possessing a bin could have resulted from a social desirability effect, in which reports of recycling increase with the presence of a bin. It is plausible that distributing recycling bins could act as a signal of a social norm for recycling. Thus, it could increase social desirability pressure even if it does not alter behavior. Neither our research nor Derksen and Gartrell's (1993) had an independent behavioral measure to check this effect directly, but we had a partial check on the social desirability hypothesis in respondents' self-reports of their recycling of items other than glass, aluminum, and plastic. Households with and without bins did not differ in self-reported recycling of these other items. Although this evidence does not definitively rule out social desirability effects, it does suggest that the observed differentiation by type of waste was more consistent with a behavioral difference than with a social desirability effect, which would have generalized to other types of recycling.

The present findings are consistent with Bagozzi's (1992) suggestion that models linking attitudes to behavior should incorporate a consideration of the context within which people act and identify boundary conditions for their applicability. Empirical support for a theoretical account that identifies strength of external barriers or inducements as a factor that defines the boundaries of applicability for theories of attitude-behavior relations is presented here. This theory makes possible an accommodation of accounts of behavior offered in two different research traditions by making a place for external conditions, attitudinal effects, and interactions of the two. In this *A-B-C* framework, the exploration of the main effects and interactions was an empirical project. However, an important theoretical and practical implication of this framework is to draw attention to the possibility that external conditions can alter attitudinal processes and that responses to external conditions may be affected by cognitive and social-psychological processes.

A contextual model such as the one presented here has substantial advantages. First, it improves the ability to model behavior by incorporating external conditions. Second, it clarifies what may otherwise seem to be discrepant findings on the linkage between attitudes and behavior. If the attitude-behavior link operates only within some contexts, then the results of a study will depend on the contexts sampled in that study. Third, it links the substantial theoretical work on attitudes and behaviors to the kinds of innovations typical of public policy, which tend to involve changes in external conditions more than in cognitions or beliefs.

Our research suggests that both behavioral theory and attitude theory should be broadened to allow for the concepts from the other intellectual culture. Attitude theory needs to be modified to include not only the perception of external conditions but the external conditions themselves. Such a broader, context-sensitive theory is necessary because both external conditions and psychological interventions are sometimes used to change behavior. Thus it is important analytically and practically to assess their effects separately and in interaction.

In the present analysis of recycling behavior, the varied external condition, increased convenience, interacted with the attitudinal process in such a way that the attitudinal model only predicts behavior within a certain range of the strength of the external condition. In this particular instance, with the removal of a substantial barrier, proattitudinal behavior became common and the Schwartz model lost its explanatory power. More generally, the evidence supports external boundaries for the Schwartz model. Similar bounds may exist for attitude-behavior models related to the theory of reasoned action.

NOTES

1. A copy of the survey instrument is available from Gregory A. Guagnano, Department of Sociology and Anthropology, George Mason University, Fairfax, VA 22030.
2. The rate of self-reported newspaper recycling, a behavior mandated by county ordinance, was so high (96%) that there was no point to analyze its dependence on attitudes.
3. Interactions of the bin variable with the other variables in the model were not statistically significant at the .05 level.

REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 172-211.
- Arbuthnot, J., Tedeschi, R., Waymer, M., Turner, J., Kressel, S., & Rush, R. (1977). The induction of sustained recycling behavior through the foot in the door technique. *Journal of Environmental Systems*, 6, 354-367.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions and behavior. *Social Psychology Quarterly*, 55, 178-204.
- Bagozzi, R. P., Baumgartner, H., & Yi, Y. (1992). State versus action orientation and the theory of reasoned action: An application to coupon usage. *Journal of Consumer Research*, 18, 505-518.
- Bagozzi, R. P., & Warshaw, P. R. (1990). Trying to consume. *Journal of Consumer Research*, 17, 127-140.
- Belsey, D. A., Kuh, K., & Welsch, R. E. (1980). *Regression diagnostics*. New York: Wiley.
- Black, J. S., & Heberlein, T. A. (1976, August). *Emergent norms and environmental action: Reciprocal causation of personal and perceived social norms in the purchase of lead-free gasoline*. Paper presented at the annual meeting of the Rural Sociological Society, New York.
- Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and contextual influences on household energy adaptations. *Journal of Applied Psychology*, 70, 3-21.

