

The Attitude–Behavior Relationship Revisited



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Abstract

The attitude–behavior relationship is of great import to many areas of psychology. Indeed, psychologists across disciplines have published thousands of articles on the topic. The majority of this research implies that the attitude–behavior relationship is linear. However, observations from 4,101 participants on Amazon’s Mechanical Turk and 321,876 online reviews demonstrate that this relationship is systematically nonlinear. Across diverse topics, measures, and contexts, as attitudes move from extremely negative to extremely positive, the corresponding shift in behavior tends to be relatively flat at first (as attitudes move from extremely to moderately negative), to steepen when attitudes cross neutral and shift from negative to positive, and to taper off again as attitudes move from moderately to extremely positive. This result can be explained on the basis of research on categorical perception. The present research suggests a fundamental pivot in how researchers construe, study, and assess the attitude–behavior relationship.

Keywords

attitudes, behavior, categorical perception, attitude strength, extremity, open data, open materials, preregistered

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Since the early 1900s, psychologists have been interested in the attitude–behavior relationship—that is, in understanding whether and how attitudes guide behavior (e.g., Ajzen & Fishbein, 2005; Allport, 1935; Eagly & Chaiken, 1993; Glasman & Albarracín, 2006). Researchers have published thousands of articles on the subject (Beatty & Kahle, 1988), making it one of the most studied topics in psychology (Petty et al., 2013). Indeed, understanding the attitude–behavior relationship has both theoretical and practical import. For example, it helps political psychologists predict election outcomes from voters’ attitudes, helps consumer psychologists predict purchase behavior from consumers’ attitudes, and helps health psychologists predict health behaviors from people’s attitudes toward those behaviors.

Given the importance of the attitude–behavior relationship, it is unsurprising that extensive research has been directed toward it. Perhaps more surprising, although views have varied with respect to the strength of the relationship (e.g., LaPiere, 1934; Wicker, 1969)

and the conditions under which it emerges (e.g., Petty & Krosnick, 1995), most prior work on this topic converges on a common assumption: If a relationship exists, it is linear (see Raden, 1985). Indeed, the attitude–behavior relationship is generally described in linear terms—shifts in attitudes are expected to be met with essentially constant corresponding shifts in behavior—and the statistic commonly used to test the attitude–behavior link is a simple correlation coefficient (e.g., Ajzen et al., 1982; Clarkson et al., 2008; Kraus, 1995). Thus, the dominant approach to studying the attitude–behavior relationship implies that if this relationship exists, it is linear. We refer to this linear view as the *classic perspective* (see Fig. 1, left panel) because it has guided conceptualizations of attitude–behavior correspondence for decades.

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In contrast to this perspective, we propose that the attitude–behavior relationship is not strictly linear. Specifically, we predict that as the favorability of attitudes increases from extremely negative to extremely positive, the corresponding shift in behavior tends to be relatively flat as attitudes move from extremely to moderately negative, to steepen as attitudes pass the neutral point and move from negative to positive, and to taper off again as attitudes move from moderately to extremely positive (see Fig. 1, middle panel). The result is a cubic curve in which the slope of the attitude–behavior relationship is steepest for attitudes around the neutral point, where attitudes change in valence. This prediction can be understood on the basis of research on categorical perception. Although attitudes are typically construed and measured in continuous terms—as the degree of positivity or negativity that one associates with some entity—we propose that people often think about attitudes categorically, which affects how they use attitudes as behavioral guides and alters the shape of the attitude–behavior relationship.

A Categorical Perspective

The categories that people form and perceive play a fundamental role in guiding thought, judgment, and behavior. For example, a substantial literature spanning diverse research domains demonstrates that people perceive differences across categories as greater in magnitude than otherwise equivalent differences within categories (e.g., Harnad, 1987; Lacetera et al., 2012; Tajfel & Wilkes, 1963). People perceive April 27th and May 5th as more different than April 19th and April 27th, for instance, and expect larger differences in temperature between the former dates than the latter (Krueger & Clement, 1994).

Recent research has revealed that categorical perception has implications for attitudes and behavior. Bechler et al. (2019, 2020) showed that people perceive attitudes in a categorical manner—that is, as negative or positive, separated by a neutral threshold—which affects their perceptions of attitude and behavior change. Bechler et al. found that people perceive attitude change as greater in magnitude when it crosses a categorical, or qualitative, threshold—for example, shifting across valence from negative to positive as opposed to within valence from positive to more positive. Moreover, these perceptions affect inferences about behavior: People believe that behavior will change more following an attitude shift across rather than within valence.

In the current research, we propose that categorical perception influences how attitudes are used as behavioral guides. Because attitudes that differ across valence

Statement of Relevance

Psychological scientists have long studied the attitude–behavior relationship. Political psychologists want to understand how voters' attitudes predict voting, consumer psychologists want to know how consumers' attitudes predict buying, and health psychologists are interested in how attitudes toward health behaviors predict those behaviors. Most research in this area assumes a linear attitude–behavior relationship. For example, as someone's attitude toward getting vaccinated grows more favorable, it is generally assumed that their likelihood of getting vaccinated increases at a constant rate. In contrast to this assumption, we found a nonlinear relationship. Attitudes that differed across negative and positive valence were associated with bigger differences in behavior than attitudes that differed within negative or positive valence. We theorize that this occurs because people perceive attitudes categorically—as positive or negative—and neglect shades of positivity or negativity. Our findings call into question longstanding assumptions about attitude–behavior correspondence and enhance researchers' ability to predict behavior going forward.

(negative vs. positive) seem more different than attitudes that differ within valence (e.g., positive vs. very positive; Bechler et al., 2019, 2020), we postulate that differences in attitudes that span the neutral point might be associated with greater differences in behavior than differences in attitudes that do not. In essence, the more different two attitudes seem (on the basis of their categorical assignments by valence), the more different their corresponding behavior might be. If this is true, as attitudes move from extremely negative to extremely positive on some measure, there should be a steeper rise or bigger jump in corresponding behavior around the neutral point (as attitudes shift from negative to positive) compared with elsewhere on the scale.

An Alternative View: The Attitude-Strength Perspective

As an alternative to the categorical perspective, the attitude-strength literature suggests a different nonlinear relationship (see Fig. 1, right panel). *Attitude strength* refers to the extent to which an attitude endures over time and influences behavior. Researchers have investigated multiple dimensions of strength—including

