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Rejecting a Bad Option Feels Like Choosing a Good One

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Across 4,151 participants, the authors demonstrate a novel framing effect, *attribute matching,* whereby matching a salient attribute of a decision frame with that of a decision's options facilitates decision-making. This attribute matching is shown to increase decision confidence and, ultimately, consensus estimates by increasing feelings of metacognitive ease. In Study 1, participants choosing the more attractive of two faces or rejecting the less attractive face reported greater confidence in and perceived consensus around their decision. Using positive and negative words, Study 2 showed that the attribute's extremity moderates the size of the effect. Study 3 found decision ease mediates these changes in confidence and consensus estimates. Consistent with a misattribution account, when participants were warned about this external source of ease in Study 4, the effect disappeared. Study 5 extended attribute matching beyond valence to objective judgments. The authors conclude by discussing related psychological constructs as well as downstream consequences.

Keywords: framing, metacognition, judgment, matching, confidence

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Decades of research have shown that people's preferences are often malleable. For example, it is now known that people make different choices depending on (a) whether options are framed as gains or losses (Tversky & Kahneman, 1981), (b) which other options just happen to be in front of them (Simonson & Tversky, 1992; Tversky & Shafir, 1992), (c) the time frame over which an attribute is described (e.g., price per year vs. price per month; Burson, Larrick, & Lynch, 2009), (d) the name given to an option (Read, Frederick, Orsel, & Rahman, 2005), and so forth. Based on such findings, there is now a widespread appreciation of the power of "choice architecture," of the fact that how choice options are arrayed and described can exert a powerful influence on the decisions that people make (Kahneman & Tversky, 1984; Thaler & Sunstein, 2008).

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In this article, we describe a simple framing manipulation that affects not what people choose but rather how they feel about their choice. Notably, we show that this framing manipulation can, by changing feelings of confidence, also influence people's beliefs about the choices of others'. This is an important contribution, because practitioners are in the business of not only altering preferences but also altering how people feel about the preferences they already have, such as when politicians seek to strengthen the attitudes of those who are already inclined to prefer the campaign's candidate or when marketers seek to strengthen the attitudes of those who are already inclined to prefer the company's product.

Such campaigns exist because although two prospective voters might agree in their preference, the citizen who is more confident in that preference will be more likely to vote. Indeed, people are more likely to act on behalf of preferences that are confidently held (e.g., Petty & Krosnick, 1995; Tormala & Petty, 2002) and that they think others would endorse (Goldstein, Cialdini, & Griskevicius, 2008). On the other hand, people are less likely to procrastinate in making a choice if they are confident about which choice to make and believe others would decide similarly (Dhar, 1997). For example, a patient deciding which of two medical procedures to undergo is more likely to make that decision quickly if the person is confident about which choice to make and thinks that others would make the same choice. It is therefore important to identify interventions that affect not only what people choose but also how people feel about those choices.

In thinking about the variables that influence decision confidence and consensus estimation, we started with the basic features of a decision: (a) the valence of the options and (b) whether the decision is framed as a choice or a rejection. Option valence has

already been shown to have some unexpected effects on decision satisfaction. People usually prefer to make their own decisions rather than having others decide for them (e.g., Botti, Orfali, & Iyengar, 2009; Gilovich & Medvec, 1995; Perlmuter & Monty, 1977; Stotland & Blumenthal, 1964; Taylor, Lichtman, & Wood, 1984). However, this preference is seemingly eliminated when people are forced to choose among undesirable alternatives. Choosing among negative options lowers confidence and satisfaction with the outcome (Beattie, Baron, Hershey, & Spranca, 1994; Burger, 1989), often so much so that people actively avoid making a decision at all (Botti & Iyengar, 2006). For example, research has suggested that, when all of the alternatives are undesirable (e.g., two bad meal options), people are more satisfied with the outcome when someone else chooses for them than when they make the choice themselves (Botti & Iyengar, 2004). This disutility of choosing for oneself comes from the unpleasant process of focusing on the disadvantages of each outcome (see also Botti & McGill, 2006). Negative options, it seems, upend many of the benefits of choice.

Notably, all the previous work in this area focused on decisions framed as choices—participants were asked to *choose* the option they most preferred. This leads to the second major variable we considered: the framing of the decision. People deciding between a chicken or steak entrée can see their decision as a choice ("I choose the chicken") or as a rejection ("I reject the steak"). The same options, with the same outcome, might be experienced differently when framed as a choice rather than as a rejection.

Although these frames are necessarily identical in terms of outcome for binary choices, that does not mean that people think of them identically (Northcraft & Neale, 1987; Park, Jun, & MacInnis, 2000). Positive frames (i.e., "choose") highlight positive attributes, whereas negative frames (i.e., "reject") highlight negative attributes (Houston, Sherman, & Baker, 1991; Shafir, 1993). Choosing may bring about more intuitive thinking, whereas rejecting may bring about more deliberative thinking (Nagpal & Krishnamurthy, 2008; Sokolova & Krishna, 2016). More important, recall that previous research has suggested that a focus on negative attributes diminishes the utility of choosing between negative options (Botti & Iyengar, 2004). That is only part of the story. We propose that the match between the decision frame and the choice context (e.g., positive vs. negative options), what we call *attribute matching,* determines the psychological response to the decision itself. That is, people feel more confident in their decision if the frame can be changed by matching a salient attribute (valence) of the decision frame with that of the options, in this case: choose the desired or reject the undesired option.

This attribute matching, we propose, fosters a feeling of metacognitive ease (i.e., that the decision feels easy to make). Metacognitive ease, or fluency, has a variety of positive effects on decision-making: For instance, fluent stimuli are reported as being more likable (Reber, Winkielman, & Schwarz, 1998) and more accurate (McGlone & Tofighbakhsh, 2000) than disfluent statements (see Alter & Oppenheimer, 2009, for a review). Moreover, people feel more confident in decisions that feel easy to make (Fazio & Zanna, 1978; Tormala, Petty, & Briñol, 2002). In the present article, we investigate the role that this ease of decision-making plays in determining psychological outcomes for individuals when making decisions among options where attribute matching exists versus does not exist.

We focus on a decision-making context in part because it is so broadly applicable. If a decision is experienced more positively, it should spill over into at least two critical domains: decision confidence and consensus estimates. Regarding choice confidence, decision makers are necessarily trying to identify the correct answer, but any decision will come with some sense of uncertainty (Gross, Holtz, & Miller, 1995; Kahneman, Slovic, & Tversky, 1982). In line with its ubiquity, this concept of attitude certainty has spawned a large literature examining myriad antecedents and consequences (e.g., Rucker, Tormala, Petty, & Briñol, 2014). Attitude certainty (see Tormala and Rucker (2007), for review) can be even further divided into attitude correctness and attitude clarity (Petrocelli, Tormala, & Rucker, 2007), although we focus on the broader notion of confidence in the present article. The experience of confidence in a decision can guide how sensitive people are to other constraining information and thus their subsequent behavior (e.g., Simmons & Nelson, 2006). Accordingly, it would be both important and surprising if merely increasing the apparent match between options and frames could operate on confidence.

