The Prominence Detraction Hypothesis:

# Context Effects as a Function of Attribute Prominence 

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#### Abstract

When extending a product line, how will the addition of the new product influence the purchase pattern of the existing products in the line? The behavioral literature offers two hypothesessimilarity and extremeness aversion-that make conflicting predictions about how the addition of a new extreme option should affect the choice shares of the original options in the set. In this paper, we articulate a theoretical account, prominence detraction, that invokes attribute prominence to predict when each hypothesis is satisfied. The prominence detraction hypothesis predicts that: a) the addition of a new extreme option that scores higher on a non-prominent attribute will increase the share of the more similar intermediate option, while b) the addition of a new extreme option that scores higher on a prominent attribute will decrease the share of the more similar intermediate option. We find support for the prominence detraction hypothesis in nine studies and in two meta-analyses.


Key Words: Prominence, Detraction, Similarity, Extremeness Aversion, Compromise, Context Effects, Preference Construction

Products are commonly marketed based on their attributes. For instance, hard drives are described in terms of their capacity and price or cameras in terms of their zoom and megapixels. When considering the introduction of a new product, a product manager needs to assess the effect of the new product on sales of the existing product line. For instance, what would be the effect of adding an expensive hard drive that offers more capacity than cheaper competitors on the shares of the existing products in the market? Although previous research on brand extensions has documented factors that determine the success of an extension and its effect on the original brand (e.g., Aaker and Keller 1990; Broniarczyk and Alba 1994; Klink and Smith 2001; Völckner and Sattler 2006), this literature has not studied how the "location" of the new product relative to the existing products affects choice shares.

Decision-making research has advanced two hypotheses that make competing predictions about how the addition of a new, third option should affect the choice share of the original options in the set. First, the similarity hypothesis (Tversky 1972; see also Huber and Puto 1983) asserts that a new option draws more share from the more similar option in the original set. Second, the extremeness aversion hypothesis (Simonson and Tversky 1992) asserts that disadvantages loom larger than their respective advantages and, as such, extreme options tend to be relatively aversive while intermediate options are favored (also called the compromise effect; Simonson 1989).

In particular, these hypotheses make competing predictions regarding the impact of adding an extreme alternative to a two-option set (i.e., an alternative scoring higher than the other alternatives on one of the two attributes; alternative C in Figure 1). Similarity predicts that a newly introduced extreme alternative should "steal" a greater share from the alternative closest to it, which is the intermediate alternative (alternative A in Figure 1). Therefore the share of the
intermediate alternative A should decrease when the extreme alternative C is added in the set. The same prediction can be made based on a "strict" version of the regularity hypothesis (Marley 1965; Luce 1977; Huber, Payne, and Puto 1982), which asserts that the choice probability of a given option should become lower when additional options are introduced in the set. In contrast, extremeness aversion predicts that the newly-introduced extreme alternative, C , should increase the attractiveness of the alternative closest to it because that alternative now becomes the intermediate option. Therefore the choice share of the intermediate alternative A should increase when the extreme alternative C is added to the set.
-Insert Figure 1 about here-

Previous research using both theoretical and behavioral approaches has attempted to accomodate similarity and extremeness aversion under the same framework (e.g., Bhatia 2013; Busemeyer, Townsend, Diederich, and Barkan 2005; Roe, Busemeyer, and Townsend 2001; Rooderkerk, Van Heerde, and Bijmolt 2011; Usher and McClelland 2004). The models presented in these papers are predicated on two assumptions. The first is that similarity is satisfied when the newly-introduced option is placed very close to the target alternative (see option $S$ in Figure 2), while extremeness aversion is satisfied when the newly introduced option is placed relatively farther from the target alternative, such that the distance between that option and the target is equal to the distance between the target and the competitor (see option C in Figure 2). Therefore, these models predict that the direction of the context effect depends on the distance between the newly introduced option and the target alternative. The second, implicit assumption is that the attributes characterizing the alternatives under consideration are, on average, equally important for decision-makers.
-Insert Figure 2 about here-

In our empirical investigation, we relax the assumption on attribute importance and show that whether similarity or extremeness aversion are satisfied depends on the prominence ${ }^{1}$ (i.e., relative importance) of the attribute. We propose a theoretical account that predicts the direction of the context effect as a function of attribute prominence and of the different strategies consumers use when making a choice. In addition, we articulate a novel hypothesis, prominence detraction, which predicts how the addition of new options influences the choice share of existing options in a set. This hypothesis is tested in nine studies described below.

## THEORETICAL BACKGROUND

## Choice Set Configuration and Decision Criteria

Prior research suggests that a choice set's structure determines the decision criterion when solving a choice problem. In particular, Tversky, Sattath and Slovic (1988) propose a three stage, sequential model in which the first step is an assessment of whether dominance relationships exist in the set (see also Evangelidis and Levav 2013; Fischer and Hawkins 1993). Next, if no dominance relationships are found, the decision-maker examines whether one of the options provides a "decisive advantage" compared to competing alternatives (see also Montgomery 1983). A decisive advantage is present, for instance, when the difference between the two options on one attribute is far greater than the difference between the two options on the other attribute.

Finally, if no decisive advantage is found, the individual employs a lexicographic strategy, hence

[^0]selecting the option scoring highest on the prominent attribute. We will be referring to this decision criterion as the prominence criterion.

In the present research we argue that choosing based on an alternative's score on the prominent attribute may actually be one of multiple decision criteria that consumers can employ at the third (and presumably final) stage of the decision process. Shafir, Simonson, and Tversky (1993) propose other decision criteria, or "reasons," that decision-makers often use when constructing their preference (see also Slovic 1975, Simonson 1989). One such reason is an alternative's relative position in the choice set; for instance, options may be favored because they are an intermediate alternative (Simonson 1989; Simonson and Tversky 1992; Shafir et al. 1993). We will be referring to this decision criterion as the compromise criterion. Prior research suggests that intermediate (or compromise) options are often perceived as attractive and acceptable choices because they allow consumers to minimize losses on both dimensions, are less susceptible to criticism, and, as a result, are less difficult to process cognitively (Shafir et al. 1993; Simonson 1989; Simonson and Nowlis 2000; Bettman, Luce, and Payne 1998).

Thus, we argue that, in the absence of a dominating option and of a decisive advantage, consumers may construct their preference based on one of two decision criteria: prominence and compromise. When there is no intermediate option in the set, consumers can only make a choice based on prominence. When an intermediate option is present in the set, however, consumers may use either prominence or compromise as their decision criterion.

## The Prominence Detraction Hypothesis

Building on this view of choice, we turn to the following question: How does the prominence of the attribute along which the new, extreme option is added determine whether similarity or extremeness aversion will be evoked? First, imagine the simple case of a consumer
facing a choice between options A and B that differ along two attributes, one of which is relatively more important (prominent) than the other. Imagine further that choosing between A and B requires the consumer to make a trade-off between these two attributes because whereas alternative A scores high on the prominent attribute and low on the non-prominent attribute, alternative B scores high on the non-prominent attribute and low on the prominent attribute (see Panel 1 in Figure 3). Since there is no intermediate option in this set, the consumer can only make a choice based on prominence, that is, by making an assessment of which option is strongest on the prominent dimension. In this particular decision problem, given the difference in attribute prominence, the consumer should have a stronger preference for A versus B. On the aggregate, Option A will have a higher share relative to B because it is favored by the only criterion that consumers can employ in their decision-making (i.e., prominence).

