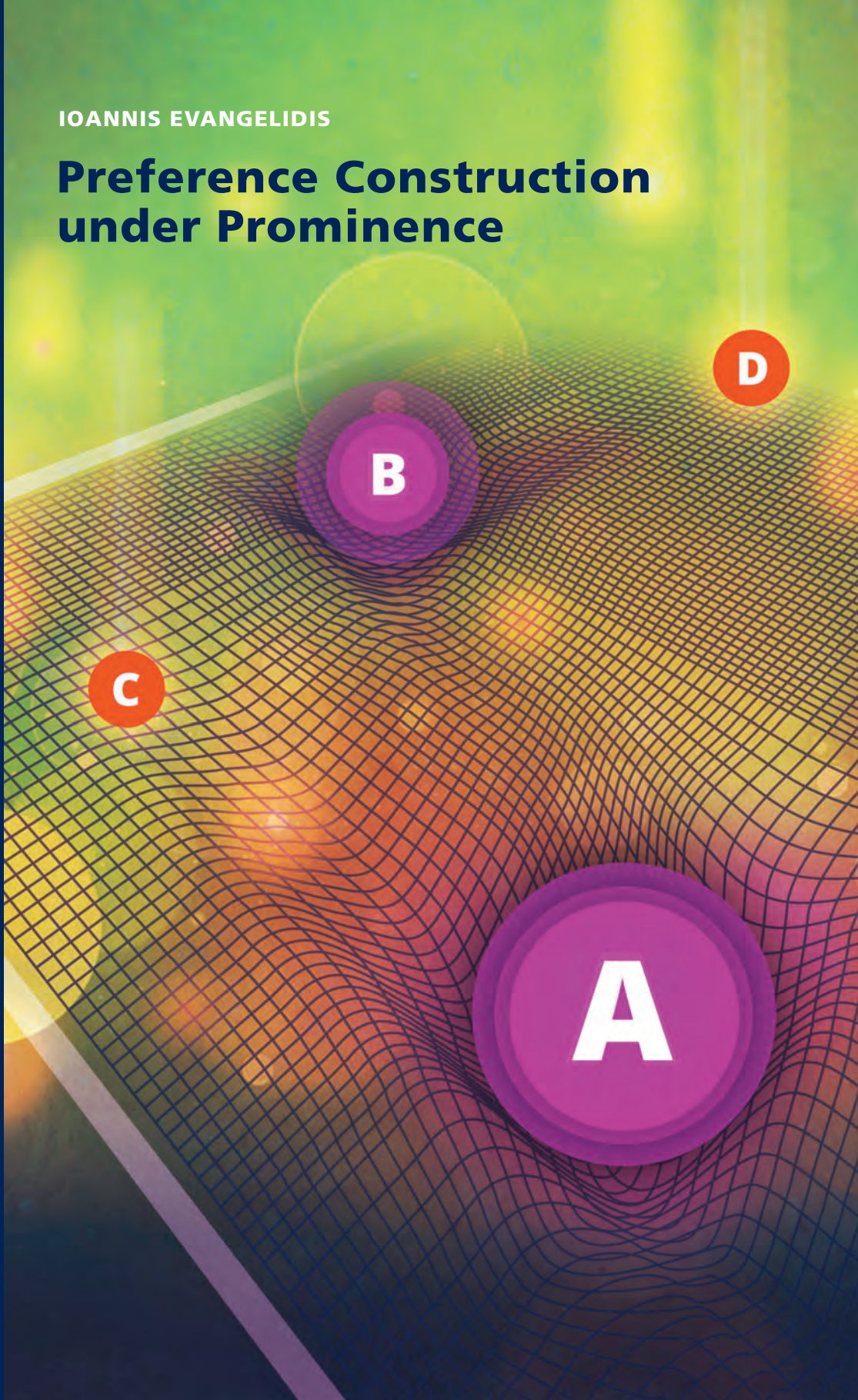
IOANNIS EVANGELIDIS

Preference Construction under Prominence



Preference Construction under Prominence

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Hoe bepalen consumenten hun voorkeur als niet alles even belangrijk is?

Thesis

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Born in Athens, Greece

Erasmus University Rotterdam

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Chapter 1. Introduction

Standard multi-attribute utility models, decision-making theory, and common sense assume that differences in attribute importance weights should determine choice. All else equal, consumers are presumed to prefer products that in their view are superior along the products' most important—or so-called "prominent"—dimensions. For instance, if memory is the prominent attribute of an electronic tablet, then consumers will prefer the device that is highest in memory, subject to a budget constraint. These are decision problems in which there is little or no uncertainty about which option to choose—people know their preference. This dissertation examines to what extent people use prominence (i.e., relative attribute importance) when constructing their preference and shows that the decision process exerts an influence on choice that is not captured by the classic theories.

I have researched two aspects of the decision process: how the process changes when attribute values differ in reliability and how the process changes when there are relational properties in the set. Both aspects influence the extent to which prominence is weighted in preference construction. First, my dissertation research suggests that the use of prominence in choice depends on the reliability of the attribute values along which alternatives are described (Chapter 2). When values associated with the prominent attribute are not perceived to be reliable, decision-makers are less likely to make choices that are consistent with their attribute preferences. In the context of financial donations in response to natural disasters, I find that the amount of money allocated for humanitarian aid depends on the number of fatalities but not on the number of survivors who are affected by the disaster (i.e., the actual beneficiaries of the aid). I further find that this effect arises because donors view values on the fatality dimension as more

reliable than values on the survivor dimension, even though the number of survivors is seen as the prominent attribute for the donation decision.

Second, my dissertation research suggests that the use of prominence in choice is contingent on choice set configuration. When relational properties such as dominance (Chapter 3) or compromise (Chapter 4) are introduced in the choice set, decision-makers are less likely to make choices that are consistent with their attribute preferences. In Chapter 3, I find that, in decisions where individuals afford greater importance to one attribute versus another, preference for an alternative scoring high on this prominent attribute may decrease when decoy alternatives that are clearly better or worse than the focal options are inserted into the choice set. In Chapter 4, I find that preference for an alternative scoring high on a prominent attribute may also decrease when intermediate (or compromise) alternatives are present in the set.

My dissertation holds implications for product line management and choice architecture. First, my data provide insights into how different types of new product introductions can influence market shares. Second, my research can have significant importance for choice architecture in public policy settings. Policy-makers who endeavor to "nudge" people to make choices that will increase their and others' welfare can design a choice context that either enhances or suppresses the likelihood of prominence being used as a decision criterion.

The research presented in Chapter 2 was conducted with Bram Van den Bergh and was published in Psychological Science. The research presented in Chapter 3 was conducted with Jonathan Levav, was published in the Journal of Marketing Research, and won the ERIM Award for Junior Top Academic Article in Management (2014). The research presented in Chapter 4 was conducted with Jonathan Levav and Itamar Simonson. We received an invitation to revise and resubmit Chapter 4 from the Journal of Marketing Research.

Chapter 2. The Number of Fatalities Drives Disaster Aid: Increasing Sensitivity to People in Need

[In Peru,] the rainy weather and flooding have caused 15 deaths across the country and affected another 30,000 residents. Reuters (2012)

In the aftermath of a disaster, authorities estimate the number of fatalities and affected individuals. Financial aid to the disaster-stricken area ideally depends on the number of affected people, because these will be the beneficiaries of humanitarian aid. The Centre for Research on the Epidemiology of Disasters (CRED), a World Health Organization Collaborating Centre, defines affected people as those "requiring immediate assistance during a period of emergency" (CRED 2009). The United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) does not rely on the number of fatalities but on the number of affected people to estimate the required financial aid.[1] In an ideal world, financial aid depends on the number of survivors who need immediate assistance.

In the real world, however, this may not be the case. In December 2003, the Bam earthquake in Iran killed 26,796 people and affected 267,628 more. Private individuals responded by donating $10.7 million. In January 2000, the Yunnan earthquake in China killed 7 people and affected 1.8 million more. Donors contributed only $94,586. These observations suggest that donors may be sensitive to the number of fatalities and much less so to the number of persons affected. As a consequence, money may be raised inefficiently, and a humanitarian disaster could follow a natural disaster. In the studies reported here, we investigated factors that

[1] Appeal reports filed by the UNOCHA are publicly available (www.unocha.org/cap/).

influence the amount of donations following a natural disaster. Our research question was twofold. First, are donors sensitive to the number of affected survivors? And second, if not, how can their sensitivity to those in need be increased?

2.1. Study 1

2.1.1. Method

In Study 1, we analyzed actual data on natural-disaster relief for the period between January 1, 2000, and July 31, 2011. To qualify as a disaster, an event has to fulfill at least one of the following criteria established by CRED: (a) 10 or more people reported killed (i.e., persons confirmed as either dead or missing but presumed dead) or (b) 100 or more people reported affected (i.e., persons requiring immediate assistance during an emergency situation). We obtained information about the characteristics of natural disasters from the International Disaster Database managed by CRED.[2] Data on financial donations by private donors was obtained from the Financial Tracking Service managed by UNOCHA.[3] Independent variables in our analysis were the number of fatalities and the number of affected people. Control variables were whether an appeal for financial aid was filed, the location of the disaster, and the type of disaster. Table 1 shows descriptive statistics for all natural disasters included in our sample.

[2] Data are available at www.emdat.be. Droughts were excluded from our data because the number of associated fatalities was unavailable.

[3] Data are available at fts.unocha.org.

Table 1: Descriptive Statistics of the 381 Natural Disasters Included in Study 1

Variable	*M*	*SD*	Range
Amount of financial aid received (conditional on receiving aid)	$53,127,212	$371,000,000	$63–3,890,357,783
Number of fatalities	2,351	18,704	0–226,096
Number of affected people	2,148,611	12,401,049	12–151,346,000

Note: The following types of natural disaster were included in the study: flood or landslide (212; 55.6%), cyclone or tropical storm (80; 21%), earthquake (60; 15.8%), volcano (15; 3.9%), avalanche or winter storm (11; 2.9%), and wildfire (3; 0.8%). The disasters occurred in Asia (159; 41.7%), Africa (70; 18.4%), South America (50; 13.1%), North and Central America (47; 12.3%), Europe (33; 8.7%), and Oceania (22; 5.8%). An appeal for financial aid was filed in 43 (11.3%) cases; financial aid was allocated for 124 (32.5%) disasters.

We modeled disaster aid as a two-stage process. In the first stage, we estimated the probability that a disaster would receive financial aid. In the second stage, we estimated the amount of financial aid. To correct for selection bias (i.e., the second stage only takes places when aid is granted), we applied Heckman's two-stage selection model (Heckman 1976, 1979). Donation likelihood was estimated with a maximum-likelihood logistic regression, whereas donation amount was estimated with a corrected ordinary-least-squares model that took into account information from disasters for which financial aid was not given.

2.1.2 Results

Our analysis yielded a significant effect of the number of fatalities in both stages of the model. We obtained a significant main effect of the number of fatalities on donation probability ($b = 0.0009893$, 95% confidence interval = [.0004411, .0015374]; Heckman $z = 3.54$, $p < .001$) as well as on donation amount ($b = 9{,}324$, 95% confidence interval = [7,945, 10,704]; Heckman

$z = 13.25$, $p < .001$; Table 2). The latter coefficient indicates that more than $9,000 was donated for each additional person killed in a disaster. In contrast, our analyses yielded no effect of the number of affected people on donation probability or donation amount.[4] In our sample of natural disasters, there was no significant correlation between the number of fatalities and the number of people who required immediate assistance ($r = .056$, $p > .27$). We conclude that donors are more likely to provide financial aid when more people die, but donors remain largely insensitive to those in need (Fig. 1).

Table 2: Results from the Two-Stage Model Used in Study 1

Predictor	Donation probability (β)	Donation amount (β)
Constant	–0.754* (0.180)	–66,400,000 (95,800,000)
Number of fatalities	0.0009893* (0.0002797)	9,324.49* (703.603)
Number of affected people	–0.000 (0.000)	–3.871 (2.756)
Appeals for financial aid	1.491* (0.275)	52,900,000 (75,100,000)
Disaster type		
Cyclone	–0.058 (0.210)	–54,400,000 (58,800,000)
Earthquake	0.272 (0.228)	–1,757,212 (63,500,000)
Volcano	0.064 (0.372)	–21,700,000 (118,000,000)
Avalanche	–0.341 (0.460)	95,300,000 (192,000,000)
Wildfire	–4.543 (1,250.877)	—[1]
Disaster location		
Asia	–0.283 (0.216)	17,500,000 (60,400,000)
South America	0.273 (0.257)	8,107,038 (68,400,000)
North and Central America	–0.023 (0.284)	–17,500,000 (74,300,000)

[4] We examined whether the ratio of fatalities to survivors may be a significant predictor of donation in our data. We found no support for either donation probability ($p > .39$) or donation amount ($p > .33$).

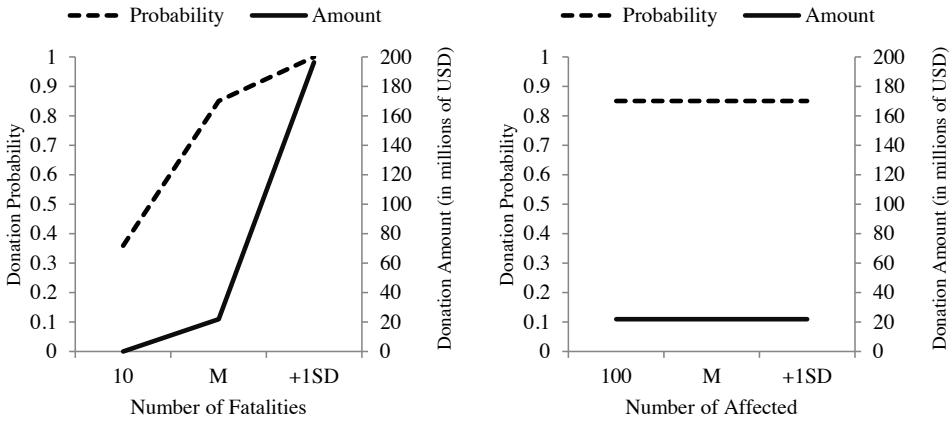
Europe	–0.612 (0.357)	–46,200,000 (144,000,000)
Oceania	0.456 (0.343)	37,900,000 (94,200,000)

Note: For the model analyzing donation probability, 381 observations were included. For the model analyzing donation amount, 124 observations were included (correcting for selection bias). Standard errors are given in parentheses. The baseline group for disaster type was flood. The baseline group for disaster location was Africa.

[1]This variable was omitted because of collinearity.

*$p < .001$.

Figure 1: Probability that money would be donated for disaster relief (left *y*-axes) and estimated amount of money that would be donated (right *y*-axes) as a function of (a) the number of fatalities and (b) the number of affected people. Other predictors were held at their mean value.



Correlational data are invaluable because they allow us to examine behavior in natural settings, but they may be problematic because there offer limited control over the conditions that lead to the observed effects. In a series of experimental studies (2a through 2c), we next tested the robustness of the correlational results and examined participants' sensitivity to values (high

vs. low) associated with attributes (people affected vs. people killed). To avoid experimental artifacts, we varied definitions of "fatalities" and "affected people" across studies, as well as the type and location of the disaster and the values associated with these attributes.

2.2 Studies 2a through 2c

2.2.1 Method

In three independent studies, we employed a 2 (number of fatalities: low vs. high) × 2 (number of people in need: low vs. high) between-subjects design with donation amount as the dependent variable.

Study 2a. Participants of Study 2a were 127 students (59% male, mean age = 21 years) at a large Western European University who took part in exchange for course credit or money. Participants read a short (three sentences in length) text on floods, along with the definitions of the number of people killed and affected ("when a flood occurs, local authorities estimate the number of people killed, which consists of those confirmed or presumed dead, and the number of [people] affected, which consists of those requiring immediate assistance during an emergency situation"). Participants were then asked to imagine that a flood has taken place in a town of 50,000 people in South America and that the event is broadcast by major national information networks. Local authorities estimated that 4,000 [or 8,000] people were killed and 4,000 [or 8,000] were affected. We asked participants to indicate the total amount of money they thought should be donated to victims of the flood (in Euros). Reference material stated that "in a similar flood in the same region in 2010, which resulted in 3,000 dead and 3,000 affected, the total amount donated was 1 million Euros." The reference material was the same across all four conditions (Hsee and Rottenstreich 2004).

