Attitude Accessibility as a Function of Emotionality

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Abstract
Despite the centrality of both attitude accessibility and attitude basis to the last 30 years of theoretical and empirical work concerning attitudes, little work has systematically investigated their relation. The research that does exist provides conflicting results and is not at all conclusive given the methodology that has been used. The current research uses recent advances in statistical modeling and attitude measurement to provide the most systematic examination of the relation between attitude accessibility and basis to date. Specifically, we use mixed-effects modeling which accounts for variation across individuals and attitude objects in conjunction with the Evaluative Lexicon (EL)—a linguistic approach that allows for the simultaneous measurement of an attitude's valence, extremity, and emotionality. We demonstrate across four studies, over 10,000 attitudes, and nearly 50 attitude objects that attitudes based on emotion tend to be more accessible in memory, particularly if the attitude is positive.

Attitude accessibility—or the ease with which an attitude comes to mind—has been at the core of research within the attitudes domain for over three decades and is considered a primary indicator of the strength of an attitude (Fazio, 2007; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; see Petty & Krosnick, 1995). Attesting to its importance, research has found that such accessibility predicts where individuals direct their attention within their environment (Roskos-Ewoldsen & Fazio, 1992), how they construe an object and process information relating to that object (Houston & Fazio, 1989; Young & Fazio, 2013), and their ultimate judgments and behavior (Fazio & Williams, 1986).

Occurring in a parallel fashion, work within the attitudes domain has also demonstrated the importance of understanding the basis of individuals' attitudes (Haddock, Zanna, & Esses, 1993; Zanna & Rempel, 1988). Specifically, this research has often examined the consequences of basing one's attitude relatively more on emotion versus cognition (see Petty, Fabrigar, & Wegener, 2003, for a review). This work has tended to indicate that emotionally-based attitudes are relatively better predictors of final judgments and behavior (Lavine, Thomsen, Zanna, & Borgida, 1998; Rocklage & Fazio, 2015; Stangor, Sullivan, & Ford, 1991, Study 3), and are expressed more consistently across different contexts (Rocklage & Fazio, 2016). Thus, emotionally-based attitudes also often demonstrate effects consistent with their having greater strength.

Despite greater accessibility and emotionality both having been associated with enhanced predictive ability of attitudes on judgments and behavior, much of the discussion surrounding the relation between these constructs has been theoretical in nature. For instance, when referencing the impact of emotionality, researchers often cite the theoretical proposition that affect is more basic than cognition (Zajonc, 1980). Indeed, it has been argued that the presence of affect across species suggests that it is more primary and is hypothesized to come to mind more quickly. Specifically referencing the possible relation between attitude accessibility and emotionality, it has also been theorized that emotionally-based attitudes may be more accessible in memory (Fazio, 1995), and that this may be due to the rather undeniable, highly diagnostic signal that affective reactions provide when forming one's evaluation of an object. Such perceived diagnosticity may lead to the development of relatively stronger associations in memory between an object and one's emotional reactions to it.

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Past Research

Much less work has examined the relation between accessibility and emotionality empirically. In fact, only two papers that we are aware of directly examine the relation between attitude accessibility and attitude basis, and these have provided ambiguous as well as mixed results. On one hand, research by van den Berg, Manstead, van der Pligt, and Wigboldus (2006) has provided preliminary evidence consistent with the hypothesis that emotionally-based attitudes are more accessible in memory. This research has shown that when individuals encounter both emotional and cognitive information relevant to a novel attitude object, they are quicker to report their subsequent evaluative judgments if they had been induced to focus on the emotional information. However, given that this research first induced an affective or cognitive focus (by having participants complete a word-search puzzle consisting of words relating to either emotion or reasoning), then exposed individuals to the novel information, and immediately thereafter measured their judgments, it is unclear whether individuals consolidated the information and formed an attitude prior to their expressions of a judgment. Instead, it is possible that the increased quickness with which individuals made their judgments was not reflective of emotionally-based attitudes coming to mind more quickly but rather related to the ease with which individuals were able to form their judgments based on emotional versus cognitive information.

On the other hand, adding to the ambiguity within this literature, research has also indicated that emotionally-based attitudes may not generally be more accessible in memory. Instead, research by Giner-Sorolla (2001) found that emotionally- and cognitively-based attitudes tended to be fairly equally accessible, and that emotionally-based attitudes were more accessible only in the case that such an attitude was also extreme. However, the results of this work are also ambiguous. This research measured individuals' attitudes and their basis by using a set of three scales that required individuals to introspect on their feelings and then their beliefs, and to be able to separate these two sources of information from one another. Specifically, in Study 1 of this work, one scale asked participants to introspect on their feelings and assess how positive to negative they were toward each object based on these feelings (a feelings-based subscale). In a second scale, they were asked to set aside any feelings they might have, and instead introspect on only their beliefs and how positive to negative they were toward each object based on these beliefs (a beliefs-based subscale). The third scale asked them for their overall evaluation. Thus, these scales required that individuals have the ability to introspect on and then separate their feelings from their beliefs and report the extent to which each influences their evaluation—a partitioning task that is likely quite difficult for individuals to complete accurately (e.g., Refling et al., 2013).

Responses to these scales were artificially dichotomized so as to classify each attitude as one that was based on either emotion or cognition. This was done by assessing the extent to which the feelings-based subscale versus the beliefs-based subscale corresponded more closely to individuals' overall evaluation. Whichever subscale was more closely related to their overall evaluation (i.e., whichever had the smallest absolute difference with the overall evaluation scale) was considered the basis of the attitude. However, whether such an approach provides an accurate measurement of the basis of an attitude is open to question. Indeed, this approach treats an attitude that was only mildly emotional in nature the same as an attitude that was highly emotional, thereby eliminating any variation among these attitudes. It seems likely that highly emotional evaluations differ from attitudes that are based on only mild emotionality. Perhaps just as importantly, across the two studies in this research, this approach led to more than one-third of the attitudes—36%—to be excluded from the analyses because, for example, the subscales corresponded equivalently with individuals' overall evaluation, and thus could not be categorized.

