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VALUES AND THEIR EFFECT ON PRO-ENVIRONMENTAL BEHAVIOR

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ABSTRACT: Environmental protection may be described as a social dilemma. That is, collectively, we are better off if the environment is protected, but rational self-interest often dictates environmental exploitation. The role of personal values in influencing pro-environmental behavior is gaining increasing attention relative to other solutions, such as monetary incentives and punitive sanctions. Using Schwartz's measure of values, I examine the influence of values on environmental behavior. Based on Schwartz's theory, values found to have a positive influence on environmental behavior are self-transcendent/openness to change and universalism/biospheric. Values found to have a negative influence include self-enhancement/conservation.

Citizenship in a democracy has often been conceptualized as a moral obligation. Not only are individuals expected to look out for their own welfare, but they are expected to consider what is best for the society as a whole. Often, conflicts arise between pursuing self-interest and realizing the collective good. Generally, conflicts between individual and collective interests are called "social dilemmas" (Dawes, 1980; Yamagishi, 1994). Individualistic preoccupation may be detrimental to democracy as a whole (deTocqueville, 1840/1945) and may undermine the provision of a variety of collective goods in specific. Individuals are reluctant to give blood, even though they all would prefer to have a ready supply; they are reluctant to donate to public television even though they watch its programs; and they are reluctant to take public transportation even though each would prefer a traffic-free highway. Environmental protection presents a similar conflict between individual and collective preferences.

Collectively, we prefer environmental protection, but few wish to pay the associated costs. Hardin (1968) has described the outcome of this conflict as a "tragedy of the commons," a tragedy because few people make the collectively beneficial choice.

Recently, attention has been given to the role of values in motivating pro-environmental behavior to promote collectively beneficial decision making. Voluntary choice may be influenced by values that transcend self-interest. Stern (1992), for example, in his review of psychological research on environmental behavior, identifies a multiplicity of factors that influence pro-environmental behavior, with attitudes and values playing a significant role. The study reported here is specifically concerned with the role of values in promoting pro-environmental behavior.

VALUES AND ENVIRONMENTAL BEHAVIOR

Values are not the only solution to the social dilemma of environmental protection. Other motivators include formal and informal sanctioning systems and market incentives that make pro-environmental behavior more or less rewarding (Axelrod & Lehman, 1993; De Young, 1993; Grasmick, Bursik, & Kinsey, 1991; Gray, 1985; Karp & Gaulding, in press). Nevertheless, values seem to play an important role.

Past research has suggested that values play a role in specific situations when they are activated by a set of altruistic concerns. Schwartz (1977) argued that altruistic behavior would occur when individuals hold personal norms with regard to a specific behavior. He further argued that these norms are the result of both the awareness of the consequences of engaging or not engaging in the behavior and the ascription of personal responsibility for carrying out the altruistic behavior. Thus values influence behavior when they are activated by situational concerns. Hopper and Nielsen (1991) and Vining and Ebreo (1992) found that recycling can be predicted by Schwartz's altruism model. Stern, Dietz, and Kalof (1993) found

the Schwartz model predictive of environmental behavioral intentions.

This model is largely predictive because it is both situationally specific and because it includes one additional concern beyond personal values. First, personal norms are measured at the same level of analysis as the behavior; for example, an individual who feels personally obligated to help in a disaster is more likely to help in a disaster than others. Second, the model addresses one rational calculation by actors: the perception of the costs and benefits of engaging in the behavior, that is, the awareness of consequences.

But values may be influential even when they are not situationally specific. Rokeach (1973) argued that values are generalized internal standards that transcend specific situations. They are relatively few in number (in contrast to the thousands of attitudes one might hold) and are relatively stable. Most important, they are guides for behavior; thus they should have a measurable influence on behavioral choice. Values may also guide behavior independently of cost/benefit calculations. Rokeach's Scale of Values was employed in a test of the effect of values on recycling (Dunlap, Grieneeks, & Rokeach, 1983). By distinguishing values according to Maslow's (1968) Hierarchy of Needs, Dunlap et al. found that recyclers pursued higher order needs to a greater extent than nonrecyclers. In a study by Simmons, Binney, and Dodd (1992), a new item, "a clean environment," was added to the Rokeach scale. In a factor analysis, Simmons et al. found this value to be conceptually related to self-transcendent items such as a world of peace, a world of beauty, equality, and freedom.