- Brehm, J. W. (1966). *A theory of psychological reactance*. New York: Academic Press.
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.
- Derksen, L., & Gartrell, J. (1993). The social context of recycling. *American Sociological Review*, 58, 434-442.
- De Young, R. (1984). Motivating people to recycle: The use of incentives. *Resource Recycling*, 42, 14-42.
- De Young, R. (1985-1986). Encouraging environmentally appropriate behavior. *Journal of Environmental Systems*, 15, 281-292.
- De Young, R. (1986). Some psychological aspects of recycling. *Environment and Behavior*, 18, 435-449.
- De Young, R. (1990). Recycling as appropriate behavior: A review of survey data from selected recycling education programs in Michigan. *Resources, Conservation, and Recycling*, 3, 1-13.
- Dietz, T., Frey, R. S., & Kalof, L. (1987). Estimation with cross-national data: Robust and nonparametric methods. *American Sociological Review*, 52, 380-390.
- Dietz, T., Kalof, L., & Frey, R. S. (1991). On the utility of robust and resampling procedures. *Rural Sociology*, 56, 461-474.
- Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. *Advances in Experimental Social Psychology*, 23, 75-109.
- Fazio, R. H., Zanna, M. P., & Cooper, J. (1977). Dissonance and self-perception: An integrative view of each theory's proper domain of application. *Journal of Experimental Social Psychology*, 13, 464-479.
- Fishbein, M. (1979). A theory of reasoned action: Some applications and implications. In H. E. Howe, Jr. (Ed), *Nebraska Symposium on Motivation* (pp. 65-116). Lincoln: University of Nebraska Press.
- Gardner, G. T., & Stern, P. C. (in press). *Environmental problems and human behavior*. Needham Heights, MA: Allyn & Bacon.
- Geller, E. S., Winett, R. A., & Everett, P. B. (1982). *Preserving the environment: New strategies for behavior change*. New York: Pergamon.
- Gitlitz, J. S. (1989) Curbside collection containers: A comparative evaluation. *Resource Recycling*, 70, 20-51.
- Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior: Normative and behavioral strategies to explain participation in a community recycling program. *Environment and Behavior*, 23, 195-220.
- Humphrey, C. R., Bord, R. J., Hammond, M. M., & Mann, S. H. (1977). Attitudes and conditions for cooperation in a paper recycling program. *Environment and Behavior*, 9, 107-24.
- Ingram, R. E., & Geller, E. S. (1975). A community integrated, behavior modification approach to facilitating paper recycling. *JSAS Catalog Selected Documents in Psychology*, 5, 327.
- Jacobs, H. E., & Bailey, J. S. (1982-1983) Evaluating participation in a residential recycling program. *Journal of Environmental Systems*, 12, 141-152.
- Katzev, R. D. (1989, February). *How to motivate recycling: Applying minimal justification techniques*. Paper presented at the Association for Conservation Information Winter Workshop, Arlington, VA.
- Katzev, R. D., & Pardini, A. U. (1987-1988). The comparative effectiveness of reward and commitment approaches in motivating community recycling. *Journal of Environmental Systems*, 17, 93-113.

- Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology*, 44, 117-154.
- Pardini, A. U., & Katzev, R. D. (1983-1984). The effect of strength of commitment on newspaper recycling. *Journal of Environmental Systems*, 13, 245-54.
- Reid, D. H., Luyben, P. D., Rawers, R. J., & Bailey, J. S. (1976). Newspaper recycling: The effects of prompting and proximity of containers. *Environment and Behavior*, 12, 157-166.
- Salmon, C. T., & Nichols, J. S. (1983). The next birthday method of respondent selection. *Public Opinion Quarterly*, 47, 270-276.
- Schwartz, S. H. (1968a). Awareness of consequences and the influence of moral norms on interpersonal behavior. *Sociometry*, 31, 355-369.
- Schwartz, S. H. (1968b). Words, deeds and the perception of consequences and responsibility in action situations. *Journal of Personality and Social Psychology*, 10, 232-242.
- Schwartz, S. H. (1970). Elicitation of moral obligation and self-sacrificing behavior. *Journal of Personality and Social Psychology*, 15, 283-293.
- Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221-279). New York: Academic Press.
- Stern, P. C., Black, J. S., & Elworth, J. T. (1983). Adaptations to changing energy conditions among Massachusetts households. *Energy*, 8, 515-523.
- Stern, P. C., Dietz, T., & Black, J. S. (1986). Support for environmental protection: The role of moral norms. *Population and Environment*, 8, 204-222.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, 25, 322-348.
- Stern, P. C., & Oskamp, S. (1987). Managing scarce environmental resources. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 1044-1088). New York: Wiley.
- Tyler, T. R., Rasinski, K. A., & Griffin, E. (1986). Alternative images of the citizen: Implications for public policy. *American Psychologist*, 41, 970-978.
- Van Liere, K. D., & Dunlap, R. E. (1978). Moral norms and environmental behavior: An application of Schwartz's norm activation model to yard burning. *Journal of Applied Social Psychology*, 8, 174-188.
- Witmer, J. F., & Geller, E. S. (1976). Facilitating paper recycling: Effects of prompts, raffles and contexts. *Journal of Applied Behavioral Analysis*, 9, 315-22.