Finally, at a more conceptual level, it is unclear why a relation between attitude emotionality and attitude accessibility should be limited only to more extreme reactions. The theorizing noted earlier (Fazio, 1995) postulates that emotionally-based attitudes may be more accessible in memory due to their ability to provide a diagnostic signal of one's evaluation. For example, when comparing attitudes that are only moderate with respect to their extremity, why would a more emotional reaction not offer a more diagnostic indicator of one's attitude than a cognitive reaction, especially if such is the case for extreme attitudinal responses? Indeed, based on the now-lengthy line of research demonstrating individuals' reliance even on relatively low-intensity affect (Pham, 2007; Schwarz, 2012; Schwarz & Clore, 1983), it appears reasonable to hypothesize that feelings and emotionality in general provide relative diagnostic information regarding one's attitude.

The Current Research

Given the relative lack of research linking attitude accessibility and attitude basis as well as the ambiguous and mixed nature of existing work, the current investigation aims to provide the most systematic examination of the relation between accessibility and attitude basis to date. Specifically, to provide more consistent evidence regarding the relation between these attitude dimensions, we consider their relation across 10,000 attitudes, nearly 280 participants, and 50 unique attitude objects. To do so, we combine recent advances in both attitude measurement and statistical modeling.

Regarding attitude measurement, we utilize the Evaluative Lexicon (EL; Rocklage & Fazio, 2015; Rocklage, Rucker, & Nordgren, in press)—a tool recently introduced by researchers to measure individuals' evaluations and their basis via

language. The EL is based on the recognition that our words have the ability to provide not only an indication of whether we "like" or "dislike" an object but also the extremity and basis of that attitude. Specifically, the EL utilizes evaluative adjectives such as "delightful" and "smart" to measure individuals' attitudes. Each time an individual utilizes an adjective from the EL, this adjective can be quantified in terms of its valence, extremity, and basis using normative ratings previously obtained from a large sample of participant judges. For example, judges were asked to rate the extent to which a given adjective implied an evaluation was based on emotional reactions to the object (0 = *not at all emotional*; 9 = *very emotional*). Based on the average ratings provided by these judges, the adjective "delightful," for instance, has the normative rating of 3.32 (out of 4.50) on positive extremity and 7.27 (out of 9.00) on emotionality—a relatively positive as well as emotional reaction. The adjective "smart," on the other hand, has the normative rating of 3.34 on positive extremity and 2.89 on emotionality—also positive, but a rather cognitive, unemotional reaction.

The EL has been validated both in controlled experiments and in real-world text as a measure of the extent to which an evaluation is based relatively more on emotion versus cognition. For example, Rocklage and Fazio (2015, Study 2) experimentally created emotionally- and cognitively-based attitudes in the laboratory by exposing participants to an emotionally evocative narrative of an individual's encounter with a fictitious sea animal or an encyclopedic description of the animal's features. They then measured these attitudes by allowing individuals to select from adjectives that indicated more emotional reactions (e.g., "magnificent") or more cognitive reactions (e.g., "useful") using the EL. This experiment demonstrated that the EL successfully predicted which passage individuals had read far better than expected by chance alone. Moreover, using 5.9 million Amazon.com product reviews, Rocklage and Fazio (2015, Study 3) found that the more emotional an adjective was, as measured via the EL, the more it occurred alongside other words indicative of more emotional reactions (the verb "feel") versus more cognitive reactions (the verbs "think" and "believe"). Given that the EL measures attitude basis as a continuum from emotional to cognitive, this association also indicated that the more cognitive the adjective, the more it was used alongside those words that signal more cognitive reactions ("think" and "believe").

In addition to differentiating adjectives in terms of their implied emotionality, the EL has been shown to distinguish emotionality from the extremity implied by the adjectives. While more emotional adjectives tend to imply a more extreme evaluation (e.g., "amazing"), the EL also contains adjectives that are equally extreme but not as emotional (e.g., "smart"). Thus, in the current work, we are able to simultaneously assess the relation of attitude basis and extremity with attitude accessibility, and examine whether the effect of emotionality is limited to more extreme attitudes, as observed by Giner-Sorolla (2001).

Regarding statistical modeling, we use a mixed-effects modeling approach which allows us to directly model the shared variance not only among participants' attitudes but also the shared variance that arises among attitude objects. This approach allows us to be more confident in our ability to replicate the results in a separate sample and to generalize from the current set of participants and stimuli to those that could be included in a separate study (Baayen, Davidson, & Bates, 2008; Judd, Westfall, & Kenny, 2012). Moreover, it allows us to treat each expressed attitude on its own without violating traditional regression's assumption that each participant's attitude is independent of another. Finally, mixed modeling also allows us to treat all variables as continuous, and does not require us to artificially dichotomize variables as was the case in the approach utilized in the Giner-Sorolla (2001) research.

Studies 1 to 3

To begin, we are able to make use of existing data (Rocklage & Fazio, 2016). The aim of this earlier research was to assess how people make a required speeded decision about an object when they have ambivalent reactions. When individuals were ambivalent, the valence associated with greater emotionality, as measured by the EL, dominated when they were making a final judgment of that object. So, if the positive adjectives with which individuals described their evaluations of an object were more emotional than the negative adjectives that were selected as descriptive, then individuals were likely to judge the object favorably. This effect emerged even when controlling for the extremity of the selected adjectives. This finding illustrates the importance of emotionality when individuals attempt to resolve their ambivalence in order to reach a dichotomous decision. Additional analyses also indicated an interesting effect of emotionality when evaluations were univalent in nature; individuals' speeded decisions were more likely to correspond with the attitudes they expressed earlier when those univalent attitudes were more emotional in nature. This was particularly true of positive attitudes; negative attitudes appeared to be relatively consistent across contexts regardless of the emotion associated with them. In essence, negative attitudes seemed not to require emotionality to remain consistent, whereas positive attitudes did. Both the finding for ambivalent attitudes and that for univalent attitudes suggest that more emotional reactions to an attitude object offer an evaluative signal that individuals weight more heavily when making decisions.