Second, imagine a decision problem where a new alternative C is added along the nonprominent dimension, such that option B now becomes an intermediate option in the choice set (Panel 2 in Figure 3). As we explain earlier, relative to the two-option set, here consumers may use a choice strategy that is based on either compromise or prominence, each of which favors a different option. In particular, they can either select the middle alternative, B, or the option that scores highest on the prominent dimension, A. We predict that in the three-option set the share of (the now-intermediate option) B will increase relative to its share in the two-option set (Panel 1 in Figure 3) because in the former set the choice of B is supported by one of two criteria (compromise); by contrast, in the two-option set this option is neither a compromise nor the better option on the prominent dimension.

Third, imagine a decision problem wherein a new alternative $\mathrm{C}^{\prime}$ is added along the prominent dimension, such that now option A becomes an intermediate option in the choice set (Panel 3 in Figure 3). Here, too, consumers may invoke one of two choice strategies, compromise
and prominence. Prominence in this set favors option C' because C' scores highest on the prominent attribute; compromise favors the now-intermediate option A. We predict that in this three-option set the share of (the now-intermediate option) A will decrease relative to its share in the two-option set (Panel 1 in Figure 3) because in the former the choice of $A$ is supported only by one of two criteria (compromise), whereas in the latter its choice is supported by the sole criterion available to make a choice (i.e., it is strong on the prominent dimension).
-Insert Figure 3 about here-

In summary, our analysis leads to the following hypotheses (Table 1):
H1: The addition of a new extreme option that scores higher on a non-prominent attribute will increase the share of the more similar intermediate option;

H 2 : The addition of a new extreme option that scores higher on a prominent attribute will decrease the share of the more similar intermediate option.

We label this proposition the prominence detraction hypothesis. From a decision theoretic perspective, the first clause (i.e., H1) of our hypothesis violates both similarity and regularity, while the second clause (i.e., H2) does not. In contrast, the second clause violates extremeness aversion, while the first clause does not. Hence, there is no hypothesis in decision theory that can explain our full pattern of results.
-Insert Table 1 about here-

## OVERVIEW OF STUDIES

We tested the prominence detraction hypothesis in nine studies. All decision problems investigated here involve choices where consumers face a tradeoff between two attributes, one of
which is more prominent than the other (we explain how we operationalize prominence in the methods sections below).

Our first six studies (Studies 1a-1f) test the prominence detraction hypothesis in the context of different choice problems using both real and fictitious products. Prominence detraction suggests that: a) the addition of a new extreme option that scores higher on a nonprominent attribute will increase the share of the more similar intermediate option, while b) the addition of a new extreme option that scores higher on a prominent attribute will decrease the share of the more similar intermediate option. We find robust evidence for both parts of the prominence detraction hypothesis.

In Study 2 we address a potential rival account whereby the observed prominence detraction choice pattern reflects a shift in attribute weights. Specifically, we measure relative attribute importance weights (i.e., prominence) and show that, while preference for Options A and $B$ changes as a function of adding extreme options $C$ and $C^{\prime}$ (Figure 4), prominence is not affected. This result indicates that, indeed, our effects are not due to a shift in attribute weights. We further find that consumers' tendency to use prominence when making a choice decreases significantly when a compromise option is introduced in the choice set. Finally, in Studies 3 and 4, we moderate prominence detraction by manipulating the prominence of the attribute (Study 3) and by priming our participants to use prominence when making a choice (Study 4). We conclude with a discussion of the theoretical and managerial implications of our findings.

STUDIES 1A-1F: THE PROMINENCE DETRACTION HYPOTHESIS

Studies 1a-1f test the prominence detraction hypothesis. All six studies employ the same experimental design and replicate our basic effect across a wide range of product choices.

## Study la - Toshiba Hard Drive

Procedure. For this study we used the Toshiba Canvio hard drive as our stimulus (Figure 4). The hard drive has different models that differ on two attributes: capacity and price. We drew all information (including prices) from Amazon. We recruited 302 respondents ( $60 \%$ male, $M_{\text {age }}$ = 31) through Amazon's Mechanical Turk and randomly assigned them to one of three conditions; all participants were provided with a picture of the hard drive (Figure 4). In the twooption condition, participants were asked to imagine that they wanted to buy a Toshiba USB external hard drive, and that they could choose between two models:
"Toshiba Canvio 500 GB, $\$ 57.89$; Capacity: 500 GB ; USB 3.0-powered portable add-on storage; Easy to use with no software to install; Protects your drive (Internal Shock Sensor and Ramp Loading Technology)

Toshiba Canvio 750 GB, $\$ 61.99$; Capacity: 750 GB; USB 3.0-powered portable add-on storage; Easy to use with no software to install; Protects your drive (Internal Shock Sensor and Ramp Loading Technology)."

In a pretest, 82 respondents from the same participant population as our main study ( $56 \%$ male, $M_{\text {age }}=31$; recruited through Mechanical Turk) were presented with the same stimuli and were asked to indicate which attribute (capacity or price) they considered more important to a decision about a hard drive. The vast majority $(83 \%$; sign test $p<.001)$ indicated that capacity is the prominent dimension in this decision problem. Thus, in one three-option condition we added a third option that scored better on the non-prominent attribute, i.e., price:
"Toshiba Canvio 320 GB, \$49.98; Capacity: 320 GB; USB 3.0-powered portable add-on storage; Easy to use with no software to install; Protects your drive (Internal Shock Sensor and Ramp Loading Technology)."

In a second three-option condition we added a third option that scored better on the prominent attribute, i.e., capacity:
"Toshiba Canvio 1 TB, \$75.60; Capacity: 1 TB; USB 3.0-powered portable add-on storage; Easy to use with no software to install; Protects your drive (Internal Shock Sensor and Ramp Loading Technology)."

Participants were asked to choose which brand they would buy by clicking a radio button on the screen.

Results. Choice proportions are summarized in Table 2. We find support for prominence detraction. The majority (94\%) of respondents in the two-option condition chose the 750 GB model. When the 500 GB model became an intermediate option, its choice share increased ( $6 \%$ vs. $21 \%, \chi^{2}=8.68, p=.003$ ), a violation of both similarity and regularity. We argue that the 500 GB option benefits from becoming an intermediate option because in the three-option set it is favored by one of two possible decision criteria (i.e., compromise), whereas in the two-option control condition no criterion favors its selection. In contrast, when the 750 GB model became an intermediate option its choice share decreased ( $94 \%$ vs. $23 \%, \chi^{2}=67.36, p<.001$ ), a violation of extremeness aversion. We argue that this loss of share occured because the 750 GB option is favored by just one of two possible decision criteria in the three-option set (again compromise), whereas in the two-option control condition it is favored by the only criterion available to make a choice (i.e., prominence).