Regarding consensus estimation, this construct has been at the core of advances in the understanding of social judgment. Starting with initial work on the false consensus effect (Ross, Greene, & House, 1977), there has been recognition that people first look inward when asked to make judgments about others. This projection tendency, whether rational or irrational (Dawes, 1990; Krueger & Clement, 1994), springs from egocentrism. The tendency is consequential. For example, people misjudge the thirst and hunger of others depending on their own state (Van Boven & Loewenstein, 2003) and misjudge the humor of a new joke based on their own prior exposure (Campbell, O'Brien, Van Boven, Schwarz, & Ubel, 2014). Those misjudgments spring from transient personal states, unaccounted for when characterizing others in a different state. Again, notably, and most interesting, we think that this might occur as a result of merely manipulating the decision frame. People might experience the transient confidence from the match of valence and frame and infer that their decision will be more popular than it actually is.

Although previous work has found evidence for consensus estimates' driving those of confidence (Horcajo, Petty, & Briñol, 2010; Petrocelli et al., 2007; Visser & Mirabile, 2004), we present the aforementioned path. In doing so, we suggest that people go through the world feeling initially more or less confident about their decisions and secondly (perhaps once prompted) considering what percentage of others may agree with them. However, the alternative—that learning of consensus around a position increases one's confidence in it—is equally reasonable under many circumstances. We believe both possibilities have merit. In our studies, we present confidence as a potential mediator for consensus, but the reverse order often yields similar results. Out of length concerns, we present only the former (interested readers may consult posted data sets, linked in each study's description). Regardless, in our studies, we frequently failed to attenuate our consensus effects after including confidence in our models, and again, reversing the order yielded similarly incomplete results. The aim of this article, then, was not to demonstrate a definitive order to this process or to settle any sort of debate. Rather, we were interested in how a novel and simple framing manipulation can affect both of these outcomes.

To our knowledge, only two published studies have come close to testing this hypothesis, but they did so incompletely and with inconsistent results. Meloy and Russo (2004, Studies 2a and 2b) asked participants to either choose or reject between positive options (e.g., good employees) or negative options (e.g., bad employees) and then measured decision confidence. However, the authors did not cleanly manipulate valence, because in their studies the "positive" employee had some negative features (e.g., an employee described as "a plodder"; p. 120) and the "negative" option some positive features (e.g., an employee said to have periods of "above average productivity"; p. 120). This muddling of valence may explain the researchers' muddled results (in fairness, these results were not of primary concern to the authors): Although people were more confident when choosing between two positive options than when rejecting between them (as we would predict), they were equally confident when choosing between two negative options as when rejecting between them (as we would not predict). Moreover, even this attenuated interaction from their Study 2a failed to emerge in their Study 2b. In our studies, we provide a much cleaner test of our hypothesis, and we consistently demonstrate the robustness of our findings across multiple stimuli and multiple studies with large samples. In addition, we propose and present evidence for a mechanism for this pattern of findings, generalize beyond simple valence matching and subjective decisions, and investigate not only reported confidence but also perceived consensus in decision-making.

Our studies investigate how attribute matching can influence confidence and consensus estimates. In Study 1, we establish evidence for the attribute-matching hypothesis, showing that people are more confident in, and believe that others are more likely to agree with, choices between positive options and rejections between negative options than choices between negative options and rejections between positive options. Study 2 generalizes this effect to a new domain while showing that the effect is stronger when the choice options are extreme rather than moderate. In Study 3, we examine whether the effects arise because the speed and ease of matched decisions inspire greater confidence. In Study 4, we show that the effect hinges on a lack of awareness, because it is eliminated when people are warned that attribute matching might influence their confidence. Finally, Study 5 explores whether the matching hypothesis extends to objective judgments (e.g., calorie estimations). We conclude with a discussion of alternative explanations and future work for attribute matching.

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the respective study descriptions; we analyzed our data only after collection had finished (Simmons, Nelson, & Simonsohn, 2012). Sample sizes were at least 150 participants per between-subjects condition, larger if time and resources allowed. Every study in this article was preregistered with the Open Science Framework. Preregistered hypotheses, sample sizes, materials, procedures, exclusion criteria, and analysis plans, as well as full data sets for each study, are linked within each study's description. For completeness, our "file drawer" of studies, both successful and not (also all preregistered), is available in the online supplemental materials.

Study 1

Each of the studies manipulating decision frame use a similar paradigm. In this study, participants were asked to make a decision between two similarly likable options. For some people this decision was expressed as a choice, whereas for others it was framed as a rejection. Additionally, we varied the valence of the pairs of options. Some pairs consisted of two desirable options, and some pairs consisted of two undesirable options. In this way, we orthogonally manipulated the frame of the decision and the valence of the targets, creating matched and mismatched pairings. Moreover, our mixed design allowed all participants to experience both types of pairings. Choosing from attractive options and rejecting from unattractive options were the matched-valence trials. All participants made their decision and then reported their decision confidence and their estimate of the percentage of others who would have made the same decision (Pre-registration and data: https://osf.io/tc7h4/).

Method

Participants. We recruited 2,519 participants from a private research company (M_{age} = 48.5; 51.5% female) to complete a survey about preferences. We determined this sample size in advance to be all participants in one survey session. This session consisted of multiple unrelated studies strung together and ran until at least 1,500 participants had passed the attention check in the first study of the set. We decided in advance to analyze the data of only those who passed the check in our study. We did not analyze the data for Study 1 until that threshold had been met and data collection had ceased.[1]

Materials, procedure, and design. Participants were asked to imagine they were selecting models for an upcoming advertising campaign. They viewed pairs of women's head shots from Pochon, Riis, Sanfey, Nystrom, and Cohen (2008) that were pretested to be attractive or unattractive. The pairs were designed such that attractiveness did not significantly differ within each pair (see Pochon et al., 2008, for more information about the pretest). Specifically, participants saw 16 pairs of women's head shots: eight pairs of attractive women and eight pairs of unattractive women, presented in a randomized order. For approximately half of participants the decision was framed as a choice (i.e., "Which woman would you choose?"), and for the remaining participants the decision was framed as a rejection (i.e., "Which woman would you reject?").

After each selection, participants were reminded of their answer and reported how confident they were in their decision on a 9-point scale ranging from 1 (*Not at all confident*) to 9 (*Extremely confident*) and, as a measure of perceived consensus, what percentage of other people would make the same decision (on a sliding scale from 0% to 100%, with the marker starting at 50%). At the conclusion of the 16 trials, participants were given a brief attention check (Oppenheimer, Meyvis, & Davidenko, 2009), and then they provided their age and gender.