However, given that this past research focused on ambivalence resolution and consistency across contexts, the analyses reported by Rocklage and Fazio (2016) did not include an examination of whether attitude basis was related to the accessibility of the attitude, as indexed by the response latencies. As the mixed results from past research have indicated, it is possible that the speed with which individuals make their decisions exhibits a different pattern. For instance, it is

possible that there is no difference in accessibility between emotionally- and cognitively-based attitudes, or that any such differences are moderated by extremity, as in Giner-Sorolla (2001). Thus, whereas individuals may be relatively more consistent when expressing their more emotionally-based attitudes, they may not be any quicker to do so. Finally, it is even possible that individuals tend to make quicker decisions when their attitude is based more on cognition, and that it is due to these quick decisions that they more often respond inconsistently. These arguments call for a close examination of the speed with which attitudes involving different levels of emotionality, different degrees of extremity, and different valence are expressed when individuals are required to offer speeded dichotomous decisions. The three studies involved in the Rocklage and Fazio work provided an initial opportunity to do so with an existing dataset.

Method

Given the similarities of Studies 1 through 3, we overview their procedure one after the other, and then report their results.

Study 1

Participants. Participants were 44 undergraduate students who earned partial fulfillment of a psychology course requirement.

Procedure

The EL: Assessing attitude basis and extremity. Participants began the experiment by familiarizing themselves with a list of adjectives taken from the EL. We used a representative subset of about half of the entire list of EL adjectives to shorten the experiment's overall length and simplify participants' task (see Table A in the Supplementary Materials for the list of adjectives used).

After reviewing these adjectives, participants evaluated 41 different attitude objects (see Table B in the Supplementary Materials). Participants were shown the name of each object, and then instructed to choose the two to five adjectives that described their evaluation of that object. They were then instructed to choose a single adjective of these two to five adjectives that *best* described their evaluation of each object. This best adjective therefore represents individuals' general evaluation of the object and, as we detail subsequently, serves as the primary predictor variable for our analyses.

To simplify the layout of the adjectives, they were listed in two separate columns where the first column contained all of the positive adjectives listed in alphabetical order, while the second column contained all of the negative adjectives also in alphabetical order. Furthermore, to allow participants to feel free to select from both the positive and negative adjective columns for a single object, they were given the additional instructions to "feel free to choose from both sides of the list for each object (both positive and negative adjectives)."

In terms of selecting the objects for participants to evaluate, we began by generating a large list of attitude objects based on our intuition of what individuals might normatively evaluate as positive or negative across both affective and cognitive bases. Next, we conducted a series of pilot studies using the EL to assess the extent to which the objects we chose represented a wide range of positivity/negativity as well as affective/cognitive bases. An analysis of individuals' best adjectives across the attitude objects in all three studies indicated that there was a wide range of valence (.92-7.62 on a scale ranging from 0-9; *SD* = 2.35) and basis/emotionality (3.74-6.97 on a scale ranging from 0-9; *SD* = 0.94) at the aggregate level.[1] There was also no correlation between valence and basis, $r(47) = -.05$, $p = .74$, across the attitude objects, consistent with a wide, unbiased distribution. The final attitude objects ranged from those normatively more emotional in nature—for example, "roller coasters" and "chocolate cookies"—to those more cognitive in nature—"traffic lights" and "power plants." They also ranged from very positive—"sunshine" and "companionship"—to very negative—"murder" and "traffic accidents."

Measuring attitude accessibility. Individuals were then shown the names of the objects they had previously rated using the EL, and were asked to respond as quickly and as accurately as possible whether they liked or disliked that object by pressing one of two keys. The time between the presentation of the attitude object on the screen and individuals' judgment served as the measure of attitude accessibility.

Study 2.
In Study 2, we altered the instructions and structure of the tasks to increase the generalizability of the findings.

Participants. Participants were 75 undergraduate students who earned partial fulfillment of a psychology course requirement.

Procedure

The EL: Assessing attitude basis and extremity. The procedure in Study 2 was the same as in Study 1 except for two changes: First, internal analyses of Study 1 revealed that individuals often did not select as many as five adjectives and, when they did select five adjectives, the additional adjectives were largely redundant with those already chosen. We therefore simplified the task and asked participants to choose just two to four adjectives.

Second, to increase the generalizability of our results, we reordered the adjectives, and removed the special instructions for participants to feel free to choose both positive and negative adjectives. Instead, we simply arranged all the adjectives alphabetically, and then separated them into three columns for ease of reading.

Table 1. Mixed Model Coefficients for Studies 1 to 4.

	Emotionality	Extremity	Valence	Valence × Emotionality	Valence × Extremity	Emotionality × Extremity	Valence × Emotionality × Extremity
Study 1	−.010***	−.016*	.001	−.012***	.007	.002	−.001
Study 2	−.009***	−.021***	−.005	−.007**	−.001	.00004	−.002
Study 3	−.006**	−.019***	−.0008	−.007**	.005	−.0004	.003
Study 4	−.007**	−.004	.001	−.007*	.003	.001	.001

Note. The relative size of the coefficients should not be viewed as the strength of their association with response time as the predictor variables are on different scales.
$^*p \leq .05.$ $^{**}p \leq .01.$ $^{***}p \leq .001.$

Measuring attitude accessibility. The attitude accessibility measure in Study 2 was very similar to that used in Study 1. However, in Study 1 it is possible that by instructing participants to decide between "liking" or "disliking" an object they could be led to rely relatively more on affective reactions when responding to the object. Thus, in Study 2, we provided participants with more general instructions: "If you are generally positive toward the object, like it, believe it is good, are favorable toward it, or are 'pro' it," press the key we labeled "+." For the negative option, they were given the following instructions: "If you are generally negative toward the object, dislike it, believe it is bad, are unfavorable toward it, or are against it," press the key we labeled "−."