This study provides preliminary support for prominence detraction. We show that whether the choice probability of the intermediate alternative increases or decreases depends on the prominence of the attribute along which the new extreme option is added. In the next five studies (Studies 1b-1f) we replicate this basic effect using different products, attributes, and distances between alternatives in the dimensional space

## Studies 1b-f-Further Evidence for Prominence Detraction

Participants in Studies 1b-f were assigned to one of three choice set conditions similar to Study 1a. For Study 1b we used the Canon PowerShot camera as our stimulus; the prominent attribute was quality and the non-prominent attribute was price. For Study 1c we used the Hobbit: An Unexpected Journey Blu-ray disc as our stimulus; the prominent attribute was price and the non-prominent attribute was quality. For Study 1d we used the Sony Walkman as our stimulus; the prominent attribute was capacity and the non-prominent attribute was price. For Study 1e we used the choice of a hypothetical TV as our stimulus (Simonson 1989; Evangelidis and Levav 2013); the prominent attribute was picture quality and the non-prominent attribute was price. Finally, for Study 1f we used the choice of a hypothetical car as our stimulus (Simonson 1989; Evangelidis and Levav 2013); the prominent attribute was fuel efficiency and the non-prominent attribute was ride quality. In Studies 1b-1e, we followed the procedure of past studies on extremeness aversion, and placed the extreme alternatives relatively "far" from the original alternatives A and B (position C in Figure 2). In Study 1f, however, we placed the new extreme options very close to the original alternatives A and B (similar to the position S in Figure 2), in order to test whether prominence detraction is sensitive to the distance between the options. We find support for prominence detraction in all five studies (Table 2): adding a new extreme option scoring higher on a non-prominent attribute increased the share of the more similar intermediate option, while adding a new extreme option scoring higher on a prominent attribute decreased the share of the more similar intermediate option. Detailed descriptions of the stimuli, procedure, and results of Studies 1b-1f can be found in Appendix A. We discuss the effect sizes that we observe in these studies in two meta-analyses that we report in the General Discussion. -Insert Figure 4 about here--Insert Table 2 about here-

## STUDY 2: USE OF PROMINENCE

Earlier we argued that consumers choosing from a two-option set rely primarily on relative attribute importance-that is, attribute prominence-to construct their preference. However, consumers choosing from a three-option set that includes an intermediate option may use either prominence or compromise as their decision criterion. Therefore, compared to consumers choosing from a two-option set, consumers choosing from a three-option set are less likely to be influenced by attribute prominence when making their selection. We thus expect that consumers' choices from three-option sets will be less consistent with relative attribute importance weights. In Study 2 we test this prediction.

## Procedure

We recruited 300 participants ( $65 \%$ male, $M_{\text {age }}=30$ ) through Amazon's Mechanical Turk and randomly assigned them to one of three conditions in two choice problems: the car choice problem (Study 1f) and the Toshiba hard drive choice problem (Study 1a). In the car choice problem we placed the extreme alternatives C and $\mathrm{C}^{\prime}$ relatively further from the original alternatives A and B compared to Study 1f. We slightly tweaked values on fuel efficiency to provide a more realistic range where the maximum miles per gallon (mpg) value was 42 and the minimum mpg value was 15 . Specifically, participants in the two-option condition were provided with the following options:
"Brand A: scores 73 on ride quality and has a fuel efficiency of 33 miles per gallon Brand B: scores 83 on ride quality and has a fuel efficiency of 24 miles per gallon."

In a pretest $\left(\mathrm{N}=80,54 \%\right.$ female, $M_{\text {age }}=33$, MTurk), we found that a majority $(92 \%$; sign test $p$ <.001) of respondents from our main study's participant population consider fuel efficiency to be the prominent attribute of a car.

In one three-option condition we added a third option that scored better on the nonprominent attribute ride quality:
> "Brand C: scores 93 on ride quality and has a fuel efficiency of 15 miles per gallon."

In a second three-option condition we added a third option that scored better on the prominent attribute fuel efficiency:
> "Brand C": scores 63 on ride quality and has a fuel efficiency of 42 miles per gallon."

Stimuli for the Toshiba hard drive choice problem were identical to Study 1a. Participants made a choice and evaluated the importance of each attribute $(1=$ not at all important to $10=$ very important) in a counterbalanced order. We use the difference in importance between the prominent and the non-prominent attribute as an indicator of degree of prominence for a given consumer (Evangelidis and Levav 2013) and examine differences in the extent to which prominence predicts choice across conditions.

## Results

We replicated our basic effects in both scenarios (Table 3). With respect to the car choice, most ( $81 \%$ ) respondents in the two-option condition preferred brand A. When brand B became an intermediate option its choice share increased ( $19 \%$ vs. $45 \%, \chi^{2}=14.43, p<.001$ ). In contrast, when brand A became an intermediate option its choice share decreased ( $81 \%$ vs. $58 \%$,
$\left.\chi^{2}=12.32, p<.001\right)$. Similarly, the vast majority ( $92 \%$ ) of respondents in the two-option condition of the hard drive scenario preferred the 750 GB model. When the 500 GB model became an intermediate option its share increased ( $8 \%$ vs. $18 \%, \chi^{2}=4.11, p=.043$ ). In contrast, when the 750 GB model became an intermediate option its share decreased ( $92 \%$ vs. $24 \%, \chi^{2}=$ 67.87, $p<.001$ ).
-Insert Table 3 about here-
There was no effect of experimental condition on prominence judgments (i.e., relative attribute importance) for either the car choice ( $F<1, p>.66$ ) or the hard drive choice ( $F<1, p>$ $.42) .{ }^{2}$ Fuel efficiency was seen as more prominent relative to ride quality $(M=8.78, S D=1.35$ vs. $M=6.77, S D=1.87, F(1,299)=203.61, p<.001)$ and capacity as more prominent than price $(M=8.69, S D=1.73$ vs. $M=7.64, S D=1.98, F(1,299)=45.68, p<.001)$, regardless of the choice set configuration. To test our prediction that consumers would be more likely to make choices that are inconsistent with their relative attribute importance weights when constructing their preference in the presence compared to the absence of an intermediate option, we conducted a series of logistic regressions. In our first analysis we regressed the choice probability of the option scoring high on the prominent attribute (i.e., brand A or brand $\mathrm{C}^{\prime}$ depending on the car choice set condition; the 750 GB or the 1 TB version depending on the hard drive choice set condition) on the difference in importance judgments, choice set size (two versus three options), and their interaction. In a second regression, we replaced the set size variable with two dummies each indicating whether the third alternative was added along the prominent (dummy 1 ) or nonprominent (dummy 2 ) dimension, and two interaction terms between these two dummies and the difference in importance judgments. Replacing the set size variable with the two dummies allows

[^1]us to examine whether the effect of prominence on choice differs depending on the location of the new extreme alternative. Our theory asserts that, compared to a two-option set, decisionmakers should be less likely to use prominence when constructing their preference in a set that includes an intermediate alternative, irrespective of the position of the additional option (extreme on prominent vs. non-prominent attribute).