Study 2b. In Study 2b, we tested whether participants were sensitive to the number of beneficiaries when the beneficiaries' need was made concrete. To this end, we replaced the term "affected" with "survivors" in our paradigm and defined the latter as "persons in need of assistance such as food, shelter, sanitation, and/or medicine." Participants were 90 individuals (67% male, mean age = 29 years) recruited through Amazon's Mechanical Turk. They first read a short (three sentences in length) text on earthquakes, along with the definitions of people killed (same as in Study 2a) and survivors. Participants then imagined that an earthquake has taken place in a city in Asia and that the event is broadcast by major national information networks. According to local authorities, 4,000 [or 8,000] people were killed and 4,000 [or 8,000] survived. We asked participants to indicate the total amount of money they thought should be donated to victims of the earthquake (in U.S. dollars, or USD). Reference material stated that "in a similar earthquake in the same region in 2010, which resulted in 3,000 dead and 3,000 survivors, the total amount donated was 2 million USD."

Study 2c. In Study 2c, we tested whether participants were more sensitive to the number of beneficiaries when the beneficiaries' need was made more salient. Instead of providing definitions of fatalities and survivors before presenting the values (high vs. low), we included the definitions immediately after the values. Participants were 86 individuals (67% male, mean age = 28 years) recruited through Amazon's Mechanical Turk. We first gave the participants a short text on floods. Participants were then asked to imagine that a flood has taken place in a city in Africa and that the event is broadcast by major national information networks. According to local authorities, 6,000 [or 11,000] people were killed (persons confirmed dead, presumed dead, and/or missing) and 6,000 [or 11,000] survived (persons in need of assistance such as food, shelter, and/or medicine). We asked participants to indicate the total amount of money they

thought should be donated to victims of the flood. Reference material stated that "in a similar flood in the same region in 2010, which resulted in 5,000 dead and 5,000 survivors, the total amount donated was 4 million USD."

2.2.2 Results

Across Studies 2a through 2c, participants indicated that significantly more money should be allocated for a disaster with a high number of fatalities than for a disaster with a low number of fatalities (see Table 3). Although there seemed to be a weak trend, the effect of the number of affected people failed to reach significance in all three studies. We conclude that, irrespective of attribute definition, concreteness or saliency of the need, and type and location of disaster, individuals asked to allocate money to disaster victims are more sensitive to the number of fatalities than to the number of people in need.

Table 3: Results from Studies 2a Through 2c: Mean Amount of Money Donated (in Millions of Dollars) and Comparisons Between Means

	Low number of fatalities		High number of fatalities			
Study	Low number of affected people	High number of affected people	Low number of affected people	High number of affected people	Comparison between means for fatalities	Comparison between means for affected people
Study 2a	1.57 (0.74)	2.18 (1.36)	2.69 (1.94)	2.99 (2.00)	$F(1, 123) = 11.48$, $p = .001$, $\eta_p^2 = .09$	$F(1, 123) = 2.56$, $p > .11$, $\eta_p^2 = .02$
Study 2b	3.26 (2.74)	4.24 (2.05)	4.91 (3.53)	6.08 (4.56)	$F(1, 86) = 6.20$, $p = .015$, $\eta_p^2 = .07$	$F(1, 86) = 2.34$, $p = .13$, $\eta_p^2 = .03$
Study 2c	4.53 (1.23)	5.19 (2.05)	6.51 (2.94)	7.39 (2.91)	$F(1, 82) = 16.52$, $p = .000$, $\eta_p^2 = .17$	$F(1, 82) = 2.25$, $p > .13$, $\eta_p^2 = .03$

Note: Standard deviations are given in parentheses. There was no statistically significant interaction between the number of fatalities and the number of affected people in any of the three experimental studies ($p > .14$).

2.3 Pilot studies

To assess our theoretical framework, we conducted two pilot studies. In one pilot study, we asked 58 respondents (72% male, mean age = 28 years) to rank order two disasters—i.e., (a) 8,000 fatalities, 4,000 affected; (b) 4,000 fatalities, 8,000 affected—based on the total amount that should be donated. The majority of respondents (78%) indicated that a "low fatalities, high affected" disaster deserved more financial aid than a "high fatalities, low affected" disaster. Respondents realized that the number of affected people was a valid cue to determining financial aid when they evaluated multiple disasters. However, they did not weigh cue validity when they learned about a single disaster. Cue validity refers to whether a cue allows for correct or

appropriate inferences (Gigerenzer and Gaissmaier 2011; Gigerenzer and Goldstein 1996). Instead of a valid cue, respondents in our main studies relied on the number of fatalities, an invalid but reliable cue. Cue reliability, according to the psychometric definition of the term (Hair, Black, Babin, Anderson, and Tatham 2006), refers to the degree to which the measurement of a cue is error free and, thus, whether different values represent true differences in scores (York, Doherty, and Kamouri 1987). In the second pilot study, we measured the reliability and validity of the two cues (Table 4).

Table 4: Results of a Pilot Study: Mean Reliability and Validity of Cues Used to Determine Financial-Aid Allocation and Comparison between Cues

Measure	Number of People killed	Number of affected people	Comparison between cues
Reliability	5.10 (1.39)	4.68 (1.37)	$F(1, 62) = 3.98, p = .05, \eta_p^2 = .06$
Validity	4.52 (1.35)	6.16 (0.95)	$F(1, 62) = 71.22, p = .000, \eta_p^2 = .54$

Note: $N = 63$ (59% male, mean age = 29 years; participants were recruited through Amazon's Mechanical Turk). Standard deviations are given in parentheses. Reliability was assessed by asking participants how reliable authorities' estimates of the number of people killed and affected were (1 = *not at all reliable*; 7 = *extremely reliable*). Validity was assessed by asking participants to what extent donations to disaster victims should depend on the number of people killed and the number of affected people (1 = *not at all*; 7 = *very much*).

We contend that the number of fatalities is an invalid, but reliable, cue because its estimation is perceived to be error free. Respondents assumed that it is relatively easy to assess whether someone is dead or alive (i.e., there is low measurement error). Conversely, we contend that the number of affected people is a valid, but unreliable, cue because its estimation is perceived to have high measurement error. Respondents assumed that different values (low vs. high) may not necessarily represent true differences in actual need (food, shelter, sanitation,

medicine). Therefore, we propose that cue validity needs to be primed (Study 3) or that cue reliability needs to be enhanced (Study 4) to increase sensitivity to people in need.

2.4 Study 3

2.4.1 Method

We recruited 345 individuals (58% male, mean age = 30 years) through Amazon's Mechanical Turk. We used a 2 (number of fatalities: low vs. high) × 2 (number of affected: low vs. high) × 2 (cue validity: control vs. primed) experimental design with all factors manipulated between subjects and donation amount as the dependent variable.

The setup of the study was identical to that in previous experiments. Participants were provided with the same attribute definitions as in Study 2a and were asked to imagine that an earthquake has taken place in a city in Asia and that the event is broadcast by major national information networks. According to local authorities, 5,000 [or 8,000] people were killed and 5,000 [or 8,000] were affected. Participants had to indicate the amount "they thought should be donated to victims of the disaster." Reference material stated that "in a similar earthquake in the same region in 2010, which resulted in 4,000 dead and 4,000 affected, the total amount donated was 3 million USD."

Half of the participants were exposed to a choice problem prior to responding to the main dependent measure. In the primed-validity condition, we first asked participants to "imagine that two earthquakes have taken place in the world: For earthquake A, local authorities estimate that 4,500 people were killed and 7,500 were affected, whereas for earthquake B, local authorities estimate that 7,500 people were killed and 4,500 were affected." Participants had to "rank the two earthquakes based on the total amount that should be donated to their victims." Note that this

problem is similar to the one in our pilot study. When individuals face such a dilemma, they should consider attribute validity to resolve the trade-off (Tversky, Sattath, and Slovic 1988). We assumed that this choice problem would prompt participants to weigh cue validity in a subsequent decision. Participants in the control condition were exposed to the exact same choice problem, but after the dependent measure.

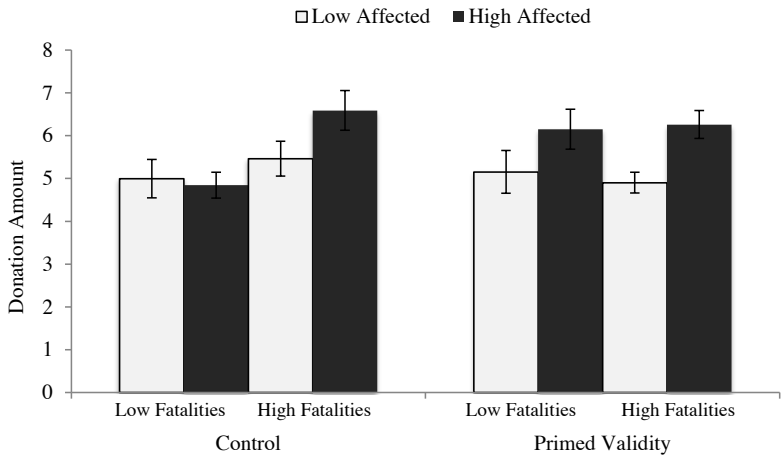
2.4.2 Results

Our manipulation of validity was successful. Two out of 3 participants (66.7%) indicated that more money should be allocated for a disaster with a high number of affected people and a low number of fatalities than for a disaster with a high number of fatalities and a low number of affected.[5]

When validity was not primed, we replicated prior findings. We observed a significant effect of the number of fatalities, $F(1, 337) = 7.46$, $p = .007$, $\eta_p^2 = .02$. Participants indicated that more money should be allocated after an earthquake with a high number of fatalities (M = \$6.08 million, SD = \$2.75 million) than after an earthquake with a low number of fatalities (M = \$4.92 million, SD = \$2.58 million; see Fig. 2). The effect of the number of affected people was not significant, $F(1, 337) = 1.45$, $p = .23$. Participants did not indicate that significantly more money should be allocated for a disaster with a high number of affected people (M = \$5.68 million, SD = \$2.66 million) than for a disaster with a low number of affected people (M = \$5.19 million, SD = \$2.77 million).

[5] This belief was stronger (72%) when validity was primed (i.e., asked first) than when it was not (61%), $\chi^2(1) = 3.90$, $p = .048$. This finding may be explained by cognitive-dissonance theory (Festinger 1954): Participants who originally demonstrated sensitivity to the number of fatalities may have been reluctant to admit that the number of people affected is a valid cue. We analyzed the main effects of the two cues within each validity condition.

Figure 2: Results from Study 3: mean amount of money that participants said should be donated for disaster relief as a function of the number of fatalities and the number of affected people. Results are shown separately for the control condition and the primed-validity condition. Error bars show standard errors.



In sharp contrast, when validity was primed, we found a significant effect of the number of affected people, $F(1, 337) = 9.02$, $p = .003$, $\eta_p^2 = .03$. Participants believed that more money should be allocated for a disaster with a high number of affected victims (M = \$6.20 million, SD = \$2.64 million) than for a disaster with a low number of affected victims (M = \$5.01 million, SD = \$2.43 million; see Fig. 2). In contrast, the effect of the number of fatalities was not significant, $F(1, 337) = 0.03$, $p > .85$. Participants did not indicate that more money should be allocated for a disaster with a high number of dead people (M = \$5.46 million, SD = \$2.02 million) than for a disaster with a low number of dead people (M = \$5.68 million, SD = \$3.13 million).

Not all interactions implied by our patterns of simple effects were statistically significant. Although the interaction of validity prime and number of fatalities was significant, $F(1, 337) = 4.36$, $p = .038$, $\eta_p^2 = .01$, the interaction of validity prime and number of affected people, $F(1, 337) = 1.50$, $p > .22$, as well as the three-way interaction among the validity prime, the number of fatalities, and the number of affected people was not statistically significant, $F(1, 337) = 0.66$, $p > .41$.

Study 3 suggests that donors become insensitive to the number of fatalities when cue validity is primed (See Appendix A for additional evidence). In the fourth and final study, we tested whether sensitivity to people in need can be increased by enhancing the perceived reliability of a cue. More specifically, we manipulated reliability by replacing a valid but unreliable cue (i.e., the number of affected people) with an equally valid but more reliable cue (i.e., the number of homeless people). To test our assumption that the estimation of the number of homeless people is less prone to measurement error (i.e., differences in values reflect true differences in need), we conducted a pretest. We provided definitions of people killed ("confirmed and presumed dead"), people affected ("those requiring immediate assistance during an emergency situation"), and homeless people ("those whose house was completely destroyed and [who] are in need of immediate assistance in the form of shelter"), and we asked participants to rate all cues on perceived reliability and validity. Results confirmed our predictions (see Table 5). The number of affected people was seen as a more valid but less reliable cue than the number of dead people, whereas the number of homeless people was perceived to be an equally reliable cue as the number of dead people and an equally valid cue as the number of affected people. We hypothesized that participants would be sensitive to people in need when cue reliability was high

(survivors were referred to as "homeless") rather than low (survivors were referred to as "affected").

Table 5: Results of the Pretest for Study 4: Mean Reliability and Validity of Cues Used to Determine Financial-Aid Allocation

Measure	Number of people killed	Number of affected people	Number of people homeless
Reliability	4.95_a (1.48)	4.25_b (1.62)	4.82_a (1.33)
Validity	4.05_b (1.89)	5.43_a (1.56)	5.73_a (1.47)

Note: N = 44 (54% male, mean age = 33 years; participants were recruited through Amazon's Mechanical Turk). Standard deviations are given in parentheses. Within a row, means with different subscripts differ significantly ($p <$ .04). Reliability was assessed by asking participants how reliable they thought estimates of the number of killed, affected, and homeless are (1 = *not at all reliable*; 7 = *extremely reliable*). Validity was assessed by asking participants how much the number of people in each of these categories should influence the decision of how much money to donate to victims of the disaster overall (1 = *not at all*; 7 = *extremely*).

2.5 Study 4

2.5.1 Method

A total of 244 students at a large Western European University (53% female, mean age = 21 years) took part in the study in exchange for course credit. We used a 2 (number of fatalities: low vs. high) × 2 (number of people in need: low vs. high) × 2 (cue reliability: low vs. high) experimental design with all factors manipulated between subjects and donation amount as the dependent variable. The experimental setup was identical to that used in our prior studies. We provided definitions of fatalities and people in need, and we manipulated the reliability of the latter cue by defining survivors as either "affected" (low reliability) or "homeless" (high

reliability). Participants were then asked to imagine that a tornado has taken place in a city in Eastern Asia and that the event is broadcast by major national information networks. Local authorities estimate that 2,000 [or 4,000] people were killed and 2,000 [or 4,000] were affected [or left homeless]. We asked participants to indicate the amount "they thought should be donated to victims of the disaster." For half the participants, the reference material stated that "for a similar disaster in the same region in 2010, which resulted in 1,500 killed and 1,500 affected, the total amount donated was 500,000 Euros." For the other half, the reference material made the same statement but "affected" was replaced with "homeless."

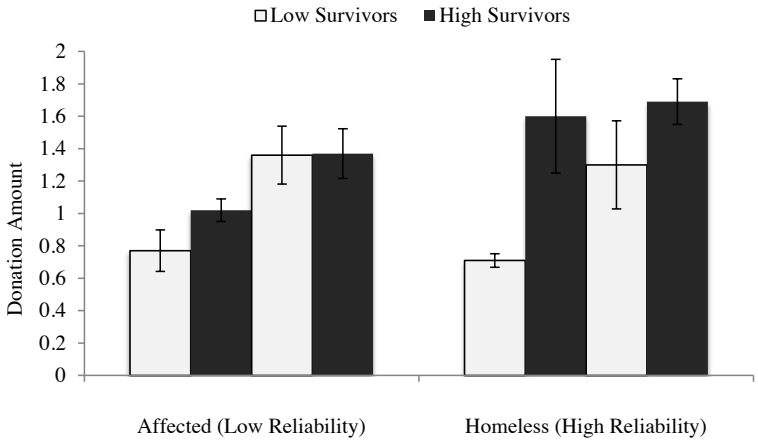
2.5.2 Results

Because cue validity was not primed, we expected and found a significant main effect of the number of fatalities, $F(1, 236) = 9.29$, $p = .003$, $\eta_p^2 = .04$. Participants believed that more money should be allocated for a disaster with a high number of fatalities (M = €1.47 million, SD = €0.94 million) compared with a disaster with a low number of fatalities (M = €1.01 million, SD = €1.13 million; see Fig. 3). There was no significant effect of cue reliability,[6] $F(1, 236) = 2.14$, $p > .14$. Participants indicated that a similar amount of money should be donated when the survivors were described as homeless (M = €1.34 million, SD = €1.27 million) compared with when they were described as affected (M = €1.10 million, SD = €0.77 million). Further, the analysis yielded a significant main effect of the number of people in need, $F(1, 236) = 8.42$, $p = .004$, $\eta_p^2 = .03$, but this effect was qualified by a two-way interaction between the number of

[6] Recent research suggests that target specificity increases generosity (Cryder, Loewenstein, and Scheines 2013). This account predicts that people donate more when the target is more specific, whereas our pattern of findings suggests that people rely on numerical values only when they believe they are reliable. More specifically, a concreteness account would predict a main effect of beneficiary description: When beneficiaries are described as homeless, rather than affected, individuals should donate more. We found no such effect. The absence of such an effect combined with the interaction between cue reliability and number of people in need supports an explanation of cue reliability.

people in need and cue reliability, $F(1, 236) = 3.74$, $p = .054$, $\eta_p^2 = .02$. We carried out planned comparisons to explore the main effect of the number of people in need at low and high levels of cue reliability.