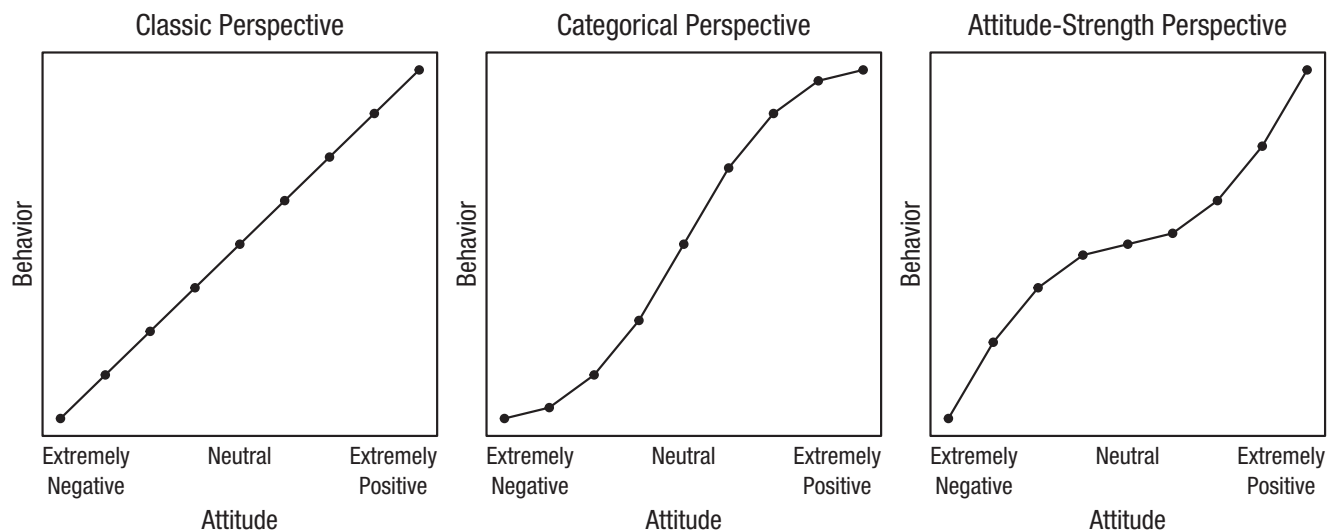


Fig. 1. Classic, categorical, and attitude-strength perspectives on the attitude–behavior relationship. *Behavior* is used generically here to indicate the likelihood, frequency, or degree of favorable behavior (lower values are graphed toward the base of the y-axes).

importance, certainty, and accessibility (see Petty & Krosnick, 1995)—and each moderates the attitude–behavior relationship (Glasman & Albarracín, 2006; Kraus, 1995). Stronger attitudes are associated with higher attitude–behavior correlations and steeper slopes in the attitude–behavior relationship than weaker attitudes (Bizer et al., 2006; Tormala & Petty, 2004; Wallace et al., 2020).

A central dimension of attitude strength is attitude extremity—the extent to which an attitude deviates from neutrality. Extremity is particularly relevant to the current discussion because it is inherently tied to attitude position and thus can be derived directly from an attitude measure. Generally, the more extreme an attitude, the stronger that attitude (Krosnick & Petty, 1995). Although research exploring the role of extremity in shaping attitude–behavior correspondence is limited (Kraus, 1995; Petersen & Dutton, 1975), the notion that extreme attitudes are more predictive of and influential over behavior than moderate attitudes appears to be widely accepted (e.g., Krosnick et al., 1993; Pomerantz et al., 1995). The logic is that increased strength gives attitudes more impact on behavior, and extremity confers strength, so attitudes should have more impact on behavior as extremity rises. Represented as a single curve, the strength perspective suggests that as attitudes become more extreme, they have increasing impact on behavior, producing the cubic relationship depicted in Figure 1 (right panel). Interestingly, we identified no research that confirms this relationship. In articles frequently cited as support for this perspective, the authors (a) do not assess the correlation or slope of the

attitude–behavior relationship (Petersen & Dutton, 1975), (b) explicitly state that they did not find evidence for nonlinearity (Fazio & Zanna, 1978), or (c) conflate extremity with other strength variables, such as importance (van Doorn et al., 2007; see also Verba et al., 1995). For further discussion of this literature, see the Supplemental Material available online.

General Method

In sum, the current research assessed the attitude–behavior relationship predicted by the categorical perspective and tested its viability relative to the classic and attitude-strength perspectives. Across seven main studies, we used a variety of attitude, behavior, and behavioral-intention measures and assessed the attitude–behavior relationship across diverse contexts. In these studies, we determined sample sizes prior to data collection, aiming for at least 100 participants per cell when manipulating attitudes or 100 observations per point on the attitude scale when measuring attitudes. Sensitivity analyses revealed that each sample had greater than 80% power to detect the predicted cubic effect. Unless otherwise noted, participants were recruited from Amazon’s Mechanical Turk. We complied with American Psychological Association, national, and institutional guidelines for experimental conduct and ethical treatment of participants, and all manipulations, measures, and exclusions are reported. Materials and data for all studies except Studies 5a to 5c are available at <https://osf.io/xdpku/>. Data sources for Studies 5a to 5c are cited in text.

Study 1

Method

Study 1 had two parts, one assessing behavioral intentions and the other assessing actual behavior in a voting context. Part 1 (conducted October 25–29, 2018) measured 1,501 participants' attitudes toward their district's active congressional candidates for the 2018 midterm elections (held on November 6, 2018) as well as their behavioral intentions (i.e., the likelihood of voting for each candidate). Participants indicated their congressional district using a district map (GovTrack, 2018), and we identified their active candidates using ProPublica.org (ProPublica, 2018). Participants reported attitudes using a scale ranging from 1 (*extremely against*) to 9 (*extremely in favor*)—5 being neutral—and their likelihood of voting for each candidate on a scale from 1 (*not likely at all*) to 7 (*extremely likely*).

We also collected measures of participants' likelihood of voting at all (for results for this measure, see the Supplemental Material) and whether participants had heard of each candidate. Given that we were not interested in the attitude–behavior relationship for nonattitudes (Converse, 1970), only attitude–behavior pairs corresponding to candidates whom participants had heard of (52.0%) were included in our analysis. Although this percentage might appear low, many of the active candidates were obscure (some participants viewed as many as eight candidates). We also excluded responses from participants who indicated congressional districts from Pennsylvania (3.5% of the remaining attitude–behavior pairs) because Pennsylvania was redistricted in the spring of 2018, and its districts had not been updated on the map we used. This left 1,128 participants and 2,022 attitude–behavior pairs for analysis.

All 1,128 participants were also invited to Part 2, which took place after the elections (November 7–21, 2018). Of those invited, 702 participated. In Part 2, participants indicated their congressional district as a consistency check and reported which candidate they voted for (or whether they did not vote) in the election. We report results for the 543 participants who passed the consistency check (reported the same district both times). Note that the attrition rate could stem in part from the sensitive nature of the information that participants were asked to provide. Importantly, analyses of the attitude–behavior relationship at Time 1 and Time 2 produce consistent results.

Results

To test whether the attitude–behavior relationship was nonlinear and whether the slope of this relationship was steepest around the neutral point (i.e., between Points

4 and 6 on the attitude scale), we conducted two analyses. First, we conducted a hierarchical mixed-model regression to test for the cubic relationship between attitudes and behavior. This analysis included a test of the linear and quadratic (controlling for linear) relationships. Of primary interest was a mixed-effects model on behavior with attitudes (linear), attitudes² (quadratic), and attitudes³ (cubic) as fixed effects and participant-level and candidate-level intercepts as random effects. We were interested in whether the attitudes³ coefficient was significant and whether the model including this cubic term improved overall fit. Because the models we fitted were nested, this latter analysis was conducted via a χ^2 or F test (Chambers, 1992), depending on the types of models (linear or mixed) under investigation. We provide additional model-comparison statistics in the Supplemental Material.

Second, to determine whether differences in behavior were greatest as attitudes moved from *slightly against* (4) to *slightly in favor* (6), relative to movement elsewhere on the attitude scale, we conducted a three-line significance test. This test estimated three regressions, each with two break points. The first regression estimated the slope of the attitude–behavior relationship for attitudes from 1 to 4 on the attitude scale (b_{1-4}), the second estimated the slope for attitudes from 4 to 6 (b_{4-6}), and the third estimated the slope for attitudes from 6 to 9 (b_{6-9}). To increase power, we included observations at each end point of those ranges (Simonsohn, 2018). Our key test of whether differences in voting behavior were greatest for differences in attitudes around the neutral point consisted of a z test assessing whether b_{4-6} was significantly steeper than b_{1-4} and b_{6-9} (Cohen et al., 2003; Paternoster et al., 1998).¹

This three-line test was beneficial because the portions of the attitude scale used to create the three groups of interest (within negative, within positive, and across valence) spanned different ranges of scale points. Indeed, attitudes were measured on a 9-point scale in Study 1 (as in much past research), which means the portions of the scale within negative (1–4) and positive (6–9) valence spanned four points, whereas the portion of the scale across valence (4–6) spanned three points. Because our statistical test examined differences in the slopes, it was not affected by this unevenness.

