The Attitude–Behavior Relationship: A Test of Three Models of the Moderating Role of Behavioral Difficulty[1]

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The moderating role of behavioral difficulty in the attitude–behavior relationship remains a controversial topic in social psychology. Previous research has been unclear in establishing the direction of this moderation, and 3 theoretical models have been proposed: positive and linear; negative and monotonic; and quadratic. The current paper reports analyses of survey data from 5 different studies that afford measures of environmental attitude, behavior, and behavioral difficulty. Across these studies, we found a substantial and unmoderated average attitude–behavior relationship (r = .54). The data also show that the attitude–behavior relationship is weaker for extremely easy and extremely difficult behaviors. Additional analyses suggest, however, that these reductions in the attitude–behavior relationship are probably because of methodological reasons.

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When climbing a mountain, the slope takes a toll, regardless of any motivation on the part of the climber. Although some people may be more or less motivated or prepared to reach the summit, the difficulty of the climb (e.g., altitude, terrain, length) are obstacles for everyone. Analogously, some situational conditions are not exclusively subjective, as they facilitate or impede behavior for all people.

In social psychology, we have traditionally favored a perspective in which we presume situational costs—and, thus, behavioral difficulties—to be differentially effective for various people, depending on their personal significance and proficiency (cf. Ross & Nisbett, 1991). In other words, social psychologists expect the situational costs (i.e., difficulty of a behavior) to interact with a person's ability to pay the price (e.g., Ajzen, 2005). From this traditional perspective, behavioral difficulty is expected to modify the intention–behavior relationship and, ultimately, the attitude–behavior relationship (cf. Dick & Basu, 1994).[3]

The most prominent example of research and theorizing about the moderating role of behavioral difficulty can be found in studies utilizing the theory of planned behavior (TPB). Ajzen (1991) proposed that the difficulty of performing a behavior—assessed by one's perceived behavioral control— would interact with a person's intention to become engaged.[4] While Ajzen could not confirm his prediction empirically,[5] others

[3] Note that in a model in which intention completely mediates the attitude effect on behavior—as in the planned behavior theory (e.g., Ajzen, 1991)—a moderated intention– behavior link necessarily implies a moderated attitude–behavior relationship. Such a complete mediation within the planned behavior framework (i.e., a nonsignificant perceived control- behavior path) typically is found when behavior either is mainly under volitional control (e.g., Madden, Ellen, & Ajzen, 1992) or when behavior-relevant influences external to a person are directly incorporated into the behavior measure that is used (e.g., Kaiser & Gutscher, 2003). A parallel can also be found in personality psychology when, for example, strong (i.e., strongly constraining or promoting) situations are suspected to affect the trait–behavior consistency negatively (e.g., Mischel, 1973)

[4] As Ajzen (1991) stated, "past theory as well as intuition would lead us to expect an interaction between . . . intentions and perceptions of behavioral control" (p. 188).

[5] Ajzen (1991) reported seven empirical tests of the interaction hypothesis, six

occasionally found some likely (given their magnitude) spurious interactions (e.g., Terry & Hogg, 1996).

Despite its feeble empirical support, the interaction hypothesis repeatedly resurrected itself in the TPB framework with various new concepts, such as *frequency of trying* or *effort* (Bagozzi, 1992; Bagozzi, Yi, & Baumgartner, 1990). The interaction hypothesis continues to emerge on a more general level too when, for instance, performance difficulty is suspected as a moderator of the attitude–behavior relationship (e.g., Stern, 2000b). To date, research on the moderating role of behavioral difficulty—particularly with respect to the environmental attitude–behavior link—has resulted in inconsistent evidence regarding its existence or direction. While some suspect a linear, positive relationship (e.g., Schultz & Oskamp, 1996); others propose a monotonic, negative one (e.g., Preisendörfer, 1999); and still others predict a curvilinear effect (e.g., Stern, 2000a). In the present paper, we test the three moderation models and examine the possibility for some methodological (e.g., restriction of range) explanations.[6]

Controversial Findings

Situations create opportunities for and constraints to behavior. The more powerful these external conditions are—the more *difficult*, time- consuming, or (literally and figuratively) expensive the behavior—the weaker the importance of attitudinal factors (e.g., Black, Stern, & Elworth, 1985). From this point of view, a person's attitude explains behavior much more extensively when the situational costs involved are low and when the behavior is relatively easy (e.g., Diekmann & Preisendörfer, 1998). Research from this

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of which were his own. Only in one of seven trials did he find marginal support for the interaction hypothesis.

[6] Although range restrictions have been reported previously (e.g., Madden et al., 1992), we abstained from a systematic exploration of the literature to establish the severity of the range-restriction problem so far. In our view, such an endeavor follows, rather than precedes, the evidence that justifies its implementation. First, we are to corroborate the possibility for a methodological explanation of an apparent moderated attitude–behavior relationship.

perspective has found smaller attitude–behavior correlations under high effort conditions (r = .22) than under low effort conditions (r = .37; Bagozzi et al., 1990; the correlations are calculated based on the data presented in Bagozzi et al.'s Table 3). Essentially, attitudes are expected to determine behavior in low-cost domains (e.g., recycling) much better than in high-cost areas (e.g., choosing not to drive; Diekmann & Preisendörfer, 2001). By and large, however, the evidence is ambiguous (see Corraliza & Berenguer, 2000).