Study 3. In Study 3, we sought to further increase the coverage of the negative attitudes and to assess whether our results were similar when modifying the subset of adjectives we included from the EL.

Participants. Participants were 63 undergraduate students who earned partial fulfillment of a psychology course requirement.

Procedure

The EL: Assessing attitude basis and extremity. We used the same procedure and instructions from Study 2 save for two changes: First, as we detail in the "Results" section subsequently, the effects we saw in Studies 1 and 2 had been strong for positive attitudes but not as strong for negative attitudes. In an effort to provide even greater coverage of the range of possible negative attitudes, we added eight negative attitude objects and removed two others (see Table B in the Supplementary Materials). Specifically, we added eight objects that were negative and seemed capable of being based relatively more on emotion (e.g., "roaches") or more on cognition (e.g., "rust"). The two attitude objects we removed—"dancing" and "swimming"—were removed based on internal analyses of Study 2 which revealed that these objects did not provide any additional coverage to the already existing list of objects.

Second, to further examine the findings regarding negative attitudes, we also modified the adjectives included in the

list by adding seven negative adjectives and removing eight others (see Table A in the Supplementary Materials for the full list). As before, the new list of adjectives was very similar in composition to the full list of EL adjectives.

Measuring attitude accessibility. We measured attitude accessibility the same as in Study 2.

Results and Discussion

Initial model details and effects of study. As detailed in the Introduction, we used mixed-effects modeling to predict attitude accessibility. Such an approach allows us to be more confident that our results will generalize to individuals and objects not included in the current studies. To that end, we treated both participants and objects as random effects. A null model predicting log-transformed response time indicated that responses from a given participant were related (intraclass correlation [ICC] = .22, $Z = 8.89$, $p < .001$) and responses for a given object were related (ICC = .11, $Z = 4.72$, $p < .001$), and thus that mixed modeling was appropriate.[2]

To assess whether there were differences in the results based on the changes made across the three studies, we dummy coded the studies, added these variables as predictors into a mixed model, and allowed them to interact with all other predictor variables (this is the same data analytic approach pursued in the Rocklage & Fazio, 2016 research). None of the effects were moderated by study, indicating that the results were consistent regardless of the changes made across the studies. Thus, we combine the studies and report their results together (but see Table 1 for the results of each study).

Constructing the mixed model. To quantify individuals' attitudes, we followed the past research (Rocklage & Fazio, 2015, 2016) and imputed the normative valence, extremity, and emotionality values implied by each individual's self-designated best adjective for each object they evaluated. As suggested by Nezlek (2011), we then mean centered the extremity and emotionality of each attitude for each participant to control for individual differences in participants' use of more or less extreme and emotional

Figure 1. Mixed model from Studies 1 to 3 relating the implied emotionality of the adjectives to response time (transformed from log milliseconds back to milliseconds) as a function of valence, controlling for extremity.
Note. Values on the *x* axis represent the approximate range of possible values in the sample.

adjectives. Specifically, we first calculated individuals' average extremity and emotionality across their adjectives, and then subtracted that average from each of their attitudes. Valence was dichotomized as either positive (coded "1") or negative ("−1"). This approach allows us to assess whether the effects of extremity and emotionality differ based on valence and is also necessary given that valence, if it were kept as a continuous measure, becomes largely redundant with extremity once the direction of the extremity is known.

In regard to response time, following the recommendation of others we log transformed individuals' response time (in milliseconds) for each attitude object (Fazio, 1990). Given that the word length of each attitude object differed, we also included the number of characters and spaces each word contained ($M = 10.06$; $SD = 4.60$) to control for how long it may take for participants to read each object before making their decisions. We mean centered this variable, so that 0 represented the average length of the attitude objects in the sample.

Predicting attitude accessibility. Given that we are interested in the effects of extremity and attitude basis when predicting how quickly individuals made their judgments, our predictors of interest were valence, extremity, emotionality, and their interactions. The emotionality by extremity interaction in particular would allow us to test the possibility that more emotionally-based attitudes are more accessible only when they are extreme, as in Giner-Sorolla (2001). As indicated above, we also included word length as a control variable.

To begin, as we might expect, the longer the name of the attitude object, the slower participants were to express their

dichotomous judgments, $\gamma = .007$, $t(45.67) = 6.25$, $p < .001$, 95% confidence interval (CI) = [.005, .009]. There was also an overall effect of extremity, indicating that the more extreme an attitude, the more accessible that attitude was, $\gamma = -.018$, $t(7468.41) = 5.12$, $p < .001$, 95% CI = [−.024, −.011].

Most importantly, we found an overall effect of attitude basis, indicating that the more an attitude was based on emotionality, the more accessible the attitude, $\gamma = -.007$, $t(6343.71) = 5.14$, $p < .001$, 95% CI = [−.01, −.004]. Mirroring the past finding regarding the consistency of responses across contexts (Rocklage & Fazio, 2016), this result was qualified by a valence by emotionality interaction, $\gamma = -.007$, $t(5765.92) = 4.37$, $p < .001$, 95% CI = [−.009, −.004]; see Figure 1, which indicated that positive attitudes particularly benefitted from increases in emotionality, $\gamma = -.014$, $t(4667.60) = 7.06$, $p < .001$, 95% CI = [−.018, −.01], whereas negative attitudes showed an association in the same direction but the term was non-significant, $\gamma = -.0008$, $t(7050.71) = .35$, $p = .73$, 95% CI = [−.005, .003]. There was no emotionality by extremity interaction, $\gamma = .0003$, $t(7520.87) = .15$, $p = .88$, 95% CI = [−.004, .004], nor an emotionality by extremity by valence interaction, $\gamma = -.00003$, $t(7517.80) = .02$, $p = .99$, 95% CI = [−.004, .004].

