

HOW TRADEOFFS SHRINK ATTRIBUTE HIERARCHY

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Why do people sometimes struggle with decisions that once seemed relatively simple?

This research suggests that comparing options leads people to lose sight of which decision attributes are important. Although the difference between important and unimportant attributes is often clear in the abstract, the act of making tradeoffs highlights what people must forgo on one attribute in exchange for a gain on another, which increases the perceived importance of trivial attributes in particular. This causes the variance in perceived importance across attributes to shrink, blurring the distinction between important and unimportant attributes. Four experiments demonstrate this phenomenon, explore the underlying mechanism, and show how it leads to increased choice difficulty and dissatisfaction with the choice experience.

Keywords: multi-attribute choice models, decision difficulty, tradeoffs, distortion, conjoint analysis

Consumer choice is often difficult and fraught with conflict and uncertainty. One simple reason for such difficulty is tradeoffs. Whether deciding which flight to purchase, which house to buy, or even which entrée to order, choice options are often described by various attributes (e.g., price, tastiness, healthiness). Further, in most decisions preferences for different attributes conflict. Most consumers prefer flights with fewer connections, for example, but they also prefer cheaper flights, and direct flights are often more expensive. Similarly, most consumers prefer tastier food, but they also generally want to be healthy, and taste and health are often negatively correlated. Not surprisingly then, a great deal of research has shown that tradeoffs often produce negative emotions (Luce, Payne, and Bettman 1999), increase difficulty and conflict (Chatterjee and Heath 1996), and lead to choice deferral (Dhar and Nowlis 1999; Tversky and Shafir 1992).

In addition, however, we suggest that the mere act of tradeoff-making itself can produce further difficulty: Making tradeoffs can lead people to lose sight of which decision attributes are important, which, in turn, makes choice even more difficult. When choosing a flight, for example, most people would agree a priori that price and number of connections are more important than beverage or in-flight movie selection. But while such differences in attribute importance seem clear in the abstract, we argue that the act of making tradeoffs often muddies the distinction. In particular, we suggest that making tradeoffs among options reduces the variance in perceived attribute importance (i.e., difference between important and unimportant attributes) by making relatively unimportant attributes seem more important. This convergence of attribute importance, in turn, increases choice difficulty, uncertainty, and frustration.

We suggest this effect is driven by the focus that tradeoff making engenders. Making tradeoffs involves considering differences in attribute levels across options, which leads people to focus on *within* attribute comparisons (e.g., how much better one in-flight movie selection is

than another) and less on *between* attributes comparisons (e.g., whether in-flight movie selection is as important as ticket price). Consequently, attribute hierarchy becomes less salient. Moreover, the fact that there are tradeoffs (i.e., things to forego) within each attribute increases the perceived importance of even unimportant attributes, making all the attributes seem equally important, rather than equally unimportant.

In the next sections, we develop hypotheses about how tradeoff-making affects perceived attribute importance, decision difficulty, and satisfaction from the decision process. Four experiments test these hypotheses. We close with a discussion of the implications of our findings for choice difficulty, decision making, and well-being.

ATTRIBUTE IMPORTANCE WEIGHTS AND CHOICE

Product attributes play a key role in consumer decision making (Dhar, Nowlis, and Sherman 1999). Consumers compare specifications when buying electronics, contrast benefits when selecting services, and examine product features when choosing household goods. Models of attitude and preference formation (Fishbein and Ajzen 1975) have long emphasized the role of attributes, and the importance weights assigned to them, as determinants of evaluation and choice. Indeed, normatively accurate decision strategies, such as weighted averaging and equal weights (Bettman et al. 1998; Frisch and Clemen 1994; Green and Srinivasan 1990), use attribute levels and importance weights to predict choice. In such models, consumers pick the option with the highest aggregate value, where an option's value is determined by its attribute levels, multiplied by the corresponding attribute weight and summed across all attributes.

Factoring-in the values of all possible attributes, however, puts unrealistic demands on consumers' working memory and computational resources (Montgomery 1983). Consequently, people often use simplifying decision strategies, such as focusing only on the most important attributes and ignoring (or deferring) the less important ones (Dhar and Nowlis 1999; Payne, Bettman, and Johnson 1988; Svenson, Edland, and Slovic 1990; Tversky 1972; see Bettman et al. 1998 for a review).

As a result, the ability to discern between important and less important decision attributes plays a crucial role in reducing decision overload. Determining which attributes are important is akin to setting priorities, which simplifies the decision by enabling consumers to focus on a relatively small number of attributes, reduce tradeoff conflict (Luce, Payne, and Bettman 1999; Schrift, Netzer, and Kivetz 2011; Tversky and Shafir 1992), and employ simple, non-compensatory choice strategies (Bettman et al. 1998). Discerning between important and unimportant attributes leads to clearer, more polarized and confident preferences, whereas lack of differentiation has the opposite effect (Chernev 1997; Yoon and Simonson 2008).

Importantly, however, attribute weights are malleable, and can be constructed, modified, or distorted during the decision process. For example, decision makers tend to assign more weight to attributes that are easier to evaluate (Hsee 1996; Kivetz and Simonson 2000; Nowlis and Simonson 1997) or unique to the focal option in the comparison (Dhar et al. 1999). Attribute weight distortion can also be driven by the desire to identify a dominance structure among the options (Montgomery 1983), to favor the already preferred option (Brownstein 2003; Chernev 2001; Klayman 1995; Lord, Ross, and Lepper 1979; Russo, Meloy, and Medvec 1998), or to complicate the decision when it feels too easy (Schrift et al. 2011).

THE CURRENT RESEARCH

Building on the idea that attribute weights are malleable, we propose that the mere act of making tradeoffs across product attributes can systematically influence perceived attribute importance.

Outside a comparison context, people have a general notion of how important different attributes are. Most travelers, for example, care a lot about how many connections their flight will take and much less about the type of on-board entertainment offered.

But we suggest that comparing options containing tradeoffs tends to increase the perceived importance of attributes that consumers would otherwise judge to be unimportant. The resulting shrinkage of attribute importance variance, in turn, should increase choice difficulty, uncertainty, and frustration with the decision.

Our proposition is based on the premise that, when comparing multi-attribute options, people spontaneously focus on comparable decision elements, like values within a given attribute (e.g., “this restaurant has free parking but that one doesn’t”), because they are easy to evaluate (Hsee 1996; Markman and Gentner 1993; Simonson 2008). This comes at the expense of less salient or less evaluable comparisons across attributes. The focus on within-attribute comparisons means that importance differences *between* attributes may be neglected.