In fact, evidence for the opposite pattern has been found as well. Schultz and Oskamp (1996), for example, argued that attitudes will be stronger predictors of behavior when situational constraints are powerful and demanding, and, hence, when effort is required. From this perspective, attitudes have the greatest influence on behavior in the face of increasingly difficult tasks or progressively intolerable sacrifices. Conversely, attitude– behavior correlations approach zero when the external conditions are extremely positive and supportive, as they are with curbside paper recycling (cf. Schultz & Oskamp, 1996).

A third perspective about the moderating role of behavioral difficulty has also been proposed (e.g., Stern, 2000b). From this point of view, attitudes are stronger predictors of behavior when the influences external to a person are minimized. Thus, a curvilinear inverted-U (i.e., a quadratic) relationship is predicted. Indeed, Stern and his colleagues (e.g., Guagnano, Stern, & Dietz, 1995) found that the attitude–behavior link approached zero when external conditions were very strongly positive or negative.

Artificially Deflated Correlations

A sizable number of studies have examined the relationship between attitudes and behavior (e.g., Eagly & Chaiken, 1993; Kraus, 1995; Oskamp & Schultz, 2005). Studies across a variety of topics have found attitudes toward a range of behaviors (e.g., energy conservation, recycling) to a varying degree to be consistent with people's actions (e.g., Ajzen, 2005). For some behaviors, attitudes seem to translate easily into performance. For example, Preisendörfer (1999) found that

nearly 9 out of 10 people in his sample engaged in recycling behavior. However, for other behaviors, the link is less clear. Even though people are quite favorable toward energy conservation, only 9% have purchased energy-efficient light bulbs (Preisendörfer, 1999).

Highly uniform and apparently unanimous attitudes or actions have a substantial effect on the formal characteristics of an attitudinal or a behavioral variable's statistical distribution. When virtually everyone is favorable or almost everyone engages in a particular behavior, such instances frequently imply reduced variability in either the attitude or in the behavior measures. Such a restriction of variation, in turn, makes accurately differentiating people's opinions or their intended actions gradually more demanding. While the lack of variation in the attitude measure represents insensitivity to (existing valid, but small) attitude differences, by contrast, a prevailing action pattern masks subtle motivational differences by con- straining people to a certain performance. An example of the latter is the recycling opportunity that determines the extent to which it occurs (e.g., Derksen & Gartrell, 1993).

In statistics, it is a well-known problem that disparities in the shape of distributions as a result of restricted variability, for instance, can reduce the strength of a relationship between two variables. Technically speaking, correlation coefficients can be artificially deflated because of, for example, ceiling and floor effects in the variables on which they are based (e.g., Tabachnick & Fidell, 2006). Such an effect can occur with extremely difficult performances that channel people's engagement so that they are constrained to a certain act or its omission.

Overly easy and facilitating conditions, by contrast, can additionally mask real attitudinal differences with a biased opinion as they force people to justify unintended, dissonant actions. Such a forced consent—and, thus, problems with an attitude measure's validity—should be less of an issue at the high end of the difficulty scale because of the obvious behavioral costs involved. In other words, we expect distribution anomalies (e.g., restricted variability) to occur with behavior indicators at the high and low ends of the difficulty

dimension. At the low end of the difficulty scale, we additionally anticipate problems with the accuracy of the attitude and the behavior measures.

Research Goals

Research regarding the moderating role of behavioral difficulty in the attitude–behavior relationship has provided incompatible predictions.

While some expect attitudes to correlate with behavior when behavior is relatively easy, others predict just the opposite: Attitude–behavior correspondence will be particularly strong under high-effort conditions. The combination of both these models leads to a third model, which anticipates a quadratic difficulty effect. The goal of the present paper is to test each of three models of moderation, and to examine the possibility for a restriction of range-related and, thus, a methodological explanation.

The Present Research

Method

Participants and Procedure

The samples for the current study were obtained from five different surveys. The total number of participants was 3,338 (1,801 females, 53.9%; 1,521 males, 45.6%; 16 did not indicate gender, 0.5%). As shown in Table 1, all five samples were homogeneous with respect to participants' mean age (*M* age = 46.6 years; range = 18–89 years).

Study 1 was sampled from the resident registers of six Swiss communities. Out of 8,177 randomly selected German-speaking Swiss who were asked to volunteer for a survey, 943 returned a written consent (response rate = 11.5%). Of these, 895 (94.9%) returned completed questionnaires (for more details, see Kaiser & Gutscher, 2003).

Study 2 represents a follow-up of Study 1. About 1 year after the original assessment, a second questionnaire was sent to the 895 people who participated in Study 1. Overall, 823 people returned their questionnaires (response rate = 92.0%; for more details, see Kaiser & Scheuthle, 2003).

Table 1
Sample Description

	Origin	*N*	Mean age	Age range	Females (%)
Study 1	Switzerland	895	46.4	18–79	54.8
Study 2	Switzerland	823	47.6	19–80	55.3
Study 3	West Germany	607	45.6	18–88	52.2
Study 4	East Germany	787	46.2	18–89	57.6
Study 5	West Germany	226	47.8	24–70	38.1
Total		3,338	46.6	18–89	54.0

The samples for Studies 3 and 4 were randomly selected from the resident registers of 11 German communities. While the 7 communities of Study 3 were all located in the western part of Germany, the 4 communities of Study 4 were in the eastern, economically challenged region. Out of the 5,894 persons who were asked to volunteer for Study 3, there were 607 (response rate = 10.3%) who returned usable questionnaires. Out of the 5,000 persons who were asked to volunteer for Study 4, there were 787 (response rate = 15.7%) who returned completed questionnaires (for more details, see Kaiser, Schultz, & Scheuthle, 2007).

