THE ATTRACTION EFFECT:
AN OVERVIEW, ITS FRAGILITY, AND A META-ANALYSIS

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Sybil S. Yang

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THE ATTRACTION EFFECT:
AN OVERVIEW, ITS FRAGILITY, AND A META-ANALYSIS

Sybil S. Yang, Ph. D.

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The attraction effect (asymmetrically dominated decoy effect) is a widely documented choice phenomenon of preference reversal that holds high relevance for marketers and academics alike. A review of prior research and current experimental results suggest methodological artifacts may have exaggerated the strength and extensibility of the effect in the current literature. Experimentation under more conservative methodologies show the attraction effect exists, but the methodological factors involved in its creation remain elusive. A subsequent quantitative meta-analysis shows the average effect size in the literature to be an approximate 14.7% share gain for a dominating Target option. The effect appears to be weaker as the Target captures more share in the control condition. No other choice option or methodological characteristics were found to be related to the creation or magnitude of the attraction effect.

BIOGRAPHICAL SKETCH

Sybil S. Yang graduated from the Haas School of Business at the University of California, Berkeley in 1997 with a Bachelor's of Science in Business Administration and a minor in Educational Psychology. Upon graduation she worked as an investment banking analyst at Salomon Smith Barney and then as a venture capital analyst for Skipstone Ventures. In 2002, she began graduate studies at Cornell University, and in 2005 earned Masters degrees in Hospitality Management from the School of Hotel Administration and Business Administration from the S.C. Johnson Graduate School of Management. After leaving Cornell, she applied her hospitality and business learning to the field of restaurant revenue management consulting. To further pursue her love of food and hospitality, Sybil became a faculty member at the Culinary Institute of America in Hyde Park, NY where she found a love for teaching and mentorship.

In 2007, Sybil matriculated into the PhD program in the School of Hotel Administration at Cornell University. Her research interests include consumer decision making, food and beverage operations, and menu design. She endeavors to bring academic and analytical insights to the hospitality industry, and to bring practical inspiration from industry to academia. Sybil is currently an Associate Professor at San Francisco State University's College of Business, in the department of Hospitality and Tourism Management.

Dedicated to mom, dad, grandma, and Jai ☺.

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CHAPTER I: AN OVERVIEW

INTRODUCTION

Decoys are choice options offered with the sole intent of affecting the choice dynamic between all other options. From a practitioner perspective, a decoy is choice fodder offered to increase the choice likelihood of another product. Overall, decoys share two features. First, a decoy is never meant to take choice share for itself. For example, a decoy's attributes are usually positioned to look inferior or undesirable relative to a Target option or relative to both a Target and a Competitor option. Since the decoy's attributes are inferior to at least one other option, a rational decision maker should never choose the decoy itself. Alternatively, a decoy with clearly superior attributes can be declared to be unavailable once (if) it is chosen. Akin to a bait-and-switch tactic, this superior decoy is never truly an available option. Second, the presence of a decoy in a choice set affects the choice made between all other options. Since a decoy is never actually meant to be the chosen option, its existence in a choice set can be thought of as merely a means to shift market share between the other options, never truly taking share for itself.

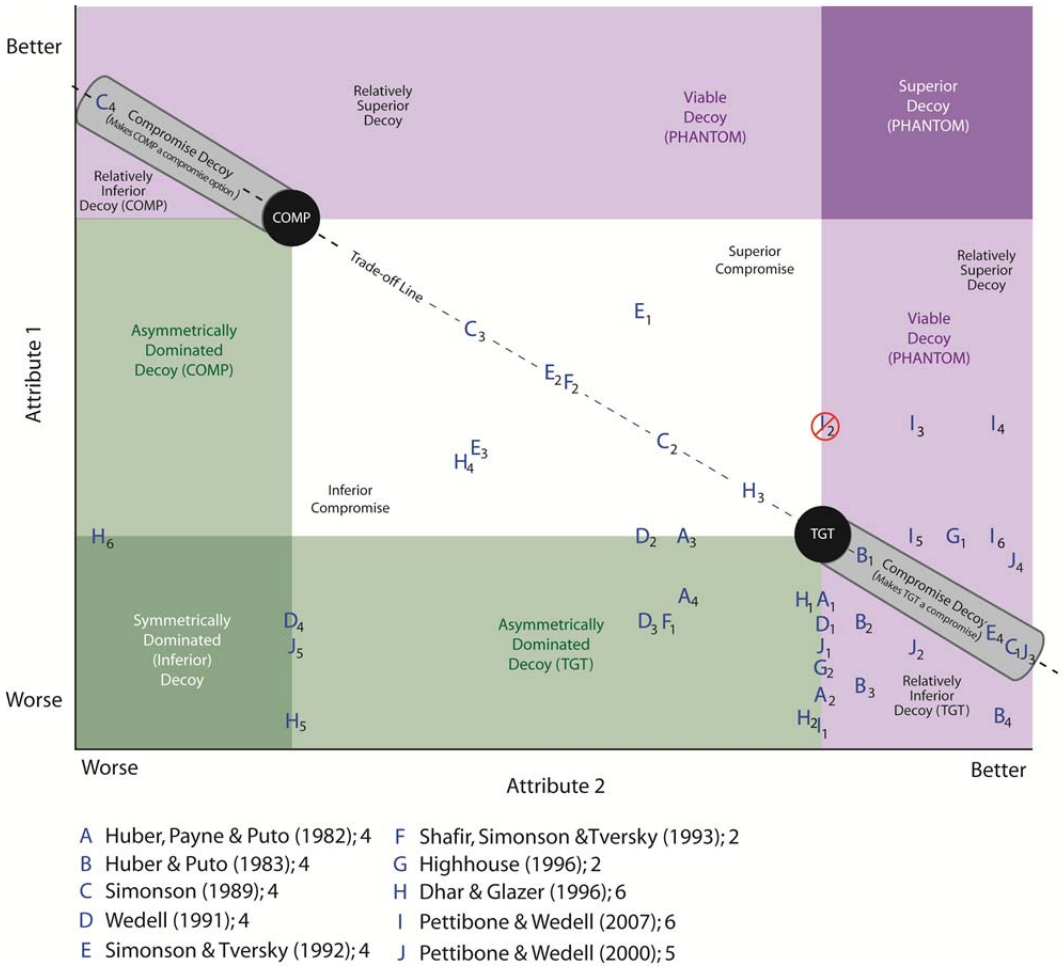
The combination of these two features necessarily implies an effective violation of regularity. Regularity is a classic choice modeling condition where, given a choice set 'A' where A is a subset of choice set 'B,' the probability of choosing option x from B cannot be greater than the probability of choosing x from A:

$$\text{Given } A \subseteq B \text{, then } P(x;A) \geq P(x;B) \tag{1}$$

In other words, based on the principle of regularity (Luce, 1959), the addition of a decoy into a choice set should not increase the choice share of any of the already existing options. Furthermore, if a decoy is similar to the items in the existing choice set (consider a classic

wooden duck decoy used in hunting), then the decoy would cannibalize market share from the option it is most similar to. Here, the similarity hypothesis assumes a fixed utility for a single type of option. If choice set A is comprised of a duck and a goose, and B includes a decoy wooden duck, the similarity hypothesis assumes that the utility of hunting ducks (as measured by the proportion who would choose the duck from choice set A) is fixed and must now be split between the duck and decoy duck in choice set B. Because the duck hunting utility 'pie' is now divided between a duck and a duck decoy, the probability of choosing a duck from B cannot be greater than choosing a duck from A. According to similarity, when given a decoy that is more similar to a target option x, Equation (1) should hold true.