Recently, Schwartz (1992; Schwartz & Bilsky, 1987, 1991) and his colleagues have presented a new theory of values and a methodology that is predicated on the Rokeach scale. According to Schwartz (1992), values are arrayed along two dimensions. In any culture, individual values will fall along a dimension of self-enhancement to self-transcendence. This dimension reflects the distinction between values oriented toward the pursuit of self-interest and values related to a concern for the welfare of others.

It arrays values in terms of the extent to which they motivate people to enhance their own personal interests (even at the expense of others) versus the extent to which they motivate people to transcend selfish concerns and promote the welfare of others, close and distant, and of nature. (p. 43)

The second dimension contrasts openness to change with conservation.

It arrays values in terms of the extent to which they motivate people to follow their own intellectual and emotional interests in unpredictable and uncertain directions versus to preserve the status quo and the certainty it provides in relationships with close others, institutions, and traditions. (p. 43)

This dimension indicates the degree to which individuals are motivated to independent action and willing to challenge themselves for both intellectual and emotional realization.

Schwartz further postulates that within these two dimensions are 10 motivational value types:

1. Universalism: "understanding, appreciation, tolerance, and protection for the welfare of all people and for nature" (p. 12).
2. Benevolence: "preservation and enhancement of the welfare of people with whom one is in frequent personal contact" (p. 11).
3. Conformity: "restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms" (p. 9).
4. Tradition: "respect, commitment, and acceptance of the customs and ideas that one's culture or religion impose on the individual" (p. 10).
5. Security: "safety, harmony, and stability of society, of relationships, and of self" (p. 9).
6. Power: "attainment of social status and prestige, and control or dominance over people and resources" (p. 9).
7. Achievement: "personal success through demonstrating competence according to social standards" (p. 8).
8. Hedonism: "pleasure or sensuous gratification for oneself" (p. 8).
9. Stimulation: "excitement, novelty, and challenge in life" (p. 8).
10. Self-direction: "independent thought and action-choosing, creating, exploring" (p. 5).

These value dimensions and motivational types may be predictive of behavior that promotes the collective good in

general, and environmental behavior in particular. Attitude theory (Ajzen & Fishbein, 1980) suggests that global attitudes are poor predictors of specific behaviors. Values are important because of their measurable impact on behavior, despite the generality. Recent research using the Schwartz Scale of Values is limited, but it has demonstrated the link between values and behavior. Stern and Dietz (in press) used 32 items from the Schwartz scale and added two additional environmental items. The environmental items formed a single factor with other self-transcendent items. Stern and Dietz found that self-transcendence was a positive predictor of a willingness to engage in pro-environmental political action. Self-enhancement was found to be a negative predictor. The dependent variable in this study most closely corresponds to behavioral intentions, which may be most predictive of pro-environmental attitudes rather than actual behavior (Ajzen & Fishbein, 1980).

The objective of this study is to clarify the role of values in predicting environmental behavior. Unlike previous studies, this one uses a complete Schwartz Scale of Values to test the effects of a full range of values on a set of self-reported environmental behaviors. The two major questions asked in this study are What kinds of values do individuals hold? and Do values influence pro-environmental behavior? Based on Schwartz's model, the following hypotheses are formulated, predicting the relationship between values and pro-environmental behavior.

H1: Individuals who strongly value both self-transcendence and openness to change will engage in pro-environmental behavior. When self-transcendence and openness to change are combined as a set of values, we expect both a willingness to contribute to the collective good and a willingness to change the status quo to do so. Such individuals may express their beliefs through activism, calling for social changes that positively affect the environment, despite any risk of sanctions by those who wish to preserve the status quo.

H2: Individuals who strongly value both self-transcendence and conservation will engage in pro-environmental behavior but will do so when the behavior is a normative standard. According to Cialdini, Reno, and Kallgren (1990), norms may

be both injunctive and descriptive, referring to what people are supposed to do and what they actually do. Not littering would be an example of such a behavior that is both normative and pro-environmental.

H3: Individuals who strongly value self-enhancement and openness to change will engage in pro-environmental behavior only when there is a clear link between self-interest and pro-environmental behavior. For example, buying organic produce may be both self-interested (healthier) and pro-environmental.