Study 5 represents a convenience sample of 226 German homeowners. Because of a lack of extremely difficult behaviors and because of the similarity of the variables that allowed us to construct the steps-to-a-private-source- of-solar-power variable (see next section), we decided to implement the data from this study (for more details, see Hübner, 1997).

Given the response rates and potential self-selection biases inherent in the samples, the participants in the five studies cannot be regarded as representative of either German-speaking Swiss or of Germans. For the purpose of the present research—that is, comparing the strengths of relationships—

representativeness is less of an issue, as long as participants reflect a wide range of individual differences in the attitudinal and behavioral variables of interest.

Measures

All five questionnaires contained measures of conservation behavior, environmental attitude, and of the difficulty of each behavior. For 15 of the 25 behaviors in our research—in addition to a technically defined, but conventional measure of difficulty—we had subjective difficulty assessed based on people's perceived behavioral control (PBC) as it is operationalized in a planned behavior framework (e.g., Ajzen & Madden, 1986).

Conservation behavior. In Studies 1 to 4, a 5-point scale ranging from 1 (*never*) to 3 (*occasionally*) to 5 (*always*) was used to assess individual endorsement of different specific conservation behaviors (see Table 2). If a participant could not answer, *I don't know* was a response alternative. *I don't know* responses were coded as missing values. Negatively formulated behaviors were recoded; thus, they should be read as "I refrain from . . .".

From prior research (see Kaiser, Frick, & Stoll-Kleemann, 2001), we know that self-reports represent fairly stable and valid indicators of tangible conservation behavior. The former was corroborated with a

Table 2

Behavioral Difficulties of Conservation Behaviors

	Difficulty (Endorsement %)				
Conservation behavior	Study 1	Study 2	Study 3	Study 4	Study 5
1. I bring empty bottles to a recycling bin.	98.54	98.16	98.33	93.98	—
2. I collect and recycle used paper.	98.66	97.92	97.50	—	—
3. I wash dirty clothes without prewashing.	—	—	—	82.96	—
4. I use a clothes dryer. (R)	—	—	—	77.52	—
5. I buy seasonal produce.	—	—	—	76.07	—
6. I use an oven cleaning spray to clean my oven. (R)	—	—	—	71.41	—
7. I drive my car in or into the city. (R)	57.14	58.54	25.93	—	—
8. I have pointed out unecological behavior to someone.	16.53	17.45	35.51	22.43	—
9. I buy meat and produce with eco-labels.	—	—	21.88	—	—
10. I drive on freeways at speeds under 100 kph (62.5 mph).	22.00	21.92	—	9.32	—
11. At red traffic lights, I keep the engine running. (R)	—	—	—	9.32	—
12. Steps to a private source of solar power[a]	—	—	—	2.45	.089

Note. (R) = reverse-scored. Shaded cells indicate behaviors for which a person could express his or her attitude based on two items with different response scales. Correspondingly, two correlations could be calculated (see Appendix). *Behavioral difficulty* represents the proportion of people who indicated engaging in an act reliably (i.e., either *often* or *always*): the higher the proportion, the easier a behavior.

[a]This item is a newly designed variable.

test–retest reliability (r_{tt} = .83) of a self-report measure of overall conservation behavior, the latter with a high average correlation between behavioral self-reports and objective such indicators, $M(r)$ = .81. Table 2 details the 12 specific behaviors that were assessed in the current study, as well as their difficulties.

To include an extremely difficult behavior that allowed for variance that was not already artificially restricted by a limited *Yes*/*No* response format, we constructed a new variable (see Table 2); that is, steps to a private source of solar power. In Study 4, the three dichotomous items (i.e., only *Yes*/*No* answers possible) were "I have looked into the pros and cons of having solar power," "I have requested a cost estimate for having solar power installed," and "I have purchased solar panels to produce energy."

In Study 5, the items were "I looked into information materials on having solar water heating," "I had a personal audit for having solar water heating installed," and "I ordered a solar water heating system." Based on these three dichotomous items, person scores were created on a 4-point scale ranging from *no action taken* (i.e., all items negatively answered) and *information gathered* (i.e., a positive response to the information item, but two negative responses to the other two items) to *estimate requested/personal audit* (i.e., a positive response to this item, regardless of the response to the information item) and *panels purchased/ordered* (i.e., a positive response to the acquisition item, regardless of the response to the other two items).

Environmental attitude. In Studies 1 to 3, attitude (toward behavior) was measured twice by rating each behavior statement—for instance, recycle paper, limit speed on freeways, point out unecological behavior to others—on two 5-point bipolar scales. On the first scale, the endpoints were *good* and *bad*; and on the second scale, the endpoints were *appropriate* and *inappropriate*. In these three studies, because of having pairs of attitude measures, two correlations were calculated for each of the five behaviors under consideration (see the Appendix).

In Study 4, only one attitude measure for each of nine behavior statements was used. This time, we again employed a 5-point *good*/*bad* response scale with five of the behavior statements and an

appropriate/*inappropriate* scale for the remaining four behavior statements. In Study 5, attitudes toward acquiring solar panels were measured twice by rating this behavior statement on two 11-point bipolar scales. Again, the first scale ranged from *good* to *bad*; while the second scale ranged from *useful* to *useless*. To make the scales comparable, we transformed the 11-point response option into a 5-point response option by collapsing the three options around the midpoint, and by combining the remaining eight responses into four pairs of adjacent options. Note that this transformation of the response scale only negligibly affected our later results.