Figure 3: Results from Study 4: mean amount of money that participants said should be donated for disaster relief as a function of the number of fatalities and the number of survivors. Results are shown separately for the conditions in which survivors were described as "affected" and the conditions in which they were described as "homeless." Error bars show standard errors.



Replicating our prior studies, results of Study 4 showed that there was no significant effect of the number of people in need when cue reliability was low (i.e., survivors were described as "affected"), $F(1, 236) = 0.46$, $p > .49$. Participants indicated that a similar amount of money should be donated when the number of affected people was high (M = €1.20 million, SD = €0.66 million) compared with when it was low (M = €1.02 million, SD = €0.86 million; see Fig.

3). However, when the more reliable cue "homeless" was used, we obtained a significant main effect of the number of people in need, $F(1, 236) = 11.86$, $p = .001$, $\eta_p^2 = .05$. Respondents believed that more money should be allocated for a disaster with a high number of homeless people ($M = €1.65$ million, $SD = €1.47$ million) than for one with a low number of homeless people ($M = €0.92$ million, $SD = €0.80$ million).

2.6 General Discussion

The studies reported here suggest that donation decisions are based primarily on the number of fatalities instead of the number of survivors (i.e., the actual beneficiaries). This constitutes a potential societal problem because (a) disasters with many victims might be receiving less funding than needed when fewer people die, and (b) disasters with a few victims may be receiving more funding than needed when more people die. Our experimental data provide a potential remedy for this problem: Participants became insensitive to the number of fatalities when cue validity was primed (Study 3) and sensitive to the number of people in need when cue reliability increased (Study 4).

These findings complement previous research on biases in prosocial decision making. Prior work has shown that one identifiable victim elicits stronger responses than thousands of statistical victims do (Kogut and Ritov 2005; Schelling 1968; Small and Loewenstein 2003) and that people become more reluctant to save the same number of lives when those lives originate from a larger population (Fetherstonhaugh, Slovic, Johnson, and Friedrich 1997; Slovic 2007). Such effects, which are contingent on the way people process informational input (Kahneman 2003; Kruglanski and Gigerenzer 2011; Simon 1955) are detrimental because humanitarian aid is misallocated.

Although we acknowledge that our manipulations may have changed more than reliability and validity alone, we are convinced that our work has meaningful contributions for theory on decision making. Most prior research emphasized that cue validity is the main driver of decisions (Gigerenzer and Gaissmaier 2011; Newell, Rakow, Weston, and Shanks 2004; Slovic 1966; York et al. 1987). Our research, however, suggests that in some cases, reliable cues (e.g., fatalities) may be favored over valid cues (e.g., beneficiaries). When solving a trade-off between apportioning aid to two disasters, donors are more likely to consider validity than reliability. However, in the absence of a trade-off, as when responding to a single disaster, a reliability rule is more likely to be employed. Future research should identify other factors that favor the use of reliable versus valid cues.

In conclusion, our findings have important implications for the development of appeals in response to disasters and humanitarian crises. Policymakers and campaign managers should strive to ensure that cues representing the beneficiaries are viewed as reliable or that cue validity is considered. Above all, attention should be diverted from the number of fatalities to the number of survivors in need. We are optimistic that these insights will enhance aid to victims of future disasters.

Chapter 3. Prominence versus Dominance: How relationships between alternatives drive decision strategy and choice

Consumers are presumed to prefer products that in their view are superior along the products' most important—or so-called "prominent"[7] (Fischer and Hawkins 1993)—dimensions. For instance, if memory is the prominent attribute of a USB key, then consumers will prefer the device that is highest in memory, subject to a budget constraint. In this paper we argue that choice sets can influence the extent to which consumers weight the prominent product dimension because the decision context that the choice set creates triggers different decision strategies. In particular, we discuss one common characteristic of the decision context that exerts a strong influence on what and how people choose: The presence or absence of dominance relationships between any of the options in the choice set. We focus on decisions between two target options that present a trade-off between a prominent and non-prominent attribute. Normatively, consumers should assign greater weight to the prominent attribute relative to its counterpart, and should choose the alternative that is superior along the prominent dimension, *ceteris paribus*.

However, in seven studies we provide evidence that when the two target options are dominated by and/or dominate other ("decoy") options in the choice set, consumers are more likely to evaluate the options in the set based on dominance relationships rather than attribute prominence. As a consequence, when the target options are embedded in a choice set with dominating or dominated decoys, the relative preference for the target option that is strongest on the prominent dimension diminishes. We further show that attribute importance judgments are unaffected by the presence of dominance relationships; instead, the use of prominence as an

[7] Prior research on decision-making (e.g., 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 adopt this label in the present work.

input to preference construction is contingent on the structure of the choice set. Finally, we show that when consumers are prompted to attend to attribute prominence, their choices can become less sensitive to the presence of dominance relationships.

3.1 Theoretical Background

3.1.1 Prominence and Dominance

Prominence describes the case where one attribute is more important than the other with respect to a criterion variable, such as choice (see Tversky et al. 1988). Identifying differences in attribute prominence is a basic component of most decision strategies (Bettman, Luce, and Payne 1998); when one attribute is more prominent than another, the difference in prominence is reflected in the decision-maker's choice. For example, imagine that a consumer is making a purchase decision about a TV, for which he examines different alternatives that vary with respect to picture quality and price. If the consumer feels that picture quality is more important than price—at least within the specific range of values under consideration for these two attributes—then he or she will be more likely to use differences in picture quality between options as the determinant of which brand to buy. This implies that differences along a prominent attribute translate to larger differences in subjective utility (Savage 1954; von Neumann and Morgenstern 1947) relative to differences along a non-prominent attribute. Classic utility theory would thus predict that the higher an alternative scores on the prominent attribute, the more likely it is that the decision-maker will prefer it. The decision-maker will forego an alternative scoring higher than another alternative on the prominent attribute only if the second alternative compensates by scoring relatively much higher on the non-prominent attribute.

Dominance describes the case where one alternative scores higher on one attribute while scoring at least as high on all other attributes relative to another alternative (Fischer and Hawkins 1993). If a dominance relationship exists, then the individual should prefer the dominating alternative as this option should deliver the highest subjective utility out of all the options in a set (Savage 1954; von Neumann and Morgenstern 1947). For example, imagine that an individual considers renting an apartment. He is offered two alternatives: Alternative A is a high quality apartment that is close to work and alternative B that is of equally high quality, but far from work. In such a case we would obviously expect the individual to prefer alternative A to alternative B because it is equal or better on all dimensions.

3.1.2 A Hierarchy of Decision Strategies

Tversky, Sattath, and Slovic (1988) suggest that individuals solve a decision problem using a three-stage process (see also Fischer and Hawkins 1993). The decision-maker's initial step is to ascertain the presence of dominance relationships in the choice set. Next, if no dominance relationships are found, the decision-maker assesses whether one of the options has a "decisive advantage" relative to the others. Such an advantage manifests when the difference between the two options on one attribute is far greater than the difference between the two options on the other attribute. For example, a decisive advantage exists if a TV brand has two times better picture quality than a competing brand for a price that is only 5% higher. Finally, if there is no decisive advantage, the individual solves the problem through a lexicographic strategy, where the option scoring highest on the prominent attribute is preferred (Fishburn 1974). In essence, the decision-maker assesses attribute importance only as a last resort, after failing to identify dominance relationships or the presence of a decisive advantage. In the

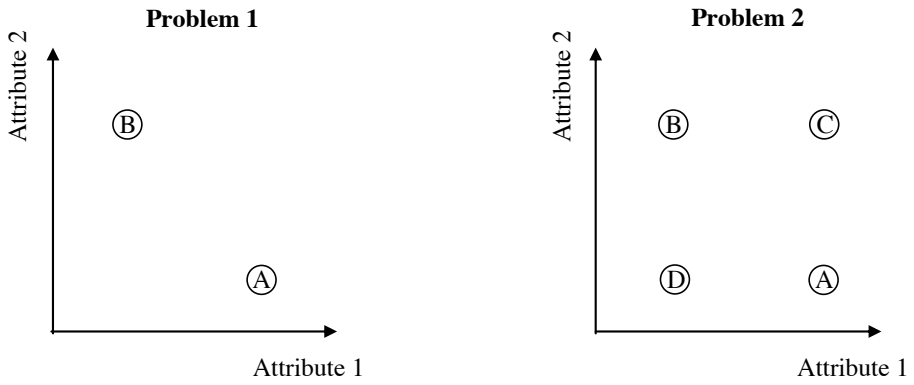
present work we focus on the top and bottom rungs of this hierarchy (i.e., we do not examine the influences of decisive advantage).

With this three-stage process in mind, imagine the simple case of a consumer facing a choice between options A and B that differ along two attributes, attribute 1 and attribute 2. Assume that A and B present a trade-off between these two attributes, and that alternative A scores high on attribute 1 and low on attribute 2, whereas alternative B scores high on attribute 2 and low on attribute 1 (see Problem 1 in Figure 4). Thus, there is neither a dominance relationship nor a decisive advantage in this choice set. Now, assume that within the given range of values for attributes 1 and 2, attribute 1 is more prominent than attribute 2, meaning that the individual considers 1 to be more important and thus assigns a higher subjective weight for this attribute relative to 2. In such a decision problem, given the prominence of attribute 1 over attribute 2, the individual should have a stronger preference for A versus B, i.e., A > B.

Next, imagine a decision problem with four alternatives (see Problem 2 in Figure 4). In this problem the consumer again chooses between different alternatives that differ on the same attributes, 1 and 2. In addition to alternatives A and B as before, the choice set also includes two additional alternatives, C and D. Alternative C is equal to alternative A on attribute 1 and equal to alternative B on attribute 2. This means that alternative C is better than both A and B on one attribute, but equal to both A and B on another attribute, making C the dominating alternative in this choice set. On the other hand, alternative D is equal to alternative A on attribute 2 and equal to alternative B on attribute 1. In other words, alternative D is worse than both A and B on one of the two attributes, but equal to both alternatives on the other attribute, making D the dominated alternative in this choice set. If one were to assume that the consumer's preferences

are based on attribute prominence, then his or her preference structure would be: (i) A > B, (ii) C > A, (iii) C > B, (iv) A > D, and (v) B > D.

Figure 4: Problems 1 and 2



The independence of irrelevant alternatives axiom (Arrow 1963; Ray 1973) stipulates that if A > B in Problem 1, then the same should hold for Problem 2, as the presence of C and D should have no bearing on the relative preference for A and B. However, we predict a violation of this axiom because consumers will resolve the two problems using different decision strategies that result in different preference orderings.

In Problem 1, a decision-maker cannot rely on dominance because each alternative is high on one of the attributes and low on the other. According to Tversky et al.'s (1988) three-stage process, the decision-maker is now left to apply a lexicographic rule that is preceded by an evaluation of each attribute's importance. He or she will then prefer the alternative that is superior on the prominent attribute; in Problem 1 this will lead to a greater relative preference for alternative A over alternative B.

In contrast, in Problem 2 there are easy-to-discern dominance relationships: Alternative C strictly dominates the other three alternatives, whereas Alternative D is dominated by the other three alternatives. Thus, the decision-maker should have a stronger preference for the dominating alternative C relative to all the other options, and a weaker preference for the dominated alternative D relative to all the other options. To make an assessment of preference regarding alternatives A and B still requires an assessment of attribute prominence, as in Problem 1. However, as we elucidate below, this kind of assessment is relatively unlikely.

3.1.3 Strategy Stickiness

We argue that the decision-maker's initial strategy of using the dominance cue in Problem 2 may persist even when he constructs his preference for A and B. That is, although Tversky et al. (1988) predict that the decision-maker will proceed through the hierarchy until he finds the strategy that allows him to differentiate between the alternatives, we predict that this is unlikely to be the case. A substantial body of research indicates that people remain overly faithful to an initially-adopted strategy even when the problem context changes and a different strategy would be more sensible or appropriate. For instance, Luchins' (1942) classic demonstration of the "*Einstellung* effect" shows that people persist in applying a problem-solving strategy that was developed for a preceding, complex problem even when the subsequent problem is simple and could be solved with a more straightforward approach. Similarly, individuals making consecutive decisions in a stock market game failed to adapt to changes in the decision context, such as payoff structure (Bröder and Schiffer 2006). These decision-makers simply retained a strategy that was optimal in the first phase of the game also in its later phases, where other strategies would have been more beneficial. Levav, Reinholtz, and Lin

(2012) provide comparable evidence of strategy stickiness in sequential consumer search. They find that people adopt a strategy—maximizing or satisficing—that is appropriate for an initial choice set-size and persist with this strategy even when the set-size changes substantially and a different strategy would be more appropriate. Finally, Simonson, Bettman, Kramer, and Payne (2013) show that an initially triggered comparison and thinking mode attenuates the impact of other thinking modes, even when the former provides no solution to the decision problem.

The research on strategy persistence motivates the basic claim that we advance in this paper. Specifically, we predict that in the presence of a dominating and/or dominated option in a choice set, consumers will persist in evaluating *all* the options in that set using dominance as the criterion. While this may be an appropriate strategy for options such as C and D in Problem 2 above because they are strictly dominating or strictly dominated, it is not a sensible evaluation criterion for A and B because it does not allow the consumer to differentiate between these two options. In particular, from a dominance perspective A and B are "tied" since they dominate each other along one of the two dimensions. Consequently, the relative preference for A over B will be greater in Problem 1, the two option set, than Problem 2, the four option set, as A is stronger on the prominent dimension but "equal" to B in terms of dominance.

3.2 Overview of Studies

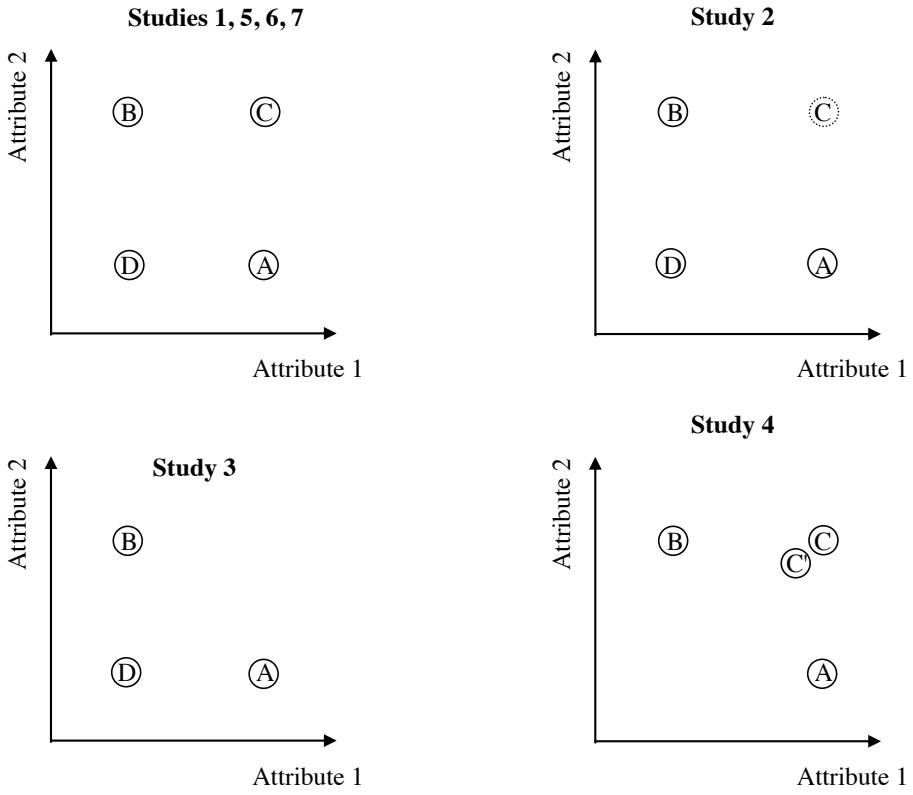
Our empirical section comprises seven studies. We show that when individuals are presented with a choice set in which there is a dominance cue, they construct their preference based on this cue and are consequently less likely to make an evaluation based on attribute prominence. Our experiments test our effect using both ratings and choice as preference. Study 1 documents this basic effect using two decision problems in which for half our participants the

target options A and B are presented alongside a dominating and a dominated decoy. Study 2 addresses the alternative explanation that after identifying the best option in the four option set, C, participants simply become indifferent between A and B. We address this possibility by offering C as an unavailable, phantom option. Study 3 provides further evidence against this account by using only a dominated decoy, D. In Study 4 we provide evidence against the alternative explanation that adding any option that is superior to A and B leads to the assimilation of these two focal options in the utility space. We use a two-option set with target options A and B, a three-option set with an additional dominating decoy, C, and a three-option set with a superior decoy, C', that is not clearly dominating. We show that our effect arises only when there is a clear dominance cue.