For the car choice, the first analysis revealed that the effect of prominence on choice was greater in the two-option condition $\left(B=1.36, \mathrm{SE}=.31\right.$, Nagelkerke $R^{2}=.67 ; \chi^{2}=19.34, p<$ $.001)$ than in the three-option conditions $\left(B=.67, \mathrm{SE}=.10\right.$, Nagelkerke $R^{2}=.40 ; \chi^{2}=41.13, p<$ .001). This interaction was significant, $B=-.69, \chi^{2}=4.52, p=.034$. In the second regression, we found that the effect of prominence on choice was weaker compared to the two-option condition both when brand B was the intermediate option $\left(\mathrm{B}=.74, \mathrm{SE}=.15\right.$, Nagelkerke $R^{2}=.46 \mathrm{vs} . \mathrm{B}=$ 1.36, $\mathrm{SE}=.31$, Nagelkerke $R^{2}=.67 ; \chi^{2}=3.26, p=.071$ ) and when brand A was the intermediate option $\left(\mathrm{B}=.62, \mathrm{SE}=.15\right.$, Nagelkerke $R^{2}=.34$ vs. $\mathrm{B}=1.36, \mathrm{SE}=.31$, Nagelkerke $R^{2}=.67 ; \chi^{2}=$ $4.57, p=.033$ ). The results are illustrated in Figure 5. -Insert Figure 5 about here-

The identical analyses conducted on the hard drive choice revealed qualitatively similar results. Our first analysis revealed that the effect of prominence on choice was greater in the two-option condition $\left(B=1.46, \mathrm{SE}=.43\right.$, Nagelkerke $\left.R^{2}=.54 ; \chi^{2}=11.56, p=.001\right)$ than in the three-option conditions $\left(B=.55, \mathrm{SE}=.09\right.$, Nagelkerke $\left.R^{2}=.36 ; \chi^{2}=36.61, p<.001\right)$. This interaction was significant, $B=-.90, \chi^{2}=4.25, p=.039$. The effect of prominence on choice was weaker compared to the two-option condition both when the 750 GB drive was the intermediate option $\left(\mathrm{B}=.56, \mathrm{SE}=.13\right.$, Nagelkerke $R^{2}=.38$ vs. $\mathrm{B}=1.46, \mathrm{SE}=.43$, Nagelkerke $R^{2}=.54 ; \chi^{2}=$
4.07, $p=.043$ ) and when the 500 GB drive was the intermediate option $(\mathrm{B}=.55, \mathrm{SE}=.13$, Nagelkerke $R^{2}=.32$ vs. $\mathrm{B}=1.46, \mathrm{SE}=.43$, Nagelkerke $\left.R^{2}=.54 ; \chi^{2}=4.03, p=.045\right)$.

Finally, note that in both decision problems prominence was less predictive of choice (see Nagelkerke $R^{2}$ indices for changes in model fit) when an intermediate option was present compared to when it was not. We interpret this result to mean that decision-makers are less likely to rely on prominence-and thus make choices that are inconsistent with their relative attribute importance weights-when there is an intermediate option in the set relative to when no such option is present.

Our prominence detraction hypothesis suggests that choice set configuration leads to changes in the decision criteria (i.e., prominence and compromise) that consumers can employ to make a selection. We have argued that consumers can only use prominence when there is no intermediate option, but may use either prominence or compromise when an intermediate option is present. In other words, on the aggregate, the importance of prominence as a decision criterion decreases when the set size increases from two to three. The data of Study 2 confirm this argument, as prominence is more predictive of choice in the absence compared to the presence of an intermediate option. Building on the findings of Study 2, in Studies 3 and 4 we moderate prominence detraction by manipulating the extent to which the attribute is perceived to be prominent (Study 3) and by nudging people to use prominence (Study 4) even when an intermediate option is present.

## STUDY 3: ATTENUATING PROMINENCE

Our prominence detraction hypothesis asserts that the effect of adding a third alternative to a choice set is dependent on the degree of prominence of the attribute along which the new
option is added. Thus far, our studies have manipulated prominence by manipulating the attributes used to describe an option. In this study, we moderate prominence detraction by attenuating the extent to which a particular attribute is viewed as prominent. We used the car choice problem of Study 2 and exposed half of our participants to a statement indicating that ride quality should be treated as the prominent attribute. By increasing the prominence of this formerly non-prominent attribute-and thereby decreasing the prominence of the formerly prominent attribute, fuel efficiency-we expected that the effects predicted by prominence detraction would be attenuated.

## Procedure

We randomly assigned 601 individuals ( $61 \%$ male, $M_{\text {age }}=29$ ) recruited through Amazon's Mechanical Turk to one of six experimental conditions in a three (choice set: two options vs. extreme on non-prominent vs. extreme on prominent) by two (prominence prime: present vs. absent) between-participants design. To decrease the relative prominence of fuel efficiency, we primed the importance of ride quality by presenting half of our participants with the following statement: "Experts recommend that ride quality should be considered as the most important attribute for this decision." The other half of the participants were presented with the same three choice set conditions as those in Study 2, with no prime.

## Results

The results are summarized in Table 4. When prominence was not primed, we replicated prior findings: The majority ( $91 \%$ ) of respondents in the two-option condition preferred brand A , the option scoring higher on the prominent attribute (fuel efficiency). When brand B became an intermediate option, its choice share increased ( $9 \%$ vs. $33 \%, \chi^{2}=15.40, p<.001$ ). In contrast,
when brand A became an intermediate option, its choice share decreased ( $91 \%$ vs. $49 \%, \chi^{2}=$ 34.17, $p<.001$ ).

When prominence was primed, fewer participants ( $72 \% \mathrm{vs} .91 \%$ when prominence was not primed) in the two-option condition preferred brand A. The decrease in the choice share of A between the two-option conditions was significant $\left(\chi^{2}=10.92, p=.001\right)$. We interpret this result to mean that our prominence prime was succesful, as evinced by the smaller proportion of respondents selecting the option (brand A) that scores higher on the otherwise-more-prominent dimension, fuel efficiency. We would consequently expect that the shifts in choice shares between the two and three-option conditions would be attenuated as well. Accordingly, when brand B became an intermediate option its choice share only slightly increased ( $28 \%$ vs. $38 \%$, $\chi^{2}$ $=2.25, p>.13)$. Similarly, when brand A became an intermediate option its choice share only slightly decreased ( $72 \%$ vs. $58 \%, \chi^{2}=4.05, p=.044$ ). The interaction between adding an extreme option on the non-prominent attribute and the prominence prime manipulation was significant, as was the interaction between adding an extreme option on the prominent attribute and the prominence prime manipulation on choice were statistically significant $\left(\chi^{2}=3.85, p=\right.$ .050 and $\chi^{2}=9.99, p=.002$ respectively).

Our results indicate that the degree of attribute prominence influences the magnitude of prominence detraction. By increasing the prominence of the formerly non-prominent attributeand thereby decreasing the relative prominence of the formerly prominent attribute-the effects observed in our earlier studies were significantly attenuated. In Study 4 we moderate our effects by priming respondents to employ prominence when constructing their preference. -Insert Table 4 about here-

In Study 2 we showed that consumers are less likely to consider attribute prominence in the presence relative to the absence of an intermediate option. In Study 4 we moderate the extent to which consumers consider prominence when making a choice by using a manipulation first introduced by Tversky and Kahneman (1991). Tversky and Kahneman show that people's attentiveness to an attribute increases when that attribute is framed as a loss. In their studies, participants were provided with a reference point and were then asked to choose between two options that were described along two attributes (see Panel 1 in Figure 1). Compared to the reference point, one of the attributes yielded gains while the other attribute yielded losses. Tversky and Kahneman found that their respondents were more likely to select the option that minimized their losses relative to the reference point, rather than select the option that maximized their gains. In our experiment we used Tversky and Kahneman's manipulation as a way to draw participants' attention to the prominent attribute by framing that attribute as a loss. This manipulation was found to be effective in priming the use of prominence in previous research (Evangelidis and Levav 2013).