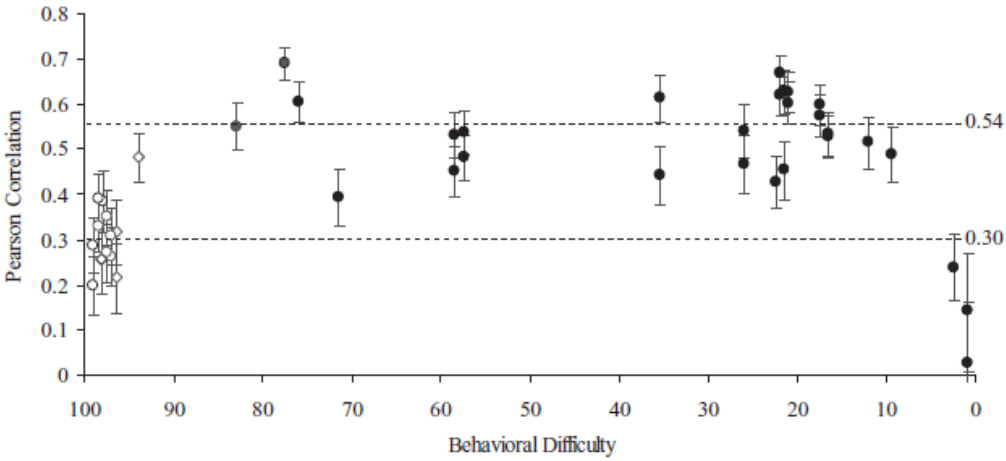

Figure 1. Attitude–behavior relationship as a function of behavioral difficulty. *Note*. These 41 Pearson correlations derive from five different studies with different numbers of participants: $N_1 = 895$; $N_2 = 823$; $N_3 = 607$; $N_4 = 787$; $N_5 = 226$. Accordingly, the 95% confidence intervals vary in magnitude. *Full black dots* represent Pearson correlation coefficients based on variables with *no* indication of a restriction-of-range problem ($SD \leq .50$, in both of the two variables involved). *Black framed dots* represent Pearson correlation coefficients based on variables with a *probable* restriction-of-range problem ($SD \leq .50$, in both of the two variables involved). *Black framed diamonds* represent Pearson correlation coefficients based on variables with a *possible* restriction- of-range problem ($SD \leq .50$, in at least one of the two variables involved).

Across the five studies, there were 41 attitude–behavior pairs (see Table 2). In Studies 1, 2, and 3, there were 30 such pairs (10 in each study); in Study 4 there were 9 pairs; and in Study 5, there were 2 pairs (see Appendix). Each pair corresponded perfectly,

such that the attitude measures were specific to the behavior. Note that our measurement approach represents one of the standard procedures to assess directly the attitude toward a behavior that is essential to ensure measurement compatibility or correspondence with the corresponding single-action measure (e.g., Ajzen & Fishbein, 1980). These 41 correlation coefficients served as the data points for the current study (see Figure 1).

Behavioral difficulty. The studies contained two measures of behavioral difficulty. The first was the performance proportion of each behavior. Following previous studies (e.g., Kaiser & Gutscher, 2003; for empirical backing, see Kaiser & Wilson, 2000), we assessed the difficulty of each behavior by collapsing *often* and *always* responses: The higher the proportion of people who picked these two response categories, the easier the behavior. By contrast, if only a few people engage in a certain behavior *often* or *always*, we are dealing with a difficult act (see Table 2).

To assess the behavioral difficulty of the steps someone has taken to a private source of solar power in Studies 4 and 5, we considered theproportion of persons who claimed to have acquired solar panels. Note that such a definition of difficulty is identical with the item difficulty definition ordinarily used in classical test theory and similar to the one employed in item response theory (e.g., Embretson & Reise, 2000). Nevertheless, we felt a need to validate the proposed difficulty index. For that purpose, we used perceived behavioral control, a second measure of behavioral difficulty that we had also inquired about for 15 of the 25 behaviors.

First, we calculated mean perceived control for each of the 15 behaviors. Second, we correlated this mean with our difficulty measure (i.e., proportion of engagement). The Pearson correlation between the two difficulty indicates, mean perceived control and proportion of engagement, was almost perfect ($r = .98$, $p < .01$; $n = 15$). In other words, our proposed but rather technical difficulty measure strongly correlated with people's subjective behavioral difficulty ratings (i.e., mean perceived behavioral control).

Restricted variability. We used the size of the standard deviation as our primary measure of the variability of a variable. Since measures based on 5- and 4-point response formats can approximate the measurement units (i.e., the metric) and the

formal properties of a standard normal distribution, we employ the formal properties of the standard case as our point of reference to detect potentially restricted variances. In a normal distribution, 68% of all answers are expected to fall within a range of ±1 *SD*, and 95% of all answers are expected to fall within a range of ±2 *SD* around the mean (cf. Rosenthal & Rosnow, 1991). At the same time, the standard deviation of a normal distribution corresponds with the metric of a normally distributed variable (in *z*-value units). That is, 95% of all measures are expected to fall within 5 scoring values (i.e., 4 units of measurement).