But beyond merely increasing attention to within-attribute comparisons at the expense of between-attribute comparisons, tradeoffs, by definition, highlight what people must give up on one attribute in exchange for a gain on another attribute. We argue that this focus on the forgone underscores potential losses on each attribute (Brenner, Rottenstreich, and Sood 1999; Carmon and Ariely 2000; Carmon, Wertenbroch, and Zeelenberg 2003) which, as a result, may “loom

larger” (Kahneman and Tversky 1979). Namely, the fact that there is something to forgo (i.e., lose) on an attribute may increase the extent to which it is perceived as consequential and hence the importance weight of that attribute (Chatterjee and Heath 1996; Zeelenberg et al. 1996).

The focus on perceived losses that tradeoff-making engenders should have a particularly pronounced effect on relatively unimportant (versus important) attributes. This is because an increase in perceived importance has a greater marginal effect on unimportant attributes than on important ones (Meyer and Sathi 1985; Nowlis and Simonson 1996; Sela and Berger 2012b). The result is overall convergence of attribute importance weights. While it may not change how people see the unimportant attributes in general, in the moment these attributes may come to be seen as more important. And although the unimportant attributes may still be less important in absolute terms, the relative increase in their perceived importance makes them less likely to be ignored or deferred in the decision process, thereby hindering decision simplification strategies and increasing decision complexity and effort as discussed above (Bettman et al. 1998; Tversky 1972).

In sum, we propose that making tradeoffs among choice options should shrink attribute variance by making relatively unimportant attributes more important. This, in turn, should lead decision makers to consider additional attributes, thereby complicating the decision and increasing choice difficulty and uncertainty. Further, we hypothesize that the effect of tradeoff-making on attribute variance is driven by the increased focus on within-attribute comparisons and the perception of losses that tradeoff-making engenders. Specifically, we predict that decreased loss aversion should attenuate the effect of tradeoff-making on attribute importance variance.

We test our propositions in four experiments. In Experiment 1, we examine how making tradeoffs among attributes impacts attribute importance variance by boosting the perceived importance of relatively unimportant attributes. Experiment 1 also examines the detrimental downstream consequences of attribute importance variance shrinkage on decision difficulty and certainty. Experiment 2 directly tests the role of within-attribute comparisons in this effect and rules out alternative explanations. Experiment 3 manipulates loss aversion to test the underlying role of perceived losses. Finally, Experiment 4 provides additional support for our theory by examining the moderating role of construal level. Our theory suggests that the effect of tradeoff-making should be more pronounced when people focus on low-level aspects of the decision rather than the “big picture”, and attenuated when they maintain a high-level, goal-directed notion of what is important in the decision.

Importantly, we argue that attribute weight convergence is not simply an artifact of the additional information that comparisons provide regarding the sacrifices one has to make. We demonstrate this by examining how moderators that increase within-attribute tradeoffs and decrease sensitivity to losses influence the effect, even when all the information is held constant.

EXPERIMENT 1: COMPARISONS MUDDY THE DISTINCTION BETWEEN IMPORTANT AND UNIMPORTANT ATTRIBUTES

Experiment 1 has three main goals. First, it tests whether comparing multi-attribute options reduces the variance in perceived attribute importance weights. We ask people to rate how important different decision attributes are either before or after they begin comparing the options. While people can easily distinguish between important and less important product

attributes in general, we predict that comparing options containing tradeoffs should muddy that distinction.

Second, Experiment 1 examines our suggestion that this attribute importance convergence is driven by less important attributes becoming more important (rather than more important attributes becoming less important).

Third, it examines the negative downstream consequences of this effect. We test how shrinking attribute variance impacts decision ease, choice certainty, and decision satisfaction.

Method

One hundred and two participants (mean age = 35; 59% women) were recruited from an online nationwide pool of people who had indicated they were interested in participating in psychological studies. They were randomly assigned to one of two between-subject conditions which were identical except for task order (rate-attributes-first vs. compare-options-first).

Participants were asked to imagine buying a domestic flight ticket. In the rate-attributes-first condition, participants first indicated how important each of six attributes (flight duration, number of stops, baggage fee, price, airport distance, and aircraft comfort level) would be for them when buying a flight ticket (1 = extremely unimportant; 7 = extremely important). To ensure that there would be no information differences between the order conditions, the available range of levels within each attribute was provided in parentheses (e.g., “Number of Stops (range: 0 – 2)”). After rating attribute importance, participants in the rate-attributes-first condition saw four options, one in each column, described on the same six attributes they rated previously, one in each row. The options contained tradeoffs among the attributes (e.g., a longer flight departing

from a convenient airport versus a shorter flight from a less convenient airport). See Appendix A.

In the compare-options-first condition, however, participants first saw the flight options and were asked to evaluate them carefully (without making a selection yet). After examining the options, they rated the importance of each attribute, using the same measure described above.

The focal dependent variable was the variance among individual attributes' importance ratings. After comparing and rating (or vice-verse), all participants chose their preferred option.

To examine the downstream consequences, we also measured decision ease, certainty, and overall satisfaction. At the end of the study, participants rated the extent to which it was difficult to think about which option to choose (reverse coded), the extent to which they felt that one of the options fitted them better than others, how satisfying the evaluation was, and how certain they were about being able to find the best option. These were aggregated to construct an index of decision satisfaction ($\alpha = .85$).

Results

Effect on attribute importance variance. A one-way ANOVA revealed that compared to the rate-attributes-first condition, comparing the options first reduced attribute importance variance ($M_{\text{Compare}} = 1.62$ vs. $M_{\text{Rate}} = 2.34$; $F(1, 100) = 7.21, p < .01$).

To further test what was driving this effect, we ran a 2 (Task Order) x 2 (Attribute Type: unimportant vs. important) repeated-measures ANOVA on the least and most important attributes, based on each respondent's idiosyncratic ratings. The analysis revealed the predicted interaction ($F(1, 100) = 8.37, p < .005$). Specifically, compared to rating the attributes first, comparing the options first increased the importance of the least important attribute ($M_{\text{Compare}} =$

3.16 vs. $M_{\text{Rate}} = 2.58$, $F(1, 100) = 4.02$, $p < .05$) but had no effect on the most important attribute ($M_{\text{Compare}} = 6.06$ vs. $M_{\text{Rate}} = 6.26$, $F < 1$, ns). Note that these results are inconsistent with a ceiling effect explanation for the lack of movement on the important attributes, because ratings of important attributes were actually slightly (though nonsignificantly) lower in the compare-options-first condition (6.06) than in the rate-attributes-first condition (6.26). Further, consistent with the notion that a ceiling effect was not responsible for the lack of movement on the important attributes, ratings of the second and third most important attributes did not vary either as a function of task order (5.72 vs. 5.58 and 5.16 vs. 5.04, respectively, all $F < .4$, ns), despite the fact that these were farther away from the high end of the scale.

Decision satisfaction. We also examined the downstream consequences of this effect for decision satisfaction. Consistent with our prediction, a one-way ANOVA on the decision satisfaction index revealed that comparing the options first decreased decision satisfaction ($M_{\text{Compare}} = 4.83$ vs. $M_{\text{Rate}} = 5.51$; $F(1, 100) = 6.35$, $p < .02$).