We began with a hierarchical mixed-model regression assessing the relationship between attitudes and behavioral intentions (computing orthogonal polynomials; Kennedy & Gentle, 1980). Replicating past research, our analyses revealed a significant positive linear relationship between attitudes and intentions, $b = 99.03$, 95% confidence interval (CI) = [96.67, 101.40], $t = 82.41$, $p < .001$, $r = .88$. Controlling for this relationship, we

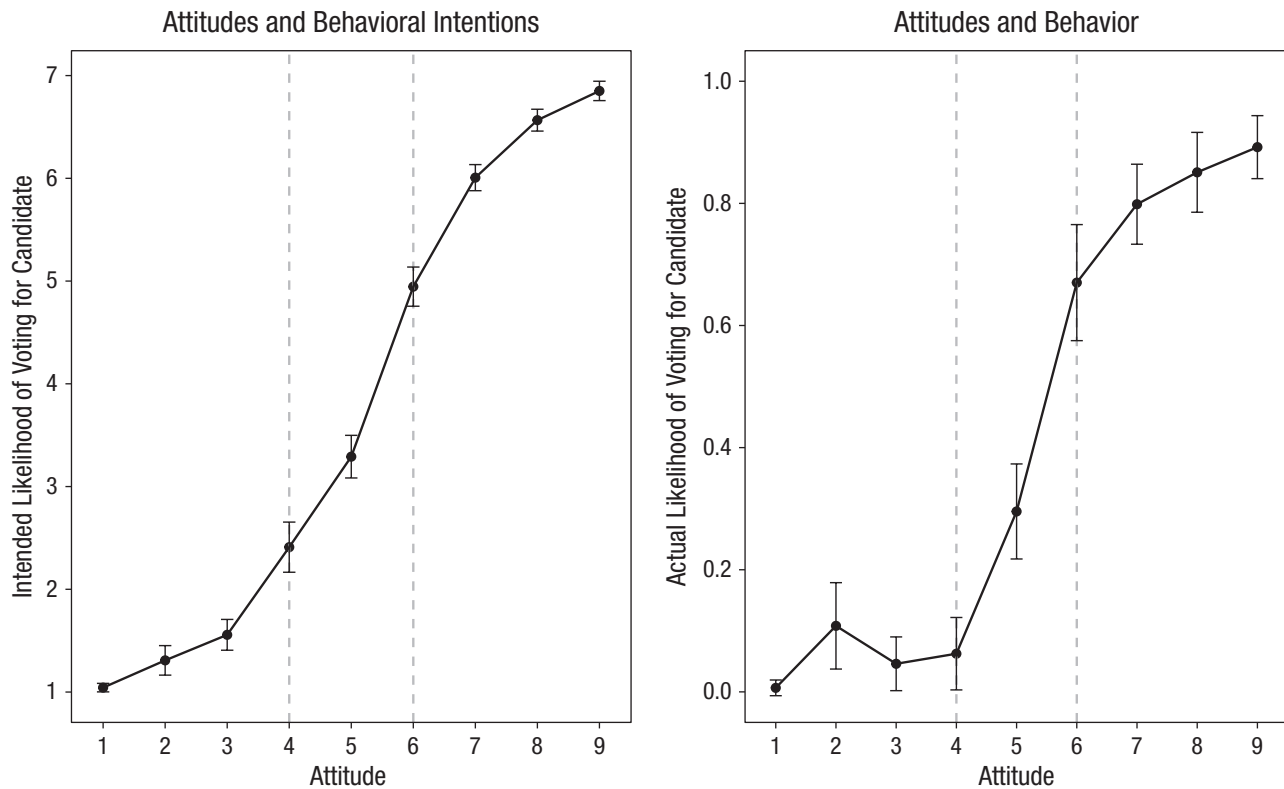


Fig. 2. Relationship between attitudes and behavioral intentions (left panel; Part 1) and between attitudes and behavior (right panel; Part 2) in Study 1. Dashed lines indicate the two break points used to conduct the three-line significance test. Points are raw means, and error bars are 95% confidence intervals at each level of attitude. Plotted behavioral-intention results include all participants who completed Part 1 (regardless of whether they completed Part 2).

also found a significant quadratic (attitudes²) relationship, $b = 6.22$, 95% CI = [3.88, 8.55], $t = 5.22$, $p < .001$. Most germane, controlling for both the linear and quadratic terms, we found a significant cubic (attitudes³) relationship, $b = -17.85$, 95% CI = [-20.04, -15.65], $t = -15.95$, $p < .001$ (see Fig. 2). The cubic model provided significantly better fit than both the linear, $\chi^2(2) = 266.90$, $p < .001$, and quadratic, $\chi^2(1) = 239.84$, $p < .001$, models.

Following these analyses, we estimated three regressions, which indicated three significant positive slopes: $b_{1-4} = 0.40$, 95% CI = [0.35, 0.46], $t = 14.17$, $p < .001$; $b_{4-6} = 1.31$, 95% CI = [1.14, 1.47], $t = 15.62$, $p < .001$; and $b_{6-9} = 0.60$, 95% CI = [0.54, 0.66], $t = 19.71$, $p < .001$ (see Table 1). However, as predicted, the slope of the attitude–intention relationship was steeper across neutral (b_{4-6}) than within negative (b_{1-4}), $z = 10.23$, $p < .001$, or within positive (b_{6-9}), $z = 7.94$, $p < .001$, valence. Although not pertinent to our primary interests, results also showed that the slope of the attitude–intention relationship was steeper within positive (b_{6-9}) than within negative (b_{1-4}) valence, $z = 4.73$, $p < .001$. Relatedly, the slope was also steeper between neutral and slightly positive (5 and 6) than between slightly negative and neutral (4 and 5).²

For analysis of actual behavior (voting reported after the election), responses were coded 0 if the respondent did not vote for a candidate and 1 if the respondent voted for a candidate. As displayed in Figure 2 and Table 1, the results of this analysis were consistent: The cubic model provided significantly better fit than both the linear and quadratic models, and the slope of the attitude–behavior relationship was steeper when attitudes crossed neutral than when attitudes moved within negative or positive valence.

In summary, Study 1 offered an initial comparison of the classic, attitude-strength, and categorical perspectives in a context that involved consequential behavior: voting in a U.S. congressional election. For both behavioral intentions and actual behavior, the results were most compatible with the categorical perspective.