H4: Individuals who strongly value self-enhancement and conservation are the least likely to be pro-environmental. However, when there is both a clear link between self-interest and pro-environmental behavior, and the pro-environmental behavior is normative, they will engage in the behavior. For example, turning lights off in an unused room is pro-environmental (saves electricity), self-interested (saves money), and normative (a widely accepted practice).

STUDY DESIGN

In this study, values are measured using the Schwartz (1992) Scale of Values. Pro-environmental behavior is measured by a scale of self-reported pro-environmental activities. Several value configurations are derived through factor analysis; these are then used to test hypotheses regarding the influence of values on self-reported behavior. Pro-environmental behavior is broadly considered as a contribution to the collective good, distinguishing it from self-interested behavior. However, specific pro-environmental behaviors may be more or less self-interested. Thus we must distinguish between self-transcendent and self-enhancing environmental behavior. We must also distinguish between behavior that is normative and that which is atypical.

Subjects. Questionnaires were distributed to 302 (122 males and 180 females) undergraduates enrolled in an introductory sociology course at the University of Washington in spring 1993.

Materials. The Schwartz Scale of Values consists of 56 items designed to measure values cross-culturally. In this questionnaire, subjects are asked to rate the importance of each item as a "guiding principle in my life." A 9-point scale is used, including -1 = *opposed to my values*, 0 = *not important*, 3 = *important*, 6 = *very important*, 7 = *of supreme importance*. The 56 items are divided into two lists. For each list, subjects are asked to choose first the value that is most important to them and the value that is least important as an anchoring technique.

The environmental behavior scale consisted of 16 items measuring the frequency of participation in a variety of pro-environmental activities. These items were measured along a 5-point scale: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *usually*, 5 = *always*.

DATA ANALYSIS AND RESULTS

The object of this study is twofold: to analyze the structure of values and to assess the effect of these values on environmental behavior. A factor analysis (principal-axis factoring in SPSS for Windows) was conducted to reduce the 56 values into underlying constructs. Two types of rotation were used to clarify the factors. The objective of the first rotation, a quartimax rotation, was to maximize the location of dominant factors, should they exist, in order to test Schwartz's two-dimensional theory of values. A second rotation, this time varimax, was used to test the validity of Schwartz's theory of motivational types. Factors obtained from these rotations were used as independent variables in a series of multiple regressions, with environmental behavior as the dependent variable. A composite scale of the 16 environmental behavior items was used as the primary dependent variable for some of these regressions. Three more dependent variables were constructed as a result of a factor analysis conducted to reduce the 16 behavior items to underlying behavioral constructs.

TABLE 1
Environmental Behavior Factors With (Varimax)
Rotated Factor Loadings, Means, and Standard Deviations

<i>Environmental Behavior</i>	<i>Factor Loading</i>	<i>Mean^a</i>	<i>Standard Deviation</i>
Factor 1: Good Citizen		3.60	
Recycled cans, bottles, or papers	.595	4.14	0.83
Avoided using aerosol spray cans	.402	3.74	1.23
Bought products made of recycled materials whenever possible	.439	3.23	0.91
Voted for a candidate or referendum that supports environmental protection	.506	2.90	1.28
Tried not to litter	.659	4.52	0.74
Tried to reduce the amount of plastic products bought	.541	3.08	1.19
Factor 2: Activist		1.51	
Contributed money to an environmental group	.412	1.83	0.97
Did volunteer work for an environmental group	.556	1.77	1.03
Wrote a letter to your congressman about the environment	.753	1.27	0.72
Wrote a letter to the editor of a newspaper	.667	1.18	0.57
Factor 3: Healthy Consumer		2.29	
Avoided buying foods with chemicals (like preservatives)	.703	2.30	1.03
Bought organically grown produce	.506	2.22	0.95
Avoided buying products made by a company that pollutes	.629	2.35	1.07

a. Scale ranges from 1 = *never* to 5 = *always*.

DERIVATION OF THE DEPENDENT VARIABLES: ENVIRONMENTAL BEHAVIOR

The 16 environmental behavior items in the questionnaire were reduced to underlying constructs by factor analysis (principal-axis factoring) with a varimax rotation.² Three factors were obtained after varimax rotation. These factors are reported in Table 1, along with means and standard deviations of each item and summary means for each factor. No item had a factor loading greater than .4 on more than one factor, and three items had no high loadings on any factor.