[1] The sample size of 1,500 was set for the purposes of a larger project that specifies that target for all contributing experiments. Notably, as part of that project, Study 1 was replicated in three other labs sampling from three other populations. Although the project's protocol currently precludes us from sharing those, we can say that the effects were highly significant and similar in magnitude to those in the reported study.

Results

In this study, 1,018 participants (40.4%) failed the attention check and were excluded from analyses. Although this number may seem high, it is not atypical for this more naïve participant pool, and the exclusion rule adheres to our preregistration plan[2] (Figure 1 plots the results).

Confidence. With the remaining 1,501 participants, we ran an ordinary least squares (OLS) regression (and did so for all studies). Using trial as the unit of analysis, we regressed participants' confidence ratings on frame (.5 = choose, −.5 = reject) and option (.5 = attractive faces, −.5 = unattractive faces), and the Frame × Option interaction. We clustered standard errors at the participant level. A main effect of option emerged ($b = .43$, $SE = .03$, $p < .001$), as well as a main effect of frame ($b = .16$, $SE = .06$, $p = .008$). Critically, these effects were qualified by our predicted interaction ($b = 1.10$, $SE = .06$, $p < .001$): For attractive targets, participants who were choosing the better model were more confident in their decision ($M = 7.04$, $SD = 1.04$) than were the participants rejecting the worse model ($M = 6.33$, $SD = 1.41$), $t(1499) = 11.09$, $p < .001$. For unattractive targets, the effect reversed ($M_{\text{choose}} = 6.05$, $SD = 1.34$, vs. $M_{\text{reject}} = 6.45$, $SD = 1.24$), $t(1499) = 5.95$, $p < .001$.

Consensus. We ran the same analysis for consensus estimates. As before, although frame ($b = 1.96$, $SE = .55$ $p < .001$) and option ($b = .73$, $SE = .29$, $p = .013$) were both significant predictors of consensus estimates, these effects were qualified by the predicted crossover interaction ($b = 9.19$, $SE = .58$ $p < .001$): For attractive trials, participants choosing the better model gave higher consensus estimates ($M = 68.4\%$, $SD = 12.3$) than did participants rejecting the worse model ($M = 61.9\%$, $SD = 12.6$), $t(1499) = 10.19$, $p < .001$). However, this effect reversed for unattractive trials ($M_{\text{choose}} = 63.1\%$, $SD = 12.0$, vs. $M_{\text{reject}} = 65.7\%$, $SD = 11.1$), $t(1499) = 4.42$, $p < .001$. In addition, when we entered confidence measures into the model, the interaction effect for consensus estimates was reduced (from $b = 9.19$ to $b = 2.35$), consistent with mediation ($z = 4.92$, $p < .001$).

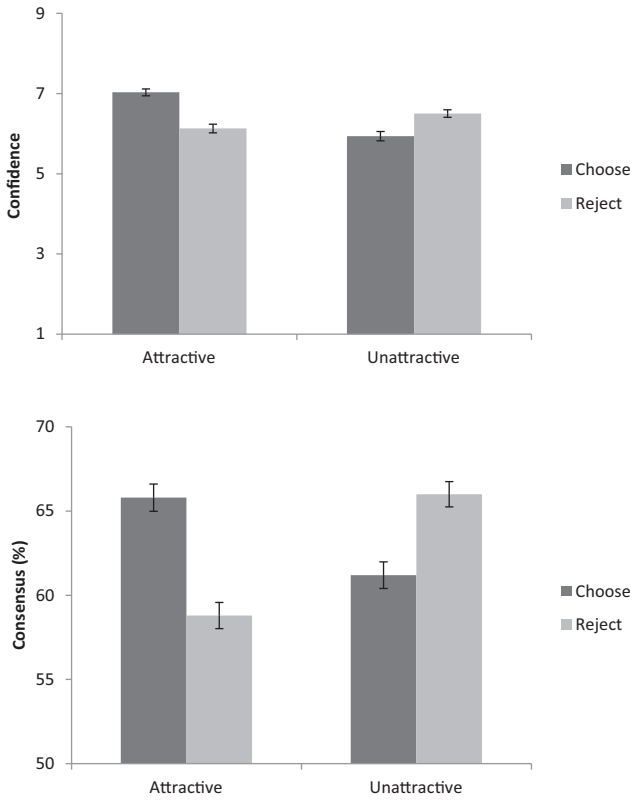

Figure 1. Matched trials (outer bars) showed higher decision confidence and perceived consensus than did mismatched trials (inner bars) in Study 1, with pairs of female faces.

Replication

To test whether this initial demonstration of attribute matching was replicable, we conducted an exact replication. We recruited 300 participants from Amazon Mechanical Turk and received 303 ($M_{\text{age}} = 35.1$; 65.6% female). The difference between our recruitment goal and final sample size (in this and subsequent Amazon Mechanical Turk studies) likely stems from a delay between the completion of the final survey and its completion code's being registered online (which would close the study) or participants' sharing the survey with friends for fun. In all cases, data were not analyzed until Amazon Mechanical Turk marked the study as "completed." Three participants (1.0%) failed the attention check and were excluded from analyses (Pre-registration and data: https://osf.io/bm6jr/). We ran the same analyses used in Study 1 and found an identical pattern: Confidence and consensus estimates were significantly higher when the valence of the decision frame and the options matched than when they mismatched ($b_{\text{confidence}} = 1.46$, $SE = .06$; $b_{\text{consensus}} = 11.19$, $SE = 1.18$, $ps < .001$). As before, when we entered confidence measures into the model, the interaction effect for consensus estimates was reduced (from $b = 11.19$ to $b = 3.71$), again consistent with mediation ($z = 3.86$, $p < .001$).

Discussion

When people were "choosing" between two attractive faces, they were more confident in their decision and thought more people would agree with them than when they were "rejecting" between the same pair. This demonstrates a strong attribute matching effect: When people were asked to choose between options, we found that they were more confident in their decisions for attractive pairs than for unattractive pairs. However, this finding reversed under a reject frame. These matching effects on consensus estimates were then partially explained by the matching effects on confidence. Notably, the same results were obtained in a replication with a different population.

In Study 2, we sought to test whether this effect generalized to a new choice domain, one that allowed us to test whether the effect is strongly among stimuli that are more extremely (vs. moderately) valenced.

[2] Although we preregistered to analyze the data from only those who passed the attention check, in each study the effect was similar in size and highly significant when analyzing all participants. All data are available on the Open Science Framework (OSF) pages whose URLs appear in the references.