Figure 1. Decoy Map



Yet, starting with Hubert, Payne and Puto's (HPP) study on "asymmetrically dominated alternatives" (1982), it has become clear that many forms of decoy choice options can be designed so the principles of regularity and similarity are routinely violated. Although HPP posited several explanations for what they termed to be the 'Asymmetrically Dominated Alternative,' 'Decoy,' or 'Attraction Effect,' they ultimately declared that "A unique explanation for the effect found, is missing" (1982). Following HPP's paper was a flurry of experiments that tested boundary conditions for the effect, which, in the process, developed into sub streams of research on different types of decoys: inferior, superior, symmetrically dominated, and phantom decoys. A summary of the most often cited types of decoy are shown in Figure 1. Decoys have also been studied under the auspices of context effects under the premise that the presence of a decoy changes the context in which a decision is made. In short, a decoy is a rationally irrelevant option that changes the choice context such that the probability of choosing a given option changes with the presence of the decoy.

Types of Decoys and the Decoy Landscape

Thus far, published research concerning decoys has focused on the decision made between a core choice set of two options: a Target and a Competitor {Target, Competitor}, and how the decision changes when the choice set is expanded to include a Decoy {Target, Competitor, Decoy}. Furthermore, the majority of research conducted on the topic has experimented with options evaluated on only two attribute dimensions[1]. As such, a major dynamic in the choice process between options involves a trade-off evaluation between attributes:

[1] Ariely & Wallstein (1995), presented choice sets on three dimensions as a means to prevent decision makers from making choices strictly by calculating and comparing ratios. Choplin & Hummel (2005) used a one-dimensional analogue of physical distance to measure attribute evaluation in the presence of a decoy.

how much of Attribute 1 am I willing to give up for a better level of Attribute 2? All other things equal, whether the Target or Competitor is chosen presumably speaks to a trade-off between the two attributes that the decision maker has considered and found palatable. The slope of the line drawn between the Target and the Competitor on these two dimensions represents the exchange rate accepted or trade-off made between the attributes when deciding between the two options. Visually, each option in a choice set can be plotted along its two attribute dimensions as shown in Figure 1. The Target and the Competitor each dominate the other on one attribute. In this case, the Target is inferior to the Competition on Attribute 1 but superior on Attribute 2. That being said, attributes do not necessarily have to be comparable on continuous or ordinal dimensions. Use of categorical attribute variations such as brand name, country of origin (Chuang & Yen, 2007), and feature availability, as well as non-traditional attributes variations such as differing shapes and sizes, distances and line lengths have resulted in decoy effects (Choplin & Hummel, 2002 & 2005).

In general, the option closest in proximity to, and is most similar to the Decoy is considered the Target. Notice that the graphic in Figure 1 is reflective across a line drawn perpendicular to the trade-off line; the Competitor would become the Target if decoys were placed closest to the Competitor. For simplicity, Figure 1 depicts only decoys closest to the Target and only shows the Competitor as a reference point. Unless otherwise noted, the present article refers to the Target, Competitor and Decoy positions in Figure 1 to graphically clarify attribute ratings and relative choice position descriptions within the text.

The type of decoy created depends on how the decoy's attributes are positioned relative to the attributes of both the Target and Competitor. Figure 1 illustrates the decoy landscape as understood based on the current literature. A general categorization of decoy types can be made

based on whether a decoy is dominated by none, one, or both choice options of the core decision set. Note that within each decoy type, the level of inferiority or dominance can vary. Decoys which are dominated by both options are *symmetrically dominated*, or *inferior* decoys, and to date have garnered little attention by researchers. Decoys dominated only by the Target are *asymmetrically dominated* decoys, and are the original decoys examined by HPP. Decoys that are not dominated by any choice option are considered *viable* decoys, and are usually included as *phantom* or unselectable options. Each of these decoy types affect consumer decision processes differently and as a result, produce different effects. The present article examines studies relevant to asymmetrically dominated decoys, and in the process touches on the literature of various other decoy types and attempts to organize current findings and hypotheses in a manner that will facilitate future research and theory building on the subject.

THE ASYMMETRICALLY DOMINATED DECOY

Asymmetrically Dominated (AD) decoys are options which are completely dominated by the Target on one or two attributes. Asymmetrically dominated decoys represent a steeper attribute trade-off to the Competition relative to the Target. The decoy itself does not possess an attribute that is superior to the Target. Theoretically, given the presence of the Target in the choice set, no rational decision maker (by an economic definition) should choose the decoy over the Target. However, experimental results have shown time and again that an asymmetrically dominated decoy may occasionally garner some share for itself, though it remains unclear why some consumers opt for a sub-optimal option. The overall effect though is that including an asymmetrically dominated decoy generally results in an apparent shift of choice share from the Competition to the Target. This share gain by the Target in the presence of the Decoy (and at the

expense of the Competitor) is necessarily a violation of the similarity hypothesis (Tversky, 1972) which implies that the option most similar to the decoy should be cannibalized, not helped by the presence of the decoy. The light green shaded area in Figure 1 shows the domain of asymmetrically dominated decoys and includes decoy placements $A_{1\text{-}4}$, $D_{1\text{-}4}$, F_1, and G_2.

The asymmetrically dominated decoy effect was found to be robust across multiple product classes (i.e. Doyle et al., 1999; Dhar & Glazer, 1996; Sivakumar & Cherian 1995; see Heath & Chatterjee, 1995 for a review of literature prior to 1995; also see Figure 3 for a list of product classes studied), hiring and employee selection (Slaughter, Sinar, & Highhouse, 1999; Highhouse, 1996), choice of political candidates (Hedgecock et al., 2009; Herne, 1997; Pan et al., 1995), gambles (Herne, 1999; Tversky, & Simonson, 1993), and even with shapes and lines (Choplin & Hummel, 2005). The effect has also been found within- and between-subjects, as tested with various quality measures and price attributes. The effect has also been observed in the animal world where asymmetrically dominated decoys have a significant target-share increasing effect on honeybees and gray jays (Shafir, Waite & Smith, 2002), and hummingbird foraging behavior (Bateson, Healy, & Hurly, 2002)[2]. Despite the wide-spread effects demonstrated across many product classes and decision contexts, the effect was not observed with just as many other products within multi-product experiments including theatre tickets and appliances (Munro & Popov, 2009), travel packages (Josiam & Hobson, 1995), cars (Heath & Chatterjee, 1995), and restaurants (Lehmann & Pan, 1994).

[2] Although the attraction effect was observed with honeybees, grey jays and hummingbirds, individual green swordtail (fish) exhibited a reverse attraction effect where the presence of an asymmetrically dominated decoy increased competitor share on mate choices (Royle, Lindström, & Metcalfe, 2008). Another attraction effect study from the animal kingdom was of *Temnothorax Curvispinosus* ants. Individual ants exhibited the attraction effect with nest location selection options, but ant colonies with a collective, decentralized decision making mechanism did not exhibit the effect (Edwards & Pratt, 2009).

What is Being Measured?