Mediation analysis. Finally, we conducted a multi-stage mediation analysis to examine whether (1) the effect of task order on attribute variance was mediated by an increase in the ratings of unimportant attributes (but not important ones), and (2) this, in turn, mediated the effect of task order on decision satisfaction. Thus task order $\rightarrow$ unimportant attribute rating $\rightarrow$ overall attribute variance $\rightarrow$ decision satisfaction.

Our mediation analysis relied on the bootstrapping approach and SPSS macro that Hayes (2012) developed. Bootstrapping results with 5000 samples and a 95% confidence interval (in brackets) suggested that the indirect effect of rating order on decision satisfaction, through unimportant attribute ratings and overall attribute importance variance, was significant ($B = -.13$,

[-.36, -.01]). A similar analysis examining whether the important attributes mediated the effect suggested that this was not the case ($B = -.01$, [-.07, .01]).

Discussion

Results of Experiment 1 support our proposition regarding how comparisons shrink attribute variance and illustrate the negative downstream consequences of this effect.

First, compared to when people first considered the attributes, considering tradeoffs among options that included these attributes blurred the distinction between more and less important attributes. This increased difficulty and uncertainty, and decreased overall decision satisfaction.

Second, the results indicate that this effect is driven by changes in unimportant attributes. Considering tradeoffs increased the perceived importance of the relatively unimportant attributes, but had no effect on more important attributes. While the unimportant attributes were still rated as less important in absolute terms, comparing the options reduced their difference from the more important attributes, making the unimportant attributes less likely to be ignored or deferred in the decision process.

A follow-up study further illustrates that comparing options leads people to consider more attributes. Participants ($N = 69$) either rated four flight attributes first and then compared the options and chose, as in Experiment 1, or compared the options and chose without rating the attributes at all. After entering their choice, we asked all the participants to indicate which of the four attributes influenced their decision, using a binary response (yes vs. no) for each attribute. Consistent with our theory, whereas only 5.6% of participants in the rate-attributes-first condition considered more than two attributes, this increased to 27.3% in the compare-options-

first condition, who considered at least three of the four attributes ($\chi^2(1) = 6.06, p < .05$). This supports our proposition that tradeoffs make less important attributes less likely to be ignored or deferred, thereby complicating the decision and requiring more effort.

While the results of Experiment 1 support our conceptualization, one might wonder whether they were somehow driven by the rate-attributes-first condition itself, rather than by tradeoffs in the compare-options-first condition. It is also possible that rating attributes versus comparing options triggers a different evaluative mindset (e.g., affective versus cognitive, abstract versus concrete, or heuristic versus deliberative). One might also wonder if the effects were driven by the additional information provided prior to attribute rating in the compare-options-first condition. Participants in both conditions were given information about the range of levels within each attribute, but one could argue that actually seeing the choice set provided new information. We designed Experiment 2 to rule out these alternative accounts.

EXPERIMENT 2: THE IMPORTANCE OF WITHIN-ATTRIBUTE TRADEOFF MAKING

To rule out alternative accounts due to the differences between the rate-attributes-first and compare-options-first conditions, and to directly test the underlying role of within-attribute comparisons in tradeoff making, Experiment 2 keeps the information between conditions the same but uses a layout manipulation shown to produce a within-attribute focus (Wen and Lurie 2010).

All participants were shown the same four options, one in each column, described by the same four attributes, one in each row (i.e., all participants viewed a version of the compare-options-first condition). But conditions varied based on which comparisons were highlighted. In

the by-attribute condition we highlighted the within-attribute information by drawing a horizontal box around each attribute row. In the by-option condition we highlighted the within-option information by drawing a vertical box around each option. We also had a control condition where no highlighting was used. If the effect is driven by within-attribute comparisons, as we suggest, then accentuating such comparisons (i.e., the by-attribute condition) should shrink attribute variance.

Experiment 2 also investigates the generalizability of these effects, testing them across three different product categories.

Method

Two hundred and sixty two participants (mean age = 31; 55% women) were recruited from an online nationwide pool of people who had indicated they were interested in participating in psychological studies. They were randomly assigned to a condition in a 3 (Focus of Comparison: by-attribute vs. by-option vs. control) x 3 (Product Category: flights vs. restaurants vs. toothbrushes) between subjects design.

Participants chose between four options in one of the three product categories. The options, one in each column, were described by four attributes, one in each row. The attributes for each product category were as follows: flights (price, number of connections, in-flight entertainment availability, and food and beverage availability), restaurants (wait time, food rating, outdoor seating availability, and wine selection), and toothbrushes (bristle quality rating, durability in months, color availability, and ergonomic design availability). The options contained tradeoffs on all four attributes. Before making their choice, participants were asked to rate how important each attribute was to them (1 = not at all important, 7 = extremely important).

In addition to varying product category, we also manipulated which comparisons were highlighted (adapted from Wen and Lurie, 2010, see Appendix B). In the by-attribute condition, a horizontal box was drawn around each row, highlighting the values within the same attribute across options. In the by-option condition, a vertical box was drawn around each option, highlighting the values within each option across the different attributes. In the control condition no boxes were used.

Results

Effect of comparison focus on attribute importance variance. The results bolster our suggestion that making trade-offs within attributes leads people to lose sight of which attributes are more important. A 3 (Focus of Comparison) x 3 (Product Category) ANOVA on attribute importance variance revealed the predicted main effect of comparison focus ($F(2, 253) = 7.24, p < .001$). Product category did not interact with focus of comparison ($F < 1$, ns) and is not discussed further.

Pairwise comparisons indicated the by-attribute manipulation had the predicted effect on attribute importance variance. Encouraging within attribute comparison (i.e., through the horizontal layout) reduced attribute variance compared to either the control ($M_{\text{By-Attribute}} = 2.83$ vs. $M_{\text{Control}} = 4.24$; $t = 3.18, p < .005$) or by-option condition ($M_{\text{By-Attribute}} = 2.83$ vs. $M_{\text{By-Option}} = 3.99$; $t = 2.59, p < .01$). There was no difference in variance between the control and vertical layout (i.e., by-option) conditions ($M_{\text{Control}} = 4.24$ vs. $M_{\text{By-Option}} = 3.99$; $t = .56$, ns).¹

¹ While one could expect attribute variance to be higher in the by-option condition compared to the control, this would imply that participants in that condition should make even fewer within-attribute comparisons. Given the salience of attribute information, however, it may be difficult to completely move people away from the tendency to consider the attributes at least somewhat.