Taken together, we found that the more an attitude was based on emotion, the more accessible that attitude was in memory, particularly for positive attitudes. We return to a consideration of this valence asymmetry in the General Discussion. We also did not find the effect of emotionality to be moderated by extremity, as reported by Giner-Sorolla (2001). Instead, we find that more emotionally-based attitudes, especially those that are positive, are more accessible in memory, regardless of their extremity.

Study 4

Although we have now observed the effect of emotionality on attitude accessibility across three studies, we have relied on an examination of existing data to provide this evidence. In the present study, we conduct a replication of these studies to demonstrate similar effects in an entirely new sample.

In addition, we sought to increase the generalizability of these effects in two ways: First, we conducted the study with a more diverse set of participants to assess whether the results we obtained above would replicate in a sample beyond undergraduate students (Sears, 1986). To that end, we recruited participants via Mechanical Turk, an Internet-based labor market that is more diverse, particularly in age, than university-based samples (Buhrmester, Kwang, & Gosling, 2011; Paolacci & Chandler, 2014).

Second, we also sought to ensure that the effects we have seen to this point were not due to the ordering of the tasks. For instance, it is possible that having participants indicate their attitude during the adjective checklist portion of the task somehow differentially modified the accessibility of their attitudes. Such activation could then have had downstream effects on how quickly individuals would be to make their subsequent dichotomous decisions. Thus, in the current study, we reversed the order of the procedure and placed the dichotomous decision task first so as to assess attitude accessibility prior to any attitudinal expression whatsoever and, hence, provide evidence counter to this possibility.

Method

Participants. For this experiment, given that we used a smaller set of attitude objects (see below), we also attempted to recruit a greater number of participants to bolster our statistical power. Given that Studies 1 to 3 involved samples ranging from 44 to 75 participants, each of which allowed for the detection of the effects, we attempted to recruit 100 individuals via Mechanical Turk. We were able to obtain 97 with complete data; three participants' data from the two tasks could not be matched. Attesting to their relative diversity, these participants ranged in age from 18 to 66 years with an average age of 35. There were 47 females, 48 males, and two participants who wished to identify their gender as "other."

Procedure

Measuring attitude accessibility. We began the procedure using the same attitude accessibility task as in Studies 2 and 3. To measure response time, we directed participants to the Testable website (www.testable.org).

The EL: Assessing attitude basis and extremity. Participants then used the Qualtrics website (www.qualtrics.com) to complete an EL checklist for each of 29 attitude objects drawn from the 47 objects presented in Study 3 (see Table B in the Supplementary Materials). To select this subset of objects, we calculated the normative valence and emotionality of each object using participants' responses from Studies 1 to 3, and then removed objects characterized by similar combinations of valence and emotionality. This approach allowed us to provide a similar coverage of valence, extremity, and emotionality, while also shortening the length of the experiment. Indeed, *t* tests comparing those attitude objects included in the current study versus those not included indicated that the attitude objects did not differ in their normative valence, $t(45) = .35$, $p = .73$; extremity, $t(45) = .19$, $p = .85$; or emotionality, $t(45) = .09$, $p = .93$, as quantified via individuals' adjective selections from Studies 1 to 3. The same adjectives from Study 3 were used.

Results

Constructing the mixed model. The details of this model were similar to those in Studies 1 to 3. However, Studies 1 to 3 were conducted in a well-controlled laboratory setting, and thus there were relatively few responses that were extremely quick or extremely slow. Participants in the current study, however, completed the tasks remotely, and thus there were responses that fell below or above cutoffs utilized in previous research to indicate extremely quick (less than 300 ms) and slow responses (greater than 10 s; for example, Giner-Sorolla, 2001). As such, there were a greater number of responses that fell below this lower range (less than 300 ms: 89 responses) or above it (greater than 10 s: 14 responses). Results were similar when including these responses in the analyses, but given that we wish to provide more accurate measures of response times we opted to not include these atypical responses. After filtering out these responses, the data involved a total of 2,710 judgments across the 97 participants. Response time was log transformed. Once again, a null model predicting log response time indicated that both participant- (ICC = .36, $Z = 6.35$, $p < .001$) and object-related variance (ICC = .06, $Z = 3.40$, $p = .001$) could be modeled.

Predicting attitude accessibility. As before, we found an effect of word length, indicating that the longer the name of the object, the slower participants were to respond, $\gamma = .006$, $t(26.40) = 4.73$, $p < .001$, 95% CI = [.003, .009]. Interestingly, there was an effect of extremity only when emotionality was not included in the model, $\gamma = -.012$, $t(2406.03) = 2.11$, $p = .035$, 95% CI = [−.023, −.001]. When both emotionality and extremity were included, the effect of extremity fell to non-significance, $\gamma = -.004$, $t(2396.63) = .64$, $p = .53$, 95% CI = [−.018, .009].