So far, this paper has described the asymmetrically dominated decoy effect in terms of a choice share shift. While accurate, the term is perhaps overly generalized to encompass the various metrics and methods used to measure the effect. There are two aspects to describing how the effect has been measured in the literature: First, what measure of choice or preference is used, and second, how changes in that choice share are analyzed. In the sense that the asymmetrically dominated effect describes how market share for a target increases in the presence of a decoy, many metrics have been used to measure share change. For example, HPP first compared probabilities, derived from nominal choice proportions to measure the effect. The use of choice proportions as a basis for choice probability has been the most popular measure of choice in the asymmetrically dominated effect literature (i.e. Mourali et al., 2007; Park & Kim, 2005; Choplin & Hummel, 2005). However, because the choice measurement is nominal (either an item is chosen or it is not), it has received criticism for inaccurately representing consumer preference, as choice measurement arguably operates on a continuous scale (Mishra, 1990). As such, many decoy studies also measure market share according to a preference scale where subjects use point allocations to indicate the attractiveness of an option (e.g. Yoon & Simonson, 2008; Wedell & Pettibone, 1996; Ariely & Wallsten, 1995; Mishra et al., 1993). While there is inconsistency in the share metric used (choice or preference), both metrics have yielded consistent results with regard to the attraction effect in experimental settings (Yoon & Simonson, 2007; Ariely & Wallsten, 1995).

Similar to how share is measured, there is also inconsistency in the way share change is measured and analyzed. Specifically, *change* necessarily implies a comparison of two measurements – and the two measurements being compared have differed across experimental

settings. Figure 2 lists general treatment groups, and the analytical methods used to detect an asymmetrically dominated decoy effect. To quantitatively define the dependent variables measured, let us denote "T" as Target, "C" as Competitor, and "D" as Decoy, and:

- Choice Set A, without a decoy is {T, C}
- Choice Set B, with a decoy is {T, C, D}
- Proportion (choice or points) of T from Set A would be written as: $T \propto A$, and
- The probability that T is chosen from Set A would be written as: p(T,A).

Based on the above notation, popular quantitative measures used to detect the presence and magnitude of the attraction effect broadly fall into three categories: 1) Changes in relative market shares, 2) Share shifts which violate expectations under a rational choice model, and 3) Preference switching. Most studies define the attraction effect as a measured difference in choice share between conditions with and without a decoy present. A relative market share metric (share with a decoy relative to without a decoy) can be further complicated by the experiment design used. Within subject differences show true preference reversals, whereas between subject differences only imply the existence of preference reversals and must rely on defined share differences compared against some expected share measure. An example of market share differences from rational choice expectations was used in HPP's 1982 study where the effect was defined as a deviation from share expectations under regularity; it was similarly defined as a deviation from expectations under a fixed utility model (Huber & Puto, 1983) as well as similarity and equal share capture models (Mishra, 1990). Operationally, most mean differences tested are comparisons of choice proportions. HPP first presented the AD decoy effect as a change in relative market share, demonstrated as:

$$(T \propto B) > (T \propto A) \quad \text{or} \quad \frac{T \propto B}{T \propto A} > 1 \tag{2}$$

In other words, Target market share proportion is greater in the Decoy choice set than in the Non-decoy set. A viable variation on this market share measure can also include the Decoy's share, especially if the Decoy was introduced as a product line extension by the Target to be a favorable decoy (Mishra, 1990). Whereas before an asymmetrically dominated decoy effect would exist only if the Target share increased, under the such a product-line extension definition, a share increase to the Target's entire product line (T+D), would also qualify:

$$[(T+D) \propto B] \quad > \quad (T \propto A) \quad \text{or} \quad \frac{(T+D) \propto B}{T \propto A} > 1 \tag{3}$$

Definition (3) is highly applicable in true marketing applications, specifically when a company uses "versioning" (Shapiro & Varian, 1998) to create a different and likely inferior version of a high-end product, usually with the intent to take share away from a competitor. However, academic literature has focused on the stricter definition (2) of the attraction effect and, typically, only compares Target versus Competitor shares.

Effect Measurement Methods

Whether a significant market share difference exists has been measured with different statistical tests, including chi-squared tests, various regression types (multi-nominal logit, log-linear, protected and ordinary least squares) which measure the significance of the coefficient on a 'Decoy x Choice' interaction, and t-Tests. This review highlights the primary advantages and disadvantages of the most popular statistical test for the effect. A more comprehensive discussion of each method is presented by Mishra (1990).

When first introduced, HPP used the McNemar test to detect the existence of the attraction effect. The null hypothesis in the McNemar test assumes homogeneity of marginal

probabilities which, in essence assumes the switching populations are not independent of each other, and uses these assumptions to compare the proportion of persons who switched from Target to Competitor versus from Competitor to Target. Thus the null hypothesis under a McNemar test for the attraction effect assumes the proportion of people who switch from their original choice are the same:

$$p(T, B \mid C, A) = p(C, B \mid T, A) \tag{4}$$

A chi-squared test is preferred to the McNemar test when measuring the attraction effect for several reasons. Most notably, if a between-subjects experiment is used, the McNemar test is inappropriate because randomly chosen individual subjects should be independent of each other. However the McNemar test assumes a constant level of loyalty, where a fixed portion of choosers will not switch at all. In addition, appropriate use of the McNemar test requires the marginal probabilities for choosing either the Target or the Competitor to remain the same between non-decoyed and decoyed scenarios. If the initial brand share distribution is highly skewed and the likelihood of switching is fixed, then marginal probabilities will not remain the same, and the McNemar test cannot be used. Finally, if the Decoy gains share for itself, a traditional McNemar test can no longer be used as there are no comparable switching probabilities to contrast the Decoy's share against. A chi-squared test on the other hand, does not make an assumption about homogenous marginal probabilities, and operates with independent populations: it can distinguish between whether the observed switching behavior is independent of the non-decoyed choice made.

Another popular method used to test for the attraction effect is to run a regression and then evaluate the significance of the coefficient on a Target Choice x Decoy Availability

interaction term. While this method allows for flexibility in terms of ability to test simultaneous interactions with multiple moderators, its efficacy, in some cases, depends on potentially erroneous assumptions. For example, proper use of a multinomial logit and log-linear models requires the independence of irrational alternatives (IIA). At its core, IIA assumes a person's evaluation of a choice should not change when the choice set has been altered to include or exclude an irrelevant option. However, as mentioned previously, explanations of the attraction effect attempt to explain an instance where IIA does not hold – the decoy, an inferior choice, and thus an irrational alternative, has been shown to reliably affect choice behavior. In addition, when using a regression method to analyze within-subject data, interpretations come at a disadvantage compared to that from a chi-squared test since a regression output would lose specific details about switching behavior. Specifically, a regression could only provide information about choice proportions with and without the decoy. However if the decoy were to gain share for itself, a regression would be unable to identify whether the decoy's share gain was at the expense of the competitor or the target. This source distinction is subtle, but important. In a line-extension application of the attraction effect, decoy share captured at the expense of the competitor should be considered switching behavior in support of preference change, and the attraction effect. However, switching from the Target to the Decoy which it dominates is switching behavior indicative of cannibalization at best, sub-optimal decision making at worst, and is not necessarily preference change away from the Competitor. Despite these limitations, using a form of regression enables testing for moderating influences on the effect.