Study 2

Method

In Study 2, we used a repeated measures design to examine the generalizability of the findings from Study 1 across a wide range of attitudes and behaviors. A total

Table 1. Summary of Study Results

Study	Attitude measure	Behavior measure	Behavior type	Random effects included	Attitude-behavior correlation	Quadratic (attitude) ² test	Cubic (attitude) ³ test	Model comparison		Slope (b)	
								Cubic vs. linear	Cubic vs. quadratic	Within negative	Across valence
1: Part 1	9-point scale, 5 = neutral	7-point scale assessing likelihood	Voting intentions	Participant & candidate intercepts	$r = .88$, $p < .001$	$t = 5.22$, $p < .001$	$t = -15.95$, $p < .001$	$\chi^2(2) = 266.90$, $p < .001$	$\chi^2(1) = 239.84$, $p < .001$	0.40 _a	1.31 _b
1: Part 2	None	Choice among candidates	Actual vote	Participant & candidate intercepts	$r = .70$, $p < .001$	$t = -3.11$, $p = .002$	$t = -7.73$, $p < .001$	$\chi^2(2) = 67.83$, $p < .001$	$\chi^2(1) = 58.20$, $p < .001$	0.02 _a	0.31 _b
2	9-point scale, 5 = neutral	101-point scale assessing likelihood	Behavioral intentions	Participant & stimulus intercepts	$r = .66$, $p < .001$	$t = 8.95$, $p < .001$	$t = -8.55$, $p < .001$	$\chi^2(2) = 151.09$, $p < .001$	$\chi^2(1) = 72.51$, $p < .001$	6.00 _a	15.27 _b
3	7-point scale, 4 = neutral	Free response (unbounded numeric)	Purchase intentions	Participant & stimulus intercepts	$r = .68$, $p < .001$	$t = 10.38$, $p < .001$	$t = -7.07$, $p < .001$	$\chi^2(2) = 155.00$, $p < .001$	$\chi^2(1) = 49.47$, $p < .001$	0.27 _a	0.80 _b
4	9-point scale, 5 = neutral	Free response (bounded percentage)	Voting intentions: valenced	None	$r = .63$, $p < .001$	$F(800) = 0.99$, $p = .321$	$F(799) = -2.54$, $p = .011$	$F(2, 799) = 3.72$, $p = .025$	$F(1, 799) = 6.45$, $p = .011$	6.52 _a	12.81 _b
5a	5-point scale	Dichotomous selection	Recommendation decision	Product & reviewer intercepts	$r = .66$, $p < .001$	$t = -230.46$, $p < .001$	$t = -199.44$, $p < .001$	$\chi^2(2) = 85,439.2$, $p < .001$	$\chi^2(1) = 37,106.4$, $p < .001$	0.05 _a	0.43 _b
5b	5-point scale	Dichotomous selection	Recommendation decision	Product intercepts	$r = .79$, $p < .001$	$t = -29.16$, $p < .001$	$t = -73.58$, $p < .001$	$\chi^2(2) = 5,706.92$, $p < .001$	$\chi^2(1) = 4,871.95$, $p < .001$	0.04 _a	0.47 _b
5c	5-point scale	Dichotomous selection	Recommendation decision	Product & reviewer intercepts	$r = .60$, $p < .001$	$t = -85.68$, $p < .001$	$t = -51.38$, $p < .001$	$\chi^2(2) = 9,023.79$, $p < .001$	$\chi^2(1) = 2,520.20$, $p < .001$	0.07 _a	0.38 _b
S1: Scale 1	5-point scale	7-point scale assessing likelihood	Voting intentions	Participant & candidate intercepts	$r = .89$, $p < .001$	$t = -8.95$, $p < .001$	$t = -3.95$, $p < .001$	$\chi^2(2) = 71.14$, $p < .001$	$\chi^2(1) = 13.31$, $p < .001$	1.45 _a	2.29 _b
S1: Scale 2	5-point scale	7-point scale assessing likelihood	Voting intentions	Participant & candidate intercepts	$r = .90$, $p < .001$	$t = 2.81$, $p = .011$	$t = -6.14$, $p < .001$	$\chi^2(2) = 41.35$, $p < .001$	$\chi^2(1) = 35.22$, $p < .001$	1.11 _a	2.14 _b
S2	5-point scale	5-point bipolar scale	Voting intentions	None	$r = .93$, $p < .001$	$t = -1.37$, $p = .171$	$t = -3.31$, $p < .001$	$F(2, 485) = 6.45$, $p = .002$	$F(1, 485) = 10.98$, $p < .001$	0.94 _{aff}	1.14 _{aff}

Note: Slope subscripts should be interpreted within rows only. Values with the same subscript do not differ at a $p < .05$ level; daggers on the same subscripts indicate values that differ at a $p < .10$ level. For studies that measured dichotomous outcomes, analyses are reported on the probability scale for ease of interpretation and to be consistent with all figures in the text. Similar analyses on the log-odds scale produce similar results (see <https://osf.io/xdpku/>). For Study S1, results are shown separately for scales on which the implied neutral point is between the second and third scale points (Scale 1) and between the third and fourth scale points (Scale 2).

Table 2. Attitude and Behavioral-Intention Measures in Study 2

Attitude ("What is your attitude toward ____?")	Behavioral intention ("How likely are you to ____ during the next 2 weeks?")
Using Facebook	Go on Facebook more than 7 times
Watching NFL games on TV	Watch an NFL game on TV
Making purchases using your smartphone	Make a purchase using your smartphone
Eating ice cream	Eat ice cream
Going out to dinner with friends	Go out to a dinner with friends
Socializing at bars	Socialize at a bar
Drinking alcohol	Drink alcohol more than 3 times
Gambling	Gamble
Listening to podcasts	Listen to a podcast
Taking photos	Take more than 10 photos

Note: NFL = National Football League.

of 501 participants reported attitudes and intentions toward 10 different behaviors (Fishbein & Ajzen, 1975) over a 2-week period (see Table 2). Attitudes were measured on a scale from 1 (*extremely against*) to 9 (*extremely in favor*), 5 being neutral. Behavioral intentions were expressed on slider scales ranging from 0 (*not likely at all*) to 100 (*extremely likely*). Because each participant reported attitudes and behavioral intentions 10 times, we obtained 5,010 total observations.

Results

As summarized in Table 1, across all 10 topics, the cubic model provided significantly better fit than the linear and quadratic models, and our three-line test indicated that the slope of the attitude–behavior relationship was steeper when attitudes crossed neutral than when attitudes moved within negative or positive valence (see Fig. 3). This result provides further evidence for the categorical perspective despite numerous procedural modifications, including assessing attitudes toward specific behaviors (as opposed to attitudes toward people, objects, or issues) and toward less polarizing topics.

Study 3

Method

In Studies 1 and 2, assessments of behavior (voting) and behavioral intentions (e.g., listening to a podcast) were both bounded (e.g., by the scale we employed). Study 3 assessed behavioral intentions using an open-ended purchase measure to increase robustness. In addition, we changed our attitude scale from 9 points to 7 points (1 = *extremely negative*, 4 = *neutral*, 7 = *extremely positive*).

A total of 699 participants imagined that they had moved to a new home and were setting up their new

living space. They viewed four household objects that they might want to have in their home: scented candles, succulents, statues or sculptures, and coffee-table books. Participants reported their attitude toward each object and indicated how many of each they would purchase for their new home by typing a number into a text box (minimum = 0, no maximum). Because each participant reported attitudes and behavioral intentions 4 times, we obtained 2,796 total observations.

Given the 7-point attitude scale, our hypothesis and analysis plan differed slightly from those in Studies 1 and 2. Specifically, we expected the slope of the attitude–behavior relationship to be steeper for attitudes between 3 and 5 than between 1 and 3 or 5 and 7. In addition, because of the unbounded nature of our behavioral-intentions measure, we preregistered our analysis plan with respect to the removal of outliers (<https://aspredicted.org/ix4qb.pdf>). Following our preregistration, we excluded observations using a robust Mahalanobis

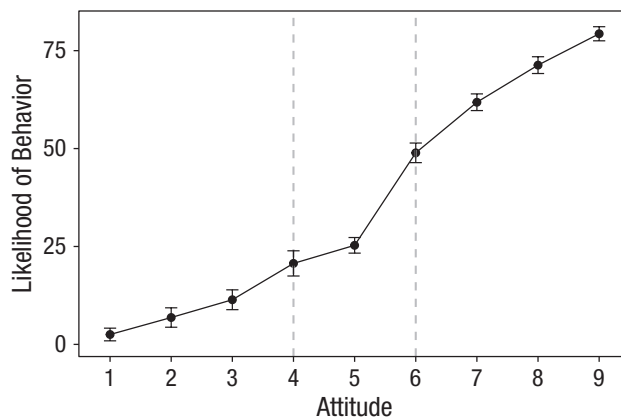


Fig. 3. Relationship between attitudes and behavioral intentions in Study 2. Dashed lines indicate the two break points used to conduct the three-line significance test. Points are raw means, and error bars are 95% confidence intervals at each level of attitude.