Most importantly, however, when all terms were included in the model, we replicated the effects of emotionality from the previous studies: The more an attitude was based on emotionality, the more accessible the attitude, $\gamma = -.007$, $t(1644.37) = 2.56$, $p = .01$, 95% CI = [−.012, −.002]. There was also a replication of the valence by emotionality interaction, $\gamma = -.007$, $t(1176.54) = 2.31$, $p = .02$, 95%
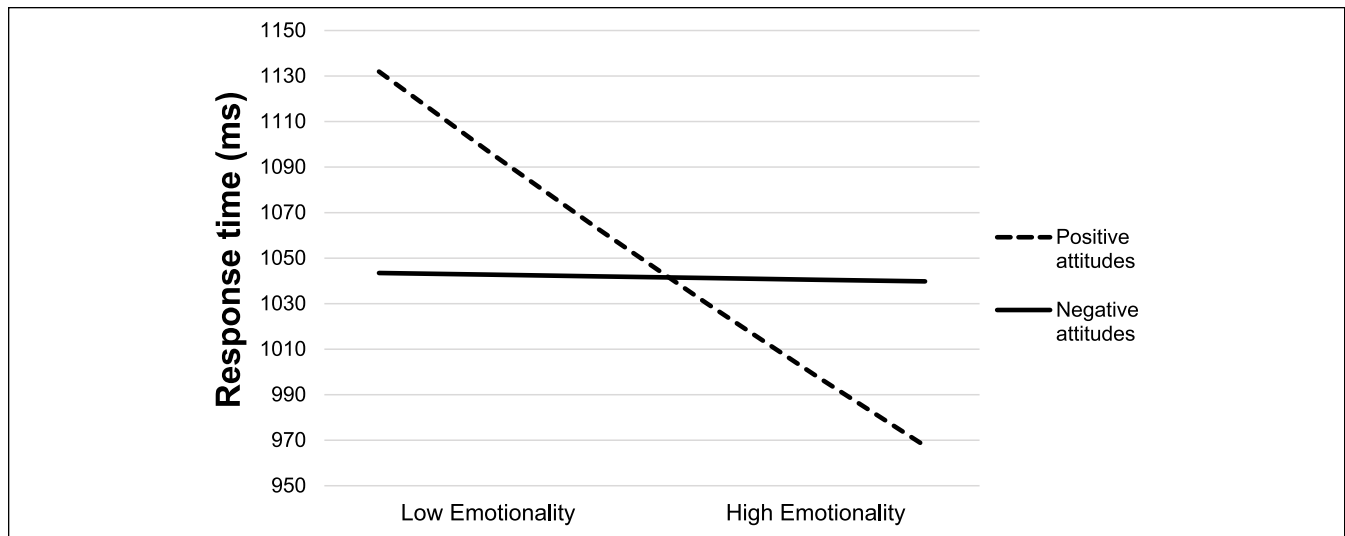
Figure 2. Mixed model from Study 4 relating the implied emotionality of the adjectives to response time (transformed from log milliseconds back to milliseconds) as a function of valence, controlling for extremity.
Note. Values on the *x* axis represent the approximate range of possible values in the sample.

CI = [−.012, −.001], whereby positive attitudes showed a particularly strong effect of emotionality, γ = −.013, *t*(949.49) = 3.41, *p* = .001, 95% CI = [−.021, −.006], and negative attitudes showed an effect in the same direction, but one that was non-significant, γ = −.0003, *t*(1995.41) = .08, *p* = .94, 95% CI = [−.008, .007]; see Figure 2. Once again, there was no emotionality by extremity interaction, γ = .001, *t*(2594.22) = .20, *p* = .84, 95% CI = [−.007, .009], nor a valence by emotionality by extremity interaction, γ = .001, *t*(2599.11) = .21, *p* = .83, 95% CI = [−.007, .009].[3]

Discussion

Using a new sample, we replicated the findings we obtained in Studies 1 to 3. Moreover, we reversed the order in which individuals completed the tasks, and therefore demonstrate that the ordering of the tasks from the previous studies does not account for the enhanced accessibility of attitudes based more on emotionality.

Throughout, we have characterized adjectives that imply low emotionality as also indicative of more cognitive reactions. Consider, for example, such EL adjectives as "smart," "valuable," and "beneficial," which are rather low in emotionality. These adjectives appear to imply evaluations based on cognitive reasoning about the attributes of the attitude object they are describing. In other words, the implications of evaluative adjectives appear to reside along a bipolar continuum ranging from more cognitive to more emotional. As noted in the Introduction to the current work, this perspective is supported by past findings. The EL was successful in differentiating between more emotionally- and cognitively-based evaluations that were created experimentally in the laboratory. In addition, verbs denoting cognition such as "think" and

"believe" accompany adjectives that imply low emotionality in real-world text, whereas the verb "feel" is more likely to accompany more emotional adjectives (Rocklage & Fazio, 2015). Nevertheless, the normative emotionality ratings from the EL were originally elicited as ratings from low to high emotionality without reference to cognition. Thus, one limitation of the current work is the absence of direct evidence regarding the inverse relation between emotionality and cognition for the EL adjectives.

To establish this relation more directly, we asked 100 participants to judge the extent to which each EL adjective implied an evaluation based on cognitive thoughts and beliefs versus an evaluation based on emotion (0 = *very much based on cognitive thoughts and beliefs*; 9 = *very much based on emotion*). The results indicated an extremely strong correlation between these normative bipolar ratings of the adjectives as cognitive to emotional and the normative unipolar emotionality ratings obtained by Rocklage and Fazio (2015), *r*(92) = .93, *p* < .001. Moreover, we asked a separate sample of 100 additional participants to judge each EL adjective on the extent to which it implied an evaluation based on cognitive thoughts and beliefs using just a unipolar scale (0 = *not at all*; 9 = *very much so*), thereby not contrasting emotionality and cognition in a single bipolar rating scale. These normative ratings were strongly inversely correlated with the ratings that measured the adjectives from more cognitive to emotional, *r*(92) = −.78, *p* < .001, as well as with the original EL emotionality ratings, *r*(92) = −.75, *p* < .001.

These new ratings also provide the opportunity to test the robustness of the current results. To that end, we constructed three separate mixed models: The first mixed model sought to replicate the results of the current study using the bipolar cognitive to emotional ratings. The

second model utilized the unipolar cognitive ratings. For the final model, given the strong interrelations between emotionality and these other ratings, we created an index that averaged the three ratings together (with the unipolar cognitive ratings reverse coded). All results from the current study were fully replicated in each of these three sets of analyses: The more emotional (cognitive) individuals' evaluation, the quicker (slower) they were to express their evaluation. Moreover, there was a significant valence by attitude basis interaction for each model, indicating that this pattern was particularly true for positive evaluations. Taken together, these results indicate that within the EL, lower emotionality implies greater cognition, and greater cognition implies lower emotionality.