To the extent that the existence of the attraction effect can be measured as a departure from expectations, the next consideration is what benchmark the observation is tested against? What expectations should the observations be tested against? Whereas Equation (2)

operationalizes a descriptive comparison between decoyed and non-decoyed share proportions, normative comparisons have also been made between the observed share proportions and share change proportions expected under regularity (constant utility), similarity and fixed utility, and naïve models. Figure 2 summarizes the normative metrics that have been used to detect the attraction effect. For the most part, the metrics in Figure 2 should lead the researcher to the same conclusion about whether the attraction effect exists. However, testing against expectations under regularity or the similarity model is more advantageous for two reasons. First, if the decoy captures an extremely large portion of the market, fixed utility and naïve models would presume the Target to have negative market share in choice set B. Second, regularity and similarity metrics can be expressed as ratios that describe the relationship between the Target and Competitor. The use of a ratio does eliminate details on whether decoy share was gained at the expense of the Target or Competitor. However, this opacity is arguably a lesser evil than the overt assumptions in the fixed utility and naïve models about where the decoy's market share came from.

Figure 2. Attraction Effect Hypothesis Tests			
Normative Model	**Null Hypothesis**	**Attraction Effect**	**Caveats, Details & Limitations**
Regularity, Constant Utility	$T \propto B = T \propto A$	$T \propto B > T \propto A$	Null holds true if regularity model explains behavior. The decoy would have to take equal proportional share from both the target and the competitor.
Similarity	$\frac{T \propto B}{T \propto A} < \frac{C \propto B}{C \propto A}$	$\frac{T \propto B}{T \propto A} \geq \frac{C \propto B}{C \propto A}$	Null holds true if similarity model explains behavior. The decoy is expected to take more share away from the most similar choice. The decoy can take share, but takes disproportionately more share from the most similar Target.
Fixed Utility	$(T + D) \propto B = T \propto A$ or $T \propto B = (T \propto A) - (D \propto B)$	$T \propto B > (T \propto A) - (D \propto B)$	An extreme version of the similarity model where the Decoy is expected to take share away from only the Target.
Naïve Model	$p(T,B) = p(T,A)$ & $p(C,B) = p(C,A)$ Or $p(T,B) = p(T,A) - \frac{p(D,B)}{2}$ & $p(C,B) = p(C,A) - \frac{p(D,B)}{2}$	$p(T,B) > p(T,A)$ & $p(C,B) < p(C,A)$ Or $p(T,B) > p(T,A) - \frac{p(D,B)}{2}$ & $p(C,B) < p(C,A) - \frac{p(D,B)}{2}$	Null holds true if a naïve model explains behavior. The decoy takes no share for itself, and preferences do not change. Alternatively, the Decoy takes equal share away from both the Target and Competitor.

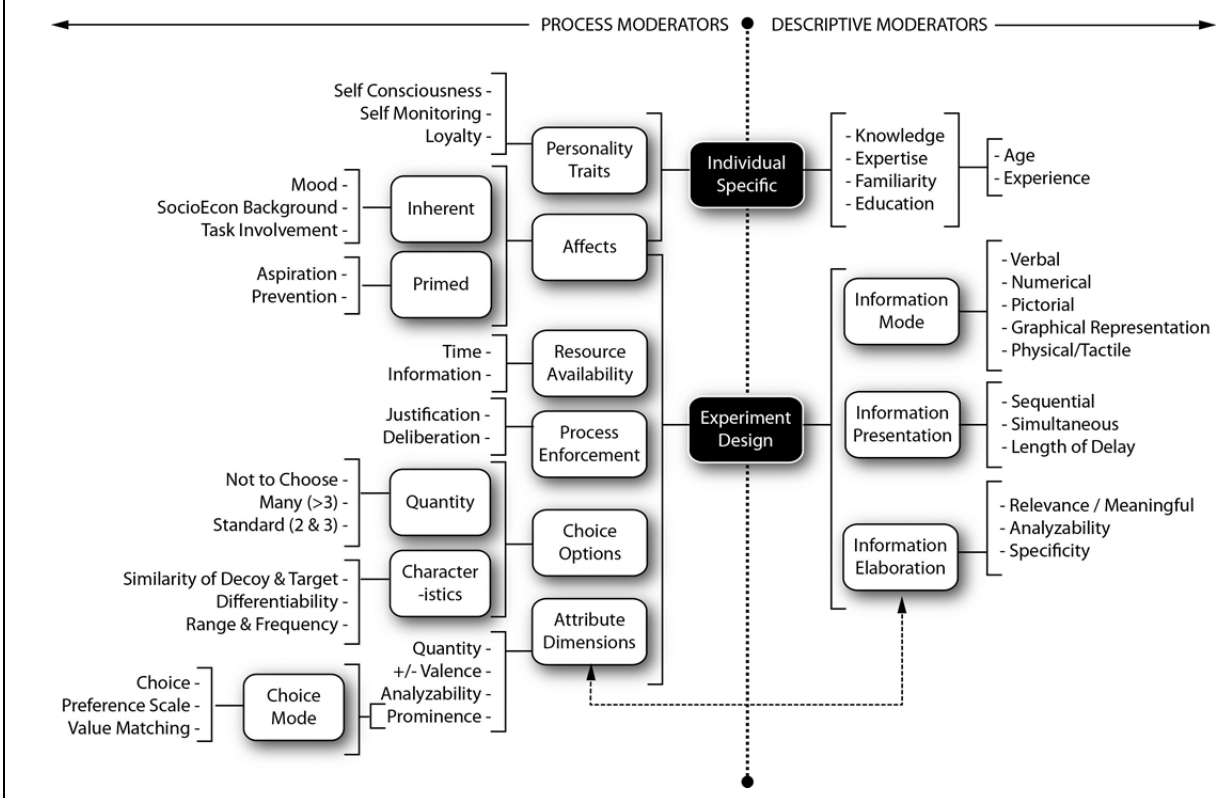
Figure 3. Experiment Group & Analytical Methods Summary