Studies 5-7 directly test our theoretical account. In Study 5 we measure attribute importance weights after participants indicate their preference. We show that while relative preference for option A over B changes when decoys C and D are inserted into the set, relative attribute importance weights (i.e., prominence) remain largely unaffected. In Study 6 we provide further support for our theory by influencing the use of prominence even where dominance cues are present. We assign participants either to a two-option set [A,B] or to a four-option set [A,B,C,D], and for half of the participants we provide a reference point relative to which all options in the choice set score lower on the prominent dimension (cf. Tversky and Kahneman 1991). We find that when participants are endowed with a reference point, preference for A over B is not affected by the introduction of dominance cues, and argue that this occurs because loss aversion shifts decision-makers' attention to attribute prominence. Finally, Study 7 illustrates that dominance cues lead to strategy stickiness; we show that the drop in preference for option A relative to B in a choice set with the dominating and dominated decoys, C and D, occurs because

decision-makers first detect dominance, and then use this criterion to evaluate A and B. By prompting people to reverse their natural order of evaluation, we find that the level of relative preference for A is the same as its relative level in the two-option condition where there are no decoy options. The choice sets used in each of our studies are depicted graphically in Figure 5. We conclude with a general discussion and managerial implications.

Figure 5: Choice Sets



3.3 Study 1: Basic Effect

In this study we test our prediction that the relative preference for an option that is superior on the prominent attribute will be greater in a two-option choice set ([A,B], i.e., Problem 1 in Figure 4) than in a four-option choice set that includes dominating and dominated decoys ([A,B,C,D], i.e., Problem 2 in Figure 4).

3.3.1 Pretest

We pre-tested our stimuli in order to confirm that one attribute was more prominent than other. Our materials were adapted from Simonson (1989). Forty-eight respondents (73% male, M_{age} = 27) were recruited through Amazon's Mechanical Turk and asked to participate in a short survey.[8] They were presented with two scenarios in succession, one for televisions and one for apartments. In the first scenario they were told to "imagine that you are considering buying a TV. You are considering different alternatives based on price and picture quality. You consider buying one of the following two brands:

> Brand A: is priced at $600 and scores 90 on picture quality;
> Brand B: is priced at $450 and scores 70 on picture quality."

In the second scenario they were told to "imagine that you are considering renting an apartment. You are considering different alternatives based on distance from your workplace and general condition of the apartment. You consider renting one of the following two apartments:

> Apartment A: is 20 miles away from your workplace and scores 80 on general condition;
> Apartment B: is 10 miles away from your workplace and scores 60 on general condition."

[8] No participants were excluded from this or any other study reported in this paper.

The attribute values in the pre-test were identical to those used in the actual study; the order of option presentation was randomized here and in all the studies we report in this paper, unless otherwise noted. Respondents were then asked to indicate which of the two attributes in each scenario they considered more important to the decision (importance was assessed following each scenario). The results indicated that the majority of participants considered picture quality to be the prominent attribute of a TV and general condition to be the prominent attribute of an apartment (60.4% and 66.7%, respectively). Thus, we expected participants in our main study to express stronger preferences for television A and apartment A in their respective decision scenarios because these scored higher on the prominent attribute.

3.3.2 Main Study Procedure

One hundred and forty-nine respondents (50% female, M_{age} = 32) were recruited through Amazon's Mechanical Turk and were asked to participate in a survey on "understanding decisions." Participants were first asked to "imagine that [they were] considering buying a TV" and were then randomly presented either the two options from the pre-test above or four options that included these first two as well as two others:

> "Brand C: is priced at $450 and scores 90 on picture quality;
> Brand D: is priced at $600 and scores 70 on picture quality."

Note that Brand C symmetrically dominates both A and B because it is low in price and high in picture quality; in contrast, Brand D is symmetrically dominated by both A and B because it is high in price and low in picture quality. Participants were then asked to indicate their likelihood of purchasing each TV on a six-point scale (1 = not at all likely to 6 = very likely).

On the next screen participants completed the same question for a rental apartment. Those who were randomly assigned to the two-option condition were offered the same choice set

as in the pre-test. Four-option condition participants were offered these same alternatives as well as two others:

> "Apartment C: is 10 miles away from your workplace and scores 80 on general condition;
> Apartment D: is 20 miles away from your workplace and scores 60 on general condition."

As in the TV scenario, Apartment C symmetrically dominates both Apartments A and B and Apartment D is dominated by both A and B. Participants were then asked to indicate, "how much would you pay for each apartment" on a six point scale (1 = lowest amount possible to 6 = highest amount possible). The study concluded with a basic demographic questionnaire.

3.3.3 Main Study Results

The results conformed to our predictions (see Table 6). Option A, the option that was stronger along the prominent dimension, was preferred to B relatively more in the two-option condition than in the four-option condition. We discuss each decision context in succession below.

Table 6: Results of Studies 1-3

Study 1 (TV Scenario)		
	Two-option	Four-option
A > B	69%	47%
A = B	11%	23%
A < B	20%	30%
Study 1 (Apartment Scenario)		
	Two-option	Four-option
A > B	66%	42%
A = B	17%	34%
A < B	17%	24%
Study 2 (Car Choice)		
	Two-option	Four-option phantom
Brand A	82%	69%
Brand B	18%	22%
Brand D		1%
None	0%	8%
Study 3 (Disaster Donation)		
	Two-option	Three-option
Disaster A	75%	58%
Disaster B	19%	30%
Disaster D		2%
None	6%	10%

TV scenario: We analyzed our data in two ways. Our first variable of interest was whether Brand A was preferred over Brand B in each condition. For each respondent, we infer

preference ordering by comparing the ratings given for each option.[9] Whereas the vast majority (69%) of participants indicated that they were more likely to buy Brand A compared to Brand B in the two-option condition, significantly fewer participants (47%) indicated that they were more likely to buy Brand A than Brand B when the dominating (C) and dominated (D) decoys were inserted into the choice set, $\chi^2 = 7.30$, $p = .007$.

Second, we compared the difference in ratings of Options A and B with an ANOVA using the number of options (2 vs. 4) as a between-subjects factor. We found a significant effect of number of options, $F(1, 147) = 4.03$, $p = .046$, such that the difference in ratings between options A and B was greater in the two-option condition ($M_{difference} = 1.16$: $M_{brand\_A} = 4.69$, $SD_{brand\_A} = 1.42$; $M_{brand\_B} = 3.53$, $SD_{brand\_B} = 1.42$) than in the four-option condition ($M_{difference} = .46$: $M_{brand\_A} = 3.41$, $SD_{brand\_A} = 1.54$; $M_{brand\_B} = 2.95$, $SD_{brand\_B} = 1.42$).[10]

Apartment scenario: Similar to the TV scenario, we find that individuals were willing to pay more money for Apartment A relative to Apartment B. Again, whereas the large majority (66%) of participants were willing to pay more for Apartment A relative to Apartment B in the two-option condition, far fewer (42%) were willing to do so in the presence of the decoys in the four-option condition, $\chi^2 = 8.45$, $p = .004$.

We also compared the difference in ratings between Options A and B with an ANOVA using the number of options (2 vs. 4) as a between-subjects factor. We found an effect of number of options [$F(1, 147) = 5.47$, $p = .021$], suggesting that the difference in ratings between options A and B was greater in the two-option condition ($M_{difference} = .90$: $M_{apartment\_A} = 3.95$,

[9] The reason we dichotomize based on rating scores is that the ratio of number of alternatives to scale points is not fixed across conditions; assuming that Brand C received the highest score and Brand D received the lowest, then the number of scale points in between is smaller compared to the two-option condition.

[10] We replicated this effect in a separate study (using the same materials) with a ranking task instead of a rating task as the response mode. The results of this study are available from the first author upon request.

$SD_{apartment\_A}$ = 1.42; $M_{apartment\_B}$ = 3.05, $SD_{apartment\_B}$ = 1.33) than in the four-option condition ($M_{difference}$ = .27: $M_{apartment\_A}$ = 3.24, $SD_{apartment\_A}$ = 1.33; $M_{apartment\_B}$ = 2.97, $SD_{apartment\_B}$ = 1.24).

3.4 Study 2: Phantom Decoy

A simple alternative to our interpretation of the data in Study 1 is that, once participants had identified the best option in the set, they became indifferent between A and B because these options' relative inferiority essentially rendered them moot. In order to address this possibility, in the current study we offered the dominating alternative, C, as a "phantom" option that participants saw but were told would be unavailable to them. By implementing this manipulation, options A and B become viable again, and their choice should theoretically be resolved by a consideration of attribute prominence. We predict, however, that the presence of the dominated option, D, will nevertheless cue respondents to use a dominance strategy, even with option C eliminated from consideration. Thus, we expect our effect to persist in a choice set that includes the dominating option as a phantom option. Furthermore, rather than indicating their ratings for each option, in this study we explicitly asked participants to make a choice between them.[11] As in the previous study, our stimuli are adapted from Simonson (1989).

3.4.1 Pretest

Similar to the pre-test of Study 1, 83 individuals (54% male, M_{age} = 28) recruited through Amazon's Mechanical Turk were asked to participate in a short survey in which they were asked to provide their opinion about attribute importance in a choice between two cars. They were

[11] In addition to this study we conducted a nearly identical study (which we do not report here for the sake of brevity) using ratings as in study 1, which yielded similar results to the ones we report here. Note that in this omitted study we had three conditions: two-option, four-option and four-option phantom. We find that preference for the option A over option B was greater in the two-option condition than either the four-option or four-option phantom conditions. The results of this study are available from the first author upon request.

requested to "imagine that you are considering buying a car. You are considering buying one of the following brands:

> 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."

They were then asked to indicate which attribute they believed to be more important for this decision: Ride quality or fuel efficiency. The vast majority of participants (89.2%) indicated fuel efficiency as the most important attribute in this decision.

3.4.2 Main Study Procedure

Two hundred and nineteen individuals (68% male, M_{age} = 29) were recruited through Amazon's Mechanical Turk and requested to participate in a survey on "understanding decisions." They were asked to "imagine that [they are] considering buying a car" and were then randomly assigned to one of two experimental conditions (two-option vs. four-option phantom). In the two-option condition participants were provided the same two brands as in the pre-test. In the four-option conditions participants were also offered:

> Brand C: scores 83 on ride quality and has a fuel efficiency of 33 miles per gallon;
> Brand D: scores 73 on ride quality and has a fuel efficiency of 24 miles per gallon.

Participants in this condition read that, "production of Brand C has been discontinued. This means that Brand C is not available for purchase anymore." As in Study 1, Brand C was the dominating decoy and Brand D was the dominated decoy. Participants were then asked to indicate which brand they would purchase; they could also indicate that they were not interested in purchasing any of the brands in the set. The study concluded with basic demographic questions.

3.4.3 Main Study Results

The results confirmed our predictions (see Table 6). Brand A, the brand stronger on the prominent attribute, was overwhelmingly preferred in the two-option condition (82%). The choice of Brand A dropped to 69% in the four-option phantom condition, $\chi^2 = 5.23$, $p = .022$. Our results indicate that our effect persists even when the dominating option is not available for choice, and further suggest that respondents did not view options A and B as moot because of their inferiority relative to C. Instead, we argue that the presence of a dominated (or dominating) alternative cues the use of dominance—rather than attribute prominence—as a decision strategy. Note that in the marketplace the presence of a phantom option is quite common, either in the form of a stock-out or of an option that a consumer cannot afford to purchase (but would ideally choose), hinting at the generalizability of our effect to a broad range of decision situations.

3.5 Study 3: Dominated Decoy

Although the dominating option, Brand C, was described as an unavailable phantom alternative in Study 2, it is still possible that its presence alone somehow influenced our participants' decision strategy. Thus, even though we had made it clear that C was not available for choice and we did not assess respondents' ratings for this option, the scenario may have been encoded in participants' minds as a four-option condition with *no* phantom alternative (see also Simonson et al. 2013). In order to address this possibility and provide a more conservative test of our hypothesis, we conducted a new study where we only used a dominated decoy instead of both dominating and dominated options. Further, we expand the applicability of our findings by changing the domain of the decision scenario from consumer products to prosocial behavior, namely, willingness to pay for natural disaster victim relief.

Donation to victims of disasters is driven by two key components, the number of people killed and the number of survivors affected. We argue that the number of survivors affected should be the prominent attribute because it is indicative of the actual beneficiaries of the aid (Evangelidis and Van den Bergh 2013). However, as in our previous studies, we predicted that the probability of such considerations will decrease when we include dominance cues in the choice set. We thus expected respondents to place greater weight on the number of fatalities in the three-option set relative to the two-option set.

3.5.1 Pretest

To confirm that our respondent pool perceived the number of affected survivors to be the prominent attribute in natural disaster donation decisions, we recruited 61 individuals (54% male, M_{age} = 30) through Amazon's Mechanical Turk to participate in a brief survey. Individuals first read the following introductory text on disasters drawn from the Center for Research on the Epidemiology of Disasters (CRED): "A disaster is a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance. Though often caused by nature, disasters can have human origins. Wars and civil disturbances that destroy homelands and displace people are included among the causes of disasters. Other causes can be: building collapse, blizzard, drought, epidemic, earthquake, explosion, fire, flood, hazardous material or transportation incident (such as a chemical spill), hurricane, nuclear incident, tornado, or volcano. When a disaster occurs, authorities estimate the number of people killed, which includes the number of persons confirmed as dead, missing, and presumed dead, and the number of people affected, which includes the number of persons requiring immediate assistance during a period of emergency." They were then asked to imagine that they were

considering making a donation to victims of a disaster, and were presented with the following two natural disasters "that [had] taken place in the world:

> For disaster A, local authorities estimate that 100 people died and 300 people were affected;
> For disaster B, local authorities estimate that 300 people died and 100 people were affected."

Participants were then asked to indicate "which attribute is more important for your decision to donate: the number of people affected or the number of people killed." As expected, 72% of the participants indicated the number of affected as the more prominent attribute.

3.5.2 Main Study Procedure

Three hundred and thirty individuals (66% male, M_{age} = 29) were recruited through Amazon's Mechanical Turk and asked to participate in a survey on "understanding people's opinions about different events." All respondents began by reading the same introductory text used in our pretest. They were then randomly assigned to one of two experimental conditions (number of options: two vs. three).

Participants in the two-option condition were presented with the same disasters A and B as in the pre-test. In the three-option condition they were presented with A and B, plus one more:

> "For disaster D, local authorities estimate that 100 people died and 100 people were affected."

Disaster D served as a dominated decoy. Next, participants were asked to indicate which victims they would choose to support by making a donation; they were also given the option not to donate. The study concluded with basic demographic questions.

3.5.3 Main Study Results

Results are summarized in Table 6. Disaster A was chosen by 75% of the respondents in the two-option condition. This share dropped to 58% in the three-option condition, $\chi^2 = 10.51$, $p = .001$. Thus, we replicate the findings of our prior studies, and show that the presence of a dominated option is sufficient to produce our effect.

3.6 Study 4: Dominating vs. Superior-But-Not-Dominating Decoy

The evidence presented thus far suggests that adding a dominating (or dominated) decoy influences how people trade-off the attributes of the focal (A and B) options in the set. A plausible explanation for our finding is that the addition of any alternative that is much better (e.g., Option C) or much worse (e.g., Option D) than the two focal alternatives may lead to the assimilation of A and B (Sherif, Taub, and Hovland 1958). In other words, the perceived difference in the utility space between A and B shrinks when the two options are judged relative to C or D. To rule out such an explanation, we conducted a study where we compared the relative preference for A over B in three conditions: Two-option control, three-option with dominating C, and three-option with superior-but-not-dominating C'. Because in such a choice set there is no clear dominance structure, we expect no change in the relative preference for A over B relative to the two-option condition. Note that this study also enables us to test our effect in a context where there is no dominated option D.

3.6.1 Procedure

We recruited 304 individuals (65% male, $M_{age} = 30$) through Amazon's Mechanical Turk. Participants were randomly assigned to one of three experimental conditions for the two different

decision problems (two-option vs. three-option with dominating option C vs. three-option with superior-but-not-dominating option C'). Our first problem was the apartment scenario used in Study 1, but with the dominated apartment D omitted. Participants in the three-option with superior-but-not-dominating option C' condition were offered the following option in lieu of Apartment C:

> "Apartment C': is 13 miles away from your workplace and scores 74 on general condition."