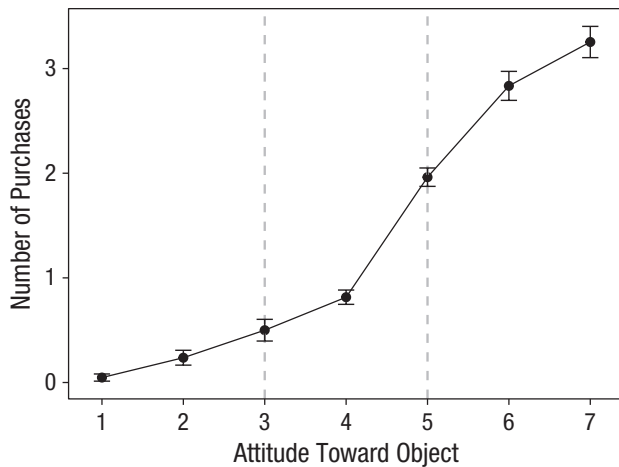


Fig. 4. Relationship between attitudes toward household objects and purchasing decisions in Study 3. Dashed lines indicate the break points used to conduct the three-line significance test. Points are raw means, and error bars are 95% confidence intervals at each level of attitude.

distance (minimum covariance determinant 75 [MCD75]; $\alpha = .01$; Leys et al., 2018) that accounted for the multivariate nature of the data (i.e., our measures of attitudes and behavior). Below, we summarize the results on the basis of observations meeting the inclusion criteria (92.3% of observations; 697 participants). The results were even stronger (i.e., more consistent with the categorical perspective) when we employed a more stringent cutoff threshold ($\alpha = .001$) that retained more observations (93.9%; 698 participants).

Results

Study 3 replicated our prior results (see Fig. 4). As detailed in Table 1, the cubic model provided significantly better fit than the linear and quadratic models, and our three-line test indicated that differences in behavioral intentions were greater when attitudes crossed neutral (moved from 3 to 5 on the scale in this study) than when attitudes moved within negative (1–3) or within positive (5–7) valence. This result suggests that evidence for our categorical perspective is contingent on neither 9-point attitude scales nor bounded behavior measures.

Study 4

Method

We had two primary aims in Study 4: to manipulate attitudes and to test a theoretically driven boundary on the cubic attitude–behavior relationship. As noted, attitudes are inherently valenced constructs that have a

qualitative barrier (i.e., a neutral point) separating them into two categories (negative and positive). This categorical distinction causes attitudes that differ across valence to appear more different than attitudes that differ within valence (Bechler et al., 2019), which we posit pushes the attitude–behavior relationship into a cubic form.

Importantly, though, this cubic relationship should occur only for what we term *valenced* behaviors. We define valenced behaviors as behaviors that imply a positive or negative attitude toward the focal attitude object. Consider a person's attitude toward a particular wine. The more one likes that wine, the more likely one is to purchase that wine. In this scenario, higher scores on a measure of purchase likelihood would generally imply more positive attitudes toward the wine in question, meaning purchase likelihood would constitute a valenced behavioral assessment with respect to that wine. To this point, our studies focused on valenced behaviors. For example, in Study 3, purchasing coffee-table books was a valenced behavior because purchasing more coffee-table books would generally imply a more positive attitude toward coffee-table books. Likewise, in Study 1, voting for (or in favor of) a candidate was a valenced behavior. Individuals with positive attitudes toward a candidate are more likely to vote in favor of that candidate than individuals with negative attitudes toward the candidate.

In contrast, we conceptualize *nonvalenced* behaviors as actions that generally relate to an attitude object but do not imply a positive or negative attitude toward that object. For instance, imagine that we measured attitudes toward the Black Lives Matter movement. Here, a non-valenced behavior measure might assess the likelihood of advocating about the Black Lives Matter movement (in either direction, for or against), whereas a valenced measure might assess the likelihood of advocating in favor of the movement. Increased advocacy intentions would be informative about attitude valence in the latter case but not the former. Similarly, if we measured attitudes toward a product, a nonvalenced behavior measure might assess consumers' likelihood of reviewing the product online (at all, positively or negatively), whereas a valenced measure would assess the likelihood of writing a positive review. In the voting context used in Study 1, voting for a particular candidate was a valenced behavior, whereas voting at all (e.g., turning out to vote) would be a nonvalenced behavior; again, the decision to vote in general does not necessarily imply a positive or negative attitude toward a particular candidate or policy. We submit that attitude valence—and, thus, the categorical perspective—likely plays a greater role in predicting valenced behaviors. In the case of nonvalenced behaviors, attitude extremity might

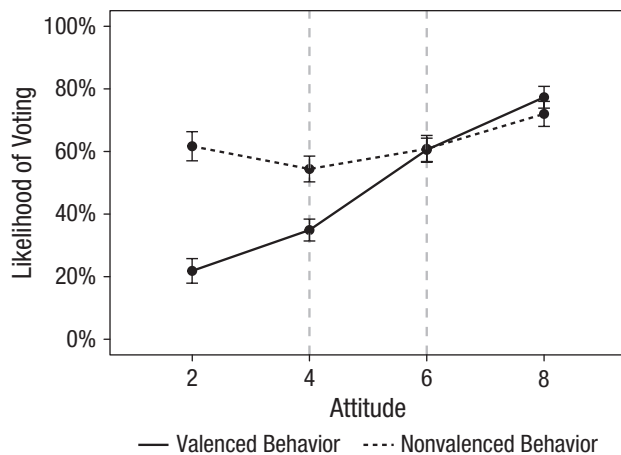


Fig. 5. Effect of attitudes on valenced and nonvalenced behavioral intentions in Study 4. Dashed lines indicate the two break points used to conduct the three-line significance test. Points are means at each level of attitude, and error bars indicate 95% confidence intervals.

be more influential; specifically, more extreme attitudes in either direction are associated with increased likelihood of taking action in general (e.g., turning out to vote). If this is true, we would expect a quadratic (U-shaped) relationship between attitudes and nonvalenced behavior, potentially consistent with an attitude-strength account (Petty & Krosnick, 1995; see also Hu et al., 2009).

To examine the relationship between attitudes and valenced versus nonvalenced behavior, we randomly assigned 803 participants to conditions in a 4 (attitude: 2, 4, 6, or 8 on a 9-point scale) $\times$ 2 (person: self or other) between-participants design. The person manipulation tested whether the cubic relationship extended to situations in which people considered others' attitudes and behaviors. We expected to observe the same patterns when participants forecasted others' behavior because the same categorization processes that generate a cubic attitude–behavior relationship for the self would operate when people consider others.