Study	Year	Products	w/in or Btwn Subjects	Share Measurement	Share Measurements Other Than: A: {T,C} & B: {T,C,D}	Metric Tested	Analysis Method	Result (AD Sig?)
Huber, Payne,Puto	1982	Cars, Beer, Restaurants,	With-in	Choice	-	% Share A vs B	McNemar Test	p≤0.10
		Lottery, TVs, Film	Between	Choice	Expected share under Regularity	% Share A vs B	Fisher Exact	p≤0.05
						B vs Regularity	Fisher Exact	p≤0.05
Huber, Puto	1983	Cars, Beer,	Within	Choice	-	% Share A vs B	McNemar Test	p<0.05
		Restaurants,	Within	Choice	-	% Share A vs B	McNemar Test	p<0.05
		Batteries, TVs, Film	Within	Choice	Expected share under Regularity	B vs Regularity	$\chi 2$	p<0.01
					Expected Share Under Fixed Utility Model	B vs Fixed Utility	$\chi 2$	p<0.01
Ratneshwar,	1987	Cars, Beer, TV,	Between	Choice	-	Log Likelihood Ratio,	Log-Linear Regression	NA
Shocker, Stewart		Orange Juice,				Brand x Decoy Interaction		
		Gas Grills, Bulbs	Between	Favorability (Ordinal)	-	% Share A vs B		p<0.05
Simonson	1989	Cars, Beer, TV, Calculator, Battery,	Between	Choice	-	% Share A vs B	Multinominal Logit	p<0.001
		Mouthwash, Apartments					Regression	
Mishra	1990	Cars, TVs, Beer	Within	Preference (Continuous)	-	% Share A vs B	Paired T	Varies by product
				Preference (Ordinal)	Expected Under Fixed Utility Model	B vs Fixed Utility	Paired T	p<0.05
				Choice	Expected Under Similarity Model	B vs Similarity	Paired T	p<0.05
					Expected Under Equal Share Capture	B vs ESC	Paired T	Varies by Product
Wedell	1991	Gambles	Within	Choice	-	Arcsin Transform of proportion	ANOVA	p<0.001
Simonson &Tversky	1992	Paper Towels. Cameras, PCs, Gifts, Microwaves,	Between	Choice	-	% Share A vs B	t-Test	p<0.05
		Gasoline, Tissue						
Mishra, Umesh, Stem Jr.	1993	Cars, TVs, Beer	Within	Preference (Continuous)		% Share A vs B	Maximum Likelihood,	p<0.001
				Choice		% Share A vs B	Structural Modeling	
Ariely & Wallsten	1995	Bikes, Microwaves, Shoes, PCs, TVs	Between	Preference (Continuous)		% Preference Share A vs B	F - Test	Varies by product
				Value Setting	Expected Under Attribute weights in A	% Share B vs Model	Fisher's PLSD	Model Can't Explain
Sivakumar & Cherian	1995	Beer, Restaurants, Cars, Apartments	Within	Preference (Continuous)	-	% Share A vs B	t-Test	p<0.05
Wedell & Pettibone	1996	PCs, Microwaves, Restaurant, Hiring	Between	Preference	-	% Share A vs B	ANOVA	p<0.001
Dhar & Glazer	1996	Cars, Stereos, Apartments,	Between	Preference	-	% Share A vs B	Significance test	p<0.01
		Managers, Grad School Applicants						
Zhou, Kim, Laroche	1996	Cars, Caluclators, Orange Juice	Within	Preference	Expected Share under Regularity	B vs Regularity	Not Specified	Not Specified
Herne	1997	Policy Proposals	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.01
Sen	1998	Restaurants	Between	Choice	-	% Preference Share A vs B	MANOVA	p<0.05
				Preference (Continuous)	-		ANOVA	
				Value Setting	-			
Doyle, O'Conner,	1999	Tapes, Batteries,	Between	Choice	-	Interaction: Choice x Decoy	Log Linear Regression	p<0.001
Reynolds, Bottomley		Orange Juice, Baked Beans						
Sedikiedes, Ariely, Olden	1999	Partner Selection	Between	Choice	-	% Share A vs B	F- Test	p<0.0001
Slaughter, Sinar, Highhouse	1999	Hiring	Between	Choice	{T,C,Dc}	% Share A vs B	$\chi 2$	p<0.001
Tentori, Osherson, Hasher, May	2001	Gift Cards / Coupon	Between	Choice	-	% Share A vs B	$\chi 2$	p=0.005
Dhar & Simonson	2003	Microwave, Cassette Player, Binoculars	Between	Choice	-	Absolute Share A vs B	$\chi 2$	Varies by Condition
Kim & Hasher	2003	Shopping,	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.01
		Extra credit						
Kivetz , Netzer & Srinivasan	2004	*The Economist* Subscription, Xerox Machines	Between	Choice	-	% Share A vs B	t-Test	p<0.05
Choplin & Hummel	2005	Circles, Ovals, Lines	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.05
Park & Kim	2005	Restaurants	Between	Choice	-	% Share A vs B	Significance test	p<0.05
Chuang & Yen	2007	Luggage, Watches, Sneakers	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.05
Mourali, Böckenholt, Laroche	2007	Toothpaste, Printers, Restaurants	Between	Choice		% Share A vs B	$\chi 2$	Varies by Interaction
Hamilton, Hong, Chernev	2007	Sunglasses, Sofa, MP3 Platers, Phone	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.05
					{T,C1,D,C2,C3}	% Share B vs {T,C1,D,C2,C3}	$\chi 2$	Reversal of AD Effect
Yoon & Simonson	2008	Microwaves,Phone, Cars	Within	Peference	-	% Share A vs B w/in same time	$\chi 2$	p<0.05
						% Share A vs B across time	Significance test	p<0.01
Bateman, Munro, Poe	2008	Environmental Policy	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.01
						Choice x Decoy	Tobit Regression	p<0.05
Pocheptsova, Amir,	2009	Apartments,	Between	Choice	-	% Share A vs B	$\chi 2$	p<0.002
Dhar, Baumeister		Gift Cards	Between	Choice	-	Interaction: Choice x Decoy	Regression	p<0.001
Hedgcock & Rao	2009	Cars, Education, Apartments, Hotels,	Within	Value Setting	-	% Share A vs B	Pearson $\chi 2$	p<0.001
		Cruises, Repair, Health Care, Careers				Arcsine Transformed Proportion	t-Test	p<0.05

ASYMMETRICALLY DOMINATED DECOY MODERATORS

Two commonly reported types of moderators impact the strength of the attraction effect: those that create descriptive variance and those that create procedural variance. Moderators that create descriptive variance do so by changing the value, meaning, and/or weighting of the information provided. Moderators that create procedural variance do so by affecting how and in what way the decision is made – the decision making processes, strategies, and goals may all change. Figure 4 diagrams and categorizes the moderating relationships discussed in the literature. Figure 5 details notable empirical studies into the effect moderators.

Figure 4. Asymmetrically Dominated Decoy Moderators



Descriptive Variance Moderators

Descriptive variance moderators include variables pertinent to permutations on the quality and quantity of knowledge, expertise, and familiarity, on attribute specifications. These permutations may be created by or given to the decision maker regarding either the specific product choices or general product classes represented in the choice set. The amount, type, format, quality, and applicability of the information available leads to descriptive variance between choice options and affects the perception of the attributes and options in the choice set. Overall, the literature suggests that the availability of better, more objective, and easily evaluable information attenuates the attraction effect.

Figure 5. Asymmetrically Dominated Decoy Moderator Studies

Attenuates the Attraction Effect	Study	Accentuates the Attraction Effect	No Effect
Information Elaboration (except with Beer)	**Ratneshwar, etal. (1987)**		Product Familiarity
Information Meaningfulness			
	Simonson, (1989)	Expectation to be Evaluated by Others	
Increased Information Relevance	**Mishra, etal. (1993)**	Increased Target & Decoy Similarity*	*No Moderation with TVs
Increased Product/Category Knowledge**		Increased Percieved Popularity of Decoy*	*No Moderation with TVs
Stronger Brand Preference			** No Moderation with TVs or Cars
Low Target Quality x High SES †	**Heath & Chatterjee, (1995)**	High Target Quality x High SES†	†No Moderation with Beer
High Target Quality x Low SES †		Low Target Quality x Low SES†	
Low Target Quality †		High Target Quality †	
Knowledge x Numerically Presented Information	**Sen. (1998)**	Knowledge x Verbally Presented Information	
Greater Age (Seniors vs College Students)	**Tentori, etal. (2001)**		
	Dhar & Simonson, (2003)	Availability of a Choose Not to Choose Option	
Greater Age (Regardless of Expertise)	**Kim & Hasher, (2005)**	Younger Age x Less Domain Specific Expertise	
Target has a Negative Country of Origin	**Chuang & Yen (2007)**	Target has a Positive Country of Origin	
Consumer is Prevention Focused	**Mourali, etal. (2007)**	Consumer is Promotion Focused	
Prevention Effect Greater with Forced Justification		Promotion Effect Greater with Forced Justification	
Prevention Oriented Products		Promotion Oriented Products	
Use of Analytical Mode of Processing	**Hamilton, etal. (2007)**	Use of Perceptual Mode of Processing	
Deliberate Thought, Forced Justification			
Graphical Represenation of Probability Attributes	**Frederick & Lee (2008)**	Numerical Representation of Probability Attributes	
Negatively Valenced Attribtue	**Malkoc, etal. (2008)**		
	Pocheptsova, etal. (2009)	Executive Control	
		Resource Depletion	
	Mao & Oppewal, (2009)	Faith in Intuition	Need For Cognition