Because the metric of our variables axiomatically approximates the *z*-value metric, a restricted variability, in turn, is evidence if the standard deviation is substantially smaller than 1. Thus, numerically we defined restriction of variability as a standard deviation that is equal to or below half of a measurement unit (i.e., $SD \leq .50$). By contrast, we suspect *no* restriction of variation problems to occur if the standard deviation of the two variables involved exceeds half a unit (i.e., $SD \leq .50$). Additionally by, examining the kurtosis of the variables involved, we were able to empirically validate our expectations regarding restrictions of variability (see Table 3).

Note that—particularly if both variables are affected by restricted ranges—we anticipate problems with the accuracy of the involved measures. It is important to point out that the logic outlined previously does not apply to aggregated scale scores. That is, it will only apply to single-item measures that contain five and perhaps four response options, not to a summed or mean-aggregated scale comprised of such measures.

Table 3

Means and Kurtosis of Behavior and Attitude Variables

	Study 1			Study 2			Study 3			Study 4			Study 5		
Conservation behavior	*M*	*SD*	Kurt	*M*	*SD*	Kurt	*M*	*SD*	Kurt	*M*	*SD*	Kurt	*M*	*SD*	Kurt
1. I bring empty bottles to a recycling bin.	4.93	0.37	49.37	4.91	0.42	41.98	4.91	0.44	44.65	4.78	0.71	13.69	—	—	—
	4.94	0.30	53.46	4.95	0.26	38.84	4.80	0.59	11.57	4.91	0.44	43.35			
	4.93	0.33	47.89	4.93	0.32	46.50	4.86	0.44	20.53	—	—	—	—	—	—
2. I collect and recycle used paper.	4.93	0.40	58.70	4.91	0.42	38.96	4.87	0.55	31.86	—	—	—	—	—	—
	4.92	0.36	52.61	4.94	0.26	25.82	4.83	0.52	19.65	—	—	—	—	—	—
	4.91	0.38	39.26	4.92	0.35	43.23	4.84	0.47	17.48	—	—	—	—	—	—
3. I wash dirty clothes without prewashing.	—	—	—	—	—	—	—	—	—	4.32	1.08	1.84	—	—	—
	—	—	—	—	—	—	—	—	—	4.08	1.20	0.33	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4. I use a clothes dryer. (R)	—	—	—	—	—	—	—	—	—	4.30	1.22	0.97			
	—	—	—	—	—	—	—	—	—	3.87	1.34	-0.57			
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5. I buy seasonal produce.	—	—	—	—	—	—	—	—	—	3.88	1.00	1.01			
	—	—	—	—	—	—	—	—	—	4.43	0.89	2.38			
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6. I use an oven cleaning spray to clean my oven. (R)	—	—	—	—	—	—	—	—	—	3.99	1.18	0.20			
	—	—	—	—	—	—	—	—	—	3.68	1.33	-0.69			
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3.43	1.31	-0.89	3.46	1.29	-0.89	2.50	1.22	-0.97	—	—	—	—	—	—
	4.34	1.07	2.29	4.42	1.01	2.90	3.98	1.28	0.08	—	—	—	—	—	—

	Study 1			Study 2			Study 3			Study 4			Study 5		
7. I drive my car in or into the city. (R)	4.12	1.15	0.69	4.18	1.10	1.14	3.59	1.25	-0.65	—	—	—	—	—	—
8. I have pointed out unecological behavior to someone.	2.59	1.00	-0.33	2.64	0.92	-0.38	3.11	1.08	-0.56	2.85	0.98	-0.21	—	—	—
	4.20	0.92	1.08	4.15	0.95	1.07	4.42	0.84	2.41	4.01	0.97	0.20	—	—	—
	4.04	1.01	0.70	3.95	1.03	0.42	4.01	0.97	0.89	—	—	—	—	—	—
9. I buy meat and produce with eco-labels.	—	—	—	—	—	—	2.66	1.02	-0.71	—	—	—	—	—	—
	—	—	—	—	—	—	4.14	0.95	1.11	—	—	—	—	—	—
	—	—	—	—	—	—	3.58	1.10	-0.49	—	—	—	—	—	—
10. I drive on freeways at speeds under 100 kph (62.5 mph).	2.38	1.29	-0.74	2.41	1.23	-0.70	—	—	—	2.10	0.98	0.23	—	—	—
	3.15	1.50	-1.42	3.23	1.44	-1.26	—	—	—	2.63	1.39	-1.09	—	—	—
	2.89	1.54	-1.51	2.94	1.48	-1.43	—	—	—	—	—	—	—	—	—
11. At red traffic lights, I keep the engine running. (R)	—	—	—	—	—	—	—	—	—	1.97	1.14	0.59	—	—	—
	—	—	—	—	—	—	—	—	—	3.04	1.40	-1.25	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12. Steps to a private source of solar power[a]	—	—	—	—	—	—	—	—	—	0.53	0.75	1.29	0.45	0.66	1.36
	—	—	—	—	—	—	—	—	—	3.08	1.30	-0.94	3.80	1.19	-0.09
	—	—	—	—	—	—	—	—	—	—	—	—	4.05	1.05	0.66

Note. Kurt = kurtosis. (R) = reverse-scored. Figures in shaded cells represent descriptive statistics for attitude variables, whereas all other figures represent descriptive statistics for behaviors. A kurtosis of 0 indicates a normal distribution; whereas a kurtosis of 7 and above indicates a distribution that is extremely peaked; that is, such a variable probably has a reduced variance.