## Procedure

We randomly assigned 602 individuals ( $65 \%$ male, $M_{\text {age }}=29$ ) recruited through Amazon's Mechanical Turk to one of six experimental conditions in a three (choice set: two options vs. extreme on non-prominent vs. extreme on prominent) by two (reference point: none vs. yes) between-participants design. The stimuli in the no-reference point conditions were identical to the car choice problem used in Study 2. The reference point manipulation consisted of presenting participants the sentence, "Your previous car scored 60 on ride quality and had a fuel efficiency of 45 miles per gallon," prior to presenting them with the available options. In this
manipulation the prominent attribute (fuel efficiency) becomes the dimension along which the consumer experiences a loss.

We expected that respondents would be more likely to use prominence when a reference point was provided regardless of the presence of intermediate options. As a result, we predicted that the decrease in the choice share of option A when option C' was added to the set (i.e., H2) would be larger in the presence (vs. absence) of the reference point because more people would migrate from A to $\mathrm{C}^{\prime}$, the option boasting the better value on the prominent attribute. Further, we expected that the increase in the choice share of option B when option C was added to the set (i.e., H 1 ) would be smaller in the presence (vs. absence) of the reference point because fewer participants would use compromise as the decision criterion. Therefore, option B would remain relatively unattractive despite becoming an intermediate option in the set.

## Results

The results were consistent with our predictions (See Table 5 and Figure 6). When no reference point was given, we replicated our earlier findings: The majority ( $83 \%$ ) of respondents in the two-option condition preferred brand A, the option scoring high on the prominent attribute (fuel efficiency). When brand B became an intermediate option its choice share increased (17\% vs. $51 \%, \chi^{2}=23.83, p<.001$ ). In contrast, when brand A became an intermediate option its choice share decreased ( $83 \%$ vs. $52 \%, \chi^{2}=20.43, p<.001$ ).

When a reference point was provided a similar proportion of respondents ( $82 \%$ ) in the two-option condition preferred brand A. However, as expected, when brand B became an intermediate option its choice share only slightly increased ( $18 \%$ vs. $26 \%, \chi^{2}=1.75, p>.18$ ). In contrast, when brand A became an intermediate option its choice share greatly decreased (82\% vs. $44 \%, \chi^{2}=29.17, p<.001$ ). Both implied interactions between adding an extreme option on
the non-prominent attribute and the reference point manipulation $\left(\chi^{2}=4.07, p=.044\right)$ and between adding an extreme option on the prominent attribute and the reference point manipulation $\left(\chi^{2}=8.32, p=.004\right)$ were statistically significant.
-Insert Table 5 about here-
-Insert Figure 6 about here-
The results of Study 4 show that a subtle prime to consider prominence moderates prominence detraction. When the new extreme alternative (C) was added along the nonprominent attribute-and participants had been primed with prominence-the share of the intermediate alternative did not increase significantly, presumably because fewer people migrated from the prominent option A to the compromise option B. In contrast, when the extreme option ( $\mathrm{C}^{\prime}$ ) was added along the prominent attribute-and participants had been primed with prominence-the share of the intermediate option decreased to a greater extent, presumably because more respondents migrated from A to the new alternative that provided a better value on that dimension, $\mathrm{C}^{\prime}$. Thus, by influencing the degree to which prominence was used as a decision criterion, we influenced the degree to which respondents displayed extremeness aversion or similarity.

## GENERAL DISCUSSION

In this paper we contrast two hypotheses in behavioral research-similarity and extremeness aversion-that make opposing predictions about how the addition of a new extreme option should affect the choice share of the intermediate option in the set. Our main proposition is that the direction of the context effect, and by extension whether similarity or extremeness aversion prevails, depends on the prominence of the attribute along which the new extreme
option is added. Specifically, we advance a new hypothesis, prominence detraction, which reconciles similarity with extremeness aversion as a function of attribute prominence.

Prominence detraction proposes that: a) the addition of a new extreme option that scores higher on a non-prominent attribute is more likely to increase the share of the more similar intermediate option, while b) the addition of a new extreme option that scores higher on a prominent attribute is more likely to decrease the share of the more similar intermediate option.

We find support for prominence detraction in nine studies. In our first six studies (Studies 1a-1f), we replicate prominence detraction across a wide range of choice problems, using both actual and fictitious products. In Study 1f we also test the effect of placing a new extreme alternative closer to the original options in the set, rather than farther away as in previous research on extremeness aversion. In Study 2, we measure prominence and find that while preference for the original alternatives in the set changes when the new extreme options are added, the relative importance weights that consumers assign to the attributes under consideration remain unaffected. We further find that consumers' propensity to use relative importance weights as an input to choice is higher in the absence of an intermediate option in the set compared to when an intermediate option is present. In our last two studies we moderate prominence detraction by attenuating the prominence of an otherwise-prominent attribute (Study 3) and by priming consumers to use prominence when making their choice (Study 4). Figure 7 provides an illustration of the effect sizes observed in our studies. Two random effects meta-analyses conducted with MetaXL show that the average effect size for H1 is medium ( $d=.60,95 \%$ LLCI $=.43$, ULCI $=.77$ ), while the average effect size for H 2 is large $(d=-1.38,95 \%$ LLCI $=-1.78$, ULCI $=-.97) .{ }^{3}$
-Insert Figure 7 about here-

[^2]
## Theoretical Implications

In addition to reconciling two classic hypotheses in behavioral research, our findings bear on several influential research streams in behavioral decision theory. First, our results suggest that the structure of a choice set can affect the subjective utility associated with value differences along an attribute. Classic utility theory would predict that differences along a prominent attribute yield higher returns on utility relative to differences along a non-prominent attribute (Savage 1954; von Neumann and Morgenstern 1947). However, the theoretical account advanced here suggests that differences along a prominent attribute may yield lower returns on utility when a choice set's configuration includes an intermediate option. Different decision criteria, such as prominence or compromise, allow for differing estimations of the subjective utility of a given option.

Second, our findings suggest that researchers should be cautious when making inferences with respect to attribute weights when estimating choice models. Choice models typically assume that choices are based on attribute weights (e.g., Gensch and Recker 1979). Researchers employing choice models tend to infer the weight of an attribute from a consumer's choice. Our framework and data (see Study 2) show that in the presence of intermediate options, consumers are less likely to use attribute weights when constructing their preference. If one were to represent consumer choice using a choice model, he or she would infer that consumers' attribute weights differ across choice set conditions. However, we posit that consumers' attribute weights do not necessarily change in the presence of intermediate options. Instead, our data show that the extent to which consumers use attribute weights when constructing their preference is contingent on the choice set‘s configuration.