At the outset of the study (conducted September 27–29, 2018), all participants were prompted to write 25 to 50 words. Participants in the *self* condition were informed that the November 2018 midterm elections were approaching, and they were instructed to write about a current political issue or candidate (for a summary of the candidates and issues that participants wrote about, see the Supplemental Material). Importantly, however, the issue or candidate that participants were instructed to write about was manipulated to be someone or something they were *pretty against* (2 on a scale ranging from 1, *extremely against the issue/candidate*, to 9, *extremely in favor of the issue/candidate*, 5 being neutral), *just somewhat against* (4), *just*

somewhat in favor of (6), or *pretty in favor of* (8). After completing the writing task, participants entered a percentage in a text box to indicate their valenced behavioral intentions (likelihood of voting in favor of this issue/candidate). Then, on a separate page, participants did the same for their nonvalenced intentions (likelihood of voting at all—either in favor or against).

Participants in the *other* condition were informed that Thanksgiving was coming up and were instructed to write about the city and state where they would be for the holiday. Afterward, participants read that the November 2018 midterm elections were approaching, and they were informed of another person's attitude toward a current political issue or candidate (manipulated to be 2, 4, 6, or 8 on the same 9-point attitude scale as in the self condition). These participants also completed measures of valenced and nonvalenced behavioral intentions, in this case making predictions about the other person's behavior.

Results

There was no interaction between the attitudes³ term and person condition on valenced, $b = -80.95$, 95% CI = $[-185.50, 23.60]$, $t(795) = -1.52$, $p = .129$, or nonvalenced, $b = -90.36$, 95% CI = $[-211.01, 30.29]$, $t(795) = -1.47$, $p = .142$, behavioral intentions, suggesting that the cubic relationship between attitudes and behavioral intentions did not differ across self and other conditions. Therefore, we collapsed across person condition and submitted both intention measures to the same analyses as in our prior studies. Because attitudes were manipulated to be 2, 4, 6, or 8, the within negative (2–4), across valence (4–6), and within positive (6–8) regions of the scale each spanned three points.

Displayed in Table 1, the results for valenced behavioral intentions paralleled those from the other studies: The cubic model provided better fit than the linear and quadratic models, and the slope of the attitude–behavior relationship was steeper when attitudes crossed neutral than when attitudes moved within negative or positive valence (see Fig. 5).

However, nonvalenced behavioral intentions did not yield the same results. Although there was a slight positive linear effect, $b = 121.47$, 95% CI = $[60.35, 182.58]$, $t(801) = 3.90$, $p < .001$, $r = .14$, we found a significant quadratic effect, $b = 130.39$, 95% CI = $[69.91, 190.87]$, $t(800) = 4.23$, $p < .001$ (see Fig. 5), and nonsignificant cubic effect, $b = -28.28$, 95% CI = $[-88.77, 32.21]$, $t(799) = -0.92$, $p = .359$. The quadratic model provided a significantly better fit than the linear model, $F(1, 800) = 17.90$, $p < .001$, and the cubic model did not improve fit beyond the quadratic model, $F(1, 799) = 0.84$, $p = .359$. A two-line test (Simonsohn, 2018) revealed that this quadratic

relationship was significantly U-shaped—first average slope: $b = -3.63$, 95% CI = $[-6.75, -0.52]$, $z = -2.29$, $p = .022$; second average slope: $b = 4.41$, 95% CI = $[2.96, 5.87]$, $z = 6.02$, $p < .001$. Notably, this relationship was consistent with the results for the nonvalenced behavioral-intentions measure in Study 1 (see the Supplemental Material).

It is potentially noteworthy that participants assigned to consider an issue or a candidate that they were pretty in favor of (8) indicated (on average) that they would be more likely to vote in favor of the issue or candidate than they would be to vote at all, which suggests some inconsistency in participants' responses. We posit that this occurred for participants assigned to consider an issue or a candidate that they were pretty in favor of (8) because some participants—across all conditions—interpreted the valenced behavior measure as asking about the likelihood that they would vote in favor of the issue or candidate if indeed they voted at all. Across all conditions, 199 participants reported that their intentions to vote were lower than their intentions to vote in favor. Restricting our analysis to participants who did not demonstrate this inconsistency, we observed the same pattern of significant and nonsignificant effects as described above (using a $p < .05$ threshold).

In short, experimentally manipulating attitudes yielded a cubic effect on behavioral intentions, but this shape was limited to valenced behavior. For nonvalenced behavior, the effect was quadratic, meaning that differences in attitude extremity had greater impact on behavioral intentions than did equivalent differences in attitude valence. This latter finding is potentially consistent with an attitude-strength perspective and suggests that the categorical perspective is less likely to apply when one is predicting nonvalenced behavioral outcomes.

Studies 5a to 5c

Method

Studies 5a to 5c used real-world data to assess an attitude-relevant behavior of great interest to researchers, practitioners, and the general population: online product reviews. We obtained three unique data sets composed of scraped reviews. The data sets consisted of 270,981 online reviews of 497 Xbox games and accessories at Bestbuy.com (Study 5a), 23,486 online reviews of 1,206 products sold by a women's clothing company (nicapoto, 2017; Study 5b), and 27,409 reviews of 44 unique Amazon products (e.g., Kindle) sold on Bestbuy.com (Datafiniti, 2019; Study 5c).

These data sets were ideal for the current research because they included two key pieces of information from product reviewers: attitudes in the form of product

ratings (1–5 stars) and behavioral decisions indicating whether or not the rater recommended the product (dichotomous: recommend/do not recommend). Treating product ratings as attitudes and recommendation decisions as behavior (or behavioral intentions), we predicted that the attitude–behavior relationship would be cubic and steepest around the neutral midpoint of 3 stars (for evidence that consumers treat a 3-star rating as neutral, see Fisher et al., 2018). That is, the slope would be steeper between 2 and 4 stars than between 1 and 2 stars or 4 and 5 stars.

Results

We conducted the same analyses as in the prior studies, and the results were consistent (see Table 1). The cubic model provided significantly better fit than both the linear and quadratic models, and our three-line test indicated that the slope of the attitude–behavior relationship was steeper when attitudes crossed neutral (2–4 stars) than when attitudes moved within negative (1–2 stars) or positive (4–5 stars) valence (see Fig. 6). Displayed in Table 1, our models included product- and reviewer-level intercepts as random effects whenever this information was available. In each study, we also examined simpler (not controlling for random effects) and more complex (e.g., controlling for product, reviewer, and other variables when available) models, and the results reported in each study were robust to these changes. Thus, real ratings and recommendations of a diverse array of products across multiple online platforms offered reliable evidence for the categorical perspective on the attitude–behavior relationship.

General Discussion

The attitude–behavior relationship is one of the most researched topics in psychology. Despite widespread interest in this relationship, little attention has been paid to its shape. However, a prevailing assumption appears to be that the relationship is linear. The current research challenges this assumption. Across diverse measures and contexts, we observed a nonlinear attitude–behavior relationship. As hypothesized, the slope was steeper when attitudes differed across rather than within valence. This finding is consistent with the proposition that people view attitudes categorically. Attitudes that differ across valence are perceived as more different than attitudes that differ within valence (Bechler et al., 2019), which produces steeper rises in behavior as attitudes move between negative and positive.