This time we asked participants to indicate their likelihood of renting each apartment on a six-point scale (1 = not at all likely to 6 = very likely), rather than assessing their willingness to pay as in Study 1.

In the next screen, participants were presented with the car choice problem. The stimuli were the same as in Study 2, with option D omitted and option C available for choice (rather than as a phantom). Participants in the three-option with superior-but-not-dominating C' were offered the following option instead of Brand C:

> "Brand C': scores 80 on ride quality and has a fuel efficiency of 30 miles per gallon."

We asked participants to indicate their likelihood of buying each brand (1 = not at all likely to 6 = very likely). The study concluded with basic demographic questions.

3.6.2 Results

The results conformed to our prediction (see Table 7). Replicating prior findings, the preference for Apartment A over Apartment B dropped in the presence of the dominating Apartment C (69% vs. 55%, $\chi^2 = 4.10$, $p = .043$; $M_{difference} = 1.08$ vs. $M_{difference} = .72$, $F(1, 301) = 1.88$, $p = .17$). However, this drop did not occur when the superior-but-not-dominating

Apartment C' was included in the choice set (69% vs. 65%, $\chi^2 = .49$, $p > .48$; $M_{difference} = 1.08$ vs. $M_{difference} = .94$, $F(1, 301) = .28$, $p > .59$). Similar effects were obtained in the car scenario: Preference for Brand A over Brand B dropped in the presence of the dominating Brand C (76% vs. 45%, $\chi^2 = 18.71$, $p < .001$; $M_{difference} = 1.09$ vs. $M_{difference} = .46$, $F(1, 301) = 7.39$, $p = .007$). This drop was smaller in magnitude when the superior-but-not-dominating Brand C' was inserted into the set (76% vs. 54%, $\chi^2 = 10.17$, $p = .001$; $M_{difference} = 1.09$ vs. $M_{difference} = .71$, $F(1, 301) = 2.69$, $p > .10$). This pattern of results suggests that our effect is largely predicated on the presence of a dominance relationship between the options in the choice set; simple superiority is not sufficient. Furthermore, these data cast doubt on the possibility that our findings arise simply because A and B are assimilated to each other in the presence of a dominance cue.

Table 7: Results of Study 4

Apartment Scenario			
	Two-option	Three-option C	Three-option C'
Preference Ordering			
A > B	69%	55%	65%
A = B	6%	24%	10%
A < B	25%	21%	25%
Mean Preference Rating (Std Dev)			
A	4.66 (1.07)	3.58 (1.22)	3.87 (1.31)
B	3.58 (1.20)	2.86 (1.07)	2.93 (1.30)
Difference	1.08	0.72	0.94
Car Scenario			
	Two-option	Three-option C	Three-option C'
Preference Ordering			
A > B	76%	45%	54%
A = B	4%	29%	18%
A < B	20%	26%	28%
Mean Preference Rating (Std Dev)			
A	4.67 (1.01)	3.28 (1.16)	3.83 (1.14)
B	3.58 (1.00)	2.82 (1.33)	3.12 (1.27)
Difference	1.09	0.46	0.71

3.7 Study 5: Prominence Usage

We have argued that decision-makers are more likely to use prominence as a decision strategy in the absence of dominance relationships compared to when such relationships are present in the choice set. The present study directly tests this hypothesis: We measured attribute

importance post-preference, and then examined whether the difference in attribute importance (i.e., the degree of prominence) predicted choice as function of the number of options in the choice set. A second aim of this study is to assess whether our set-size manipulation shifts attribute prominence judgments rather than decision strategies. That is, although we have argued that respondents engage in different *strategies* depending on the set size, it is possible that our manipulation induces a change in beliefs about which is the prominent attribute, such that for whatever reason participants in the four-option set deem the otherwise-prominent attribute not as prominent relative to participants in the two-option set.

3.7.1 Procedure

We recruited 176 participants (50% female, M_{age} = 30) through Amazon's Mechanical Turk and randomly assigned them either to a two-option or to a four-option condition, using the same stimuli as in Study 2 (although here option C was not framed as a phantom alternative). We first asked all respondents to indicate how likely they would be to purchase each brand on a six-point scale (1 = not at all likely to 6 = very likely). In the next screen, we asked participants to indicate the importance of each attribute (1 = not at all important to 10 = very important).

3.7.2 Results

We replicated our basic effect (see Table 8): Preference for Brand A relative to Brand B decreased when the decoy options were added (76% vs. 55%, χ^2 = 8.46, p = .004; $M_{difference}$ = 1.35 vs. $M_{difference}$ = .58, $F(1, 174) = 10.51$, p = .001). However, there was no effect of our manipulation on difference in attribute importance ($M_{difference}$ = 2.06 vs. $M_{difference}$ = 2.04, $F(1, 174) = .01$, $p = .94$); fuel efficiency was seen as equally prominent relative to ride quality in both

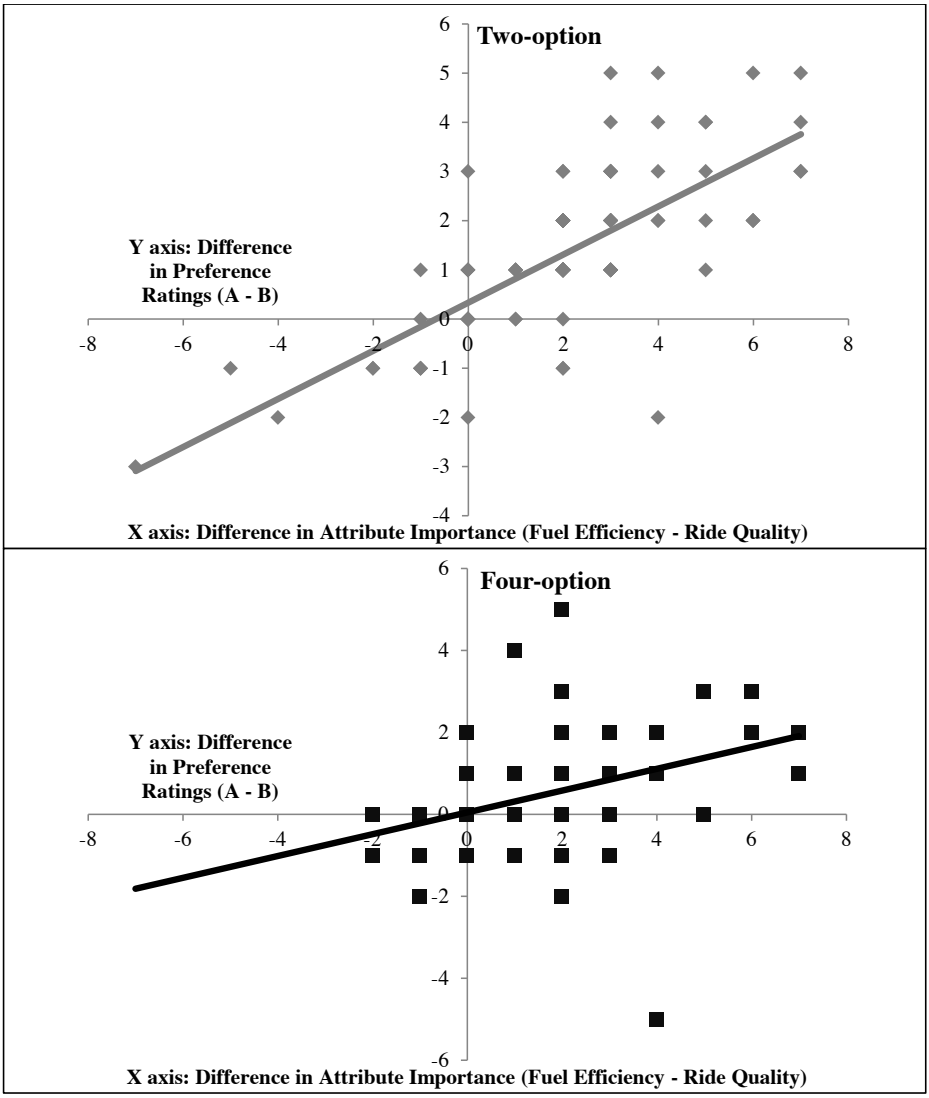
two- and four-option conditions. This suggests that, as expected, our set-size manipulation does not shift importance weights.

Furthermore, we have argued that prominence looms larger in the two-option set than in the four option-set where dominance cues are present. In order to test this directly, we conducted a regression with relative preference (i.e., the difference in the ratings of A and B) as the dependent variable and the difference in attribute importance ratings (i.e., the degree of prominence of one attribute over the other), condition dummy and their interaction as the independent variables. The analysis revealed that the effect of prominence was greater in the two-option condition (B = .49, $t(1, 172)$ = 9.28, $p < .001$; R^2 = .53) than in the four-option condition (B = .27, $t(1, 172)$ = 3.65, $p < .001$; R^2 = .12). This interaction was significant, B = -.11, $t(1, 172)$ = -2.49, p = .014 (see Figure 6). We interpret this result to mean that decision-makers are more likely to use prominence as a decision strategy when there are no dominance cues, relative to when such cues are present.

Table 8: Results of Study 5

	Two-option	Four-option
Preference Ordering		
A > B	76%	55%
A = B	11%	24%
A < B	13%	21%
Mean Preference Rating (Std Dev)		
A	4.91 (.92)	3.71 (1.22)
B	3.56 (1.10)	3.13 (1.21)
Difference	1.35	0.58
Mean Importance Rating (Std Dev)		
Fuel Efficiency	8.78 (1.52)	9.34 (.98)
Ride Quality	6.72 (1.85)	7.30 (1.70)
Difference	2.06	2.04

Figure 6: Study 6 (Prominence & Preference)



3.8 Study 6: Priming Prominence

Earlier we argued that unless the decision context compels decision-makers to consider attribute prominence, their initial approach to a decision problem is to consider dominance cues. In this study we test our contention by using a manipulation devised by Tversky and Kahneman (1991), who show that people's sensitivity to an attribute increases when that attribute is framed as a loss. In their studies participants were endowed with a reference state, and were then asked to choose between two options each characterized by two attributes; choosing required a trade-off between these attributes. The options were designed such that for one of the attributes both options yielded gains relative to the reference point and for the other attribute they 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 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 this attribute as a loss.

3.8.1 Pretest

We recruited 71 respondents (69% male, M_{age} = 32) through Amazon's Mechanical Turk. Participants were asked to imagine that "[they] are planning to have dinner with some friends," and that "[they] have the following options (prices are similar for all options):

> Restaurant A: is 14 miles away and has an average rating of 9;
> Restaurant B: is 8 miles away and has an average rating of 6."

We asked participants which attribute they thought was more important and found that the vast majority (83%) indicated average rating as the most important attribute.

3.8.2 Main Study Procedure

We randomly assigned 363 individuals (70% male, M_{age} = 27) recruited through Amazon's Mechanical Turk to one of four experimental conditions in a two (number of options: two vs. four) by two (reference point: none vs. yes) design. Participants in the control (no reference point provided) conditions were asked to imagine that "[they] are planning to have dinner with some friends," and that "[they] have the following options (prices are similar for all options)." Participants in the reference point conditions read instead that "[they] are planning to have dinner with some friends. In the past [they] used to dine at a restaurant that is now closed for renovation. That restaurant was 16 miles away and had an average rating of 10." In this manipulation, we make the prominent attribute (i.e., average rating) the dimension along which losses will be incurred, and thus expect to increase respondents' sensitivity to its importance regardless of the number of options in the choice set.

Participants in the two-option conditions were offered the same options as in our pre-test. Participants in the four-option conditions were offered two additional alternatives:

> "Restaurant C: is 8 miles away and has an average rating of 9;
> Restaurant D: is 14 miles away and has an average rating of 6."

Similar to prior studies, Restaurant C is the dominating decoy, while Restaurant D is the dominated decoy. Participants were asked to indicate their likelihood of dining at each restaurant on a six-point scale (1 = not at all likely to 6 = very likely). The study concluded with basic demographic questions.

3.8.3 Main Study Results

The results conformed to our prediction (See Table 9). When no reference point was made salient, we replicated prior findings: Preference for Restaurant A over Restaurant B

significantly decreased when the decoy options C and D were added (87% vs. 69%, $\chi^2 = 8.03$, $p = .005$; $M_{difference} = 2.11$ vs. $M_{difference} = 1.21$, $F(1, 359) = 14.27$, $p < .001$). In contrast, when the reference point was made salient, relative preference for Restaurant A over Restaurant B directionally *increased* when the decoy options were added (85% vs. 91%, $\chi^2 = 1.82$, $p > .17$; $M_{difference} = 1.95$ vs. $M_{difference} = 2.11$, $F(1, 359) = .48$, $p > .48$). The interaction implied by our pattern of results is statistically significant ($\chi^2 = 8.05$, $p = .005$; $F(1, 359) = 10.02$, $p = .002$). Our data suggest that an intervention designed to draw attention to the prominent attribute can reduce people's sensitivity to dominance cues. In particular, when individuals choose between options that imply a loss on the prominent attribute, they are more likely to prioritize prominence in their preference construction regardless of the presence of dominance relationships.[12]

Table 9: Results of Study 6

	No reference		Reference	
	Two-option	Four-option	Two-option	Four-option
Preference Ordering				
A > B	87%	69%	85%	91%
A = B	5%	12%	5%	6%
A < B	8%	19%	10%	3%
Mean Preference Rating (Std Dev)				
A	5.29 (.89)	4.31 (1.10)	5.20 (.86)	4.60 (1.01)

[12] In a follow-up study (using the same stimuli as in Study 5) we replicated this finding using a more overt manipulation of attribute prominence. We prompted half our participants to indicate which attribute is more important in advance of making their ratings, with the other half indicating importance afterward. We replicated our basic effect when participants were asked the attribute importance question after indicating their rating: preference for A was greater in the two-option set than in the four-option set. In contrast, we observed no significant effect when we asked the attribute importance question before measuring preference. Participants in the four-option condition who had been prompted were equally likely to consider prominence when expressing their preference relative to their counterparts in the two-option condition. The results of this study are available from the first author upon request.

B	3.18 (1.14)	3.10 (1.14)	3.25 (1.13)	2.49 (1.14)
Difference	2.11	1.21	1.95	2.11

3.9 Study 7: Stickiness in Use of Dominance Cues

We have reasoned that our effect arises because people's evaluation strategies are sticky; when they evaluate a choice set by first identifying dominance relationships, they persist in using dominance as their evaluation criterion. This implies that if prompted to evaluate options A and B prior to evaluating the dominating and dominated options C and D, participants should be less sensitive to the presence of dominance cues. Here we test this implication and provide support for our theoretical account by explicitly manipulating the order in which people are asked to evaluate the options in a choice set that contains dominance relationships. Participants are either asked to first rate the dominating and dominated options C and D, followed by A and B, or vice versa. We predict that when participants begin by rating C and D they will show a weaker preference for A over B relative to a two-option set (similar to the other studies reported herein); however, we expect this effect to be attenuated when they are asked to evaluate A and B first.

3.9.1 Procedure

Two hundred and fourteen individuals (71% male, M_{age} = 28) were recruited through Amazon's Mechanical Turk and randomly assigned to one of three experimental conditions (two-option vs. four-option with [C,D] first vs. four-option with [A,B] first). We used the same stimuli as in Study 5. However, participants in the four-option [A,B] first condition were asked to indicate their preference for brands A and B first, followed by their preference for C and D. The task appears below:

How likely is it that you would buy Brand A and Brand B?

	Not at all likely					Very likely
Brand A	1	2	3	4	5	6
Brand B	1	2	3	4	5	6

How likely is it that you would buy Brand C and Brand D?

	Not at all likely					Very likely
Brand C	1	2	3	4	5	6
Brand D	1	2	3	4	5	6

This order was reversed for participants in the four-option [C,D] first condition. Participants expressed their preference for the four brands on the same screen, just as they had in previous studies; the only difference was the explicit separation of the evaluation of A and B from C and D. Of course, participants were free to respond to the questions in any order that they preferred, making this a relatively conservative test.

3.9.2 Results

The results accord with our prediction (see Table 10). Relative preference for Option A over Option B was significantly lower in the four-option condition where C and D were evaluated first compared with the two-option condition (71% vs. 51%, $\chi^2 = 5.88$, $p = .015$; $M_{difference} = 1.07$ vs. $M_{difference} = .46$, $F(1, 211) = 3.50$, $p = .06$). In contrast, relative preference for A over B was not significantly different in the four-option condition where A and B were evaluated first compared with the two-option condition (71% vs. 62%, $\chi^2 = 1.36$, $p > .24$; $M_{difference} = 1.07$ vs. $M_{difference} = .76$, $F(1, 211) = .90$, $p > .34$). This pattern of results is consistent with the claim that people spontaneously assess dominance when solving a decision problem, and that they persist in assessing options through this lens even though such a strategy does not allow them to effectively differentiate certain options in the set (i.e., options A and B). This

tendency is attenuated when people are prompted to evaluate the target options A and B first, prior to detecting the dominance relationships.