Third, the results we report suggest a modification to the sequential, three-stage decision framework of Tversky et al. (1988; see also Fischer and Hawkins 1993; Montgomery 1983). In particular, we show that prominence may be just one of many decision criteria that consumers can employ at the third and final stage of the decision process. By allowing for this possibility, we show that decision-makers' propensity to employ prominence in the absence of dominance relationships and of a decisive advantage (the first two stages in Tversky et al.'s model) may be contingent on the availability of other criteria, such as the presence of an intermediate option in the set.

Fourth, research on task goals and the prominence effect in preference reversals argues that the use of prominence differs as a function of the response mode. Prominent attributes are more likely to be afforded greater weight in problems that require differentiating alternatives rather than equating them (Fischer, Carmon, Ariely and Zauberman 1999; Fischer and Hawkins 1993). Our studies suggest that the presence versus absence of intermediate options in the choice set is another moderator of the prominence effect regardless of the response mode.

## Practical Implications

Our findings have a number of implications for product line management, especially for product line extensions. Although consumers are presumed to select the product that rates highest along the prominent dimension (subject to a budget constraint), our results suggest that the use of prominence can be contingent on the structure of the choice set. Managers can boost the sales of products that rate low along the prominent dimension by adding an even weaker option and thus creating an intermediate (compromise) alternative. Conversely, adding products that are even stronger than existing ones on the prominent dimension can decrease the attractiveness of a newly-created intermediate alternative. Moreover, our meta-analyses (Figure 7) suggest that the
latter choice share shift is likely to be greater than the former. Products with attributes that are completely alignable (i.e., where attributes are shared by all alternatives) and in which compromise relationships are easy to see are more likely to show our effect. Product managers should account for this possibility particularly when positioning new products.

In addition, our results have potential implications for choice architecture in public policy settings. Policy-makers who wish to "nudge" people to make choices that will increase their welfare can design a choice context that either enhances or suppresses the likelihood of prominence being used as a decision criterion. The presence or absence of an intermediate option has been shown to be a key driver of whether decision-makers will employ prominence judgments when constructing their preference.

## Conclusion

We propose a novel hypothesis, prominence detraction, which predicts that the influence of a newly-introduced extreme option to a choice set depends on the prominence of the attribute along which the new option is introduced. When an extreme option that scores higher on a nonprominent attribute is added to the set, the choice probability of the intermediate option increases; in contrast, when an extreme option that scores higher on a prominent attribute is added to the set, the choice probability of the intermediate option decreases. Thus, our hypothesis reconciles the conflicting predictions of similarity and extremeness aversion, two fundamental hypotheses in the decision-making and consumer behavior literatures.

As we discuss in our introduction, earlier research has attempted to accomodate similarity and extremeness aversion under the same framework by relying on two assumptions. The first is that similarity is satisfied when the newly-introduced option is placed very close to the target alternative, while extremeness aversion is satisfied when the newly introduced option is placed
relatively farther from the target alternative (Figure 2). The second is that the attributes characterizing the alternatives under consideration are, on average, equally important for decision-makers. Indeed, the context effects reported in earlier consumer research are predicated on uncertainty regarding attribute trade-offs (see, e.g., Huber et al. 1982; Simonson 1989; Simonson and Tversky 1992). Attributes are assumed (but not tested) to be equally prominent, as explicitly stated by Simonson (1989, p. 160), "[context-effects arise when] there is uncertainty about the attribute weights or values, or if both attributes are perceived as about equally important." By comparison, the effects reported here are predicated on differences in attribute prominence. Prominence detraction stems not from an effort to resolve decision conflict as in the classic context effects reported in the literature (e.g., compromise, attraction; Simonson 1989), but rather from choice set configuration and the concomitant decision strategies that the configuration evokes. The present research therefore offers evidence that consumers may rely on context to make a choice even when they have a preference for one attribute over another, so that they have context-dependent preferences even under low preference uncertainty.

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TABLE 1 - Prominence Detraction: Choice Set Configuration, Decision Criteria, and Predicted Choice Shares

| Set | Decision Criterion | Choice Shares |
| :--- | :--- | :--- |
|  | (Favored Option) |  |
| A, B | Prominence (A) |  |

A, B, C Prominence (A)
(C)
(B)


Compromise (B)
$\mathrm{A}, \mathrm{B}, \mathrm{C}^{\prime} \quad$ Prominence ( $\mathrm{C}^{\prime}$ )


Compromise (A)

## Hypotheses

| Prominence Detraction (H1) | $\mathrm{P}_{\mathrm{B}}\{\mathrm{A}, \mathrm{B}\}<\mathrm{P}_{\mathrm{B}}\{\mathrm{A}, \mathrm{B}, \mathrm{C}\}$ |
| :--- | :--- |
| Prominence Detraction (H2) | $\mathrm{P}_{\mathrm{A}}\{\mathrm{A}, \mathrm{B}\}>\mathrm{P}_{\mathrm{A}}\{\mathrm{A}, \mathrm{B}, \mathrm{C}\}$ |

TABLE 2 - Results of Studies 1a-1f

| Study 1a (Toshiba Canvio; $\mathrm{n}=302$ ) |  |  |  |
| :---: | :---: | :---: | :---: |
| Two-option |  | Extreme on | Extreme on |
|  |  | non-Prominent | Prominent |
| 320GB model |  | 14\% |  |
| 500GB model | 6\% | 21\% | 15\% |
| 750GB model | 94\% | 65\% | 23\% |
| 1TB model |  |  | 62\% |
| Study 1b (Canon CyberShot; $\mathrm{n}=303$ ) |  |  |  |
| Two-option |  | Extreme on | Extreme on |
|  |  | non-Prominent | Prominent |
| SX90 model |  | 16\% |  |
| SX170 model | 5\% | 20\% | 14\% |
| SX510 model | 95\% | 64\% | 38\% |
| SX740 model |  |  | 48\% |
| Study 1c (The Hobbit: An Unexpected Journey; $\mathrm{n}=300$ ) |  |  |  |
|  | Two-option | Extreme on | Extreme on |
|  |  | non-Prominent | Prominent |
| 3D Extended |  | 18\% |  |
| Collector's Edition |  |  |  |
| 3D Extended Edition | 30\% | 36\% | 29\% |
| Extended Edition | 70\% | 46\% | 43\% |
| Theatrical Edition |  |  | 28\% |

Study 1d (Sony Walkman; n = 300)


TABLE 3 - Results of Study 2

| Car |  |  |  |
| :--- | :--- | :--- | :--- |
|  | Two-option | Extreme on | Extreme on |
|  |  | non-Prominent | Prominent |
| Brand C' |  | $29 \%$ |  |
| Brand A | $81 \%$ | $50 \%$ | $58 \%$ |
| Brand B | $19 \%$ | $45 \%$ | $13 \%$ |
| Brand C |  | $5 \%$ | Extreme on |
| Toshiba Canvio |  | non-Prominent | Prominent |
|  |  | $8 \%$ |  |
| 320 GB model | $8 \%$ | $18 \%$ | $11 \%$ |
| 500 GB model | $92 \%$ | $74 \%$ | $24 \%$ |
| 750 GB model |  |  | $65 \%$ |
| 1 TB model |  |  |  |