In general, information elaboration in the form of individual-specific knowledge and experience with brands, attributes, products or product categories, has been shown to reduce (or completely mitigate) the attraction effect (Ratneshwar et al., 1987; Mishra et al., 1993). Several

proxies for the quantity and quality of individuals' information level have been reported to attenuate the effect:

- Age (Kim & Hasher, 2005; Tentori et al., 2001)
- More years of education (Kim & Hasher, 2005)
- Higher vocabulary test scores (Kim & Hasher, 2005)
- Greater familiarity with product or product class (Ratneshwar et al., 1987)
- Greater product usage and purchase frequency (Mishra et al., 1993).

Experimental factors which improve information evaluablity and objectivity also tend to dampen the attraction effect. Those that encourage subjectivity or otherwise inhibit straight-forward comparisons tend to enhance the attraction effect. For example, increased attribute analyzability (Yeung & Soman, 2005), relevance, and meaningfulness (Mishra et al., 1993; Raneshwar et al., 1987) all reduce the strength of the attraction effect. On the other hand, the effect can be intensified through use of subjective modes of information presentation, including:

- Pictorial and tactile forms (Simonson & Tversky, 1992)
- Video demonstrations (Slaughter et al., 1999)
- Abstract graphical representations (Choplin & Hummel, 2002 & 2005)
- Smiley-face icons (Hamilton et al., 2007).

While greater subject expertise generally reduces the attraction effect, and greater information subjectivity strengthens the attraction effect, their additive effects of these characteristics are puzzling. Choice experts with more relevant product knowledge and experience exhibited *stronger* attraction effects than product novices, when presented with subjective information than with objective information (Sen, 1998). For experts, when choice information is presented in a subjective manner, the resulting situation does not help make a more informed decision, but rather accentuates the mechanisms that cause the attraction effect.

Procedural Variance Moderators

Procedure-based moderators influence how much effort and what type of information processing mechanism is used to decide. Procedural moderators operate by encouraging either effortful or superficial information processing methods. In general, the literature suggests that procedural changes which encourage more deliberate, conscientious processing tend to attenuate the attraction effect. Procedural changes that encourage superficial processing accentuate the attraction effect.

Experimental procedures likely to produce conscientious decision making generally do so by increasing subjects' involvement level with the task. For example, the following factors have been found to encourage more deliberate, conscientious processing, and also attenuate the attraction effect:

- Forced deliberation and use of analytical processes (Hamilton et al., 2007)
- High levels of product relevance, (Mishra et al., 1993).

Consistent with an inverse relationship between more conscientious processing and the attraction effect, research had shown that superficial decision making generally results in a stronger attraction effect. Notable sources of superficial information processing that accentuate the attraction effect include:

- Greater individual faith in intuition (Mao & Oppewal, 2012)
- Limited cognitive resources or diminished executive control (Pocheptsova, Amir, Dhar, & Baumeister, 2009)
- A reliance on brand loyalty, perceived popularity, and other heuristic cues (Mishra et al., 1993)
- A greater risk-seeking disposition (Khan, Zhu & Kalra, 2011; Mourali et al., 2007).

However, there is one notable scenario where seemingly more deliberative decision making strengthens, rather than reduces, the attraction effect. Greater need for justification intensifies the attraction effect (Hamilton et al., 2007; Park & Kim, 2005; Simonson, 1989;

Wedell & Pettibone, 1996). Though justification may seem to rely on more conscientious processing, *forced* justification in an experimental setting may not provide sufficient motivation to go beyond superficial deliberation. The decision process may merely seem to be more deliberative because reasoning (justification) is provided. That is to say, experiment participants with little motivation to conscientiously process may simply provide superficial reasons (such as subjective dominance) as justification. In this sense, it would be worthwhile to examine the effects of justification on the attraction effect, while controlling for elements of decision motivation or involvement.

Finally, which strategies and processes are used seems to be affected by specific combinations of decision-maker motives and attribute presentation. Heath & Chatterjee (1995) found that lower SES decision makers were susceptible to the attraction effect when the dominating target was of low quality, but not when it was of high quality. High SES decision makers were susceptible to the attraction effect only when the dominating target was of high quality, but not when it was of low quality. This finding implies that an elimination-by-aspect decision process (Tversky, 1972) is employed where options that do not meet a certain desirability threshold (in this case quality) are summarily eliminated. Thus, given the right combination of decision maker values and attribute dimensions, an attraction effect can be moderated by encouraging a bulk, choice elimination strategy.

Overall, the literature suggests that when decision makers make cursory or unengaged evaluations, the dominating relationship between target and decoy facilitates justification for choosing the target. However, when there is enough involvement in the decision, and a more deliberative decision process is used, the decoy's presence is seen as irrelevant. Consequently, a decoy effect fails to occur. It is also notable that various combinations of decision maker values

and attribute dimensions can (in addition to cursory/deliberative process changes) encourage changes in the choice strategy and criteria, such as the use of elimination-by-aspects.

ASYMMETRICALLY DOMINATED DECOY EFFECT EXPLANATIONS

Current research has uncovered a variety of moderators and partial explanations for the attraction effect. The current literature takes a predominately rational processing perspective to the effect's theoretical underpinnings. This section begins with rational processing explanations for the effect and ends with a discussion of more recent explanations that focus on less effortful, more automatic, less effortful cognitive processes.

Attribute-Weighting

The earliest proposed explanations sought to attribute the effect to perceptual differences or disparate weightings of attribute dimensions. In particular, many researchers applied Parducci's (1965) range-frequency theory as an explanation for how decision makers weigh attribute dimensions. The range principle states that value is judged based on relative position between endpoints of a given range. The frequency principle states value is judged according to its percentile rank. The two principles conflict when stimuli from different parts of the range are presented with unequal frequencies. When a conflict between the two theories exists (e.g. inclusion of an asymmetrically dominated decoy) a compromise is thought to be made where the new value is an average of the range- and frequency-based values.

Frequency Theory

Attribute importance weights are influenced by the number of levels available to define that attribute (Currim, Weinberg & Wittink, 1981). The higher the frequency, the more differentiating levels are available, and the more heavily the attribute is weighted. HPP (1982)

proposed a frequency-based explanation when they suggested that asymmetrically dominated decoys might work by creating perceptual biases on the frequency of observations of the Target's superior attribute. HPP found no significant effects for frequency increasing decoys. However, Wedell (1991) used a metric based on a three-option control condition and, ultimately, detected strong preference reversals in the presence of frequency increasing decoys. Ariely & Wallsten (1995) observed similar attraction effects and also reasoned that attribute weightings change because frequency decoys create greater differentiation along the Target's superior attribute. It is the increased ability to differentiate that leads the decision maker to place more weight on an attribute. In other words, a frequency decoy (e.g. Figure 1: A_3 or D_2) creates three levels of differentiation on Attribute 2 whereas there are still only two levels of differentiation on Attribute 1. Given that a finer distinction can be made on Attribute 2, the decision maker is presumed to place more emphasis on Attribute 2.