The three factors obtained are characterized as Good Citizen, Activist, and Healthy Consumer. The Good Citizen factor is descriptive of behaviors that are pro-environmental and are engaged in relatively frequently (the summary mean fell between sometimes and usually). The Activist factor is descriptive of behaviors engaged in infrequently, presumably because of the higher investment required for action (the summary mean fell between never and rarely). Finally, the Healthy Consumer factor is distinguished not only by level of participation but by an orientation to consumer behavior, particularly regarding purchasing healthy, ecologically friendly food. Like the Activist factor, the level of participation in this factor is relatively infrequent (the summary mean fell between rarely and sometimes).

According to Cialdini et al. (1990), norms may be considered descriptive of what most people do (descriptive norms) or prescriptive of what people ought to do (injunctive norms). Because of the high frequency of participation in the Good Citizen factor compared to the other factors, we will call this factor a descriptive norm. In contrast, the Activist factor is indicative of infrequent behavior, or behavior that is not a descriptive norm. These data cannot tell us whether or not such behavior is an injunctive norm. The Healthy Consumer factor is also indicative of infrequent behavior and is also not a descriptive norm. More important, it may reflect pro-environmental behavior that is partially self-interested; one may engage in some of these behaviors because of personal health concerns, as well as environmental concerns.

This factor analysis enabled me to construct four dependent variables: a composite score of all 16 items as a general measure of pro-environmental behavior (Cronbach's $\alpha = .82$); a factor-based score of the Good Citizen items ($\alpha = .72$); a factor-based score of the Activist items ($\alpha = .70$); and a factor-based score of the Healthy Consumer items ($\alpha = .69$). These dependent variables are simple additive scores of the individual responses to each item with a factor loading of .4 or higher on the corresponding factor.

DERIVATION OF INDEPENDENT VARIABLES: VALUES

To reduce the 56 items into a set of underlying constructs, two factor analyses (principal-axis factoring) were conducted.³ Schwartz's theory of cultural values predicts that two orthogonal dimensions and 10 motivational types of intercorrelated items will emerge in a smallest space analysis of these data. Table 2 lists the Schwartz value items and their relationship to the two dimensions and 10 motivational types. Using factor analysis, two methods may be used to obtain a similar, but not identical, outcome. First, a quartimax rotation will emphasize dominant factors, therefore minimizing the number of interpretable factors needed to explain the structural relationship of the 56 value items. Thus the largest factors ought to correspond to the quadrants of the two Schwartz dimensions. Second, a varimax rotation reduces the data by distinguishing factors by the number of high factor loadings. Thus more interpretable factors may emerge than in the quartimax rotation. These latter factors are predicted to correspond not with Schwartz's two orthogonal dimensions but with his 10 intercorrelated motivational types. The outcomes of both of these analyses are reported.

SCHWARTZ'S TWO DIMENSIONS

In the quartimax rotation, as predicted, a few factors received a relatively large number of high factor loadings (greater than .4), whereas several other factors have few high factor loadings, making these latter factors particularly difficult to interpret. Nevertheless, the object here is to identify the structure of the large factors. Factors that have three or more high loadings that do not load on other factors are interpreted. Out of 14 factors with eigenvalues greater than 1, 4 fulfilled this condition. These factors are reported in Table 3. Fundamentally, we can ask how well these 4 factors compare to Schwartz's two-dimensional construct (see Table 2). Each of these factors may be compared to a quadrant of these two dimensions (however, the factors are independent of one another, unlike Schwartz's conceptualization).

TABLE 2
Value Items According to Schwartz's Dimensions of Self-Transcendence
Versus Self-Enhancement (T/E), Openness to Change
Versus Conservation (O/C), and 10 Motivational Types