This result has important implications. First, nonlinearity might partly explain low attitude–behavior correlations in past research (e.g., Wicker, 1969). In retrospect, low correlations could offer a clue that attitudes and

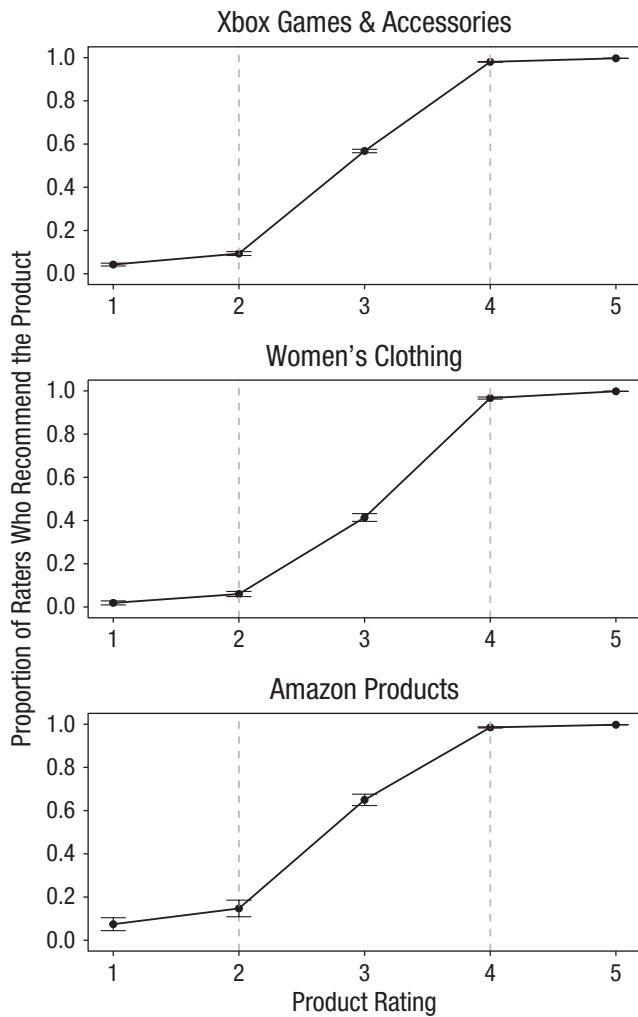


Fig. 6. Relationship between product rating and recommendation decisions in Studies 5a (top panel), 5b (middle panel), and 5c (bottom panel). Dashed lines indicate the two break points used to conduct the three-line significance test. Points are raw means, and error bars are 95% confidence intervals at each level of attitude.

behavior do not relate strictly linearly. Researchers will likely enhance behavioral prediction by recognizing that the attitude–behavior relationship can assume a nonlinear form. In addition, our studies help illuminate the type of attitude differences that might be expected to have the greatest impact on behavior. Most importantly, for valenced behavior, we observed greater differences in behavior as attitudes moved across neutral, shifting between negative and positive. This finding did not extend to nonvalenced behavior.

These findings raise a number of questions for future research. First, although our studies used a range of measures, each study employed a symmetrical, bipolar attitude scale containing a neutral midpoint. What would happen if we used a different type of scale—for instance, a scale without a neutral point or an asymmetrical scale in which valence shifted to the left or

right of the midpoint? In an initial assessment, we conducted Study S1 (see the Supplemental Material for full method and results). Even without a neutral point in the scale's center, this study provided evidence for the categorical perspective: The attitude–behavior relationship was steepest where valence shifted on the attitude scale, regardless of where that shift occurred.

How would a unipolar attitude scale affect the attitude–behavior relationship? We suspect that a single unipolar scale—for example, ranging from *not at all* to *extremely positive*—would cause the relationship to lose its cubic shape and become more linear because a unipolar scale would have no categorical threshold separating negative and positive valence. Unipolar scales have been employed in attitudes research, particularly in research on ambivalence (Thompson et al., 1995), and exploring how these types of scales moderate the attitude–behavior relationship would be worthwhile.

Relatedly, although our studies used bipolar attitude measures, our behavioral measures were more unipolar—assessing the likelihood of voting in favor, the number of objects one would buy, and so on. Could it be that misalignment between the attitude and behavioral measures distorted the attitude–behavior relationship and produced the cubic pattern we observed? If our measures precisely mirrored each other, would the linear perspective prevail? For preliminary evidence, we conducted Study S2 (see the Supplemental Material for full method and results). We asked participants about their attitudes and intentions toward a single entity and used measures that were closely aligned in scale points, bipolar structure, and anchor labels. Again, we observed the curve predicted by the categorical perspective.

Our studies raise conceptual questions as well. First, do the results have implications for attitude and behavior *change*? We focused on people's preexisting attitudes and their intended and actual behavior; results indicated that some differences in attitudes were associated with greater differences in behavior than others. This insight suggests that different types of attitude change might cause different degrees of behavior change. Although people can be more receptive to within- rather than across-valence change (Bechler et al., 2020; Bechler & Tormala, 2021), if indeed attitude change occurs, it appears that across-valence shifts might often have more behavioral impact.

Also important is research exploring further nuances in attitude–behavior correspondence. In one example, we found valence asymmetries. The attitude–behavior relationship was generally steeper for positive than negative attitudes. Investigating this asymmetry systematically—for instance, exploring whether it is tied to the approach–avoid nature of the behavior in question—would be a valuable next step. In addition,

it is worth examining whether the attitude–behavior relationship shifts according to the barriers, stakes, or effort associated with a behavior. Perhaps when the barriers or effort required to act are low (e.g., clicking to recommend products), the categorical perspective dominates because being favorable or unfavorable is sufficient to trigger corresponding behavior. When barriers, stakes, or required effort are high (e.g., buying a home), however, more extreme attitudes might be required to trigger corresponding behavior as the threshold for action shifts to a more extreme position. If so, the relationship might steepen toward the extremely positive end of the attitude scale.

Finally, is the cubic relationship we observed actually compatible with an attitude–strength perspective? For example, if attitudes predicted strength in a cubic fashion, whereby the relationship between attitude position and strength was steepest in the middle of the scale, attitude strength might account for the relationship we observed. However, the relationship between attitudes and attitude strength is typically U-shaped (see Raden, 1985): Attitudes become stronger as they move away from neutral toward more extreme positions. Thus, attitude strength is unlikely to explain our results.

In sum, our findings suggest a pivot in how researchers should construe, study, and assess attitude–behavior correspondence. People often perceive attitudes categorically, which appears to affect their use as behavioral guides. Thus, researchers should understand that the relationship between attitudes and behaviors can be nonlinear, and they should test for nonlinear relationships to enhance behavioral prediction. Likewise, researchers studying attitude change should consider the possibility that seemingly equivalent attitude shifts might not correspond to equivalent shifts in behavioral outcomes. The current research provides new insight into a topic of classic import in psychology, and we hope that it sparks further research into the role of categorical thinking in attitudes and behavioral outcomes.

Transparency

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Author Contributions

All the authors contributed to the study designs. C. J. Bechler analyzed and interpreted the data under the supervision of Z. L. Tormala and D. D. Rucker. All the authors drafted the manuscript and/or provided critical revisions. All the authors approved the final manuscript for submission.

Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

Open Practices

All data and materials for Studies 1 through 4 (as well as Studies S1 and S2) have been made publicly available via

OSF and can be accessed at <https://osf.io/xdpku>. The design and analysis plan for Study 3 was preregistered (<https://aspredicted.org/ix4qb.pdf>). This article has received the badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at <http://www.psychologicalscience.org/publications/badges>.



Supplemental Material

Additional supporting information can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797621995206>

Notes

1. In a robustness check, we also examined alternative analytical approaches: (a) splitting the data by focusing on attitudes ranging from 1 to 3, 4 to 6, and 7 to 9 so that there would be no overlapping points on the attitude measure across the three slopes of interest (possible in Studies 1–3); (b) using bootstrapping to test for differences in slopes (all studies); and (c) using segmented (i.e., broken-stick) regression (all studies). In Study 1 and all subsequent studies, these alternative approaches produced similar results to those reported in the text (see <https://osf.io/xdpku/>).
2. Our subsequent studies sometimes showed these same asymmetries, and further research exploring these differences would be worthwhile.