We also examined whether the effect was driven by changes in the most important versus unimportant attribute, based on each respondent's idiosyncratic ratings. A 3 (Focus of Comparison) x 2 (Attribute Importance: unimportant versus important) repeated measures analysis on the least important and most important attribute means revealed a comparison focus x attribute importance interaction ($F(2, 259) = 4.45, p < .02$), see figure 1. Specifically, compared to the control and by-option conditions, the by-attribute condition increased the perceived importance of the unimportant attribute ($M_{\text{By-Attribute}} = 3.17$; $M_{\text{Control}} = 2.37$; $M_{\text{By-Option}} = 2.59$; $F(2, 259) = 5.32, p < .005$), but not the important attribute ($M_{\text{By-Attribute}} = 6.42$; $M_{\text{Control}} = 6.43$; $M_{\text{By-Option}} = 6.26$; $F < 1.2, \text{ns}$).

Mediation analysis. Mediation analysis (Hayes 2012) provides further support for our conceptualization. Bootstrapping analysis with 5000 samples and a 95% confidence interval (in brackets) shows that the effect of comparison focus on attribute importance variance was mediated by change in the unimportant attributes ($B = -.493, [-.88, -.12]$) but not by change in the important attributes ($B = .138, [-.07, .36]$).

Insert figure 1 about here

Discussion

In addition to illustrating that these results generalize to multiple product domains, Experiment 2 provides evidence for the underlying process behind the attribute importance convergence effect. Specifically, compared to a control condition, or a layout that highlighted by-option evaluation, highlighting within-attribute comparisons shrank attribute variance. This underscores the notion that within-attribute comparisons drive attribute importance variance to shrink.

Experiment 2 also casts doubt on alternative explanations. Even when the information provided to participants was identical across conditions, encouraging people to focus on within-attribute tradeoffs led to attribute variance shrinkage. Focusing on the comparison condition also shows that the effect cannot be solely due to mindset differences between the rate-attributes-first and compare-options-first conditions in Experiment 1, such as a rating versus comparison mindset, affective versus cognitive evaluation, or heuristic versus deliberative processing.

EXPERIMENT 3: THE UNDERLYING ROLE OF PERCEIVED LOSSES

Experiment 3 tests the underlying role of perceived losses. We proposed that tradeoff-making shrinks attribute importance variance because it makes people focus on what they must forgo (i.e., lose). This makes the unimportant attributes in particular “loom larger” (Kahneman and Tversky 1979), while having a diminishing marginal impact on attributes that already seem important (Meyer and Sathi 1985; Nowlis and Simonson 1996). We test this process hypothesis using the experimental causal chain approach (Spencer, Zanna, and Fong 2005), where the hypothesized mediator is directly manipulated rather than measured. Specifically, if perceived losses underlie the effect of tradeoffs on attribute importance variance, then a manipulation that decreases loss aversion, or the tendency to assign more weight to anticipated regrets (Zeelenberg et al. 1996), should attenuate the effect of tradeoff-making.

We manipulated loss aversion using two paradigms validated in prior research. First, loss aversion decreases when people make choices for others rather than for themselves (Polman 2012). Second, priming people to feel powerful reduces loss aversion specifically by decreasing

the perceived negative impact of losses (Inesi 2010). We predict that both of these manipulations should mitigate the effect of tradeoffs on attribute variance shrinkage.

Method

One hundred eighty eight participants (mean age = 37, 51% female), recruited from a nationwide online pool, were randomly assigned to condition in a 2 (Task Order: rate-attributes-first vs. compare-options-first) x 2 (Loss Aversion: baseline vs. attenuated) x 2 (Attenuation Paradigm: self/other vs. power) between subjects design. In all conditions, participants were told that they would be reviewing several flight options and that they would rate the importance of different attributes when choosing a flight. They evaluated the same flight options used in Experiment 2.

First, we manipulated loss aversion using either choice for self versus other (Polman 2012) or a power manipulation (Inesi 2010), depending on the paradigm condition. In the self/other paradigm condition, participants were asked to imagine choosing a flight for themselves (baseline condition) or a friend (attenuated loss aversion condition). In the power paradigm condition, half the participants described the last time they went to the grocery store (baseline condition) while the other half completed a power prime manipulation in which they described an incident where they had power over another individual (power condition, borrowed from Inesi 2010).

Second, participants completed the focal decision making task. As in Experiment 1, the flight options were the same across conditions, and the only difference between conditions was the order in which the different stages of the task were presented. In the compare-options-first condition, participants were first shown four flight options and then rated how important each

attribute was to them when buying a flight ticket (1 = not at all important; 7 = extremely important). In the rate-attributes-first condition, participants rated the attributes at the outset, before seeing the options. We again included attribute level ranges in the rating task (in both order conditions), to minimize information differences between the conditions. All participants then selected their preferred option.

Finally, participants in the power paradigm condition were probed regarding whether the first task influenced or seemed related to the second task. None of them was aware of any such influence or relationship.

Results

Effect on attribute importance variance. A 2 (Task Order: rate-attributes-first vs. compare-options-first) x 2 (Loss-Aversion: baseline vs. attenuated) x 2 (Paradigm: self/other vs. power) ANOVA revealed a main effect of task order ($F(1, 180) = 8.66, p < .005$), which was qualified by the predicted task order x loss-aversion interaction ($F(1, 180) = 4.19, p < .05$), Figure 2. There were no interactions involving paradigm type (i.e., which manipulation of loss aversion was used, all $F_s < 1$, ns), so this variable is not discussed further.

Consistent with Experiment 1, in the baseline condition (i.e., choice for self or grocery shopping prime), compared to rating the attributes first, comparing the options first reduced attribute importance variance ($M_{\text{Compare}} = 2.36$ vs. $M_{\text{Rate}} = 4.36$; $F(1, 184) = 14.14, p < .001$). In the attenuated loss-aversion condition (i.e., choice for other or power prime), however, this effect disappeared ($M_{\text{Compare}} = 3.92$ vs. $M_{\text{Rate}} = 3.60$; $F < .3$, ns). These results support our suggestion that the effect is driven by the focus on perceived losses that tradeoff-making engenders.

Looked at another way, in the compare-options-first condition, attribute importance variance was lower in the baseline than in the attenuated loss-aversion condition ($M_{\text{Baseline}} = 2.36$ vs. $M_{\text{Attenuated Loss}} = 3.60$; $F(1, 184) = 4.15, p < .05$). There was no effect of loss aversion in the rate-attributes-first condition ($M_{\text{Baseline}} = 4.63$ vs. $M_{\text{Attenuated Loss}} = 3.62$; $F < 1.3, ns$).

Next, we examined whether the effect in the baseline loss-aversion condition was driven by changes in the most important versus unimportant attribute, based on each respondent's idiosyncratic ratings. A 2 (Task Order) x 2 (Attribute Type: Unimportant vs. Important) Repeated-Measures ANOVA revealed the predicted interaction ($F(1, 97) = 11.15, p < .001$). Specifically, compared to rating the attributes first, comparing the options first increased the perceived importance of the least important attribute ($M_{\text{Compare}} = 3.75$ vs. $M_{\text{Rate}} = 2.62, F(1, 97) = 11.88, p < .001$) but had no effect on the most important attribute ($M_{\text{Compare}} = 6.52$ vs. $M_{\text{Rate}} = 6.60, F(1, 97) < .3, ns$). Note that these results are again inconsistent with a mere ceiling effect explanation for the lack of movement on the important attributes, because ratings of important attributes were actually slightly (although nonsignificantly) lower in the compare-options-first condition (6.52) than in the rate-attributes-first condition (6.60). There were no corresponding effects in the attenuated loss-aversion condition (all F s $< 1.86, ns$).