TABLE 4 - Results of Study 3

|  | Two-option | Extreme on | Extreme on |
| :--- | :--- | :--- | :--- |
|  |  | non-Prominent | Prominent |
| Control |  |  |  |
| Brand C' |  | $44 \%$ |  |
| Brand A | $91 \%$ | $65 \%$ | $49 \%$ |
| Brand B | $9 \%$ | $33 \%$ | $7 \%$ |
| Brand C | $2 \%$ |  |  |
| Prominence manipulation |  | $30 \%$ |  |
| Brand C' | $54 \%$ | $58 \%$ |  |
| Brand A | $72 \%$ | $38 \%$ | $12 \%$ |
| Brand B | $28 \%$ | $8 \%$ |  |
| Brand C |  |  |  |

TABLE 5 - Results of Study 4

|  | Two-option | Extreme on | Extreme on |
| :--- | :--- | :--- | :--- |
|  |  | non-Prominent | Prominent |
| No reference point |  |  |  |
| Brand C' |  |  |  |
| Brand A | $83 \%$ | $45 \%$ | $57 \%$ |
| Brand B | $17 \%$ | $51 \%$ | $11 \%$ |
| Brand C | $4 \%$ |  |  |
| Reference point |  | $73 \%$ | $51 \%$ |
| Brand C' | $26 \%$ | $44 \%$ |  |
| Brand A | $82 \%$ | $1 \%$ | $5 \%$ |
| Brand B | $18 \%$ |  |  |
| Brand C |  |  |  |

FIGURE 1

THE INTRODUCTION OF A NEW EXTREME OPTION


Attribute 1


## FIGURE 2

SIMILARITY AND EXTREMENESS AVERSION AS A FUNCTION OF DISTANCE


Attribute 1

## FIGURE 3

## THE PROMINENCE DETRACTION HYPOTHESIS



Prominent



FIGURE 4

PICTURES OF ACTUAL PRODUCTS (STUDIES 1A-1D \& 2)

TOSHIBA CANVIO
(STUDIES 1A \& 2)


THE HOBBIT (STUDY 1C)


SONY WALKMAN (STUDY 1D)


## FIGURE 5

## CAR CHOICE \& DEGREE OF PROMINENCE ACROSS CONDITIONS (STUDY 2)



Note: This graph shows how changes in the degree of prominence influence choice probability for the option scoring higher on the prominent attribute (Brand A or $\mathrm{C}^{\prime}$ depending on the condition) across conditions. In the two-option condition there is no intermediate option in the set. In the three-option condition there is an intermediate option in the set. The other two lines represent the main effect of prominence on choice when a specific option (A or B) is the intermediate option in the set.

FIGURE 6
PROMINENCE DETRACTION MODERATED BY PROMINENCE PRIME (STUDY 4)


FIGURE 7

## META-ANALYSES OF OBSERVED EFFECT SIZES



## APPENDIX A - DETAILED DESCRIPTIONS OF STUDIES 1B-1F

## Study 1 b - Canon PowerShot

Procedure. For this study we used the Canon PowerShot as our stimulus (Figure 4). Canon PowerShot models differ on two attributes: quality (indicated by differences in video capturing quality and optical zoom) and price. We adapted all information from Amazon.com. We created a superior and more expensive SX740 and an inferior but cheaper SX90 model for the purposes of this study. We randomly assigned 303 participants ( $61 \%$ male, $M_{\text {age }}=31$ ) to one of three conditions similar to prior studies. All participants were provided with a picture of the Canon PowerShot (Figure 4). Participants in the two-option condition were asked to "imagine that you consider buying a Canon PowerShot camera. You can choose between two models:

Canon PowerShot SX170, \$219: Capture impressive 720p HD video; Powerful 16x optical zoom;
Canon PowerShot SX510, \$249: Capture beautiful 1080p full HD video; Powerful 30x optical zoom."

A pre-test showed that most $(90 \%$; sign test $p<.001)$ participants $(\mathrm{N}=81 ; 60 \%$ male, $M_{\text {age }}=33$; recruited from Mechanical Turk) perceive quality to be more prominent than price. In one three-option condition we added a third option that scored better on the non-prominent attribute price:
"Canon PowerShot SX90, \$189: Capture decent 576p video; Powerful 10x optical zoom."

In a second three-option condition we added a third option that scored better on the prominent attribute quality:
"Canon PowerShot SX740, \$279: Capture gorgeous 2160p full HD video; Powerful 40x optical zoom."

Participants were asked to choose which brand they would buy.

Results. Choice proportions are summarized in Table 2. We replicated the findings of Study 1a. The majority ( $95 \%$ ) of respondents in the two-option condition chose the higher quality, higher price SX510 model. When the lower quality, lower price SX170 became an intermediate option its choice share increased ( $5 \%$ vs. $20 \%, \chi^{2}=9.26, p=.002$ ). In contrast, when the higher quality, higher price SX510 model became an intermediate option its choice share decreased ( $95 \%$ vs. $38 \%, \chi^{2}=47.52, p<.001$ ). These results replicate Study 1a and provide further support for the prominence detraction hypothesis.

## Study 1c - Hobbit

Procedure. For this study we used the Hobbit: An Unexpected Journey Blu-ray disc as our stimulus (Figure 4). The Blu-ray disc of the movie is marketed in various editions that vary on quality (indicated by runtime and whether the movie is 3D) and price. We adapted our stimuli from Amazon.com and created a "Collector's Edition" option for the purposes of this study. We randomly assigned 300 participants $\left(64 \%\right.$ male, $\left.M_{\text {age }}=31\right)$ to one of three conditions similar to prior studies. All participants were provided with a picture of the Blu-ray disc. Participants in the two-option condition were asked to "imagine that you consider buying the Blu-ray disc of the movie The Hobbit as a birthday present for a friend. Your friend has both a Blu-ray player and a 3D TV so he can watch all different versions of the Blu-ray disc. You have the following options:

The Hobbit (Extended Edition); Runtime: 3 hrs 2 mins; 3D: No; Price: \$35;
The Hobbit (3D Extended Edition); Runtime: 3 hrs 2 mins; 3D: Yes; Price: \$55."
A pre-test showed that for this product a majority $(83 \%$; sign test $p<.001)$ of participants $(\mathrm{N}=$ 80; $54 \%$ male, $M_{\text {age }}=34$; recruited from Mechanical Turk) perceive price to be more prominent than quality (indicated by runtime and 3D). In one three-option condition we added a third option that scored better on the non-prominent attribute quality:
"The Hobbit (3D Extended Collector's Edition); Runtime: 3 hrs 2 mins \& Additional Disc with 2 hrs of Special Features \& Extras; 3D: Yes; Price: \$75."

In a second three-option condition we added a third option that scored better on the prominent attribute price:
"The Hobbit (Theatrical Edition); Runtime: 2hrs 49 mins; 3D: No; Price: \$15."

Participants were asked to indicate which edition they would buy by clicking a radio button on the screen.