Value	T/E	O/C	Motivational Type	
1	Equality	T	O	Universalism
2	Inner harmony	T	O	Universalism
3	Social power	E	C	Power
4	Pleasure	E	O	Hedonism
5	Freedom	T	O	Self-Direction
6	A spiritual life	T	C	Benevolence
7	Sense of belonging	E	C	Security
8	Social order	E	C	Security
9	An exciting life	E	O	Stimulation
10	Meaning in life	T	C	Benevolence
11	Politeness	T	C	Conformity
12	Wealth	E	C	Power
13	National security	E	C	Security
14	Self-respect	T	O	Self-Direction
15	Reciprocation of favors	E	C	Security
16	Creativity	T	O	Self-Direction
17	A world at peace	T	O	Universalism
18	Respect for tradition	T	C	Tradition
19	Mature love	T	C	Benevolence
20	Self-discipline	T	C	Conformity
21	Detachment	T	C	Tradition
22	Family security	E	C	Security
23	Social recognition	E	C	Power
24	Unity with nature	T	O	Universalism
25	A varied life	E	O	Stimulation
26	Wisdom	T	O	Universalism
27	Authority	E	C	Power
28	True friendship	T	C	Benevolence
29	A world of beauty	T	O	Universalism
30	Social justice	T	O	Universalism
31	Independent	T	O	Self-Direction
32	Moderate	T	C	Tradition
33	Loyal	T	C	Benevolence
34	Ambitious	E	O	Achievement
35	Broad-minded	T	O	Universalism
36	Humble	T	C	Tradition
37	Daring	E	O	Stimulation
38	Protecting the environment	T	O	Universalism
39	Influential	E	O	Achievement
40	Honoring parents and elders	T	C	Conformity

(continued)

TABLE 2 Continued

Value	T/E	O/C	Motivational Type
41	T	O	Self-Direction
42	E	C	Security
43	E	O	Achievement
44	T	C	Tradition
45	T	C	Benevolence
46	E	C	Power
47	T	C	Conformity
48	E	O	Achievement
49	T	C	Benevolence
50	E	O	Hedonism
51	T	C	Tradition
52	T	C	Benevolence
53	T	O	Self-Direction
54	T	C	Benevolence
55	E	O	Achievement
56	E	C	Security

Factor 1 consists of 15 items with loadings greater than .4. Thirteen (87%) consist of self-transcendence items. Thirteen (87%) consist of conservation items (items can load on both dimensions). This provides support for interpreting this factor as Self-Transcendence/Conservation. Factor 2 consists of six items. Four items (67%) are self-transcendence items. All items (100%) are openness to change items. This supports a Self-Transcendence/Openness to Change interpretation. Factor 3 consists of six items; five (83%) are self-enhancement items and five items (83%) are openness to change items. This is a Self-Enhancement/Openness to Change factor. Factor 4 consists of four items; four (100%) are self-enhancement items and three (75%) are conservation items. This factor represents the fourth and last quadrant, Self-Enhancement/Conservation.

MOTIVATIONAL TYPES

Schwartz also predicts 10 motivational types to emerge, and these are analyzed by using a varimax rotation. Here we are looking for a more distributed pattern of intercorrelations among the items, because the rotation maximizes the number of factors

TABLE 3
Factor Loadings of Values Items With Quartimax Rotation

Item	Factor Loading	α
Factor 1: Self-Transcendence/Conservation		.83
8 Social order	.425	
10 Meaning in life	.425	
11 Politeness	.599	
17 A world at peace	.438	
18 Respect for tradition	.539	
20 Self-discipline	.480	
30 Social justice	.453	
40 Honoring parents and elders	.601	
44 Accepting my portion in life	.433	
45 Honest	.515	
47 Obedient	.620	
49 Helpful	.586	
52 Responsible	.535	
54 Forgiving	.573	
56 Clean	.473	
Factor 2: Self-Transcendence/Openness to Change		.74
16 Creativity	.669	
24 Unity with nature	.474	
25 A varied life	.578	
26 Wisdom	.539	
37 Daring	.549	
53 Curious	.562	
Factor 3: Self-Enhancement/Openness to Change		.74
41 Choosing own goals	.500	
42 Healthy	.468	
43 Capable	.565	
48 Intelligent	.585	
50 Enjoying life	.511	
55 Successful	.565	
Factor 4: Self-Enhancement/Conservation		.71
3 Social power	.693	
27 Authority	.803	
39 Influential	.401	
46 Preserving my public image	.443	

NOTE: Reliability coefficients (Cronbach's Alpha) are also reported for factor-based scores

with high loadings. The varimax solution is reported in Table 4. As predicted, the structure of this solution differs from the quartimax solution. Out of 14 factors, 8 of them have three or more items with high factor loadings (Factors 1, 2, 3, 5, 6, 8, 10,