Table 10: Results of Study 7

	Two-option	Four-option, CD first	Four-option, AB first
Preference Ordering			
A > B	71%	51%	62%
A = B	8%	29%	19%
A < B	21%	20%	19%
Mean Preference Rating (Std Dev)			
A	4.68 (1.09)	3.81 (1.40)	3.68 (1.35)
B	3.61 (1.21)	3.35 (1.26)	2.92 (1.21)
Difference	1.07	0.46	0.76

3.10 General Discussion

In this paper we show that decision-makers are less likely to rely on prominence when expressing their preference about options from a choice set in which dominance relationships exist between some of the options. This results in a preference reversal where the option that is superior on the prominent dimension is strongly preferred in a two-option set, but less preferred in a three- or four-option set where dominance relationships are present. The presence of dominance is critical; when we introduce to the choice set an option that is simply superior—but not clearly dominating—it does not produce our preference reversal. We reason that when decision-makers encounter a choice set that includes dominance relationships, they spontaneously begin by assessing whether dominance relationships are present, and then use the same kind of strategy to evaluate the focal alternatives A and B even though such a strategy does

not allow one to differentiate between these options. We moderate this "strategy stickiness" by prompting the evaluation of the focal alternatives prior to the evaluation of the dominating or dominated alternatives. . Finally, we show that inducing people to consider attribute prominence prior to making a choice prompts them to be sensitive to prominence rather than dominance.

3.10.1 Relationship to Context-Effects Literature

The context effects that have been documented in the last three decades of consumer research are predicated on uncertainty regarding attribute trade-offs (see, e.g., Amir and Levav 2008; Huber, Payne, and Puto 1982; Levav, Kivetz and Cho 2010; Simonson 1989; Simonson and Tversky 1992; Dhar and Simonson 2003). Respondents in these studies are presumed to experience decision conflict because they do not have articulated values for each of a product's attributes. In turn, attributes are treated as (roughly) equally prominent, as reflected in Simonson's claim that (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, or if a trade-off analysis does not provide strong support for either of the brands." In contrast, the context effect that we report here is predicated on one attribute being prominent and not the other. Indeed, the source of our effect is not the resolution of decision conflict, but rather the structure of the relationships between options in the choice set and the concomitant decision strategies or evaluation criteria that these relationships evoke.

A closer examination of the data reported in Simonson (1989) suggests that these previously-reported context effects—and in particular asymmetric dominance—can also occur where there are differences in attribute prominence, as in our studies. However, in such situations the effect is asymmetrical; that is, the presence of a decoy influences the choice

proportion of one option but not the other. For instance, in Simonson's car scenario study's two-option set (Table 2, p. 165; the only scenario that we used here without modifying the original), there is a clear preference for the car scoring high on fuel efficiency relative to the car scoring high on ride quality (67% vs. 33%, respectively). The effect of the decoy depends on which option it is dominated by: When the decoy is dominated by the option that is superior along the prominent attribute, fuel efficiency, there is no change in choice proportion (67% vs. 69%), but when the decoy is dominated by the option that is inferior on the prominent attribute, there is a large increase in choice proportion (33% vs. 59%).

We conjecture that the same hierarchy of decision strategies that we use to explain our effect can explain this asymmetry as well. In particular, in the presence of the decoy, people can use dominance as a way to evaluate the alternatives in the set rather than prominence. When the decoy is placed next to the option that is superior on the prominent dimension, people use dominance as a strategy. However, since both dominance and prominence favor the same alternative in this case, it is unclear to what degree each strategy accounts for the observed choice proportion. In contrast, when the decoy is placed next to the option that is inferior on the prominent attribute, Simonson observes a large asymmetric dominance effect, which can be explained by his participants' usage of the dominance cue, even though prominence would lead them to choose the other option.

3.10.2 Implications for Other Literatures

Our findings also 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 of a given option. 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, our findings seem to indicate that in the presence of dominating and/or dominated options in a choice set, differences along a prominent attribute may yield lower returns on utility relative to when there are no dominance cues. This implies that prominence and dominance as decision strategies can substantially alter the subjective utility of a given option. Second, the results we report suggest a potential modification to Tversky et al.'s (1988) three-stage decision process (see also Fischer and Hawkins 1993). In particular, we show that this hierarchical process can "short-circuit" because people's initial approach to a decision problem—in this case, use of dominance cues to construct a preference ordering—can be sticky, which reduces their likelihood of advancing to the second or third stages. The result is a preference ordering that violates one of the fundamental axioms of decision theory, independence of irrelevant alternatives. Third, the strategy stickiness that we document also suggests an amendment to Payne, Bettman and Johnson's (1992, 1993) conclusions in their work on adaptive strategy selection. In particular, our data indicate that in some situations consumers adapt their initial strategy to the decision context, as described by Payne et al., but then fail to adapt their strategy as they progressively evaluate options in a set (see Levav et al. 2012 for a similar finding in the consumer search domain). Fourth, research on task goals and the prominence effect in preference reversals associates prominence with response mode—the prominent attribute receives greater weight in tasks that require differentiating options rather than equating them (Fischer, Carmon, Ariely and Zauberman 1999; Fischer and Hawkins 1993). Our studies, while not directly addressing Fischer and colleagues' interpretation, offer another contingency to the reliance on prominence, independent of the elicitation task.

3.10.3 Alternative Explanations

There are a couple of alternative explanations to the interpretation of our results. The first is that the insertion of the decoy (C and D) options actually changes attribute weights, such that the formerly prominent attribute is now made less prominent. We question this alternative for empirical and theoretical reasons. First, in Study 5 we show that attribute weights are invariant to the presence of dominance cues; regardless of the number of options, the perceptions of prominence remain the same. Second, from a theoretical perspective attribute weights should not change when the range of values is not affected (Fischer 1995; Wedell and Petitbone 1996). In our studies all dominated and dominating options had the exact same values on the two attributes as the focal options, so that the range of values remained the same across conditions. The second alternative explanation is that the addition of the decoy options increases the information load on respondents, which in turn forces them to trade off accuracy for effort (Gigerenzer and Gaissmaier 2011). Here, too, we question this alternative for empirical and theoretical reasons. First, we show that when primed to consider attribute prominence either through a manipulation of loss aversion (Study 6), or a manipulation of stickiness (Study 7), people are able to do so even when the number of options in the choice set is large. Second, a consideration of attribute prominence is a hallmark even of low-effort decision strategies (Bettman et al. 1998). Thus, it is unlikely that participants' preference orderings shift simply because of the cognitive load caused by the addition of two decoy options.

3.10.4 Practical Implications

Our findings raise a number of implications for product line management, particularly for vertically positioned goods where dominance is evident to consumers. Although consumers in

these situations theoretically are presumed to select the product that is 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. Products whose attributes are completely alignable and in which dominance relationships are easy to see are more likely to show our effect. Product managers should account for this possibility particularly when introducing new products—which are often superior to the existing alternatives—even when those products are unavailable due to limited distribution or future, anticipated launch so that they are effectively "phantom" options, as in our Study 2. Conversely, our findings suggest that boosting the sales of products that are relatively weak along a prominent dimension can be achieved by introducing dominating or dominated products into the product line because in such cases the prominent attribute will be afforded lesser weight.

In addition, our results can have significant importance for choice architecture in public policy settings. Policy-makers who endeavor 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. Study 3 provides such an example in the context of a donation decision; participants were less likely to consider the number of people affected by a natural disaster when there were dominance relationships in the choice set.

3.10.5 Conclusion

Attribute prominence is a fundamental component of most—if not all—decision strategies. For instance, in elimination-by-aspects (Tversky 1972) the decision-maker discards options based on whether or not they meet a minimum threshold along a subset of dimensions, with these dimensions selected based on their perceived importance to the choice. Similarly,

weighted-adding requires an assessment of attribute prominence to determine the weight given to each attribute in the choice process. Even strategies that are designed to minimize cognitive effort, like a lexicographic strategy, are predicated on decision-makers taking account of attribute prominence. In this paper we provide evidence that the relationships between the items in a choice set may determine the extent to which prominence is considered. We discuss one such case, namely the presence or absence of dominance relationships, and consistently show that decision-makers are less likely to rely on prominence when choosing from sets where dominance relationships exist.

Chapter 4. The Prominence Detraction Hypothesis: Context Effects as a Function of Attribute Prominence

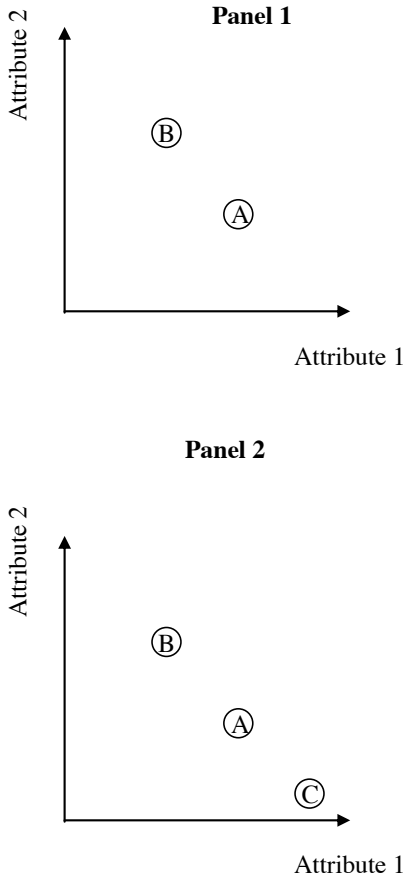
Products are commonly marketed based on their attributes. For instance, hard drives are described in terms of their capacity and price or cameras in terms of their zoom and megapixels. When considering the introduction of a new product, a product manager needs to assess the effect of the new product 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 7). 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 7). 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.

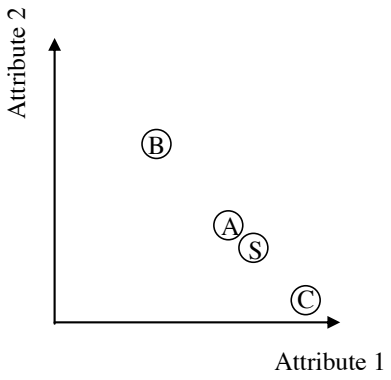
Figure 7: The Introduction of a New Extreme Option



Previous research using both theoretical and behavioral approaches has attempted to accommodate 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 8), 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 8). 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.

Figure 8: Similarity and Extremeness Aversion as a Function of Distance



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[13] (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.

4.1 Theoretical Background

4.1.1 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 2013b; 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 selecting the option scoring highest on the prominent attribute. We will be referring to this decision criterion as the *prominence* criterion.

[13] Prior research on decision-making (e.g., Evangelidis and Levav 2013b; 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.

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.

4.1.2 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 9). 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 non-prominent dimension, such that option B now becomes an intermediate option in the choice set (Panel 2 in Figure 9). 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 9) 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 C' is added along the prominent dimension, such that now option A becomes an intermediate option in the choice set (Panel 3 in Figure 9). 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 9) 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).

In summary, our analysis leads to the following hypotheses (Table 11):

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;

H2: 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.

Figure 9: The Prominence Detraction Hypothesis

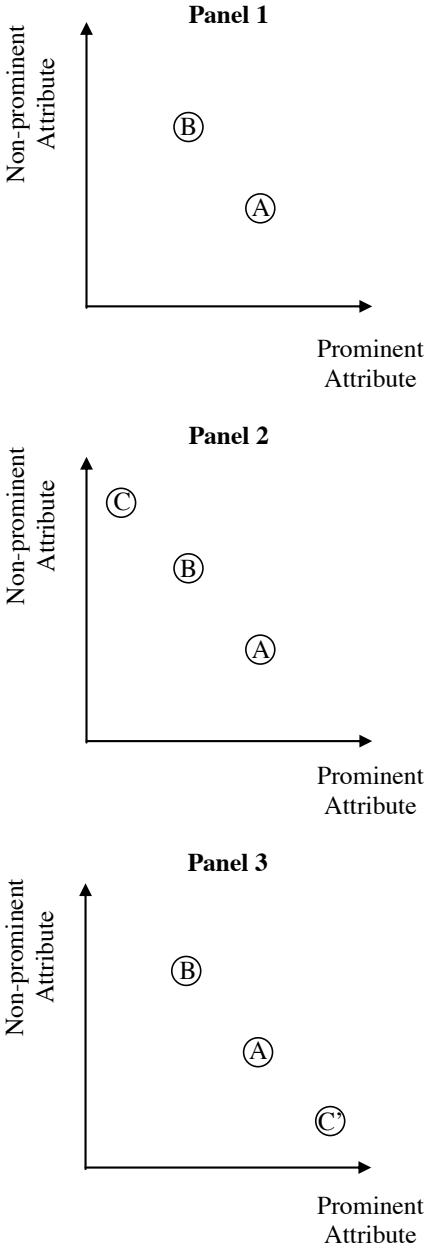


Table 11: Prominence Detraction: Choice Set Configuration, Decision Criteria, and Predicted Choice Shares

Set	Decision Criterion (Favored Option)	Choice Shares
A, B	Prominence (A)	
A, B, C	Prominence (A)	
	Compromise (B)	
A, B, C'	Prominence (C')	
	Compromise (A)	
Hypotheses		
Prominence Detraction (H1)		$P_B\{A, B\} < P_B\{A, B, C\}$
Prominence Detraction (H2)		$P_A\{A, B\} > P_A\{A, B, C\}$

4.2 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 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 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' (Figure 10), 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.

4.3 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.

4.3.1 Study 1a – Toshiba Hard Drive

Procedure. For this study we used the Toshiba Canvio hard drive as our stimulus (Figure 10). 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_{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 10). In the two-option 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_{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 12. 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 occurred 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.

4.3.2 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 2013b); 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 2013b); 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 8). 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 8), 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 12): 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 B. We discuss the effect sizes that we observe in these studies in two meta-analyses that we report in the General Discussion.

Figure 10: Pictures of Actual Products (Studies 1a-1d & 2)

TOSHIBA CANVIO (STUDIES 1A & 2)

CANON POWERSHOT (STUDY 1B)

THE HOBBIT (STUDY 1C)

SONY WALKMAN (STUDY

Table 12: Results of Studies 1a-1f

Study 1a (Toshiba Canvio; n = 302)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
320GB model		14%	
500GB model	6%	21%	15%
750GB model	94%	65%	23%
1TB model			62%
Study 1b (Canon CyberShot; n =303)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
SX90 model		16%	
SX170 model	5%	20%	14%
SX510 model	95%	64%	38%
SX740 model			48%
Study 1c (The Hobbit: An Unexpected Journey; n = 300)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
3D Extended Collector's Edition		18%	
3D Extended Edition	30%	36%	29%
Extended Edition	70%	46%	43%
Theatrical Edition			28%
Study 1d (Sony Walkman; n = 300)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
4GB model		9%	

8GB model	7%	19%	15%
16GB model	93%	72%	16%
32GB model			69%
Study 1e (TV; n =272)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
Brand C'			55%
Brand A	86%	64%	29%
Brand B	14%	29%	16%
Brand C		7%	
Study 1f (Car; n = 302)			
	Two-option	Extreme on non-Prominent	Extreme on Prominent
Brand S'			37%
Brand A	81%	59%	53%
Brand B	19%	31%	10%
Brand S		10%	

4.4 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.

4.4.1 Procedure

We recruited 300 participants (65% male, M_{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 C' 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 (N = 80, 54% female, M_{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 non-prominent 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 2013b) and examine differences in the extent to which prominence predicts choice across conditions.

4.4.2 Results

We replicated our basic effects in both scenarios (Table 13). 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%, $\chi^2 = 12.32$, $p < .001$). 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%, $\chi^2 = 67.87$, $p < .001$).