[a]This item is a newly designed variable.

Results

To test the moderating role of behavioral difficulty in the attitude– behavior relationship, two regression analyses were performed. The criterion in these analyses was the attitude–behavior correlations shown in Figure 1 (see also the Appendix). The predictor variable was the empirically derived behavioral difficulty, which represents the engagement proportion shown in Table 2. There were 41 Pearson correlation coefficients that were analyzed, with an average correlation of .44. (We calculated mean Pearson correlation coefficients by way of converting correlations into Fisher's *Z* scores. The averaged *Z* scores, subsequently, were then retranslated into Pearson correlations.) The overall pattern is shown in Figure 1.

In the first regression, we tested the bivariate linear relationship between behavioral difficulty and the strength of the attitude–behavior link. In line with Schultz and Oskamp's (1996) effort hypothesis, we found a significant positive relationship between behavioral difficulty and the attitude–behavior strength, $F(1, 39) = 4.26$, $p < .05$ ($R^2 = .10$; $\beta = .31$), $t(39) = 2.06$, $p < .05$.

In a second regression analysis, we added a curvilinear relationship between behavioral difficulty and the strength of the attitude–behavior link. This analysis again reveals a significant, but this time quadratic effect, in line with Stern and his colleagues (e.g., Guagnano et al., 1995; Stern, 2000b), $F(1, 38) = 24.44$, $p < .001$ ($R^2 = .56$). This finding (note the remarkable rise in the proportion of explained variance) appears to be caused mainly by a sharp drop in the attitude–behavior relationships toward the extremes of the difficulty dimension (i.e., based on

behaviors with engagement proportions greater than 95% or smaller than 5%; see Figure 1).

To further examine the nature of the curvilinear relationship, we excluded the 15 correlations that were based on behaviors with engagement proportions beyond either 5% or 95%; and we regressed the strength of the attitude– behavior relationship on behavioral difficulty again. With only the 26 correlations based on nonextreme behaviors, we found neither a significant linear, $F(1, 24) = 0.24$, $p = .63$ ($R^2 = .01$); nor a quadratic effect, $F(1, 23) = 0.16$, $p = .85$ ($R^2 = .01$). It is noteworthy that the mean correlation of these 26 nonextreme attitude–behavior correlations increased by .10 (D*r*) to a substantial mean correlation of .54 over and above what we found with all 41 correlations (see Figure 1).

A closer look at the standard deviations of the variables involved suggests that the behaviors and the corresponding attitude measures toward the easy end, but not toward the demanding end of the difficulty dimension appear to be restricted in their variability, which is additionally backed by kurtosis figures (see Table 3). In other words, we found indications that, at least with easy behavior, ceiling effects in the attitude and behavior measures artificially deflated the attitude–behavior correlations. This general deflation becomes obvious in a linear regression based on the 12 correlations concerning extremely easy actions (i.e., based on engagement proportions greater than 95%), which resulted in a nonsignificant effect, $F(1, 10) = 0.17$, $p = .69$ ($R^2 = .02$). Moreover, the average of these 12 correlations turned out to be considerably smaller ($\Delta r = .14$) than what the overall average implies it to be ($r = .30$, as compared to $r = .44$; see Figure 1).

With the data from the extremely demanding end of the difficulty dimension (i.e., based on engagement proportions smaller than 5%), we did not find an indication of strong floor effects in either the attitude or the behavior measures (see Table 3). Still, correlation coefficients can be depressed by various other sorts of disparities in the shape of the distributions of the two variables involved. To test for such artificial anomalies, we computed the maximal possible correlations for all 41 attitude–behavior pairs. To this aim, we sorted the scores of each attitudinal and behavioral variable from low to high.

Correlating two ordered variables, in turn, typically produces their maximal correlation. Subsequently, we estimated the extent of possible distribution anomalies affecting an empirical attitude–behavior correlation by linking the maximal and empirical correlations. With a Pearson correlation of .40 (p = .01), the method-induced bias appears to be statistically substantial. Interestingly, however, only the correlation pairs involving the extremely difficult behaviors seem responsible for the overall effect (r = .99, p = .09), as we found no such relationship between maximal and empirical correlations for the remaining 38 correlation pairs (r = -.05, p = .78).

General Discussion

Based on data from five different studies surveying more than 3,300 persons, our research, at first, yields evidence for both a positive linear and curvilinear difficulty effect on the attitude–behavior relationship. In line with others (e.g., Guagnano et al., 1995), we found a more pronounced attitude–behavior link with difficulties between p = .05 and p = .95 than with more extreme difficulties. Unexpectedly, though, no significant trend could be established for the nonextreme, large middle region, which challenges all three proposed moderation hypotheses (i.e., the positive, the negative, and the quadratic).

A closer inspection of the data points in Figure 1 reveals a relatively narrow bandwidth of the correlations around the mean correlation of .54 (range = .40–.69; see Appendix). In the best-case reading of our data (i.e., when all data points below the average are replaced by the highest reasonable value and all those above the average with the lowest reasonable value, given the 95%

confidence intervals), all effect sizes are exclusively large and all numbers cluster in the area between .46 and .65. By corroborating Ajzen's (1991) conclusion, our research challenges the moderating role of behavioral difficulty with respect to the attitude–behavior link. Rather, we found a relatively strong but difficulty-independent attitude–behavior relationship for all behaviors that are endorsed by at least 5% and at most 95% of the people.