TABLE 4
Factor Loadings of Values Items With Varimax Rotation

Item	Factor Loading	α
Factor 1: Achievement		
41 Choosing own goals	.498	.74
42 Healthy	.428	
43 Capable	.583	
48 Intelligent	.644	
50 Enjoying life	.430	
55 Successful	.577	
Factor 2: Stimulation/Self-Direction		
9 An exciting life	.406	.74
16 Creativity	.661	
25 A varied life	.563	
26 Wisdom	.550	
37 Daring	.470	
53 Curious	.520	
Factor 3: Tolerance ^a		
33 Loyal	.676	.62
35 Broad-minded	.528	
36 Humble	.597	
Factor 5: Security		
8 Social order	.490	.62
12 Wealth	.491	
13 National security	.670	
Factor 6: Power		
3 Social Power	.637	.71
27 Authority	.790	
39 Influential	.451	
46 Preserving my public image	.415	
Factor 8: Universalism/Biospheric		
24 Unity with nature	.439	.72
29 A world of beauty	.586	
38 Protecting the environment	.613	
Factor 10: Friendship ^a		
7 Sense of belonging	.680	.61
23 Social recognition	.437	
28 True friendship	.499	
Factor 11: Inner strength ^a		
2 Inner harmony	.580	.61
14 Self-respect	.504	
20 Self-discipline	.407	

NOTE: Reliability coefficients (Cronbach's alpha) are also reported for factor-based scores.
a. Empirically derived factor labels.

and 11). These factors may be representative of motivational types (Table 2 shows the correspondence of individual items to

the motivational types). Factor 1 consists of six items. Three items are representative of Achievement. One item is representative of Hedonism, a bordering region in Schwartz's spatial model. Two items are from distal regions. Thus this factor may be tentatively called Achievement, but it has relatively little correspondence to Schwartz's construct. Factor 2 consists of six items. Five of six represent Stimulation and Self-Direction, which are bordering types. One item represents Universalism. This factor may be called Stimulation/Self-Direction. Factor 3 consists of three items each from a separate (but bordering) region. This lack of correspondence suggests an alternative motivational label. Considering the items, loyal, broad-minded, and humble, one possible label may be Tolerance. Factor 5 consists of three items; two are Security and one is Power, a bordering type. This factor is called Security. Factor 6 consists of four items, three representing the Power type, and one from Achievement (a bordering type). This factor is called Power. Factor 8 consists of three items, each a Universalism type. However, each item is also conceptually relevant to environmental values as argued by Stern, Dietz, Guagnano, and Kaijof (1994). Therefore, this factor is called Universalism/Biospheric. Factor 10 consists of three items, each from a separate (but again bordering) region. After consideration of the items, sense of belonging, social recognition, and true friendship, this factor is called Friendship. Factor 11 consists of three items, inner harmony, self-respect, and self-discipline, each from a different region. The factor is called Inner Strength. In sum, of the eight interpretable factors, five show some correspondence to Schwartz's motivational types (Achievement, Stimulation/Self-Direction, Security, Power, and Universalism/Biospheric). Three are given names outside of the Schwartz conceptualization (Tolerance, Friendship, and Inner Strength). Most relevant to the subject of this article is the identification of Stern et al.'s Biospheric value as a distinct factor in which other social values items do not load highly.

Both the quartimax and varimax analyses were used to construct factor-based scores. As in the case of the dependent variables, these scores are additions of the raw scores for each

TABLE 5
Predicted Effects of Values Factors on Environmental Behavior Factors

Values Factor	Good			Healthy
	Composite	Citizen	Activist	Consumer
Self-Transcendence/Openness to Change	+	+	+	+
Self-Transcendence/Conservation		+	-	-
Self-Enhancement/Openness to Change		-	-	+
Self-Enhancement/Conservation	-	-	-	-
Universalism/Biospheric	+	+	+	+
Achievement		-	-	+
Security	-	-	-	-
Power	-	-	-	-
Stimulation/Self-Direction				
Tolerance				
Friendship				
Inner Strength				

high-loading item. Reliability coefficients (Cronbach's alpha) for the interpreted quartimax and varimax factors are reported in Tables 3 and 4.

HYPOTHESES

At this point, we are able to assert the operational hypotheses regarding the relationship between values factors and environmental behavior factors. Predictions regarding the effect of Schwartz's two dimensions are based on quartimax factors, and predictions regarding the effect of motivational types are based on varimax factors. Regressions were conducted to test these predictions. The predictions are summarized in Table 5.