Insert figure 2 about here

Mediation analysis. Finally, we used a simultaneous moderated mediation analysis to test whether either the unimportant or important attribute ratings mediate the effect of task order and loss-aversion on overall attribute importance variance. Bootstrapping analysis (Hayes 2012), using 5000 samples and a 95% confidence interval (in brackets), indicates that the indirect effect of task order on attribute importance variance was mediated by the unimportant attributes in the

baseline loss-aversion condition ($B = -1.77, [-2.76, -.77]$) but not in the attenuated loss-aversion condition ($B = -.69, [-1.69, .32]$). Important attributes did not mediate the effect in any condition ($B = -.12, [-.60, .35]$, and $B = .01, [-.34, .34]$, respectively).

Discussion

Experiment 3 demonstrates the underlying role of perceived losses in this effect. As in Experiment 1, comparing the options first shrank attribute importance variance compared to rating the attributes first. This shrinkage disappeared, however, when participants completed one of two tasks known to attenuate loss-aversion (Inesi 2010; Polman 2012). This provides strong evidence that the effect of task order on attribute importance variance is driven by perceptions of loss that tradeoff-making engenders. Further, the fact that two different loss aversion manipulations had the same effect increases the construct validity and generalizability of this finding.

The results also rule out two alternative accounts. First, an information-based alternative account cannot account for the effect of loss aversion. Even though participants saw identical decision stimuli across all the compare-first conditions, loss aversion still moderated the effect. Further, the fact that loss aversion only played a role in the compare-options-first condition, underscores the notion that loss perceptions are evoked by the tradeoffs, which, in turn, drive our effect.

The results so far are inconsistent with a preference bolstering explanation: whereas a bolstering explanation predicts that attribute distortion should decrease decision difficulty, our findings show that it increased difficulty. Moreover, a bolstering account implies that attribute distortion should favor the preferred option, and that participants should strive to polarize (i.e.,

increase the difference) between the best and second favorite options (Montgomery and Svenson 1983), to reduce conflict. Ancillary analyses show that neither occurred. For each participant, we calculated a predicted utility score for each option and examined whether they actually chose the option with the highest score². A logistic regression on actual vs. predicted choice matching revealed no effect of either task order or loss aversion condition and no interaction (all $\chi^2(1) < 1.62$, ns). Moreover, neither factor impacted the difference in utility score between the best and second favorite options (all $F(1, 184) < 1$, ns). This overall pattern of results is inconsistent with a preference bolstering explanation and underscores the maladaptive nature of our effect.

EXPERIMENT 4: THE ROLE OF CONSTRUAL LEVEL

We have suggested that comparing options shrinks attribute importance variance in part because people tend to focus on local decision elements (i.e., within-attribute tradeoffs) and lose sight of the “big picture” (i.e., what attributes are actually important). If this is truly the case, then helping consumers maintain a high-level sense of their priorities (e.g., is price or number of connections more important?) should attenuate the effect. Experiment 4 tests this possibility by examining whether construal level moderates our effect (Trope and Liberman 2010).

Further, low-level (versus high-level) construal increases consumer tradeoff-making (Khan, Zhu, and Kalra 2011). Consequently, showing that attribute importance variance shrinks more under low- than high-level construal would provide further support for our suggestion that tradeoff-making underlies these effects.

² First, we coded each attribute value on an ordinal scale (e.g., \$450 = 1, \$380 = 2, \$360 = 3, \$310 = 4). Then, for each participant, we multiplied each ordinal attribute value for each option by the attribute importance rating assigned to it, and summed across attributes to determine that option’s overall utility score (cf. Schrieff et al. 2011). Validating this utility score, participants were 55% more likely than chance to select the option with the highest score ($\chi^2(1) = 9.38$, $p = .002$).

Experiment 4 also tests an alternative account based solely on construal level. We argue that low-level construal increases within-attribute tradeoff-making, but one could argue that the compare-options-first condition itself activates a low level construal, which directly impacts attribute variance regardless of tradeoff-making. This alternative account would predict a main effect of construal level where priming low level construal by itself leads to lower attribute variance than does priming high level construal. In contrast, our theory predicts a task order by construal level interaction. We test which occurs.

Finally, Experiment 4 further examines the downstream consequences of attribute variance shrinkage for decision satisfaction.

Method

One hundred twenty four participants (mean age = 29, 53% female), recruited from a nationwide online pool, were randomly assigned to condition in a 2 (Task Order: rate-attributes-first vs. compare-options-first) x 2 (Construal Level: high vs. low) between subject design.

Participants completed two purportedly unrelated tasks. In the first, we primed participants with either a high or a low level construal mindset using a procedure validated in prior research (Alter and Oppenheimer 2008; Freitas, Gollwitzer, and Trope 2004). In the high (versus low) level construal condition, participants were asked to write a description of why (versus how) they might perform four everyday activities.

Second, participants completed a decision making study identical to the one used in Experiment 3, in which they rated attribute importance either before or after comparing the choice options, and subsequently chose their preferred option. To measure downstream

consequences, participants answered the same questions relating to decision satisfaction as in Experiment 1 (averaged to form an index, $\alpha = .91$).

Probing participants revealed that none of them was aware of the relationship between the two tasks and none of them thought the first task influenced the second.

Results

Effect on attribute importance variance. A 2 (task-order: compare-options-first vs. rate-attributes-first) x 2 (construal level: high vs. low) ANOVA revealed only the predicted task order x construal interaction ($F(1, 120) = 8.57, p < .005$), see figure 3. Note that there was no main effect of the construal level manipulation ($F < .1, ns$), casting doubt on an alternative account based solely on construal level driving the effect.

Instead, supporting our theorizing, under low-level construal, compared to rating the attributes first, comparing the options first decreased attribute importance variance ($M_{\text{Rate}} = 6.90$ vs. $M_{\text{Compare}} = 4.26$; $F(1, 120) = 8.48, p < .005$). There was no effect of task-order in the high-level construal condition ($M_{\text{Rate}} = 5.41$ vs. $M_{\text{Compare}} = 6.31, F(1, 120) < 1.3, ns$).