Study 2

As in Study 1, we varied the valence of the decision frame (choose vs. reject) and the valence of the options (positive vs. negative). Additionally, to test whether attribute matching would emerge with less extreme stimuli, we included four levels of valence: extremely positive, slightly positive, slightly negative, and extremely negative (see Table 1 for the exact stimuli). We predicted that attribute matching would still emerge for the less extreme stimuli, albeit in smaller magnitudes (Pre-registration and data: https://osf.io/expw5/).

Method

Participants. We decided in advance to recruit 300 participants from Amazon Mechanical Turk and received 301 (M_{age} = 36.1; 55.0% female).

Materials, procedure, and design. Participants viewed 20 pairs of words in a randomized order. The words were chosen based on valence ratings provided by Bellezza, Greenwald, and Banaji (1986) and paired such that valence did not significantly differ within each pair. The 20 trials consisted of five pairs of extremely positive, slightly positive, slightly negative, and extremely negative words each (see Table 1). As in Study 1, half of participants were asked to indicate their preference by choosing the word they preferred, and half were asked to do so by rejecting the word they did not prefer (readers interested in the [nondiffering] choice share within each pair are referred to the online supplemental materials). After making each choice, participants completed the same confidence and consensus measures used in Study 1. At the conclusion of the study, participants received the same attention check as in Study 1 and provided their age and gender.

Results and Discussion

Fourteen participants (4.7%) failed the attention check and were excluded from analyses (Figure 2 plots the results).

Confidence. Using trial as the unit of analysis, we regressed confidence ratings on frame, option, and extremity (−.5 = moderate, .5 = extreme); all possible two-way interactions; and the three-way Frame × Option × Extremity interaction. We clustered standard errors at the participant level. Although frame (b = .17, SE = .11, p = .135) and option (b = −.07, SE = .06, p = .217) were not significant predictors of confidence, our predicted Frame × Option interaction was highly significant (b = 2.10, SE = .12, p < .001): On positive trials, participants choosing the better word were more confident of their choice (M = 6.92, SD = 1.04) than were participants rejecting the worse word (M = 6.04, SD = 1.20), $t(285)$ = 6.63, p < .001, an effect that reversed for negative trials (M_{choose} = 5.79, SD = 1.35, vs. M_{reject} = 7.02, SD = .89), $t(285)$ = 9.09, p < .001. Supporting the idea that attribute extremity moderates the matching effect, the three-way Frame × Option × Extremity interaction was highly significant (b = 1.37, SE = .17, p < .001). Attribute matching occurred even for the slightly positive and slightly negative word pairs but was less pronounced ($b_{interaction}$ = 1.38, SE = .13, p < .001).

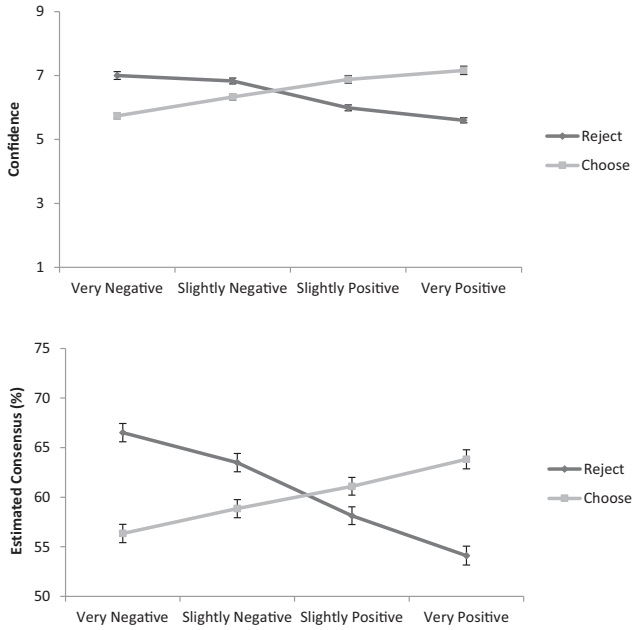

Figure 2. The size of the attribute-matching effect varied with attribute intensity in Study 2, with pairs of words.

Thus, as in Study 1, choosing between positive options led to higher confidence than did rejecting between the same options, and choosing between negative options led to lower confidence than did rejecting between the same options. Additionally, Study 2 contributes the new insight that that reversal interaction is stronger for extreme option pairs than for moderate option pairs, but the interaction remained significant for both.

Consensus. We then repeated this analysis with consensus estimates. The effect of frame was not significant (b = −.47, SE = .96, p = .620), whereas the effect of option was (b = −1.89, SE = .54, p < .001). Critically, however, our predicted interaction was highly significant (b = 13.72, SE = 1.09, p < .001): On positive

Table 1
Word Pairs Used as Stimuli in Studies 2–4

Very negative	Slightly negative[a]	Slightly positive[a]	Very positive
murderer vs. tumor	thorn vs. jealousy	circus vs. world	joy vs. kiss
poison vs. slaughter	snob vs. beggar	fur vs. privacy	pleasure vs. vacation
war vs. maggot	useless vs. wasp	knowledge vs. learn	family vs. laughter
cancer vs. funeral	rage vs. stress	water vs. employment	paradise vs. sunrise
lice vs. suicide	putrid vs. stupid	earth vs. improve	romantic vs. love

[a] Not used in Studies 3 and 4.

trials, participants choosing the better word gave higher consensus estimates ($M = 65.0\%$, $SD = 10.1$) than did participants rejecting the worse word ($M = 57.6\%$, $SD = 8.8$), $t(285) = 6.61$, $p < .001$. However, this effect reversed for negative trials ($M_{\text{choose}} = 56.1\%$, $SD = 10.3$, vs. $M_{\text{reject}} = 62.5\%$, $SD = 9.3$), $t(285) = 5.49$, $p < .001$. As with confidence ratings, the three-way interaction was also significant ($b = 11.86$, $SE = 1.71$, $p < .001$), indicating that although the Frame × Option interaction was significant even for the moderately valenced trials ($b_{\text{interaction}} = 7.61$, $SE = 1.30$, $p < .001$), it was smaller than it was for the extremely valenced trials ($b_{\text{interaction}} = 19.66$, $SE = 1.48$, $p < .001$). As in Study 1, when we entered both the confidence and consensus measures into the model, the Frame × Option interaction effect for consensus estimates was reduced (from $b = 13.74$ to $b = 3.65$), consistent with mediation ($z = 3.72$, $p < .001$).

Study 2 shows that attribute matching occurs not just when the attribute is at its extremes; even the only slightly positive and slightly negative word pairs significantly showed attribute matching, with the size of the effect varying with attribute intensity. In the next two studies, we turn to a possible mechanism for attribute matching: decision ease.