References

- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173–221). Erlbaum.
- Ajzen, I., Timko, C., & White, J. B. (1982). Self-monitoring and the attitude–behavior relation. *Journal of Personality and Social Psychology*, 42(3), 426–435.
- Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.), *A handbook of social psychology* (pp. 798–844). Oxford University Press.
- Beatty, S. E., & Kahle, L. R. (1988). Alternative hierarchies of the attitude–behavior relationship: The impact of brand commitment and habit. *Journal of the Academy of Marketing Science*, 16(2), 1–10.
- Bechler, C. J., & Tormala, Z. L. (2021). Misdirecting persuasive efforts during the COVID-19 pandemic: The targets people choose may not be the most likely to change. *Journal of the Association for Consumer Research*, 6(1), 187–195.
- Bechler, C. J., Tormala, Z. L., & Rucker, D. D. (2019). Perceiving attitude change: How qualitative shifts augment change perception. *Journal of Experimental Social Psychology*, 82, 160–175.
- Bechler, C. J., Tormala, Z. L., & Rucker, D. D. (2020). Choosing persuasion targets: How expectations of qualitative change increase advocacy intentions. *Journal of Experimental Social Psychology*, 86, Article 103911. <https://doi.org/10.1016/j.jesp.2019.103911>
- Bizer, G. Y., Tormala, Z. L., Rucker, D. D., & Petty, R. E. (2006). Memory-based versus on-line processing: Implications for attitude strength. *Journal of Experimental Social Psychology*, 42(5), 646–653.

- Chambers, J. M. (1992). Linear models. In J. M. Chambers & T. J. Hastie (Eds.), *Statistical models in S* (pp. 95–144). Wadsworth & Brooks/Cole.
- Clarkson, J. J., Tormala, Z. L., & Rucker, D. D. (2008). A new look at the consequences of attitude certainty: The amplification hypothesis. *Journal of Personality and Social Psychology*, 95(4), 810–825.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Erlbaum.
- Converse, P. E. (1970). Attitudes and non-attitudes: Continuation of a dialogue. In E. R. Tuft (Ed.), *The quantitative analysis of social problems* (pp. 168–189). Addison-Wesley.
- Datafiniti. (2019). *Consumer reviews of Amazon products* [Data set]. Kaggle. <https://www.kaggle.com/datafiniti/consumer-reviews-of-amazon-products>
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt Brace Jovanovich.
- Fazio, R. H., & Zanna, M. P. (1978). Attitudinal qualities relating to the strength of the attitude-behavior relationship. *Journal of Experimental Social Psychology*, 14(4), 398–408.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.
- Fisher, M., Newman, G. E., & Dhar, R. (2018). Seeing stars: How the binary bias distorts the interpretation of customer ratings. *Journal of Consumer Research*, 45(3), 471–489.
- Glasman, L. R., & Albarracín, D. (2006). Forming attitudes that predict future behavior: A meta-analysis of the attitude-behavior relation. *Psychological Bulletin*, 132(5), 778–822.
- GovTrack. (2018). *Congressional districts map*. <https://www.govtrack.us/congress/members/map>
- Harnad, S. (1987). Psychophysical and cognitive aspects of categorical perception: A critical overview. In S. Harnad (Ed.), *Categorical perception: The groundwork of cognition* (pp. 1–28). Cambridge University Press.
- Hu, N., Zhang, J., & Pavlou, P. A. (2009). Overcoming the J-shaped distribution of product reviews. *Communications of the ACM*, 52(10), 144–147.
- Kennedy, W. J., Jr., & Gentle, J. E. (1980). *Statistical computing*. Marcel Dekker.
- Kraus, S. J. (1995). Attitudes and the prediction of behavior: A meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin*, 21(1), 58–75.
- Krosnick, J. A., Boninger, D. S., Chuang, Y. C., Berent, M. K., & Carnot, C. G. (1993). Attitude strength: One construct or many related constructs? *Journal of Personality and Social Psychology*, 65(6), 1132–1151.
- Krosnick, J. A., & Petty, R. E. (1995). Attitude strength: An overview. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 1–24). Erlbaum.
- Krueger, J., & Clement, R. W. (1994). Memory-based judgments about multiple categories: A revision and extension of Tajfel's accentuation theory. *Journal of Personality and Social Psychology*, 67(1), 35–47.
- Lacetera, N., Pope, D. G., & Sydnor, J. R. (2012). Heuristic thinking and limited attention in the car market. *American Economic Review*, 102(5), 2206–2236.
- LaPiere, R. T. (1934). Attitudes vs. actions. *Social Forces*, 13(2), 230–237.
- Leys, C., Klein, O., Dominicy, Y., & Ley, C. (2018). Detecting multivariate outliers: Use a robust variant of the Mahalanobis distance. *Journal of Experimental Social Psychology*, 74, 150–156.
- nicapoto. (2017). *Women's e-commerce clothing reviews* [Data set]. Kaggle. <https://www.kaggle.com/nicapoto/womens-ecommerce-clothing-reviews>
- Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology*, 36(4), 859–866.
- Petersen, K. K., & Dutton, J. E. (1975). Centrality, extremity, intensity: Neglected variables in research on attitude-behavior consistency. *Social Forces*, 54(2), 393–414.
- Petty, R. E., & Krosnick, J. A. (Eds.). (1995). *Attitude strength: Antecedents and consequences*. Erlbaum.
- Petty, R. E., Wheeler, S. C., & Tormala, Z. L. (2013). Persuasion and attitude change. In I. B. Weiner & M. J. Lerner (Eds.), *Comprehensive handbook of psychology: Vol. 5. Personality and social psychology* (2nd ed., pp. 369–390). John Wiley.
- Pomerantz, E. M., Chaiken, S., & Tordesillas, R. S. (1995). Attitude strength and resistance processes. *Journal of Personality and Social Psychology*, 69(3), 408–419.
- ProPublica. (2018). *2018 midterm election congressional candidates* [Data set]. <https://www.propublica.org/datastore/dataset/2018-midterm-election-congressional-candidates>
- Raden, D. (1985). Strength-related attitude dimensions. *Social Psychology Quarterly*, 48(4), 312–330.
- Simonsohn, U. (2018). Two lines: A valid alternative to the invalid testing of U-shaped relationships with quadratic regressions. *Advances in Methods and Practices in Psychological Science*, 1(4), 538–555.
- Tajfel, H., & Wilkes, A. L. (1963). Classification and quantitative judgement. *British Journal of Psychology*, 54(2), 101–114.
- Thompson, M. M., Zanna, M. P., & Griffin, D. W. (1995). Let's not be indifferent about (attitudinal) ambivalence. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 361–386). Erlbaum.
- Tormala, Z. L., & Petty, R. E. (2004). Source credibility and attitude certainty: A metacognitive analysis of resistance to persuasion. *Journal of Consumer Psychology*, 14(4), 427–442.
- van Doorn, J., Verhoef, P. C., & Bijmolt, T. H. (2007). The importance of non-linear relationships between attitude and behaviour in policy research. *Journal of Consumer Policy*, 30(2), 75–90.
- Verba, S., Schlozman, K. L., & Brady, H. E. (1995). *Voice and equality: Civic voluntarism in American politics* (pp. 391–415). Harvard University Press.
- Wallace, L. E., Patton, K. M., Luttrell, A., Sawicki, V., Fabrigar, L. R., Teeny, J., MacDonald, T. K., Petty, R. E., & Wegener, D. T. (2020). Perceived knowledge moderates the relation between subjective ambivalence and the “impact” of attitudes: An attitude strength perspective. *Personality and Social Psychology Bulletin*, 46(5), 709–722.
- Wicker, A. W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of Social Issues*, 25(4), 41–78.