H1: Self-Transcendence/Openness to Change will be positively associated with all types of pro-environmental behavior. Thus Self-Transcendence/Openness to Change will have a positive effect on the Composite score of pro-environmental behaviors. It will also positively predict the Activist, Good Citizen, and Healthy Consumer factors. Because Universalism/Biospheric is a motivational type associated with both self-transcendence and openness to change, it is further predicted

that Universalism/Biospheric will have a positive effect on all four pro-environmental factors. Moreover, biospheric values are the most relevant to environmental action. Therefore, they should have the clearest effect.

H2: Individuals who strongly value Self-Transcendence/Conservation will engage in pro-environmental behavior, but will do so when it is normatively prescribed to do so. Thus holding these values will negatively predict the Activist and Healthy Consumer factors but positively predict the Good Citizen factor. The Composite factor does not distinguish between types of behavior; therefore predictions for it cannot be made. No motivational types were obtained that fall within the Self-Transcendence/Conservation category.

H3: Individuals who strongly value Self-Enhancement/Openness to Change will engage in pro-environmental behavior only when there is a clear link between self-interest and pro-environmental behavior. Because Healthy Consumer behaviors are not social norms, they require adherence to Openness to Change. Because such behaviors may be motivated by either self-interest or collective interest, they may be self-enhancing or self-transcending. Holding these values will negatively predict both the Activist and Good Citizen factors, but positively predict the Healthy Consumer factor. Again, predictions regarding the Composite factor cannot be made because of the contradictory normative effects on each behavior type. Based on the location of the Achievement within these underlying dimensions, it is further predicted that Achievement will have a positive effect on Healthy Consumer and a negative effect on Activist and Good Citizen.

H4: Individuals who strongly value Self-Enhancement/Conservation are the least likely to be pro-environmental. A pro-environmental behavior factor that satisfies the above condition, in which a positive influence may be observed, was not obtained in these data. Thus holding these values will negatively predict all four environmental behavior factors, including the Composite score. Based on the location of the motivational

types within these underlying dimensions, it is further predicted that Security and Power will have a negative effect on all four environmental behavior factors.

Eight separate regressions were conducted to measure the effects of the values factors on the environmental behavior factors. Four regressions tested the effects of the quartimax values factors on each of the four dependent variables, and four more regressions were conducted for the varimax factors. The regressions were conducted using listwise deletion of missing cases. The regression of the varimax factors included all eight factors, although four were not predicted because they did not represent the Schwartz model (Tolerance, Friendship, Inner Strength) or combined motivational types from two quadrants (Stimulation/Self-Direction). Results of these quartimax and varimax regressions are reported in Table 6.

H1: As predicted, Self-Transcendence/Openness to Change had a significant, positive effect on Composite, Activism, Good Citizen, and Healthy Consumer. Universalism/Biospheric also had a positive effect on all four pro-environmental behavior factors.

H2: Self-Transcendence/Conservation had no significant effects.

H3: Self-Enhancement/Openness to Change had no significant effects, nor did Achievement.

H4: Self-Enhancement/Conservation was a negative predictor of Composite and Activist.

The main finding in this study is the effect of Self-Transcendence/Openness to Change and Universalism/Biospheric as positive predictors of all three types of environmental behavior. It is clear that many of the predicted effects were not obtained. Out of 29 operational predictions, only 10 were statistically significant. Yet out of that 10, all predictions were confirmed. The two hypotheses with consistent directional predictions for all types of behavior (H1 and H4) found the most support. The second and third hypotheses were not supported. Although the other effects were not significant, 15 out of 19 predictions were in the expected directions. Thus 25 out of 29 predictions were in the expected directions.