Study 3

Study 3 mirrored Study 2 except for two key differences. First, Study 3 used only the extremely positive and extremely negative words, and second, it included both direct (7-point scale) and indirect (decision time) measures of decision ease. Decisions on matching trials should feel easier to make, and be made faster, than would those for mismatched trials. Furthermore, we predicted the standard matching effect from the previous studies would replicate but, more important, that it would be mediated by our direct measure of decision ease. Note that because of the unreliability of response time data (Evans, Dillon, & Rand, 2015; Fazio, 1990), we preregistered our response time variable as exploratory (Preregistration and data: https://osf.io/jk3mu).

Method

Participants. We recruited 421 participants from Amazon Mechanical Turk ($M_{\text{age}} = 31.1$; 57.2% female). We had predetermined to recruit 400 participants in total.

Materials, procedure, and design. Participants viewed the five extremely positive and five extremely negative word pairs from Study 2, in a randomized order. As in Study 2, participants were asked either to choose the word they preferred or to reject the word they did not prefer. We surreptitiously recorded the amount of time participants spent on this decision page. Next, all participants were asked how easy making their decision felt on a 9-point scale ranging from 1 (*Very difficult*) to 9 (*Very easy*) before also responding to the same confidence and consensus measures we used in the previous studies. After the last trial, participants received the same attention check as in previous studies and reported their age and gender.

Results and Discussion

Sixty (14.3%) participants failed the attention check and were excluded from analyses.

Ease. With the remaining participants, we ran the same analysis as in Study 1 on the ease measure (frame: −.5 = choose, .5 = reject; option: −.5 = negative, .5 = positive), clustering standard errors at the participant level and using trial as the level of analysis. Neither frame ($b = -.06$, $SE = .09$ $p = .511$) nor option ($b = -.06$, $SE = .07$, $p = .423$) was a significant predictor of ease. However, our predicted crossover interaction was highly significant ($b = -2.84$, $SE = .14$, $p < .001$): On positive trials, participants choosing the better word reported the decision was easier to make ($M = 5.73$, $SD = .88$) compared with participants rejecting the worse word ($M = 4.25$, $SD = 1.22$), $t(359) = 13.22$, $p < .001$, an effect that reversed for negative trials ($M_{\text{choose}} = 4.37$, $SD = 1.22$, vs. $M_{\text{reject}} = 5.73$, $SD = .99$), $t(359) = 11.67$, $p < .001$.

Response time. Per our preregistration, due to the nature of response times, we first excluded any responses less than 200 ms and then log-transformed the resulting data before conducting our analyses (Whelan, 2008); however, for ease of understanding, we report the raw means in text.[3] We then fit the model for our transformed response time variable. Here, frame was a significant predictor of response time ($b = .19$, $SE = .03$, $p < .001$) and option was not ($b = -.02$, $SE = .01$, $p = .117$). More important, however, our predicted interaction again obtained ($b = .28$, $SE = .27$, $p < .001$). In line with our hypothesis, on positive trials, participants who chose the words they preferred chose faster ($M = 5.39$ s, $SD = 2.82$) than did participants who rejected the words they did not prefer ($M = 7.46$ s, $SD = 3.27$), $t(357) = 8.52$, $p < .001$. This difference was smaller on negative trials ($M_{\text{choose}} = 6.56$ s, $SD = 4.04$, vs. $M_{\text{reject}} = 7.62$ s, $SD = 12.55$), $t(367) = 1.28$, $p = .203$.

Confidence. We next ran the same analyses on reported confidence. Here, neither frame ($b = -.14$, $SE = .11$, $p = .231$) nor option ($b = .11$, $SE = .08$, $p = .182$) was a significant predictor of confidence; however, our predicted interaction was ($b = -2.61$, $SE = .17$, $p < .001$): On positive trials, participants who chose the words they preferred reported higher confidence in making their choice ($M = 7.50$, $SD = .97$) than did participants who rejected the words they did not prefer ($M = 6.06$, $SD = 1.58$), $t(359) = 10.50$, $p < .001$, an effect that reversed for negative trials ($M_{\text{choose}} = 6.08$, $SD = 1.55$, vs. $M_{\text{reject}} = 7.25$, $SD = 1.14$), $t(359) = 8.15$, $p < .001$. When we entered ease into the model for confidence, the Frame × Option interaction was reduced (from $b = -2.61$ to $b = -.18$), consistent with mediation ($z = 1.99$, $p = .047$).

Consensus. Finally, we repeated this analysis with consensus estimates: Frame was not a significant predictor of consensus estimates ($b = -1.08$, $SE = .92$, $p = .243$) and option was ($b = -3.65$, $SE = .67$, $p < .001$), but, critically, our predicted interaction obtained ($b = -14.30$, $SE = 1.34$, $p < .001$): On positive trials, participants who chose the words they preferred gave higher consensus estimates in making their choice ($M = 64.4\%$, $SD = 11.6$) than did participants who rejected the words they did not prefer ($M = 56.1\%$, $SD = 9.3$), $t(359) = 7.41$, $p < .001$, an effect that reversed for negative trials ($M_{\text{choose}} = 60.9\%$, $SD = 10.7$, vs. $M_{\text{reject}} = 66.9\%$, $SD = 11.7$), $t(359) = 5.16$, $p <$

[3] Using untransformed response times yields equivalent effect sizes and significance levels. We report transformed statistical tests in keeping with convention and our preregistration.

.001. When we entered the measure of confidence into the model predicting consensus, the interaction effect was reduced (from $b = -14.30$ to $b = -4.12$), consistent with mediation ($z = 4.01$, $p = .005$).

Study 3 presents preliminary evidence for decision ease as a mechanism behind attribute matching effects on confidence. In addition to replicating the attribute matching effect from Studies 1 and 2, participants' reports of how easy making the decisions felt, as well as how quickly they made those decisions, mediated their reported confidence. Along these lines, we hypothesized that participants misattributed this change in decision ease to their confidence in their preferences instead of to our manipulations. However, rather than affecting only *subjective* ease, it could be that our manipulations affect how objectively easy the decisions were to make.

To disentangle these two possibilities in Study 4, we prompted some participants to consider this irrelevant source of experiential information, without stating its direction of influence. If our effect had been emerging from misattribution, this prompt would attenuate the effect; if, instead, the effect existed only because matched decisions were inherently easier, then this prompting would have no effect. This approach also allowed us to implicate decision ease in our model more directly, beyond the mere correlational evidence from Study 3: Participants cued to discount their ease of decision-making failing to report the usual changes in confidence and consensus estimates would suggest that decision ease was in fact involved in this process.