Range Theory

Based on the range principle, the perceive value of an object is determined by comparison against a set of endpoints. What is considered an endpoint will vary by context. For example, a 30 year-old may seem old when presented with two teenagers, but may not seem old when presented with a teenager and an octogenarian. Wider attribute ranges narrow the perceived distance between options within the range. Though early experiments found initial support for range theory explanation (HPP, 1982; Huber & Puto, 1983), the overall evidence suggests range effects do not play a major role in creating the attraction effect.

HPP initially suggested that the combined effects of range extensions and attribute weightings are responsible for a decoy effect. A range-increasing asymmetrically dominated decoy would extend the range of the Target's inferior attribute (for example Figure 1 decoys $A_{1\text{-}2}$,

D_1, G_2, $H_{1\text{-}2}$, I_1 and J_1) thereby narrowing the perceived difference in the Target's weak attribute. A wider range created by the decoy (for example, A_2 creates a wider range on Attribute 1 than does A_1) reduces the contrast between options. The result is that less weight is placed on the Target's inferior attribute.

Though range and frequency theories can account for many instances of the attraction effect, they cannot account for observed attraction effects observed under many experimental conditions. In the following instances, frequency- and range-only explanations either cannot make a prediction on effect, or predicts erroneously:

Decoys positioned to increase range and/or frequency on both attributes, or positioned to create competing range and frequency effects still reliably produce an effect for the Target. Note in Figure 1 that decoys $A_{1\text{-}2}$, $D_{1,4}$, G_2, $H_{1,2,5}$, I_1 and $J_{1,5}$ all increase the frequency of differentiable observations across the attribute where the Competitor dominates, and should thus encourage share gain for the Competitor. Yet these decoys all still produce reliable decoy effects for the Target (HPP, 1982; Wedell, 1991; Highhouse, 1996; Dhar & Glazer, 1996; Pettibone & Wedell, 2000 & 2007). Similarly, decoys positioned at A_4 (HPP, 1982), D_3 (Wedell, 1991), and F_1 (Shafir et al., 1993) all increase the number of points of differentiation along both Attributes 1 and 2, yet have still produced reliable asymmetrically dominated decoy effects which favor the Target.

Attribute-weighting theory cannot predict in choice scenarios with only a single, subjective attribute dimension. Choplin & Hummel (2005) produced an attraction effect with line and circle size variations, and Ariely, (2008) produced the effect with photographs of date prospects of varying degrees of attractiveness. With only a single attribute to choose on, and no objective

measure of superiority, range and frequency-based explanation cannot begin to explain why preference would shift to the target.

Range effects do not scale into stronger attraction effects. Under range theory expectations, more extreme decoys should produce stronger attraction effects as the Target's weak attributes would be particularly salient. However, extreme-range creating decoys have not consistently product larger attraction effects. (Huber & Puto, 1983; Mishra et al., 1993).

Frequency and range theories are inconsistent with attribute weight outcomes observed for negative-valanced choice scenarios. When choosing between options on two unfavorable attributes, decision makers tend to more heavily weigh the functionally superior attribute, regardless of which attribute has greater frequency (Malkoc et al., 2008).

It is also difficult for range and frequency theories to explain why many moderators are able to accentuate or attenuate the effect. For example, attribute weight-shift theories cannot explain why:

- Increased justifiability strengthens the effect. (Wedell & Pettibone, 1996),
- The effect is stronger and more prevalent in individuals with high faith in intuition (Mao & Oppewal, 2012), or
- A risk-seeking disposition would strengthen the effect (Mourali et al., 2007).

In summary, while manipulations of attribute range or frequency have been able to produce the attraction effect, they have not been able to do so consistently. Nor have they been able to produce expected additive effects when a decoy is positioned appropriately. While there may be yet unexplored perceptual or analytical boundaries of a combined range and frequency effect, such pursuits may not contribute much to the explanation of the attraction effect. Too

much empirical evidence suggests that attribute weighting methods are flawed, and cannot satisfactorily account for observed outcomes.

Risk-Aversion

While how attribute dimensions are valued or weighted in the presence of a decoy are still under debate. Even more controversy exists regarding what decision criteria and processes are used, and how they are used, to arrive at a final choice. One explanation for how decision makers use attribute information stems from prospect theory and loss aversion. Loss aversion assumes decision makers will try to void losses while prospect theory predicts decision makers would prefer to minimize loses over risking for gains (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). As applied to the attraction effect, the decision maker is thought to use background knowledge and/or the local context (which includes the decoy's attribute values) to create an anchor to evaluate both the Target and Competitor's attributes. The Decoy's attributes define a reference point and frames the Target's superior attribute as a moderate gain, coupled with no gain or loss on the weaker attribute (versus a large gain and large loss relative to the Competitor's attribute rankings) (Highhouse, 1996). For example, relative to a decoy such as A_4 in Figure 1, choosing the Target would be perceived as gaining modest amounts of both Attributes 1 and 2. Choosing the Competitor would be perceived as a large loss on Attribute 2 for a large gain on Attribute 1. Prospect theory in this case would predict an attraction effect and share gain for the Target.

The effect of risk-related moderators seems to support a loss aversion and prospect theory based explanation. For example, prevention-minded, risk-averse decision makers tend to be *less* susceptible to the attraction effect than promotion-minded decision makers (Mourali et al., 2007; Schley, 2005). Though risk aversion and prospect theories accurately predict attraction effects in

these instances, they are unable to account for an effect in several other instances. For example, attraction effects have been shown to exist in scenarios where loss aversion and prospect theory cannot predict an outcome:

When options are presented in a manner where no clear anchor is suggested. Strong attraction effects existed when decision makers were first shown {T,C,D} and then asked to choose from {T,C}[3] (Sivakumar & Cherian, 1995), and when decision makers were asked to make a choice from {T,C} after having evaluated a five-option set which included {T,C,D} (Simonson & Tversky, 1992).

When no attribute trade-off dynamic exists. Risk aversion and prospect theories rely upon a trade-off relationship between two attributes. However, as mentioned earlier with attribute-weighting explanations, attraction effects exist even under one-attribute dimension scenarios (Ariely, 2008; Choplin & Hummel, 2005). Attraction effects can also be seen when the Target and Competitor are presented along different, non-comparable attribute dimension, disallowing direct trade-off comparisons (Park & Kim, 2005).

When attribute characteristics do not correspond to measures of risk. Risk aversion and prospect theories assume the attributes being evaluated carry with them an inherent measure of risk; for example price puts money as risk and quality can put convenience, usability, and image at risk.

[3] With priming and other forms of anchor-triggering mechanisms, it is assumed the decision maker anchors to the option presented to them first sequentially, then within-subject preference reversals should not be observed when choice sets shrink from {T,C,D} to {T,C} since decision makers should already be primed or anchored to either T, C or D. T should already be recorded as a moderate gain (relative to the decoy) and C should be recorded as a large gain and loss. In this presentation sequence, the subject has equivalent knowledge about the decoy option in both cases, so the probability of choosing the Target from {T,C} and {T,C,D} should be the same if priming or anchoring effects are involved.