Table 13: Results of Study 2

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

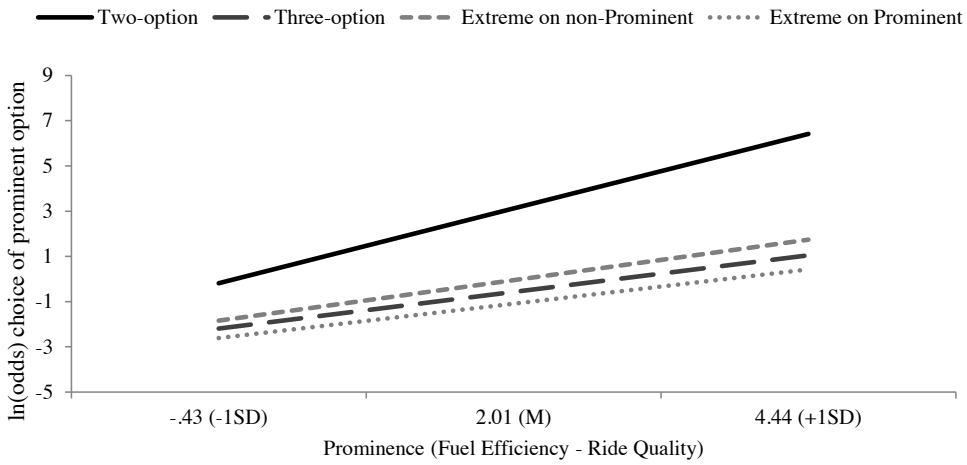
There was no effect of experimental condition on prominence judgments (i.e., relative attribute importance) for either the car choice ($F < 1, p > .66$) or the hard drive choice ($F < 1, p > .42$).[14] Fuel efficiency was seen as more prominent relative to ride quality ($M = 8.78, SD = 1.35$ vs. $M = 6.77, SD = 1.87, F(1, 299) = 203.61, p < .001$) and capacity as more prominent than price ($M = 8.69, SD = 1.73$ vs. $M = 7.64, SD = 1.98, F(1, 299) = 45.68, p < .001$), 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

[14] There was no significant interaction of experimental condition and order in which participants responded on the measures on the importance weights.

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 C' depending on the car choice set condition; the 750GB or the 1TB 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 non-prominent (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 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, decision-makers 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 (B = 1.36, SE = .31, Nagelkerke R^2 = .67; χ^2 = 19.34, p < .001) than in the three-option conditions (B = .67, SE = .10, Nagelkerke R^2 = .40; χ^2 = 41.13, p < .001). This interaction was significant, B = -.69, χ^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 (B = .74, SE = .15, Nagelkerke R^2 = .46 vs. B = 1.36, SE = .31, Nagelkerke R^2 = .67; χ^2 = 3.26, p = .071) and when brand A was the intermediate option (B = .62, SE = .15, Nagelkerke R^2 = .34 vs. B = 1.36, SE = .31, Nagelkerke R^2 = .67; χ^2 = 4.57, p = .033). The results are illustrated in Figure 11.

Figure 11: 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 C' 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.

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 (B = 1.46, SE = .43, Nagelkerke R^2 = .54; χ^2 = 11.56, p = .001) than in the three-option conditions (B = .55, SE = .09, Nagelkerke R^2 = .36; χ^2 = 36.61, p < .001). This interaction was significant, B = -.90, χ^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 (B = .56, SE = .13, Nagelkerke R^2 = .38 vs. B = 1.46, SE = .43, Nagelkerke R^2 = .54; χ^2 =

4.07, p = .043) and when the 500 GB drive was the intermediate option (B = .55, SE = .13, Nagelkerke R^2 = .32 vs. B = 1.46, SE = .43, Nagelkerke R^2 = .54; χ^2 = 4.03, p = .045).

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.

4.5 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.

4.5.1 Procedure

We randomly assigned 601 individuals (61% male, M_{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.

4.5.2 Results

The results are summarized in Table 14. 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% 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 ($\chi^2 = 10.92$, $p = .001$). 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 ($\chi^2 = 3.85$, $p = .050$ 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 attribute—and 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.

Table 14: Results of Study 3

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

4.6 Study 4: Priming Prominence

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 9). 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 2013b).

4.6.1 Procedure

We randomly assigned 602 individuals (65% male, M_{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 C', 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., H1) 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.

4.6.2 Results

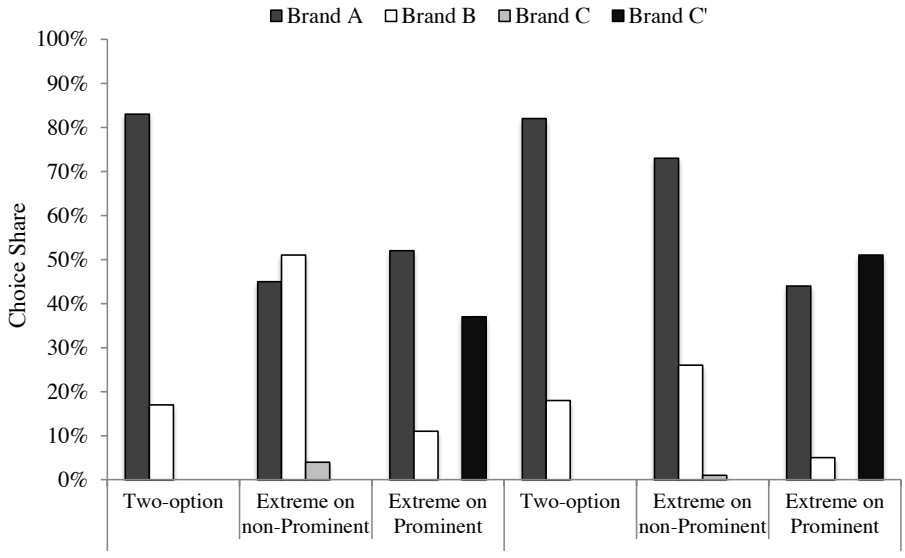
The results were consistent with our predictions (See Table 15 and Figure 12). When no reference point was given, we replicated our earlier findings: The majority (83%) of respondents in the two-option condition preferred brand A, the option scoring high on the prominent attribute (fuel efficiency). 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 ($\chi^2 = 4.07$, $p = .044$) and between adding an extreme option on the prominent attribute and the reference point manipulation ($\chi^2 = 8.32$, $p = .004$) were statistically significant.

Table 15: Results of Study 4

	Two-option	Extreme on non-Prominent	Extreme on Prominent
No reference point			
Brand C'			37%
Brand A	83%	45%	52%
Brand B	17%	51%	11%
Brand C		4%	
Reference point			
Brand C'			51%
Brand A	82%	73%	44%
Brand B	18%	26%	5%
Brand C		1%	

Figure 12: Prominence Detraction Moderated by Prominence Prime (Study 4)



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 non-prominent 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 (C') 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, C'. 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.

4.7 General Discussion

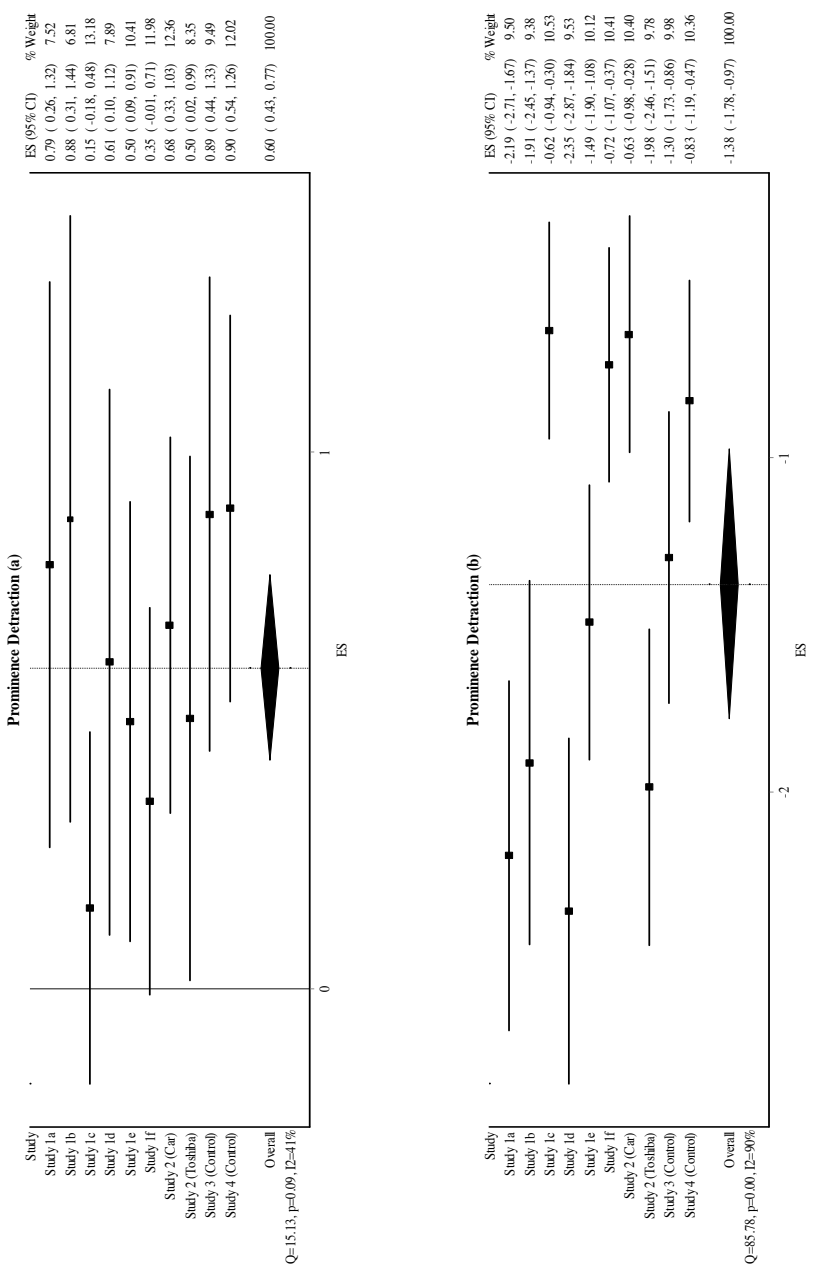
In this paper we contrast two hypotheses in behavioral research—similarity and extremeness aversion—that make opposing predictions about how the addition of a new extreme option should affect the choice share of the intermediate option in the set. Our main proposition is that the direction of the context 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 13 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 H2 is large (d = -1.38, 95% LLCI = -1.78, ULCI = -.97).[15]

[15] In both meta-analyses, we excluded the experimental conditions where a moderator was present.

Figure 13: Meta-Analyses of Observed Effect Sizes



4.7.1 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.

4.7.2 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.

4.7.3 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 non-prominent 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 accommodate 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.

Chapter 5. Conclusion

5.1 General Discussion

Both utility theory and common sense assume that decision-makers evaluate alternatives consistent with the weights that they assign to the different attributes. Alternatives that are superior along the prominent attribute should be preferred over alternatives that are superior along the non-prominent attribute(s). For instance, donors should be donating more money to disasters with a higher number of people in need conditional on perceiving the number of survivors as the prominent attribute for the donation decision. Consumers should be willing to pay more money to purchase a camera that provides higher picture quality conditional on perceiving picture quality as the prominent attribute for the purchase decision. This dissertation shows that the extent to which attribute prominence drives valuations and choice may depend on several parameters of the decision process.

In Chapter 2, we found that the use of prominence in choice depends on the reliability of the attribute values along which alternatives are described. When values associated with the prominent attribute are not perceived to be as reliable as values associated with the non-prominent attribute, decision-makers are more likely to make choices that are inconsistent with their attribute preferences. We examined donors' response to natural disasters and found that the amount of money allocated for humanitarian aid depends on the number of fatalities rather than the number of survivors who are in need of assistance. We further found that this effect arises because donors view the number of fatalities as more reliable than the number of survivors, even though the number of survivors is seen as the prominent attribute for the donation decision. This is particularly problematic because disasters with many victims might be receiving less funding than needed when fewer people die. We further found that when nudged to solve a trade-off

between allocating aid to two disasters, donors are more likely to consider attribute prominence over reliability hence becoming less sensitive to the number of fatalities. Finally, we found that replacing the broad category affected with a more precise one (i.e., homeless) can lead to an increase in donors' sensitivity to the number of people in need.

In Chapter 3, we argued that the use of prominence in choice depends on the presence of dominance relationships between the alternatives under consideration. We found that decision-makers are less likely to employ prominence when expressing their preference about alternatives from a choice set in which dominance relationships exist. This results in a preference reversal where the option that is superior on the prominent dimension is strongly preferred in a two-option set, but less preferred in a three- or four-option set where a symmetrically dominated and/or symmetrically dominating alternative is added to the set. We proposed a decision-making framework according to which, when decision-makers choose from a choice set that includes dominance relationships, they spontaneously begin by assessing whether dominance relationships are present, and then use dominance as a criterion to evaluate all alternatives in the set. We show that priming people to consider attribute prominence prior to making a choice prompts them to consider prominence over dominance when evaluating the alternatives. Finally, we moderate our findings by prompting the evaluation of the focal alternatives (i.e., the alternatives presenting a trade-off) prior to the evaluation of the dominated or dominating alternatives.

In Chapter 4, we argued that the use of prominence in choice depends on the presence of an intermediate alternative in the set. We found that decision-makers are less likely to employ prominence when expressing their preference about alternatives from a choice set in which an intermediate option is present. Based on this premise, we advanced a new hypothesis,

prominence detraction, according to which: 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 found empirical support for prominence detraction in nine studies and in two meta-analyses. We also found that prominence detraction is moderated when the prominence of the attributes is manipulated and when decision-makers are primed to employ prominence when choosing.

5.2 Future Directions and Implications for Choice Architecture

Earlier decision-making research assumed that preferences are constructed when there is uncertainty about attribute weights, when attributes are equally important, or when consumers have no strong preference for any of the alternatives under consideration (e.g., Bettman et al. 1998; Huber, Payne, and Puto 2014; Shafir et al. 1993; Simonson 1989, 2008). This dissertation provides empirical evidence that runs counter to that fundamental assumption. Even when attributes are not equally important or when one alternative is strongly preferred over another, consumers are still swayed by the decision context. Variations in attribute reliability and choice set configuration may drive consumers to make choices that are inconsistent with their inherent preferences, and by extension, with the principle of utility maximization.

Future research should investigate other aspects of the decision process apart from set configuration or attribute reliability that may lead to preference reversals under conditions of prominence. For instance, another aspect of the decision process that can influence choice is the process through which decision-makers attain their preferred outcomes or alternatives. Research by me and Jonathan Levav (2013a) suggests that when there is little or no uncertainty about a

preferred outcome, individuals prefer experiencing the very same outcome through action rather than inaction, which leads to significant preference reversals when the most—but not the least—preferred outcome is framed as the result of inaction. For instance, we show that the common tendency to prefer a certain gain over a risky gain is reversed when the certain gain is framed as the result of inaction. We show that these reversals occur because attaining the otherwise-preferred outcome through inaction (with the otherwise-less preferred outcome is obtainable through action) decreases the difference in the perceived attractiveness between the two outcomes. Based on our findings, we introduce a new type of utility that we call "choice utility" and that pertains to individuals' preference about how they want to attain an outcome.

These findings are important since one of the most ubiquitous tools of choice architecture is the use of defaults (Goldstein et al., 1998). Choice utility implies that under certain conditions—when preference certainty is high—defaults can actually backfire, leading people to deliberately make choices that are different from the default. Our results concord with Sunstein (2013), who argues that defaults appear to be particularly sticky when the underlying decision is hard (see also Fleming, Thomas, & Dolan, 2010). We should, however, note that although similar in that both frames imply non-choice, an option framed as an inaction and one framed as a default might differ in several ways. For instance, defaults can represent an implicit endorsement or a signal of a majority opinion (Brown & Krishna, 2004; Dinner et al., 2011; McKenzie et al., 2006). An option explicitly framed as an inaction like in our experiments might carry none of these meanings or carry them weakly (Evangelidis and Levav 2013a). Where default options are perceived as inactions—and where preference certainty is relatively high—we would expect to find choice utility effects that are very similar to those we find in our studies.

In conclusion, choice utility and the empirical evidence presented in this dissertation suggest that choice architects should be cautious when employing interventions under conditions of prominence. When consumers face trade-offs that are relatively easy to solve (e.g., when they know that they care more about one attribute over another), interventions may paradoxically lead to preference for suboptimal outcomes since preferred alternatives may be inconsistent with one's inherent preferences. For instance, a consumer choosing a health plan and who cares more about quality than about saving money may end up choosing a cheaper lower quality plan instead of a more expensive higher quality plan when clearly worse health plans are present in the consideration set (see Chapter 3), or when an intermediate plan is available (see Chapter 4), or when the higher quality plan is made attainable through inaction (Evangelidis and Levav 2013a). Therefore, attribute prominence should treated as an indispensable component of choice architecture.

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APPENDIX A – STUDY S1

Method

A total of 97 individuals (66% male, M_{age} = 31) were recruited through Amazon's Mechanical Turk. We used a 2 (number of fatalities: low vs. high) by 2 (number of affected: low vs. high) experimental design, with all factors manipulated between-participants, and donation amount as the dependent variable. This study was conducted in two parts.