Study 4

The purpose of Study 4 was to more directly test the hypothesis that the increase in confidence and consensus estimates on matched trials comes from a misattribution of decision ease from attribute matching and not from the decision's becoming objectively easier to make. Study 4 used the same materials and procedure as in Study 3 but without the additional measure of ease (we chose not to measure response time in this study, given the ambiguity in the literature and in the results of Study 3). Instead, we introduced a third factor: Some participants were warned that the valence of the frame and the options may have made the decision feel easier prior to their reports of confidence and consensus. This approach of calling participants' attention to the source of ease to demonstrate misattribution has been used in the past with much success (e.g., Cesario, Grant, & Higgins, 2004; Gorn, Goldberg, & Basu, 1993; Thomas & Morwitz, 2009; Williams, Duke, & Dunning, 2017).[4] The logic behind this manipulation is that participants will "only draw on these experiences as a source of information when their informational value is not discredited" (Schwarz & Clore, 2007, p. 389). We therefore predicted that participants who did not receive this notice would show the attribute matching effect, whereas those who did would properly attribute their increase in ease to our manipulations and show no effects (Pre-registration and data: https://osf.io/gdrvs/).

Method

Participants. We recruited 502 participants from Amazon Mechanical Turk ($M_{age} = 30.8$; 49.4% female). We had predetermined to recruit 500 participants in total. We did not analyze the data until that threshold had been met and data collection ceased.

Materials, procedure, and design. As in Study 3, participants viewed five extremely positive and five extremely negative word pairs in a randomized order and were randomly assigned either to choose the word from each pair that they preferred or to reject the word they did not prefer. As in previous studies, all participants reported their confidence and perceived consensus. However, after making their selection but before reporting their confidence, consistent with the approach taken by Cesario et al. (2004), half of participants read this: "Before continuing, please consider the following: Past research suggests that phrasing a decision positively [negatively] could affect how easy your decision seems, *depending on* the positivity or negativity of the options." Participants in these warned conditions saw the message on every trial and could not proceed to the next page for 2 s. At the conclusion of the study, participants received the same attention check as in previous studies and provided their age and gender.

Results and Discussion

Forty-four participants (8.8%) failed the attention check and were excluded from analyses (Figure 3 plots the results).

Confidence. Using trial as the unit of analysis, we regressed confidence ratings on frame, option, and warning ($-.5$ = unwarned, .5 = warned) and on all possible two-way interactions and the three-way Frame × Option × Warning interaction. We clustered standard errors at the participant level. Frame ($b = -.28$, $SE = .09$, $p = .002$) and option ($b = .34$, $SE = .06$, $p < .001$) were both significant predictors of reported confidence. As in previous studies, these effects were qualified by the predicted interaction ($b = -.94$, $SE = .12$, $p < .001$), but, more important, the predicted three-way interaction was also significant ($b = 2.76$, $SE = .23$, $p < .001$). To probe the nature of this interaction further, we discuss the unwarned and warned conditions separately.

In the unwarned conditions, without the warning manipulation, attribute matching replicated as predicted. The predicted Frame × Option interaction was highly significant ($b = 2.32$, $SE = .18$, $p < .001$): On positive trials, participants reported greater confidence when choosing ($M = 7.43$, $SD = .99$) than rejecting ($M = 5.99$, $SD = 1.54$), $t(244) = 8.61$, $p < .001$, whereas on negative trials, participants reported greater confidence when rejecting ($M = 7.19$, $SD = 1.06$) than choosing ($M = 6.32$, $SD = 1.22$), $t(244) = 5.89$, $p < .001$. In the warned conditions, however, the results were very different. Although the Frame × Option interaction was still significant ($b = .44$, $SE = .15$, $p = .003$), for positive trials participants reported similar levels of confidence whether they were choosing ($M = 7.11$, $SD = .92$) or rejecting ($M = 7.04$, $SD = .99$), $t(254) = .63$, $p = .530$. On negative trials, an unpredicted significant difference did emerge, but it was in the direction opposite of what was observed in the

[4] An older, alternative version of this paradigm (Schwarz et al., 1991) has participants attribute their decision ease to something outside of the decision itself. We chose our approach because the alternative unnecessarily deceives participants and appears statistically unreliable (e.g., most of the reported test statistics are not significant). At the request of reviewers, we attempted to rerun Study 4 with this type of approach, but, in line with the absence of evidence in the original article, we did not find the predicted attenuation of our effect. Full results are available in the online supplemental materials.

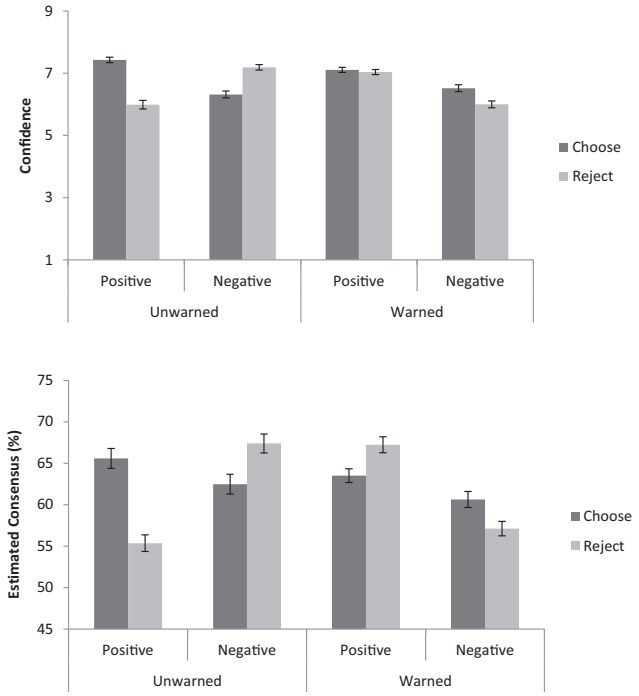

Figure 3. Attribute matching failed to emerge when participants were warned about the source of their decision ease in Study 4 with pairs of words.

unwarned condition (M_{choose} = 6.52, SD = 1.21, vs. M_{reject} = 6.00, SD = 1.29), $t(254) = 3.53$, $p = .001$.

Consensus. We then fit the same model for consensus estimates. Neither frame ($b = -1.65$, $SE = .87$, $p = .060$) nor option ($b = .89$, $SE = .61$, $p = .146$) valence significantly predicted estimated consensus. As in previous studies, however, the predicted Frame × Option interaction was highly significant ($b = -3.84$, $SE = 1.22$, $p = .002$), and more important, the predicted three-way interaction was also significant ($b = 22.93$, $SE = 2.44$, $p < .001$). To probe the nature of this interaction further, we again discuss the unwarned and warned conditions separately.