Consistent with our prior studies, the effect in the low-level construal condition was driven by comparing options increasing the perceived importance of less important attributes. Specifically, a 2 (task order) x 2 (Attribute Importance: important vs. unimportant) repeated measures analysis revealed a task order x attribute importance interaction ($F(1, 54) = 7.22, p < .01$). Compared to rating the attributes first, comparing the options first increased the importance of the unimportant attribute ($M_{\text{Rate}} = 1.71$ vs. $M_{\text{Compare}} = 2.69$; $F(1, 54) = 4.52, p < .05$). There was no significant effect, however, on the important attribute ($M_{\text{Rate}} = 6.86$ vs. $M_{\text{Compare}} = 6.46$; $F(1, 54) = 2.69, p = .11$). A similar ANOVA in the high-level construal condition revealed a

marginally significant decrease in the unimportant attribute, in the compare-options-first versus the rate-attributes-first condition ($F(1, 66) = 2.86, p < .1$), with no effects or interactions involving the important attribute ($F_s < 2, ns$).

Effect on decision satisfaction. A task order x construal level ANOVA on the decision satisfaction index revealed the predicted interaction ($F(1,120) = 8.90, p < .01$). Specifically, under low-level construal, comparing the options first decreased decision satisfaction ($M_{\text{Compare}} = 5.01$ vs. $M_{\text{Rate}} = 5.73$; $F(1,120) = 4.84, p < .03$). In the high-level construal condition, decision satisfaction was actually higher in the compare-options-first condition than the rate-attributes-first condition ($M_{\text{Compare}} = 5.95$ vs. $M_{\text{Rate}} = 5.37$; $F(1,120) = 4.07, p < .05$).

Multi-stage moderated mediation analysis. Finally, we conducted a multi-stage mediated moderation analysis to examine whether the effect of task order on attribute variance under low-level construal – but not under high-level construal – was mediated by an increase in the ratings of the unimportant attributes, and in turn mediated the effect of task order on decision satisfaction (that is, a task order $\rightarrow$ unimportant attribute ratings $\rightarrow$ overall attribute variance $\rightarrow$ decision satisfaction causal path, significant only in the low construal condition). Bootstrapping mediation analysis (Hayes 2012), using 5000 samples with a 95% confidence interval (in brackets), suggested that the indirect effect of rating order on decision satisfaction, through unimportant attribute ratings and overall attribute importance variance, was significant under low-level construal ($B = -.588, [-1.45, -.02]$) but not under high-level construal ($B = .009, [-.10, .23]$). This confirms our mediated moderation hypothesis.

Insert figure 3 about here

Discussion

The results of Experiment 4 underscore our theory by showing that the effect of comparisons on attribute variance was more pronounced under conditions that are known to increase tradeoff-making (i.e., low-level construal) and disappeared under conditions known to inhibit tradeoff-making and promote goal-directed behavior (i.e., high-level construal).

Experiment 4 also rules out an alternative account according to which construal level alone was driving the effect. This alternative account would have predicted a main effect of construal level on attribute variance, but the results suggest that construal-level alone does not account for the effect.

Finally, we repeated the procedure discussed in Experiment 3 to test whether changes in attribute importance ratings could have been driven by preference bolstering. Casting further doubt on this alternative account, neither task order nor construal level or their interaction influenced actual vs. predicted choice matching (all $\chi^2(1) < 1$, ns), and there was no effect of either factor on the difference between the best and second highest rated options (all $F < 1$, ns). Note that a preference bolstering account is also inconsistent with the fact that our effect was pronounced under low-level construal: preference bolstering is, by definition, goal directed, and therefore should be more likely under high level construal.

GENERAL DISCUSSION

People often find themselves struggling with decisions that seemed relatively simple at the outset. What toothbrush to buy or which flight to choose seem trivial in general, but they somehow become difficult when people actually face the choice options.

This research suggests that one reason for this difficulty is that merely comparing multi-attribute options can lead people to lose sight of what is important in the decision. While the

difference between important and unimportant attributes is often clear in the abstract, we suggest that the act of tradeoff-making itself can increase decision difficulty by making people perceive relatively unimportant attributes as more important. This shrinking attribute hierarchy increases decision difficulty (Bettman et al. 1998).

Four experiments support this perspective. Across a variety of product categories, comparing multi-attribute options caused attribute importance variance to shrink due to an increase in the perceived importance of relatively unimportant attributes (Experiments 1-4). This, in turn, increased choice difficulty and uncertainty (Experiments 1 and 4).

The results also illustrate that the effect is driven by the subjective perception of losses that tradeoff-making engenders. The effect was more pronounced when the visual layout encouraged within-attribute comparisons (Experiment 2) and under low-level construal (Experiment 4), which increases tradeoff-making and leads people to lose their goal-directed sense of what is important in the decision. The fact that the effect of tradeoffs disappeared when loss-aversion was attenuated through various manipulations (Experiment 3) supports our theorizing that the effect is driven by the perception of losses that tradeoff-making engenders.

The experiments also cast doubt on a number of alternative accounts. First, the results rule out the possibility that the effect was merely due to the additional information that comparisons provide. Even when the information remained the same across conditions, situational moderators like focus of attention, decreased loss aversion, and construal level moderated the effect (Experiments 2-4). Second, the studies cast doubt on an alternative account according to which the effect was due to construal-level by itself, regardless of tradeoff-making (Experiment 4).

Third, the experiments cast doubt on the possibility that changes in attribute ratings were driven by preference bolstering. In addition to the fact that attribute ratings did not support the preferred option (Experiments 3 and 4), preference bolstering cannot explain why attribute variance shrinkage made choice more rather than less difficult (Experiments 1 and 4), why it was driven specifically by unimportant rather than important attributes (Experiments 1-4), or why it was more pronounced under a within-attribute focus (Experiment 2), loss aversion (Experiment 3), and low construal level (Experiment 4).

Understanding Choice Difficulty

A large body of work shows that choice can be difficult and fraught with regret due to factors that directly increase decision complexity and conflict, e.g., having too many options to choose from (Iyengar and Lepper 2000), excessive information (Jacoby, Speller, and Kohn 1974), and conflicting tradeoffs (Tversky and Shafir 1992).

But in addition to these external sources of difficulty, more recent research shows that decision difficulty is often amplified by additional cognitive and motivational processes that arise once people start deliberating. The tendency for unique attributes to trigger excessive search, for example (Griffin and Broniarczyk 2010), or for people to artificially complicate important decisions that seem “too easy” (Schrift et al. 2011), both increase choice difficulty in a dynamic manner, with decision makers actively contributing to the increase. Unexpected difficulty may also lead people to infer that the decision is more important than initially believed, and consequently increase deliberation time and effort (Sela and Berger 2012a).

This paper contributes to this burgeoning literature and deepens understanding of how these indirect processes increase decision difficulty, conflict, and uncertainty. In fact, one could expect these processes to have a mutually reinforcing impact. Lack of ideal point initially, for

example, may trigger people to expand their search, which in turn may inform them about non-alignable attributes they desire, making realistic options seem unacceptable (Griffin and Broniarczyk 2010); the subjective feeling of losing that these within-attribute tradeoffs engender blurs the distinction between important and trifling decision dimensions (the current research); and the increased cognitive effort associated with all this unexpected processing may trigger the metacognitive inference that it is important to get the decision right, increasing deliberation further and culminating in a “decision quicksand” experience (Sela and Berger 2012a).