In the first part, we gave the participants a short (three sentences in length) text on earthquakes, along with the definitions of the number of people killed and affected ("in such events, authorities estimate the number of people killed, which consists of the persons confirmed or presumed dead, and affected, which consists of the persons requiring immediate assistance during an emergency situation").

Participants were then randomly assigned to one of four experimental conditions. Participants were asked to imagine the following: "an earthquake has taken place in a city in Asia. The event is broadcasted by major national information networks. According to local authorities, 4,000 (vs. 8,000) people were killed and 4,000 (vs. 8,000) were affected."

We asked respondents to indicate the total amount of they thought should be donated to victims of the earthquake (in USD). A modulus stated that "in a similar earthquake in the same region in 2010, which resulted in 3,000 dead and 3,000 affected, the total amount donated was 2 million USD."

In the second part of our study, participants were exposed to four different earthquakes: "Now imagine that the following four earthquakes have taken place in the world. For earthquake A, local authorities estimate that 4,500 people were killed and 8,500 were affected. For earthquake B, local authorities estimate that 8,500 people were killed and 4,500 were affected.

For earthquake C, local authorities estimate that 8,500 people were killed and 8,500 were affected. For earthquake D, local authorities estimate that 4,500 people were killed and 4,500 were affected." We also provided disasters C and D to have a full design, similar to the four conditions of the first part of the study.

We then asked participants to "rank the earthquakes based on the total amount that should be donated to their victims."

Results

First part: Replicating prior studies, we found a statistically significant effect of the number of fatalities on donation amount $F(1, 93) = 4.42$, $p = .038$, $\eta_p^2 = .05$. Respondents indicated that an earthquake with a high number of fatalities should receive more money ($M = 4.97$, $SD = 2.70$; units are millions of USD) than an earthquake with a low number of fatalities ($M = 3.86$, $SD = 2.58$). Furthermore, participants indicated that a disaster with a high number of affected ($M = 4.60$, $SD = 1.63$) should receive more money than a disaster with a low number of affected ($M = 4.10$, $SD = 3.50$), yet the effect of the number of affected on donation was not statistically significant $F(1, 93) = 1.04$, $p > .31$.

Second part: Non-parametric analyses yielded statistically significant differences between the earthquakes for our dependent measure (Friedman's $\chi^2 = 240.70$, $p = .000$). Separate Wilcoxon Signed-Rank tests showed that differences were statistically significant between all six pairs of events ($p < .004$). Not surprisingly, the high fatalities + high affected earthquake is ranked first by virtually all participants (94%); while the low fatalities + low affected earthquake is ranked last by virtually all participants (95%). More importantly, the low fatalities + high

affected earthquake is ranked second by the majority of participants (60%); while the high fatalities + low affected earthquake is ranked third by most participants (63%).

Our data suggests that when donors are asked to solve a trade-off between disasters that differ with respect to the values of the two cues, cue validity is the main driver of choice. We infer this because donors prioritized the number of affected victims over the number of fatalities in their decision-making in the second part of our study. Moreover, this effect rises even though the very same donors were more sensitive to the number of fatalities when responding to a single disaster in the first part of our study.

APPENDIX B – DETAILED DESCRIPTIONS OF STUDIES 1B-1F

Study 1b – 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_{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 (N = 81; 60% male, M_{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 (64% male, $M_{age} = 31$) 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 (N = 80; 54% male, M_{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_{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 two-option 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 (N = 80; 61% male, M_{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 non-prominent 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. 19%, $\chi^2 = 5.52$, $p = .019$). 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 1e –TV

Procedure. Two hundred and seventy-two respondents (63% male, $M_{age} = 29$) 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 2013b; 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 (N = 79, 61% male, M_{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 1f –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_{age} = 32) through Amazon's Mechanical Turk. Materials were adapted from Simonson (1989) and Evangelidis and Levav (2013b). 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 (N = 80, 65% male, M_{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 non-prominent 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.

Summary (English)

Prior academic research and common sense assume that differences in attribute importance weights should determine choice. All else equal, consumers are presumed to prefer products that in their view are superior along the products' most important—or so-called "prominent"—dimensions. For instance, if memory is the prominent attribute of an electronic tablet, then consumers will prefer the device that is highest in memory, subject to a budget constraint. This dissertation examines to what extent people use prominence (i.e., relative attribute importance) when constructing their preference and shows that the decision process exerts an influence on choice that is not captured by the classic theories.

In Chapter 2, we argue that the use of prominence in choice depends on the perceived reliability of the prominent attribute. When values associated with the prominent attribute are not perceived to be as reliable as values associated with the non-prominent attribute, decision-makers are more likely to make choices that are inconsistent with their attribute preferences. We examined donors' response to natural disasters and found that the amount of money allocated for humanitarian aid depends on the number of fatalities rather than the number of survivors who are in need of assistance. We further found that this effect arises because donors view the number of fatalities as more reliable than the number of survivors, even though the number of survivors is seen as the prominent attribute for the donation decision.

In Chapter 3, we argue that the use of prominence in choice depends on the presence of dominance relationships between the alternatives under consideration. We found that decision-makers are less likely to employ prominence when expressing their preference about alternatives

from a choice set in which clearly better or worse alternatives exist (i.e., there is dominance). This results in a preference reversal where the option that is superior on the prominent dimension is strongly preferred in a two-option set, but less preferred in a three- or four-option set where a symmetrically dominated (i.e., clearly worse) and/or symmetrically dominating (i.e., clearly better) alternative is added to the set. We proposed a decision-making framework according to which, when decision-makers choose from a choice set that includes dominance relationships, they spontaneously begin by assessing whether dominance relationships are present, and then use dominance as a criterion to evaluate all alternatives in the set.

In Chapter 4, we argue that the use of prominence in choice further depends on the presence of an intermediate alternative in the set. We found that decision-makers are less likely to employ prominence when expressing their preference about alternatives from a choice set in which an intermediate option is present. Based on this premise, we advanced a new hypothesis, *prominence detraction*, which allows us to predict how the addition of a new extreme alternative will affect the choice shares of the original options in the set. We found support for prominence detraction in a series of experiments and in two meta-analyses. This dissertation holds implications for product line management and choice architecture.

Summary (Dutch)

Onderzoek en gezond verstand vertellen ons dat het relatieve belang dat men hecht aan een bepaald kenmerk onze keuzes zou moeten bepalen. Bijvoorbeeld, als we aannemen dat opslagcapaciteit het belangrijkste kenmerk van een tablet is, dan zouden consumenten het apparaat met de grootste opslagcapaciteit moeten verkiezen, natuurlijk binnen een bepaald vooropgesteld budget. Consumenten zouden steeds producten moeten kiezen die superieur zijn op de dimensies die zij prominent (d.w.z. belangrijk) vinden. In dit proefschrift onderzoek ik in welke mate prominentie—het relatieve belang van een product kenmerk—voorkeuren bepaalt. Ik toon aan dat consumenten niet altijd het product verkiezen dat het beste scoort op het belangrijkste kenmerk en dat dat gebeurt op een manier die niet verklaard kan worden door klassieke theorieën.

In hoofstuk 2 toon ik aan dat het belang van prominentie afhangt van de gepercipieerde betrouwbaarheid van het prominente kenmerk. Wanneer de schatting van het prominente kenmerk minder betrouwbaar wordt geacht, zijn mensen meer geneigd om beslissingen te maken die niet overeenkomen met hun eigenlijke voorkeuren. Zo zijn mensen bijvoorbeeld meer geneigd om geld te doneren na een natuurramp met veel doden, dan na een natuurramp met veel overlevenden die dringend hulp nodig hebben. Hoewel donoren het aantal mensen in nood als een prominentere dimensie van een natuurramp beschouwen—humanitaire hulp zou moeten afhangen van het aantal levenden in plaats van het aantal doden; voor de doden is hulp immers te laat—beoordelen donoren informatie over het aantal doden als meer betrouwbaar. Het toekennen van humanitaire hulp is daarom hoofdzakelijk afhankelijk van het aantal doden, eerder dan van

het aantal overlevenden dat dringend hulp nodig heeft. Mensen maken dus niet altijd keuzes die superieur zijn op de dimensie die zij het belangrijkst vinden.

In hoofdstuk 3 stel ik dat de mate waarin beslissingen bepaald worden door prominentie (het belang van een kenmerk) afhangt van de aanwezigheid van dominantie-relaties tussen keuze-alternatieven. Een serie experimenten toont aan dat het belang van prominentie afneemt wanneer er duidelijk betere of slechtere alternatieven aanwezig zijn (d.w.z., wanneer er "dominantie" in de keuze-set is). Dit kan in bepaalde situaties leiden tot een omkering van voorkeuren. Zo kan een alternatief dat superieur is op een bepaald belangrijk kenmerk verkozen worden wanneer men kiest tussen twee producten, maar niet wanneer men kiest uit drie of vier producten waarbij er een duidelijk slechter product (een symmetrisch gedomineerd alternatief) of een duidelijk beter product (een symmetrisch dominant alternatief) aan de keuze-set wordt toegevoegd. Mensen lijken spontaan dominantie-relaties te gebruiken—eerder dan prominentie—om producten in een keuze set te beoordelen.

In hoofdstuk 4 stel ik dat het gebruik van prominentie in keuzegedrag afhangt van de aanwezigheid van een product dat het midden houden tussen twee andere producten (i.e., een compromis-alternatief). Een serie experimenten en twee meta-analyses tonen aan dat prominentie aan belang verliest wanneer er een compromis alternatief aanwezig is. We introduceren een nieuwe hypothese, prominentie detractie, die voorspelt hoe het toevoegen van een extreem alternatief de keuze voor de oorspronkelijke producten beïnvloedt. Dit proefschrift heeft implicaties voor het management van productlijnen en het ontwerpen van een keuze-structuur die consumenten in staat stelt om betere beslissingen te nemen.

Summary (Greek)

Προηγούμενη ακαδημαϊκή έρευνα καθώς και η κοινή λογική, υποθέτουν ότι η βαρύτητα που αποδίδουμε στα διάφορα χαρακτηριστικά προϊόντων ή γενικότερα αντικειμένων και γεγονότων επηρεάζει τις αποφάσεις μας σχετικά με αυτά. Τα άλλα ίσα (ceteris paribus), οι καταναλωτές υποτίθεται ότι προτιμούν προϊόντα που κατά την άποψη τους υπερέχουν σε απόδοση στα πιο σημαντικά χαρακτηριστικά της εκάστοτε κατηγορίας. Για παράδειγμα, εάν η μνήμη είναι το πιο σημαντικό προϊοντικό χαρακτηριστικό ενός tablet για έναν καταναλωτή, τότε αυτός ο καταναλωτής θα πρέπει να προτιμήσει τη συσκευή με τη μεγαλύτερη μνήμη (με βάση τον προϋπολογισμό του). Αυτή η διατριβή εξετάζει σε ποιο βαθμό οι καταναλωτές λαμβάνουν υπ'όψη τους τη βαρύτητα των χαρακτηριστικών ενός αντικειμένου όταν το αξιολογούνε, και φανερώνει ότι οι καταναλωτές δεν επιλέγουν πάντα τα προϊόντα που υπερέχουν στα πιο σημαντικά για αυτούς χαρακτηριστικά. Τα ευρήματα αυτά είναι αντίθετα με τις προβλέψεις των κλασικών θεωρών.

Στο Κεφάλαιο 2 υποστηρίζουμε ότι το εάν θα λάβουμε υπ'όψη μας τη βαρύτητα των διαφόρων χαρακτηριστικών όταν παίρνουμε μια αποφάση εξαρτάται από την αξιοπιστία των μετρήσεων των τιμών των χαρακτηριστικών αυτών. Όταν θεωρούμε ότι οι μετρήσεις ενός σημαντικού κατά τα άλλα χαρακτηριστικού δεν είναι το ίδιο αξιόπιστες με τις μετρήσεις ενός λιγότερο σημαντικού χαρακτηριστικού, τότε είναι πιο πιθανό να λάβουμε απόφασεις που είναι αντίθετες με τη βαρύτητα που αποδίδουμε στα χαρακτηριστικά αυτά. Στο συγκεκριμένο κεφάλαιο εξετάσαμε πως ανταποκρίνονται οι δωρητές στις φυσικές καταστροφές και βρήκαμε ότι το ύψος των δωρεών για τα θύματα των καταστροφών εξαρτάται από των αριθμό των θανάτων παρά από τον αριθμό των επιζώντων που χρειάζονται βοήθεια. Επίσης, βρήκαμε ότι η

συμπεριφορά αυτή των δωρητών οφείλεται στο γεγονός ότι θεωρούν ότι ο αριθμός των νεκρών είναι πιο αξιόπιστος από τον αριθμό των επιζώντων, παρά το γεγονός ότι οι ίδιοι θεωρούν ότι ο αριθμός των επιζώντων είναι πιο σημαντικός για την δωρεά σε σχέση με τον αριθμό των νεκρών.

Στο Κεφάλαιο 3 υποστηρίζουμε ότι το εάν θα λάβουμε υπ'όψη μας τη βαρύτητα των διαφόρων χαρακτηριστικών όταν παίρνουμε μια αποφάση εξαρτάται από την παρουσία σχέσεων κυριαρχίας μεταξύ των εναλλακτικών που εξετάζουμε. Στο συγκεκριμένο κεφάλαιο βρίσκουμε ότι οι καταναλώτες δείχνουν ισχυρότερη προτίμηση για ένα προϊόν που υπερέχει σε απόδοση στο πιο σημαντικό χαρακτηριστικό όταν αξιολογείται σε συνδυασμό με ένα προϊόν που υπερέχει σε απόδοση σε ένα λιγότερο σημαντικό χαρακτηριστικό, παρά όταν αξιολόγειται σε συνδυασμό με επιπλέον προϊόντα τα οποία είναι αντικειμενικά καλύτερα ή χειρότερα και από τις δύο προαναφερθείσες εναλλακτικές (δλδ. υπάρχουν σχέσεις κυριαρχίας). Με βάση αυτά τα ευρήματα, προτείνουμε ένα μοντέλο λήψης αποφάσεων κατά το οποίο, όταν οι καταναλωτές επιλέγουν από ένα σύνολο εναλλακτικών που περιλαμβάνει σχέσεις κυριαρχίας, τότε χρησιμοποιούν αυτές τις σχέσεις για να αξιολογήσουν όλες τις εναλλακτικές που περιλαμβάνονται στο σύνολο. Στο Κεφάλαιο 4 επεκτείνουμε αυτά τα ευρήματα και υποστηρίζουμε ότι το εάν θα λάβουμε υπ'όψη μας τη βαρύτητα των διαφόρων χαρακτηριστικών όταν παίρνουμε μια αποφάση εξαρτάται επίσης από την παρουσία ενδιάμεσων εναλλακτικών εντός του συνόλου. Τα αποτελέσματα αυτής της διατριβής έχουν επιπτώσεις για τη διαχείριση του μείγματος προϊόντος των επιχειρήσεων, καθώς και για ευρύτερα ζητήματα σχετικά με το σχεδιασμό παρεμβάσεων που καθοδηγούν τους ανθρώπους στη λήψη ορθότερων αποφάσεων.

Curriculum Vitae

Ioannis Evangelidis was born in Athens, Greece on October 8th, 1984. He received his Bachelor's degree in Marketing and Communication from Athens University of Economics and Business. He received his Master's degree (cum laude) in Business Administration from Rotterdam School of Management (Erasmus University). In 2010, he started his Ph.D. research in Marketing at the Erasmus Research Institute of Management. His main research interests concern attribute weighting processes, decision-making, goals, time, and charitable giving. His work has been published in prestigious marketing (Journal of Marketing Research) and psychology journals (Psychological Science), and has received worldwide media coverage (e.g., Boston Globe, Chicago Tribune, Die Welt, Huffington Post, Stanford Social Innovation Review and the Nation's Health). Ioannis has presented his research at several international conferences (e.g., ACR, SCP, SJDM, and BDRM) and universities (NYU, Columbia, University of California Berkeley, University of Chicago, University of Florida, INSEAD, and Bocconi University). He was a visiting research scholar at the Stanford Graduate School of Business during 2012-2014, and he will be working as an Assistant Professor in Marketing at Bocconi University from September 2015.

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First, we argue that the use of prominence in choice depends on the perceived reliability of the prominent attribute. When values associated with the prominent attribute are not perceived to be as reliable as values associated with the non-prominent attribute, decision-makers are more likely to make choices that are inconsistent with their attribute preferences. Second, we argue that the use of prominence in choice depends on the presence of relational properties between the alternatives under consideration. We found that decision-makers are less likely to employ prominence when expressing their preference about alternatives from a choice set in which dominance or compromise relationships are present. This dissertation holds implications for product line management, public policy, and choice architecture.

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