At the low end of the difficulty scale (i.e., $p > .95$; see Figure 1), we found a substantial drop in the mean correlation to a mere medium effect size (i.e., $r = .30$), and clear evidence for some restriction-of-range problems. In the recycling domain, we are obviously dealing with an extremely favorable public opinion and generally easy behaviors. Mean attitude scores of about 4.90 on a 5-point response scale underscore such an interpretation (see Table 3). This attitude ceiling effect is accompanied with a restricted variability in performance as well, which is indicated by the corresponding standard deviation and kurtosis figures in Table 3. Thus, a restriction in range is a likely part of the explanation for deflated correlations at the easy end of the difficulty dimension (cf. Tabachnick & Fidell, 2006).

Since Schultz and Oskamp's (1996) research was based exclusively on recycling data, we inspected all 13 of our recycling-related data points more closely. This inspection paralleled their findings of a positive linear moderation effect. We also found behavioral difficulty to have a significant impact on the strength of the attitude–behavior relationship, $F(1, 11) = 6.11$, $p < .05$ ($R^2 = .36$; $\beta = .60$), $t(11) = 2.47$, $p < .05$. In other words, the more difficult a behavior is, the tighter the attitude–behavior link in the recycling domain.

Given the relatively limited number of data points (i.e., only 13), one slightly deviant figure can, obviously, cause such an effect (cf. Figure 1). Note that the mean ($r = .31$) of all 13 recycling-related correlations—which all risk being negatively affected by a restricted variability—differs only minimally from the mean ($r = .30$) for only the 12 extremely easy data points, based on behaviors engaged in by at least 95% of the sample.

At the high end of the difficulty scale (i.e., $p < .05$), the spread of the attitude indicators from Studies 4 and 5, unexpectedly, seems to be normal, with no sign of shrinkage in variability (see Table 3). Hence, the deflated attitude–behavior link cannot be explained by reduced variability in the behavior measures. Nevertheless, with an almost perfect link ($r = .99$) between maximally possible and empirically found correlations, our research still yields evidence for a methodological explanation of the deflated attitude– behavior correlations involving the three most difficult behaviors.

Overall, our findings warrant differential reasoning for the decrement in the correlations at the two extreme ends of the difficulty scale. At the low end of the difficulty scale, variability of both the attitude and the behavior measures is constrained. The more subtle the quantitative individual differences, the more influential even very small random fluctuations (i.e., measurement error) are. In other words, overly easy and facilitating conditions make the valid assessment of individual attitudinal and behavioral differences increasingly more demanding. Thus, deflation of the correlation at the low end is probably caused by measurement inaccuracies as a result of the condensed distributions of the involved variables. At the demanding end of the difficulty scale, we found anomalies in the shape of the distributions of the involved attitudinal and behavioral variables most likely responsible for the drop in correlations between attitude and behavior. With only three data points at the extremely demanding end of the difficulty dimension, however, three alternative explanations—two methodological and one theoretical—still are possible.

We newly designed the three solar power-related behavior measures based on three dichotomous items. By using a 4-point response instead of a 5-point format, it could be that we inadvertently destroyed the equivalence and, thus, the comparability of these three indicators of extremely difficult behavior with the other behavior measures. This interpretation would invalidate three of the data points at the high end of the difficulty dimension (see Figure 1), but would leave our general conclusion basically unaffected.

A second line of reasoning to explain the deflated effect sizes at the high end of the difficulty dimension goes as follows: At the high end, we deal with an extremely small number of persons who actually engage in an act. Factually, 16 persons (2.5%) had purchased (Study 4) and 2 persons (0.9%) had ordered (Study 5) solar panels. By contrast, 244 (37.4%) had either gathered information or requested estimates (Study 4) and 80 persons (35.7%) had either gathered information or had had personal audits (Study 5). The spread, which according to Table 3 is comparatively larger for attitude than for performance items, indicates that people are relatively more diverse in their opinions than in their performance regarding solar panels. Thus, it is likely that people engage in these behaviors for a variety of reasons. Yet, alternative motives for an action have more weight with fewer people and, thus, can significantly lower the attitude–behavior link as well. Consequently, the drop in effect size at the high end of the difficulty dimension could be an indication of the existence of a relatively strong minority opinion for which solar panels are appealing for reasons other than environmental ones (e.g., saving money, being self-reliant).

Finally, given the relatively scarce evidence (grounded in only three data points), the low-cost hypothesis, which claims that attitude determines behavior better in low-cost than in high-cost domains, is still tenable (e.g., Diekmann & Preisendörfer, 1998). Our findings, however, narrow the scope of the low-cost hypothesis so dramatically that the hypothesis basically becomes inconsequential. Our research largely reduces the high-cost area to behaviors that are only marginally prevalent ($p < .05$) and, at the same time, expands the low-cost area to the vast majority of actions.

We offer two comments on our approach to measuring difficulty. First, because behavioral difficulties are operationalized as the relative number of people who behave accordingly, they are not grounded in people's awareness, recognition, or subjective evaluation of the boundary conditions of an action. Rather, they are a function of the forces that facilitate or constrain behavior (e.g., climate, terrain) that affect everyone who acts in a certain context (see Scheuthle,

Carabias-Hütter, & Kaiser, 2005). Thus, behavior can be psycho- logically (as a result of subjective barriers, such as social norms) or logistically (as a result of tangible obstacles, such as availability) constrained, as long as these impediments are socially shared and endured. Moreover, difficulty approximated as an endorsement probability was found to be equivalent to the actual control component of perceived behavioral control (see Kaiser & Gutscher, 2003). At the same time, endorsement probabilities— although less subjective— still overlap remarkably with a traditional difficulty measure (i.e., perceived behavioral control).