Relation to Prior Research and Boundary Conditions

While this work is related to other findings, it differs in some important ways. Prior work has shown that people may artificially inflate the weight of unimportant attributes to feel they have conducted “due diligence” (Schrift et al. 2011). But whereas this behavior occurs particularly in important decisions and when one option dominates (or almost dominates) other options in the choice-set, our perceptual process applies to the more common case where no dominant option exists and tradeoffs must be made, in both important and unimportant decisions (e.g., choosing a hypothetical toothbrush). Motivated choice complication should increase decision satisfaction, by providing people with the feeling that they achieved their information processing goal, but our effect decreased satisfaction. In sum, rather than competing with the choice complication paradigm, the current account applies to different situations and thus contributes to a more complete understanding of factors that increase decision difficulty.

The current research is also different from prior work on “decision quicksand” showing that people use the extent of cognitive effort spent as a metacognitive indicator of decision importance (Sela and Berger 2012a). While it is possible that increased deliberation due to

tradeoffs could lead people to perceive the attributes as more important and thus contribute to our effect, such an account cannot explain the effect of loss aversion in Experiment 3. Further, metacognitive inference of importance from difficulty has been shown to occur when people expect the decision to be unimportant, but additional data we collected shows that the effect of tradeoffs is not sensitive to whether the decision is framed as important or unimportant.

One may also wonder how our findings relate to prior research showing that people sometimes distort attribute weights in the pre-decisional phase in order to bolster an already preferred option, thereby decreasing decision difficulty and conflict (Brownstein 2003, for a review; Klayman 1995; Lord et al. 1979). There are a number of important differences between the current research and this prior work. First, while prior work on confirmation bias examined situations in which people already leaned toward one of the options (Chernev 2001; Lord et al. 1979), our work investigates the common situation where no a priori preferences exist. Indeed, our findings may not apply when people have preexisting preferences that favor one of the options, or when choice is very simple such that tradeoffs can be resolved instantaneously.

Second, prior research on pre-decisional distortion found preference bolstering when no prior preference existed, but they used a specific paradigm in which attributes were presented one at a time and participants were explicitly encouraged to state a preference or indicate which option was “leading” after seeing each additional attribute (Russo et al. 1998). Our studies examine the arguably more common situation where participants see all the information at once and are free to choose the order at which they consider the different attributes.

Our work also relates to a number of other literatures. Multi-attribute choice theories (Johnson and Meyer 1984; Tversky 1972) predict that attribute processing would be more selective (i.e., fewer rather than more attributes are considered) when some of the attributes show

little or no variance. Attribute processing also tends to be more selective as the set size grows. Our effects may therefore diminish or even reverse when a subset of the attributes has no variance or when the choice set is very large such that it leads people to use simplifying strategies (Sela, Berger, and Liu 2009).

Our research shows that attribute variance shrinkage increases decision complexity by leading people to consider additional attributes. Orthogonal to changes in complexity, however, an increase in the weight of trivial attributes can potentially make the options seem more polarized, thereby decreasing choice conflict. However, this would require (1) a specific choice-set configuration where the trivial attributes favor a single option that is either leading or tied with other leading options; and (2) extensive deliberation, which is necessary for calculating the impact of attribute weight change on overall option utility (Bettman et al. 1998). Our effects may not apply under these conditions, to the extent that the positive impact of conflict reduction outweighs the negative impact of the increase in decision complexity.

Further, contextual factors may attenuate the effect of tradeoffs on attribute importance variance. For example, formats that emphasize a small number of key attributes (e.g., price and average reviewer rating) and list additional, less important features (e.g., color options) in a separate section, may lead people to rely on those key dimensions at the expense of others, despite the presence of tradeoffs on other attributes.

While one might wonder whether these effects are restricted to simultaneous presentation of options, an additional study shows that they can emerge even when the options are presented sequentially. Participants either compared four options presented one at a time and then rated attribute importance, or rated the attributes first and then compared the options one at a time (cf. Experiment 1). The results of this study replicate our main finding, illustrating that attribute

importance variance shrinks when consumers compare the options first, as opposed to first thinking about attribute importance.

Implications

Considering the ubiquity of attribute descriptions, our results have important implications for marketing practice. Designers of conjoint analysis tests, for example, should recognize the impact of tradeoffs on perceived attribute importance. Prior conjoint research has focused on factors that directly increase task complexity and difficulty, such as the number of product attributes (De Shazo and Fermo 2002; Green and Srinivasan 1990). Our findings suggest that tradeoffs themselves can increase difficulty and distort attribute importance weights, which are at the heart of conjoint analysis. Bias is particularly likely when using presentation formats and decision frames that encourage low level, within-attribute processing (Experiment 2 and 4).

The ideas examined here also have a number of important implications for consumer welfare. Given our findings that tradeoffs can have detrimental consequences for consumer well-being (e.g., satisfaction), one might wonder how to mitigate these effects. One simple approach is to remind oneself of which attributes are important prior to making the decision. This should help inoculate consumers against shrinking attribute variance in the decision process itself, and the negative repercussions that come with it. Alternatively, maintaining a higher level of construal also mitigated these effects (Experiment 4).

The loss-based mechanism underlying the tradeoff effect may also provide insight into why social comparisons are often so painful: one reason is that they increase the perceived importance of trivial attributes with inferior (i.e., regrettable) values. Comparing features of one's car to those of the neighbor's car, for example, is likely to increase the perceived

importance of trivial attributes on which one's own car is inferior without having an equivalent effect on superior attributes, due to the asymmetric tendency to weigh disadvantages more heavily than advantages.

In closing, this research contributes to understanding choice difficulty. Making tradeoffs among attributes is an integral part of almost every decision. But while it naturally involves some difficulty, by shrinking attribute hierarchy, tradeoffs can engender even more dissatisfaction.