TABLE 6
Regression of Values Factors on Environmental Behavior Factors

	Composite Beta (SE B)	Good Citizen Beta (SE B)	Activist Beta (SE B)	Healthy Consumer Beta (SE B)
Quartimax Regression	<i>n</i> = 294	<i>n</i> = 286	<i>n</i> = 293	<i>n</i> = 288
Self-Transcendence/Openness to Change	.311** (.078)	.257** (.038)	.299** (.023)	.163* (.023)
Self-Transcendence/Conservation	.036 (.041)	.068 (.020)	-.060 (.012)	.047 (.012)
Self-Enhancement/Openness to Change	-.055 (.100)	-.102 (.049)	-.049 (.029)	.000 (.030)
Self-Enhancement/Conservation	-.121* (.093)	-.244* (.045)	.079 (.027)	-.054 (.028)
<i>R</i> ²	.159	.105	.089	.031
Varimax Regression	<i>n</i> = 292	<i>n</i> = 284	<i>n</i> = 291	<i>n</i> = 286
Universalism/Biospheric	.406** (.129)	.335** (.064)	.306** (.039)	.314** (.039)
Achievement	-.052 (.099)	-.030 (.049)	-.068 (.030)	.006 (.030)
Security	-.113 (.140)	-.115 (.069)	-.117 (.042)	-.013 (.042)
Power	-.039 (.096)	-.145 (.048)	.125 (.029)	.021 (.029)
Stimulation/Self-Direction	.049 (.089)	.025 (.044)	.077 (.027)	-.039 (.027)
Tolerance	-.034 (.135)	.079 (.067)	-.109 (.040)	-.069 (.041)
Friendship	.019 (.165)	-.037 (.082)	.069 (.049)	-.074 (.050)
Inner Strength	.011 (.152)	.029 (.075)	.043 (.046)	.025 (.046)
<i>R</i> ²	.182	.186	.140	.092

NOTE: Separate regressions are reported for quartimax and varimax factors.

*Coefficient is statistically significant at the .05 level; **Coefficient is statistically significant at the .01 level.

DISCUSSION

In this study, I address two basic questions: What kinds of values do individuals hold? Do values influence pro-environmental behavior? First, these data show some support for Schwartz's theory

of values. Using a different method than Schwartz, a factor analysis produced factors that are representative of the four quadrants of Schwartz's two-dimensional construct. These data show values that can be categorized as Self-Transcendence/Openness to Change, Self-Transcendence/Conservation, Self-Enhancement/Openness to Change, and Self-Enhancement/Conservation. In addition, factors were obtained that are representative of some of Schwartz's motivational types and some that were unique. Particularly relevant was the finding of the Universalism/Biospheric factor, in which the three environmental items were found to be distinct from other socially oriented values.

Second, the values measured in this study did have significant effects on individual contributions to a collective good, that is, pro-environmental behavior. Pro-environmental behavior was measured as a composite construct; it was also distinguished by underlying behavioral domains that were labeled Activist, Good Citizen, and Healthy Consumer. Of particular note, valuing Self-Transcendence/Openness to Change is a strong predictor of pro-environmental behavior, as is Universalism/Biospheric, whereas valuing Self-Enhancement/Conservation is a strong negative predictor (but only for the Composite and Good Citizen behaviors). The factor identification of the three environmental behavioral categories should be noted in future research. This is particularly relevant in the construction of behavioral indexes. However, the values measures in this study did not exhibit many separate effects across the three types of behavior. Future derivations of behavior should also measure normative behavior based on injunctive norms, which may have a much stronger effect on behavior than the descriptive norms measured here.

This study suggests several lines of future research, broadly distinguished by either further explaining the nature of values as a solution to social dilemmas or the place of values relative to other solutions. Intrinsic values need to be distinguished from social influence, not only separating the influence of informal and formal sanctions from intrinsic motivation, but measuring

and formal sanctions from intrinsic motivation, but measuring the effects of extrinsic factors on the formation of values. In addition, future research ought to address other rational considerations in the motivation of behavior, such as perceived individual efficacy and the estimation of consequences for various individual and collective actions.

In this article, it was argued that individual contributions to the collective good are largely constrained by conflicts between individual and collective interests. It is only in rare and unproblematic situations that short-term individual interests and long-term collective interests are coterminous, and the free-rider problem does not exist. Promoting pro-environmental behavior or any other collectively oriented behavior may be achieved by a variety of means, ranging from the coercive to the voluntary. Understanding the relationship between values and behavior increases the likelihood of finding noncoercive solutions to problems that most individuals would rather ignore than engage. For example, a voluntary program might be more successful if it can make a specifically identified value construct salient, such as Self-Transcendence/Openness to Change. Values do influence behavior, and this article expands Schwartz's theory of values to predict which values have effects on pro-environmental behavior and which do not. Moreover, those that do have effects do not always influence all types of pro-environmental behavior. Thus solutions must be derived from the specifics of both values and behavior if we are to avert further tragedies of the commons.

NOTES

1. Conservation refers to Schwartz's concept and should not be confused with environmental conservation of resources.
2. Missing cases were replaced with the mean. The analyses were also done with listwise and pairwise deletions, neither of which alters the overall structure of the factors.
3. The analyses were conducted with listwise deletions. Pairwise replacement of means does not alter the overall structure of the factors.

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