General Discussion

Using recent advances in both attitude measurement and statistical modeling, we provide the most systematic investigation to date of the relation between attitude accessibility and attitude basis. Indeed, despite the importance of both attitude accessibility and basis and their long-theorized relation (e.g., Fazio, 1995), this research is among the very few articles that empirically investigates this relation. Moreover, it does so using more robust methodological and statistical approaches. Across four studies, we find that the more an attitude is based on emotion, the more accessible it is in memory, particularly for positive attitudes. This result occurred over and above the extremity of individuals' attitudes, and thus speaks to the basis of the attitude directly.

The current results are in line with the theoretical proposition that emotional reactions provide a particularly diagnostic signal to individuals regarding their evaluation. While such perceived diagnosticity can be the result of a conscious reflection on the attitude, in many cases it will likely not be. Instead, it seems probable that emotion, whether experienced at the moment of attitude expression or earlier when the attitude was formed, provides a useful function in large part due to its ability to operate outside of conscious reflection. In the case of emotional reactions experienced at the moment of judgment, individuals are likely to have become familiar with the diagnostic value of emotionality so fully that they quickly and readily express an attitude when an object evokes a more emotional reaction, with little or no reflection on the basis of that attitude. However, the diagnosticity of emotionality may also lead individuals to readily form stronger, more accessible evaluative associations with an attitude object when they first experience an emotional reaction toward that object. In other words, at the time of attitude formation, people's sense of the diagnostic implications of emotionality may promote stronger associations even without individuals' conscious reflection. As such, the perceived diagnosticity we speak of is one of the attitude construction or activation process reaching a minimal threshold which leads individuals to be more likely to rely on this evaluation. The present findings suggest that this threshold is reached more quickly for attitudes based on emotion.

Although we have referred to the attitudes measured across these studies as "based on" emotion and cognition, we do not intend to restrict the conceptual framework to attitudes that have been formed through purely conscious processes. Attitudes developed through associative processes, such as those formed during evaluative conditioning, may also vary in terms of where they fall along the emotionality continuum. As has long been understood with respect to the development of phobias, conditioning processes may involve intense emotional reactions (e.g., Craske, Hermans, & Vansteenwegen, 2006) or arousal (e.g., Gawronski & Mitchell, 2014). However, evaluative conditioning also operates through the pairing of novel stimuli with unconditioned stimuli that are less emotionally evocative (e.g., Jones, Fazio, & Olson, 2009). However, valence is not the only facet that can be associated with an object via a conditioning procedure. Attributes that characterize an object, for example its size or speed, can be learned through associative processes (Förderer & Unkelbach, 2011; Kim, Allen, & Kardes, 1996; Olson, Kendrick, & Fazio, 2009). These associated attributes can then be evaluated for what they imply about the valence of the object, thus blending associative processes and more conscious reasoning processes.

As part of our investigation, we also examined a possibility put forth by previous work which indicated that emotionally-based attitudes may not always be more accessible, and instead only more accessible when that attitude is more extreme (Giner-Sorolla, 2001). However, we did not find evidence for this in the current study and instead found only an overall effect of emotionality. As noted previously, this overall effect of emotionality is in line with previous research indicating that even low-intensity affect can be used to inform individuals' evaluations (Pham, 2007; Schwarz, 2012; Schwarz & Clore, 1983).

The discrepancy between our outcomes and those reported in previous work is likely attributable to the approaches utilized to measure attitude basis, as well as the statistical approaches used to predict attitude accessibility. Indeed, due to the measurement approach used in the past work, a full 36% of the attitudes measured from participants were excluded from analysis (Giner-Sorolla, 2001). Given our use of the EL (Rocklage & Fazio, 2015; Rocklage et al., in press), we were able to employ all of individuals' attitudes. Furthermore, the approach used by this past work required that each attitude be artificially dichotomized into whether it was based on emotion or cognition. This has the implication of treating highly emotional attitudes the same as only mildly emotional attitudes. Using a combination of the EL and mixed modeling, however, we were able to avoid this issue and treat all variables as continuous. As such, our approach of both improved measurement and statistical modeling provides stronger evidence for the theoretical proposition that emotionally-based attitudes are more accessible in memory.

Whereas past research has only controlled for the valence of individuals' attitudes when assessing the relation between attitude accessibility and attitude basis (Giner-Sorolla, 2001), the current work directly investigated whether positive and negative attitudes show differing relations. Even with systematic modifications to both the methodological approach and stimuli utilized, we consistently found a valence asymmetry, such that emotionality was particularly associated with greater accessibility for positive attitudes but not necessarily negative attitudes. This valence asymmetry mirrors past results that have used the EL paradigm in conjunction with a dichotomous decision-making task, whereby emotionality was associated with more consistent attitude expressions across contexts for positive attitudes, but negative attitudes tended to be expressed more consistently regardless of their associated emotionality (Rocklage & Fazio, 2016).

A plausible explanation for this asymmetry comes from prior work demonstrating that negative valence is often more consequential than positive valence (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Fazio, Pietri, Rocklage, & Shook, 2015). In particular, negative attitudes promote avoidance behavior, which necessarily means that no additional information is gained about the attitude object (Denrell, 2005; Fazio, Eiser, & Shook, 2004; Rocklage & Fazio, 2014). In contrast, a positive attitude encourages approach behavior, which creates the possibility of information gain and a more nuanced understanding of the object. As a result, individuals tend to make finer distinctions regarding gradations of positive valence than they do for negative valence (Smallman, Becker, & Roese, 2014). In relation to the current results, the past work suggests that individuals may find negativity in and of itself, irrespective of whether it emanates from a cognitive or emotional basis, diagnostic when they need to reach a decision. Negativity, regardless of its source, calls for avoidance.[4] On the other hand, the finer distinctions that individuals develop for objects that they positively value allow for differentiation on the basis of emotionality. More emotional reactions provide a stronger diagnostic signal of one's positivity.