In the unwarned conditions, without the warning, attribute matching replicated as predicted. The predicted Frame × Option interaction was highly significant ($b = -15.30$, $SE = 1.88$, $p < .001$): On positive trials, participants estimated higher consensus when choosing (M = 65.6%, SD = 12.4) than rejecting (M = 55.4%, SD = 11.4), $t(244) = 6.75$, $p < .001$, whereas on negative trials, participants estimated higher consensus when rejecting (M = 67.4%, SD = 11.3) than choosing (M = 62.5%, SD = 12.9), $t(244) = 2.97$, $p = .003$. In the warned conditions, as with confidence, the results were again very different. The Frame × Option interaction was still significant ($b = 7.63$, $SE = 1.55$, $p < .001$), but, as with confidence, the unpredicted opposite pattern emerged: On positive trials, participants estimated a smaller consensus when choosing (M = 63.5%, SD = 9.14) than rejecting (M = 67.2%, SD = 11.3), $t(254) = 2.89$, $p = .004$. On negative trials, we again observed the opposite of the unwarned conditions' results (M_{choose} = 60.6%, SD = 10.6, vs. M_{reject} = 57.1%, SD = 10.2), $t(254) = 2.72$, $p = .007$.

Replication

Because of the theoretical importance of Study 4 to the present article, we ran a direct replication with the same materials to verify its reliability (Pre-registration and data: http://osf.io/4tzig/). We recruited 502 participants from Amazon Mechanical Turk; 44 (8.8%) failed the attention check and were excluded from analyses. We fit the same model as before, and the three-way interaction again emerged for both confidence ($b = 2.76$, $SE = .23$, $p < .001$) and consensus ($b = 22.93$, $SE = 2.44$, $p < .001$). The unwarned conditions showed the usual Frame × Option interaction ($b_{confidence} = -2.32$, $SE = .18$, $p < .001$; $b_{consensus} = -15.30$, $SE = 1.89$, $p < .001$). However, the warned conditions did not ($b_{confidence} = .44$, $SE = .15$, $p = .003$; $b_{consensus} = 7.63$, $SE = 1.55$, $p < .001$), showing instead the pattern from the previous study.

Discussion

Study 4 offers further, more direct, support for decision ease as a mechanism behind attribute matching's effects on confidence and consensus estimates. When participants were given a reason to attribute their increased ease of decision-making to the valence of the frame and options, the effect disappeared (or even reversed, in the replication). Put another way, when participants were told their perceptions of decision ease may have been distorted, they no longer used them to inform their confidence and consensus estimates. Of importance, that the warning did not indicate the direction of the effect suggests a corrected attribution of ease, rather than simply demand, was driving the effect.

The results of Studies 1–4 have provided preliminary evidence of attribute matching and what may be behind it; however, they speak only to the robustness of this effect within preferences. These subjective judgments are much more susceptible to changes in experiential information than are objective judgments, which can have more declarative information to call upon (Schwarz, 1998). For a more conservative test of attribute matching, Study 5 employs a judgment task based both in fact and in a domain more familiar to participants.

Study 5

Study 5 utilized a design similar to that in Studies 1 and 2 but moved beyond valence as the attribute being matched into a more objective domain. Instead of seeing positive and negative stimuli and being asked for their preferences, participants saw pairs of high- and low-calorie foods and were asked either which food has more calories or which food has fewer, a question with a known answer. Deciding which high-calorie food has more calories and which low-calorie food has fewer were the matched trials (Pre-registration and data: https://osf.io/c7xez/).

Method

Participants. We received 408 participants from Amazon Mechanical Turk (M_{age} = 34.7; 62% female). We had predetermined to recruit 400 participants in total. We did not analyze the data until that threshold had been met and data collection ceased.

Materials, procedure, and design. Participants viewed two pairs of high-calorie foods and two pairs of low-calorie foods, in a randomized order. Foods were determined to be high- or low-

calorie based on a pretest, in which 51 Amazon Mechanical Turk participants were asked to estimate the caloric content of each food separately (see Table 2 for the four food pairs). The pairs were then constructed such that the median-calorie estimates were approximately equal. For these four food pairs, study participants were randomly assigned to determine which food has more calories or which food has fewer calories. After making each selection, participants completed the same confidence and consensus measures as were in the previous studies. We also asked participants how easy the decision felt to make, as in Study 3, to ensure any effects found here had a similar mechanism. At the conclusion of the study, participants received a brief attention check ("Which food has more [fewer] calories? 3 grapes vs. grilled cheese sandwich"), reported whether they were vegetarian as well as whether they were on a diet, and provided their age and gender.

Results and Discussion

Eleven participants (2.7%) failed the attention check and were excluded from analyses.

Ease. With the remaining participants, we ran an OLS regression. Using trial as the unit of analysis, we regressed participants' ratings of decision ease on frame (−.5 = more, .5 = less), option (.5 = high-calorie foods, −.5 = low-calorie foods), and the Frame × Option interaction. We clustered standard errors at the participant level. We found no effect of frame ($b = -.07$, $SE = .10$, $p = .468$), although a significant effect of option ($b = .42$, $SE = .07$, $p < .001$) did emerge. More important, our predicted interaction was also significant ($b = .75$, $SE = .14$, $p < .001$): On high-calorie trials, participants who were asked which food had more calories reported the decision was easier to make ($M = 4.55$, $SD = 1.16$) than did participants who were asked which had fewer ($M = 4.11$, $SD = 1.1$), $t(395) = 3.91$, $p < .001$. However, this effect reversed when participants were asked about low-calorie foods ($M_{\text{more}} = 4.60$, $SD = 1.37$, vs. $M_{\text{fewer}} = 4.91$, $SD = 1.19$), $t(395) = 2.35$, $p = .019$.

Confidence. We next ran the same analysis for reported confidence. Again, we found no effect of frame ($b = .07$, $SE = .14$, $p = .618$) but did find a significant effect of option ($b = .71$, $SE = .10$, $p < .001$). More important, our predicted interaction was significant as well ($b = .90$, $SE = .19$, $p < .001$): On high-calorie trials, participants who were asked which food had more calories gave higher confidence estimates ($M = 5.39$, $SD = 1.68$) than did participants who were asked which had fewer ($M = 5.01$, $SD = 1.53$), $t(395) = 2.37$, $p = .018$. However, this effect reversed for low-calorie trials ($M_{\text{more}} = 5.65$, $SD = 1.86$, vs. $M_{\text{fewer}} = 6.17$, $SD = 1.58$), $t(395) = 3.00$, $p = .003$. In addition, when we added decision ease to the model, the interaction effect for reported confidence was reduced to nonsignificance (from $b = .90$ to $b = .12$), consistent with mediation ($z = 5.19$, $p < .001$).