Second, because we are dealing with a range of different behaviors, their compatibility could be questioned. If all 14 behaviors under consideration did not fall into one general class of behaviors, they would be qualitatively different. In other words, they could be compared along many dimensions. Thus, they could not be contrasted purely quantitatively along one dimension (i.e., difficulty), as suggested in Figure 1.

Strictly speaking, factors other than difficulty could play a role in their observed engagement differences. In essence, the behaviors would be dissimilar in more than their difficulties alone; thus, alternative interpretations of our findings would be possible. In anticipation of this argument, we tested beforehand, by applying the Rasch model, whether the 14 behaviors under consideration actually fall on one dimension (e.g., Kaiser & Wilson, 2004). It should be kept in mind that the variable "steps to a private source of solar power" is composed of three dichotomous items in Studies 4 and 5. Note also that despite their face-value similarity, the three items of Study 5 are different from the ones in Study 4, for which our argument applies. In summary, we can conclude that all behaviors represent conservation acts, and that all can be quantitatively compared along the suggested difficulty dimension.

The findings reported in this research are based on pooled data from several studies. Such data pooling is statistically problematic, particularly the double-counting of 16 of the 25 behavior variables (see Table 2) and the repeated measurement design in Studies 1 and 2, which involves 10 of the 41 attitude–

behavior pairs (see Appendix). The primary problem is the violation of independence across the correlation coefficients. That is, correlations from the same persons are probably more similar than those from different persons, as are correlations that have one variable in common. A visual inspection of Figure 1 reveals, however, that—at least in terms of effect size—spurious results are unlikely and, presumably, negligible. Any of the two attitude–behavior pairs at the same difficulty position or originating from either Study 1 or 2 could, without distorting the general impression, be substituted with its counterpart (see Appendix). Yet, a reduction in data points from 41 to 25 or 20, respectively, would only negatively affect the power of the employed significance tests.

Despite its limitations, pooling data based on substantive samples has two important advantages: (a) aggregated concept measures are, relatively speaking, quite accurate, which becomes clear in the rather small confidence intervals (e.g., Figure 1); and (b) difficulties are sample-level estimates, rather than person-level estimates, which would be the case if we employed moderated regression analyses. Finally, although statistically limited, research investigating the moderating role of behavioral difficulty in the attitude–behavior relationship traditionally compares attitude–behavior pairs in its endeavor (e.g., Diekmann & Preisendörfer, 1998; Schultz & Oskamp, 1996).

Another shortcoming in the pooling of data across studies concerns the seemingly distinct concepts employed in our research. Since our study is based on correlations from potentially dissimilar behaviors, it might seem dubious to compare the corresponding relations. In other words, the question arises whether our various attitude–behavior relationships (e.g., regarding buying of seasonal produce or regarding bottle recycling) are factually commensurable with each another. Since the 14 behaviors in our research fall into one class of activities (e.g., Kaiser & Wilson, 2004), their corresponding measures are, although literally distinct, conceptually equivalent. Necessarily, our specific environmental attitude and behavior measures are effectively commensurable as special instances of the more general

concepts and, as such, can be used to explore the nature of the environmental attitude– behavior relationship in general.

Despite its apparent intuitive appeal for psychologists (cf. Ajzen, 2005), the interactionists' presumption is challenged by our research. Namely, people's attitudes do not seem to depend on the right situational condition in their potential to affect people's behavior. We must conclude, therefore, that the external conditions facilitate and impede behavior for all people similarly, like the slope of a mountain that is the same for everyone. Accordingly, influences external to a person must be considered as main effects, and not as interaction effects, which can be done comprehensively and parsimoniously when differential behavioral difficulties are part of the measurement model that is used in the assessment of people's performance (e.g., Kaiser & Wilson, 2004).

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Appendix

Attitude–Behavior Correlations (Pearson Correlation Coefficients) From Five Studies

Conservation behavior	Study 1	Study 2	Study 3	Study 4	Study 5
1. I bring empty bottles to a recycling bin.	.33	.27	.26	.48	—
	.39	.35	.38		
2. I collect and recycle used paper.	.20	.26	.22	—	—
	.29	.31	.32		
3. I wash dirty clothes without prewashing.	—	—	—	.55	—
4. I use a clothes dryer. (R)	—	—	—	.69	—
5. I buy seasonal produce.	—	—	—	.61	—
6. I use an oven cleaning spray to clean my oven. (R)	—	—	—	.40	—
7. I drive my car in or into the city. (R)	.48	.45	.47	—	—
	.54	.53	.54		
8. I have pointed out unecological behavior to someone.	.53	.58	.44	.43	—
	.53	.60	.61		
9. I buy meat and produce with eco-labels.	—	—	.45	—	—
			.63		
10. I drive on freeways at speeds under 100 kph (62.5 mph).	.62	.60	—	.49	—
	.67	.63			
11. At red traffic lights, I keep the engine running. (R)	—	—	—	.52	—
12. Steps to a private source of solar power[a]	—	—	—	.24	.14
					.03

Note. (R) = reverse-scored. For some behaviors, persons could express their attitude based on two items with different response scales (see Table 2). Correspondingly, two attitude–behavior correlations could be calculated. [a]This item is a newly designed variable.