Results. Choice proportions are summarized in Table 2. We replicated findings of Studies 1a-b. The majority ( $70 \%$ ) of respondents in the two-option condition chose the cheaper Extended Edition. When the 3D Extended Edition became an intermediate option its choice share slightly increased ( $30 \%$ vs. $36 \%, \chi^{2}=.83, p=.36$ ). In contrast, when the Extended Edition became an intermediate option its choice share decreased ( $70 \%$ vs. $43 \%, \chi^{2}=14.20, p<.001$ ).

## Study 1d - Sony Walkman

Procedure. For this study we used the Sony Walkman as our stimulus (Figure 4). Sony Walkman models differ on two dimensions: capacity and price. We adapted our stimuli from Amazon and created a 32 GB edition for the purposes of this study. We randomly assigned 300 participants ( $65 \%$ male, $M_{\text {age }}=32$ ) to one of three conditions similar to prior studies. All participants were provided with a picture of a Sony Walkman (Figure 4). Participants in the twooption condition were asked to "imagine that you consider buying a Sony Walkman MP3 player. You can choose between two models:

Sony 8 GB Walkman MP3 Player, \$85: Capacity: 8 GB; Digital music, video \& photo player with FM radio; Rechargeable battery with up to 30 hours audio playback;

Sony 16 GB Walkman MP3 Player, \$95: Capacity: 16 GB; Digital music, video \& photo player with FM radio; Rechargeable battery with up to 30 hours audio playback."

A pre-test showed that a majority $(81 \%$; sign test $p<.001)$ of participants $(\mathrm{N}=80 ; 61 \%$ male, $M_{\text {age }}=35$; recruited from Mechanical Turk) perceive capacity to be more prominent than price. In one three-option condition we added a third option that scored better on the nonprominent attribute, price:
"Sony 4 GB Walkman MP3 Player, \$75: Capacity: 4 GB; Digital music, video \& photo player with FM radio; Rechargeable battery with up to 30 hours audio playback."

In a second three-option condition we added a third option that scored better on the prominent attribute capacity:
"Sony 32 GB Walkman MP3 Player, \$105: Capacity: 32 GB; Digital music, video \& photo player with FM radio; Rechargeable battery with up to 30 hours audio playback."

Participants were asked to choose which brand they would buy by clicking a radio button on the screen.

Results. Choice proportions are summarized in Table 2. We replicated findings of previous studies. The majority (93\%) of respondents in the two-option condition chose the 16 GB model. When the 8 GB model became an intermediate option its choice share increased ( $7 \%$ vs. $\left.19 \%, \chi^{2}=5.52, p=.019\right)$. In contrast, when the 16 GB model became an intermediate option its choice share decreased ( $93 \%$ vs. $16 \%, \chi^{2}=79.96, p<.001$ ). These results provide further support for the prominence detraction hypothesis.

Study le-TV

Procedure. Two hundred and seventy-two respondents ( $63 \%$ male, $M_{\text {age }}=29$ ) were recruited through Amazon's Mechanical Turk. Participants were asked to imagine that they were considering purchasing a TV. Materials were adapted from earlier research (Evangelidis and Levav 2013; Simonson 1989). Participants were randomly assigned to one of three experimental conditions. In the two-option condition participants were presented the following two TV brands:
"Brand A: is priced at $\$ 600$ and scores 80 on picture quality
Brand B: is priced at $\$ 450$ and scores 60 on picture quality."

A pre-test ( $\mathrm{N}=79,61 \%$ male, $M_{\text {age }}=31$, Mechanical Turk) showed that a majority ( $68 \%$; sign test $p<.002$ ) of consumers perceive picture quality to be more prominent than price in this decision problem. In one three-option condition we added a third option that scored better on the non-prominent attribute price:
"Brand C: is priced at $\$ 300$ and scores 40 on picture quality."

In a second three-option condition we added a third option that scored better on the prominent attribute picture quality:
"Brand C': is priced at $\$ 750$ and scores 100 on picture quality."

Participants were asked to make a choice by clicking a radio button on the screen.
Results. We replicated prior results with respect to choice (Table 2). The majority (86\%) of respondents in the control condition preferred brand A , the option scoring high on the prominent attribute (picture quality). When brand B became an intermediate option its choice share increased ( $14 \%$ vs. $29 \%, \chi^{2}=5.69, p=.017$ ). In contrast, when brand A became an intermediate option its choice share decreased ( $86 \%$ vs. $29 \%, \chi^{2}=50.94, p<.001$ ).

## Study lf-Car

In the present research, we assume that prominence detraction should hold regardless of the distance between the new extreme alternative and the original alternatives in the set (see possible positionings $S$ and $C$ in Figure 2). In Studies 1a-1e, we followed the procedure of past studies on extremeness aversion, and placed the extreme alternatives relatively far from the original alternatives A and B (position C in Figure 2). In this study we place the new extreme options very close to the original alternatives A and B (similar to the position S in Figure 2), in order to test whether prominence detraction is sensitive to the distance between the options.

Procedure. We recruited 302 respondents ( $58 \%$ male, $M_{\text {age }}=32$ ) through Amazon's Mechanical Turk. Materials were adapted from Simonson (1989) and Evangelidis and Levav (2013). Participants were first asked to "imagine that [they were] considering buying a car" and were then randomly assigned to one of three experimental conditions. In the two-option condition participants were presented the following two car brands:
"Brand A: scores 73 on ride quality and has a fuel efficiency of 34 miles per gallon; Brand B: scores 83 on ride quality and has a fuel efficiency of 24 miles per gallon."

In a pretest $\left(\mathrm{N}=80,65 \%\right.$ male, $M_{\text {age }}=30$, MTurk), we found that a majority $(76 \%$; sign test $p<$ .001) of participants consider fuel efficiency to be the prominent attribute of a car.

In one first three-option condition we added a third option that scored better on the nonprominent attribute ride quality and was positioned relatively close to brand B :
"Brand S: scores 85 on ride quality and has a fuel efficiency of 22 miles per gallon."

In a second three-option condition we added a third option that scored better on the prominent attribute fuel efficiency and was positioned relatively close to brand A:
"Brand S": scores 71 on ride quality and has a fuel efficiency of 36 miles per gallon."

Participants were asked to make a choice by clicking a radio button on the screen.
Results. We replicated prior results (Table 2). The vast majority (81\%) of respondents in the two-option condition preferred brand A , the option scoring higher on the prominent attribute (fuel efficiency). When brand B became an intermediate option its choice share increased ( $19 \%$ vs. $31 \%, \chi^{2}=3.62, p=.057$ ). In contrast, when brand A became an intermediate option its choice share decreased ( $81 \%$ vs. $53 \%, \chi^{2}=16.41, p<.001$ ). In sum, we find support for prominence detraction also when the distance between options is relatively small.


[^0]:    ${ }^{1}$ Prior research on decision-making (e.g., Evangelidis and Levav 2013; Fischer and Hawkins 1993; Tversky, Sattath, and Slovic 1988) labels the most important attribute in a decision problem as the prominent attribute. In order to be consistent with this research, we will be using the term prominence to refer to the relative importance of the attribute.

[^1]:    ${ }^{2}$ There was no significant interaction of experimental condition and order in which participants responded on the measures on the importance weights.

[^2]:    ${ }^{3}$ In both meta-analyses, we excluded the experimental conditions where a moderator was present.