Consensus. Finally, we fit the same model for consensus estimates. Again, we found no effect of frame ($b = -.39$, $SE = 1.05$, $p = .713$) but did find a significant effect of option ($b = 5.85$, $SE = .86$, $p < .001$). More important, the predicted crossover interaction was again highly significant ($b = 7.66$, $SE = 1.73$, $p < .001$): On high-calorie trials, participants who were asked which food had more calories estimated greater consensus around their answer ($M = 62.0\%$, $SD = 13.8$) than did participants who were asked which had fewer ($M = 57.8\%$, $SD = 12.9$), $t(395) = 3.15$, $p = .002$. However, this effect reversed for low-calorie trials ($M_{\text{more}} = 64.1\%$, $SD = 14.5$, vs. $M_{\text{fewer}} = 67.5\%$, $SD = 13.2$), $t(395) = 2.47$, $p = .014$. In addition, when we entered reported confidence into the model, the interaction effect for consensus estimates was reduced (from $b = 7.66$ to $b = 3.63$), consistent with mediation ($z = 5.07$, $p < .001$).

Study 5 shows that the effects of attribute matching are not limited to judgments of subjective preference but emerge even when people are judging stimuli on objective dimensions. To our knowledge, this is the first demonstration of a matching effect on objective judgments. Even when asked to make these objective judgments of caloric content, participants' confidence and perceived consensus were higher when the decision frame and the food pairs matched on their salient attribute. Moreover, participants' perceptions of how easy the decision felt to make showed this pattern as well, suggesting a process similar to that in previous studies despite the new domain.

Table 2
Food Pairs Used as Stimuli in Study 5

High-calorie foods	Low-calorie foods
Double cheeseburger vs. medium pepperoni pizza	Baby carrot vs. celery stick
12 buffalo chicken wings vs. small cheese pizza	4 oz. of light orange juice vs. 4 oz. of light lemonade

General Discussion

No one wants to face undesirable options, but, given that preferences are malleable, the present article demonstrates that people might still feel good about their decisions among them. We propose that this can happen through attribute matching: When a salient attribute of the decision frame matches a salient attribute of the options, the decision feels easier to make, which increases reported confidence and perceived consensus. In Study 1, we showed that participants were more confident in their preference and perceived greater consensus around it when they were choosing from attractive faces or rejecting from unattractive faces than when the frame and the options did not match in valence. Study 2 found that this matching effect emerged even with only slightly valenced options. Study 3 directly tested a possible mechanism by measuring decision ease and response time and finding strong evidence of attribute matching and mediation of confidence estimates; hence, in Study 4, notifying participants that the valence of the frame and options may affect their decision ease appeared to correct their attribution of that ease and eliminate the effect. Finally, in Study 5, we extended this finding to objective judgments. Despite experiential information's now having to compete with much more declarative information, we still found evidence of attribute matching with calorie judgments in Study 5.

One could, however, propose a few alternative explanations, instead of decision ease. For example, perhaps participants in mismatched trials were answering a different question from the one asked (i.e., response substitution; Gal & Rucker, 2011). When shown a pair of faces, participants want to answer the question "how attractive are these faces?" but are instead asked only "how

confident are you in your decision?" They substitute their response to the former when answering the latter. We assessed this account in a modified version of Study 1: We selected the two top-performing attractive and unattractive trials from the choose conditions of Study 1 (to conserve statistical power; $N = 401$) and varied whether participants first had the opportunity to rate how well suited either face was for the advertising campaign before rating how easy their initial decision felt to make and their confidence in their decision (pre-registration and data: http://osf.io/zg6b5/). We again found, contrary to a response substitution account, evidence of attribute matching, regardless of whether participants had the chance to express their attitudes toward the stimuli first (see the online supplemental materials for a full description of the methods and results).

A second alternative explanation often put forth for matching effects is positive mood, rather than decision ease (e.g., Cesario et al., 2004). Although we did not directly measure mood in our studies, most of our studies included explicitly negative stimuli (e.g., the words *murder* and *maggot*), which do not typically induce a positive mood. Accordingly, this seems like a relatively unlikely account for the findings.

A fruitful avenue for building off this work could come in the form of additional mechanisms. That is, although we show that confidence estimates drive perceived consensus and that decision ease drives confidence estimates, the question remains as to what drives decision ease. Given the subjective nature of most of our stimuli, cognitive dissonance's (Festinger, 1957) decreasing on matched trials and increasing on mismatched trials is certainly involved in some form: One feels uncomfortable in rejecting a perfectly good option and better being able to choose one. However, this account cannot accommodate our results from Study 5, in the objective domain: Stating that burgers have more calories than does pizza should be affectively equivalent to stating pizza has fewer calories than do burgers. Nevertheless, we do show strong effects on decision ease in both cases (which is strongly related to decision conflict or dissonance); hence, further research may prove useful. Another possibility is that the decision frame may cue participants to selectively recall, search, and process matching information (Markus & Kunda, 1986; Shafir, 1993). On mismatched trials, however, there was less of this desired information available, increasing decision difficulty. A third option could involve cognitive switching costs (e.g., Pecher, Zeelenberg, & Barsalou, 2003). That is, being given a positive frame may facilitate subsequent processing of positive options (a match) and hinder processing of negative options (a mismatch), which manifests as increased or decreased decision ease.

There are other existing literatures that, despite considering themselves distinct from each other, may be, in fact, quite similar to both each other and to the present work. However, none of them answers the key questions posed here. Therefore, another important stream of future research could look into connecting some of these otherwise disparate findings in the literature to ours. For example, work on regulatory fit (Higgins, 2000) claims that "when [people] use goal pursuit means that fit their regulatory orientation" (p. 1219), this fit generates its own utility (Higgins, 2005), increasing decision confidence (Cesario et al., 2004) and satisfaction (Idson, Liberman, & Higgins, 2000). Construal level theory (Trope & Liberman, 2000) research has shown that when an option's features (construals) match each other, decision makers view those options more positively (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Kim, Rao, & Lee, 2009; Todorov, Goren, & Trope, 2007). Beyond these two literatures, a number of articles in other domains appear to show a similar pattern: For example, rounded, easy-to-calculate numbers have been suggested to facilitate affect-driven decisions (Wadhwa & Zhang, 2015), and option information in the same units as the decision is utilized more in decision-making (Nowlis & Simonson, 1997; Slovic, Griffin, & Tversky, 1990). It could be that, in the abstract, these articles and literatures are each their own form of attribute matching: each one matching attributes from different parts of the decision process, with positive outcomes for the decision maker. If any mechanism is proposed and tested empirically in the previously mentioned work, it is decision ease. Hence the case of attribute matching we present here is a pure, robust, reliable form of what could be at the core of these important literatures, and better understanding the mechanism behind it would certainly be valuable.

A third, more downstream, focus of future research could include greater investigation of the consequences of these changes in decision ease. The attitude-certainty literature has suggested several important behavioral outcomes, such as resistance to change (Petrocelli et al., 2007), persistence over time (Bassili, 1996), and likelihood of acting on the attitude in question (Tormala & Petty, 2002) when the attitude is more certain, on matched trials. The regulatory fit literature has suggested that positive decision ease on matched trials may spill over into evaluating the selected option more positively. A number of exciting, important investigations can be built from this initial finding.

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