APPENDIX A

Choice Options Used in Experiment 1

	Flight Option 1	Flight Option 2	Flight Option 3	Flight Option 4
Number of Stops	1 stop	2 stops	0 stops	1 stop
Airport Location	Relatively nearby	Relatively nearby	Somewhat distant	Very distant
Baggage Fee	\$25	No fee	\$20	\$15
Price	\$380	\$320	\$410	\$350
Overall Duration	6 hours	7 hours	5.5	6.5
Aircraft Comfort	Low	Average	Low	High

APPENDIX B

Layout Manipulation Used in Experiment 2 (Based on Wen and Lurie 2010)

By-Attribute Condition (Flights):

	Flight Option 1	Flight Option 2	Flight Option 3	Flight Option 4
Connections	1 connection	Direct	2 connections	1 connection
In-Flight Entertainment	G-rated movie	None	Recent Hollywood blockbuster	G-rated movie
Price	\$360	\$450	\$310	\$380
Food Selection	Pretzels, peanuts, and sodas available for purchase	Pretzels and peanuts available for purchase and a variety of free beverages	Sodas available for purchase	Wide selection of free sandwiches and snacks, and a variety of beverages

By-Option Condition (Flights):

	Flight Option 1	Flight Option 2	Flight Option 3	Flight Option 4
Connections	1 connection	Direct	2 connections	1 connection
In-Flight Entertainment	G-rated movie	None	Recent Hollywood blockbuster	G-rated movie
Price	\$360	\$450	\$310	\$380
Food Selection	Pretzels, peanuts, and sodas available for purchase	Pretzels and peanuts available for purchase and a variety of free beverages	Sodas available for purchase	Wide selection of free sandwiches and snacks, and a variety of beverages

Control Condition (Flights):

	Flight Option 1	Flight Option 2	Flight Option 3	Flight Option 4
Connections	1 connection	Direct	2 connections	1 connection
In-Flight Entertainment	G-rated movie	None	Recent Hollywood blockbuster	G-rated movie
Price	\$360	\$450	\$310	\$380
Food Selection	Pretzels, peanuts, and sodas available for purchase	Pretzels and peanuts available for purchase and a variety of free beverages	Sodas available for purchase	Wide selection of free sandwiches and snacks, and a variety of beverages

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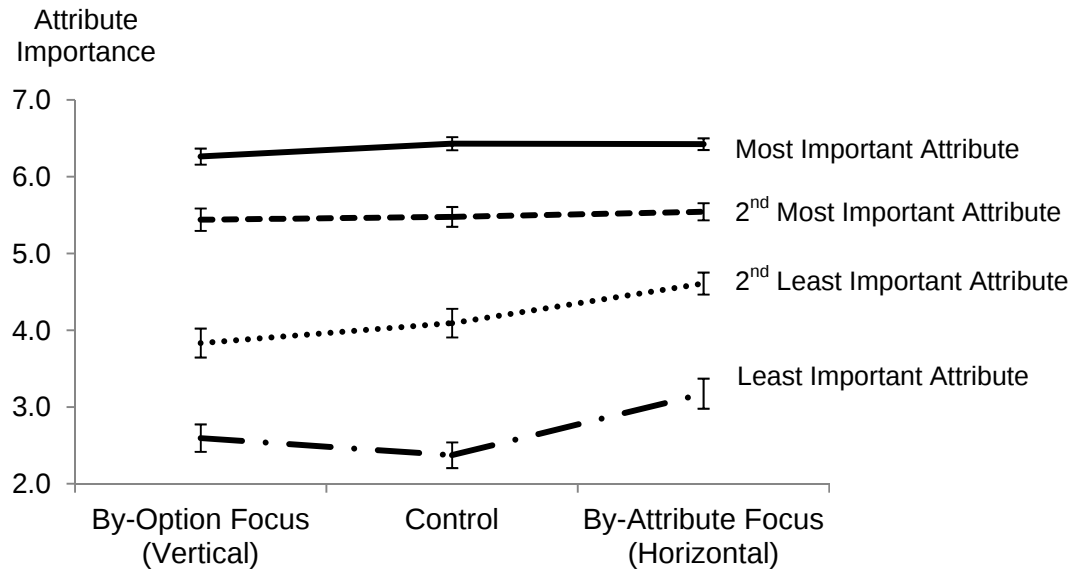
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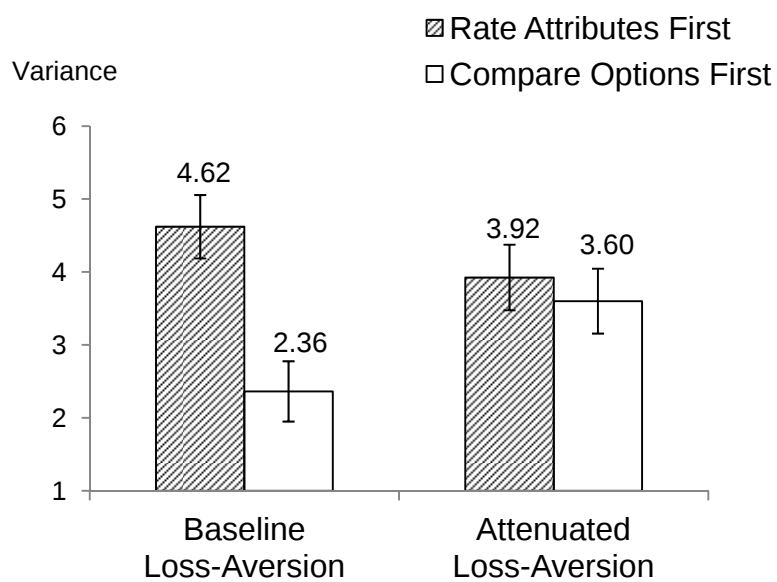
FIGURES

Figure 1: Attribute Importance Shift as a Function of Focus of Comparison (Experiment 2)



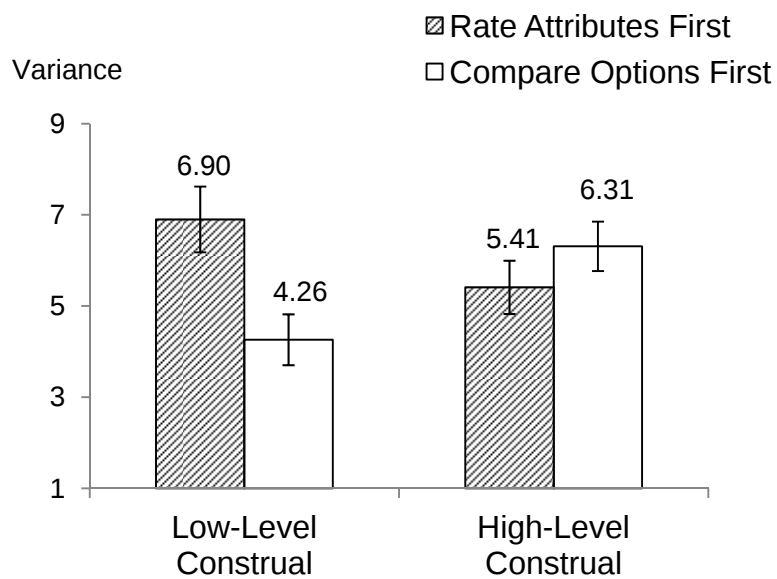
Note: error bars represent one standard error above and below cell mean.

Figure 2: Attribute Importance Variance as a Function of Task Order and Loss Aversion (Experiment 3)



Note: error bars represent one standard error above and below cell mean.

Figure 3: Attribute Importance Variance as a Function of Task Order and Construal Level (Experiment 4)



Note: error bars represent one standard error above and below cell mean.