Implications

An implication of this asymmetry relates to the past work that has found that positive information is responded to more quickly than negative information (Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008). To explain this asymmetry, these researchers put forth a density hypothesis. They hypothesized that positive information may generally have stronger associations with other positive information and, hence, when individuals are asked to categorize a stimulus as positive or negative, the positive response is facilitated. Negative information, on the other hand, is argued to be less similar to other negative information, and thus requires additional processing before issuing a final judgment. As part of their effort to demonstrate this asymmetry in speed, these

researchers asked participants to categorize 40 attitude objects as quickly as possible for whether they were considered positive or negative. They found that, indeed, individuals were quicker to categorize the positive objects. Interestingly, however, a number of the attitude objects utilized in that study were likely to elicit attitudes based on emotion; they used objects such as "sunshine," "chocolate," and "cockroach," all of which were judged as normatively emotional in the current studies. Thus, we replicate this advantage for processing of positive information in the present studies but only when the attitude is one based on emotion. We do not, however, observe such an advantage for objects that are more likely to involve a cognitive attitude basis (e.g., blood donation, gasoline, rust). Indeed, given low emotionality, negative attitudes tended to be expressed more quickly than positive attitudes. As such, it is possible that positive information receives a speed advantage, particularly when that information is based on emotion. This could, in turn, indicate that positive emotions are more similar, whereas negative emotions are more dissimilar. Such a possibility is consistent with past work (e.g., Ekman & Friesen, 1971) that identifies and distinguishes among a greater number of negative emotions (e.g., anger, disgust, fear, sadness) compared to positive emotions (e.g., joy). In any case, whether any processing advantage for positive valence or negative valence is dependent upon the density of more emotional versus more cognitive information is an interesting question for future research.

The current work provides strong evidence that emotionally-based attitudes, especially positive ones, are more accessible in memory. However, the possibility we put forth earlier regarding the work by van den Berg et al. (2006) raises an intriguing hypothesis that should be tested in future research. To reiterate, these researchers found that when provided with both emotional and cognitive information regarding a novel object, individuals were quicker to report their evaluative judgments if they had been induced to focus on the emotional information. This paradigm required that participants read information regarding a novel object, and then proceed directly to reporting their evaluation. Thus, as we argued earlier, it is possible that this finding did not reflect attitude accessibility per se, but rather the ease with which individuals can form an evaluation based on emotional versus cognitive information. Just as emotionality contributes to attitude accessibility once an attitude has been consolidated in memory, it may also contribute to the ease of attitude formation. Emotional reactions that one experiences when encountering a novel object may provide a diagnostic signal regarding one's evaluation as an attitude toward the novel object is being formed.

By making the direct link between attitude accessibility and attitude basis, this research also suggests that the downstream consequences of accessibility documented by earlier work may, in turn, be related to attitude emotionality. For example, past research has indicated that attitude accessibility predicts where individuals allocate their attention in their

environment (Roskos-Ewoldsen & Fazio, 1992), how they process information regarding a given attitude object (Houston & Fazio, 1989; Young & Fazio, 2013), and their voting behavior (Fazio & Williams, 1986) and product selections (Fazio, Powell, & Williams, 1989). Although the current study did not address these matters, these links seem possible based on the relation between attitude accessibility and emotionality.

These results also contribute to the literature on attitude strength (Petty & Krosnick, 1995). Although the seemingly related construct of attitude "intensity"—defined as the strength of the emotional reaction provoked by an attitude object (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993)—has previously been put forth as a predictor of attitude strength, in practice this construct has often been measured as something quite different than its definition. For example, studies have often measured attitude intensity via measures more akin to attitude certainty or extremity by asking individuals to self-report how "strong" and "intense" their attitude is toward an object (Haddock, Rothman, Reber, & Schwarz, 1999; Krosnick et al., 1993; see also Visser, Bizer, & Krosnick, 2006). Indeed, these measures have not been validated for the extent to which they reflect emotionality. In the present work, we utilize a validated measure of attitude emotionality and provide more direct evidence that emotionality is a predictor of attitude strength given its connection with attitude accessibility—a primary indicator of the strength of an attitude. Future research can thus investigate the extent to which attitudes based on emotion exhibit other hallmarks of attitude strength such as exhibiting a stronger impact on behavior and providing greater attitude stability over time.

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Notes

1. Further demonstrating the range of attitudes in the sample, individuals' attitudes ranged from the most negative attitude possible, .40, all the way to the most positive attitude possible, 8.71 (SD = 3.12). Emotionality also ranged from the minimum value possible, 3.00, to the maximum value, 7.50 (SD = 1.51).
2. For those readers who are interested, as indicated by these statistics, participant-related differences in response time accounted for a greater proportion of variance than did object-related differences in response time (i.e., individuals differed more in their response time compared with the response times to a given object).

3. We also conducted additional analyses utilizing all of participants' selected adjectives (as opposed to the adjective they had selected as the single best descriptor), as well as analyses assessing whether ambivalence (selecting both positive and negative adjectives) moderates the results. These analyses, which are detailed in the Supplementary Materials, replicated the emotionality findings reported here and were similar across both univalent and ambivalent attitudes.
4. This possibility, however, does not necessarily imply a main effect of attitude valence on response latencies. Indeed, given that positive and negative attitudes require different responses, an overall effect of valence is inherently difficult to interpret. For example, it may be that individuals set different criteria for categorizing an object as positive versus negative (Fazio, 1990; Herr & Page, 2004). These criteria, in addition to the accessibility of the attitude, could influence the response latencies. Nevertheless, given that our analyses assess the relation between emotionality and latencies within positive and negative responses, the current results indicate that attitude emotionality relates to greater accessibility, particularly for positive attitudes.

Supplemental Material

Supplementary material is available online with this article.

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