However, the attraction effect has been shown to persist even with attributes that have no identifiable risk associable metrics (Choplin & Hummel, 2005).

In summary, risk aversion and prospect theories have been offered as possible explanations for the attraction effect. However, subsequent risk-related moderator findings show the effect can still exist in contexts that have no relevant risk measures. Evaluation of gains and losses cannot be the reason behind the attraction effects observed for portraits (Ariely, 2008), and lines and circles (Choplin & Hummel, 2005). Finally, a prospect theory explanation hinges on gain and loss evaluations relative from the decoy's attribute values, and thus far there is no empirical support that the decoy is ever considered as a reference point. Overall, it is difficult to believe the attraction effect is the result of a risk-averse calculation.

Justification-Based

Another class of rational processing explanation relies on decision justifiability. In particular, rank order criteria or a subjective, dominance relationship between options makes choosing an asymmetrically dominating target highly justifiable. These explanations include a series of *value creation* or *emergent value created* theories - the creation of an identifiable rank order between options creates value by creating another way to justify and defend a difficult decision – through an artificially created subjective dominance. Easy choice justification has been used to explain the attraction effect (Simonson, 1989; Wedell, 1991; Shafir et al., 1993; Wedell & Pettibone, 1996; Pettibone & Wedell, 2000), especially in the face of greater attribute ambiguity or subjectivity (Zhou et al., 1996). Range increasing decoys have also been thought to operate through increased justifiability by reframing the Target's weak attribute (Ratneshwar et al., 1987). In this context, the decoy's influence is not from altering the perceived value of the Target's attributes (as with range theory); rather, the decoy influence is from repositioning the

Target as either the high, medium, or low rank on a set of attributes. Rank-based emergent value gives the Target strengthened appeal by protecting the Target from being the worst option on its weak attribute, thus making it a more justifiable option than without a decoy (Amaldoss, Bettman, & Payne, 2005; Schley, 2005; Wedell & Pettibone, 1996; Wedell 1991; Ratneshwer et al., 1987; Huber & Puto, 1983).

While justification through subjective dominance may explain part of the process behind the attraction effect, its application to negatively-valenced attributes yields results that challenge it as a stand-alone explanation. In particular, decoyed choice sets presented on negatively valenced attributes have been shown to shift share to the strongest option on a functionally superior attribute, regardless of whether that option was the target of the decoy or not (Malkoc, Hoeffer & Hedgecock, 2008). If decision makers choose purely based on justifiability of subjective dominance, then attribute valence should not moderate the attraction effect since the Target is dominant no matter what form the attribute scale is presented in. Malkoc, et al.'s finding suggests that the process of choosing or weighing an attribute likely precedes the final choice between options, and that attribute weighting can often overshadow the justifiability of a dominant relationship.

In addition, justification cannot be a stand-alone explanation for the attraction effect because it is unable to account for the effect's persistence with abstract, affect-based stimuli. The concept of justification necessitates the ability to articulate identifiable reasons for preference. However, statistically significant attraction effects have been observed in choice sets of abstract figures such as lines and circles (Choplin & Hummel, 2005). No objective justification can be given for preferring one line or circle over another. And the use of subjective, affect-based

justification goes back to the central issue that affectual preference has been created for the Target, and that increased preference exists outside of the decision maker's ability to justify.

Finally, the existence of the attraction effect with animal and insect populations does not support a justification explanation. Indeed, individual insects and birds, that presumably do not (or fundamentally cannot), provide justification for their choices still exhibit the effect (Bateson, Healy & Hurly, 2002; Shafir, Waite & Smith, 2002). Even more inconsistent with a justification explanation is with ant colony behavior. Individual ants exhibit the attraction effect yet colonies (which presumably have more potential need for inter-ant justification of choice) fail to exhibit the effect (Edwards & Pratt, 2009).

Decisional Relief

Decisional relief explanations operate under the premise that decision makers are cognitive misers. The addition of an asymmetrically dominated decoy works by providing an easy comparison: a form of 'decisional relief' for the resource constrained or cognitively tasked decision maker. Instead of struggling through the difficult task of combining attributes, analyzing tradeoffs or somehow evaluating each option as a composition of its attributes; choosing based on a subjective dominance relationship becomes a simplification process that is less effortful and perhaps more appealing to the inherent cognitive miser in all of us.

The trade-off decision that is made between {T,C} has been shown to be tasking (Luce, Bettman & Payne, 2001) as the decision maker must deliberate to arrive at an attribute preference, "do I want more of Attribute 1 or 2?," an acceptable tradeoff rate, "am I giving up too much of Attribute 1 for too little gain in Attribute 2?," and finally a decision, "did I make a good choice?" Cognitive studies, including brain imaging, show the presence of a *tradeoff aversion* in {T,C} choice sets. fMRI results support that decision makers exhibit increased

negative emotion (as measured by increased activation in the amygdala and medial prefrontal cortex) when trade-offs must be made, and then relatively lower levels of negative emotion when a decoy added to the choice set (Hedgecock & Rao, 2009). Based on these finding, Hedgecock & Rao (2009) have suggested that asymmetrically dominated decoys operate by providing choice strategies that avoid negative emotions. The authors conjecture that decision makers would choose based on dominance rather than a trade-off process because the former provides decisional relief from negative emotion.

How the decoy's presence provides decisional relief is still unclear. Introducing more options into the decision scenario would likely result in more comparisons that must be made, making the decision even more difficult. Most researchers that have proposed a decisional 'ease' explanation have simply implied that the decoy operates by shifting the focus of the choice set to {T,D} instead of {T,C} without explaining why {T,D} should be the key comparison carved out from {T,C,D}. Decisional relief also does not address how the decoy's presence increases the relative desirability of the Target over the Competitor.

A final issue with decisional relief explanations is that the attraction effect has been shown to strengthen in the presence of an option not to choose (Chuang & Yen, 2007; Dhar & Simonson, 2003). Arguably a decision maker can most effectively avoid the negative emotion associated with making tradeoffs by simply opting not to choose. Dhar & Simonson showed that offering an option not to choose created decisional relief in a {T,C, NotChoose} control set, but failed to do so in the presence of a decoy. The researchers conjectured that an asymmetric decoy only persuades indecisive decision makers to choose the Target, and is not always used as an easy decisional-way-out.

It is certainly a viable theory that the Decoy helps to provide decisional relief, but what decision mechanism(s) actually provide the relief, or why a dominance relationship might induce preference for the Target remains unaddressed.

Conclusion of Explanatory Theories

In general, there appears to be agreement that choosing between tradeoffs in a {T,C}set is effortful, and that the presence of a decoy helps create preference for the Target. Unfortunately, agreement in the literature ends there. There is compelling evidence that preference is not created through just one process of attribute weighing, justifiability, loss aversion, or increased decisional ease, but rather may stem from a combination of these, and perhaps other affect-creating processes. While many studies purport to have found a simple explanation for the effect, the inability of these explanations to account for effect variations across different moderating conditions suggests that a more complex explanation is required.

AREAS FOR FUTURE RESEARCH

Thus far, explanations for the attraction effect assume the decision maker approaches the choice process from a rational and reasoned perspective: attributes are weighed, implications are considered, and information is conscientiously combined and analyzed. In particular, researchers have predominantly assumed the decision maker arrives at a reasoned judgment and decision by actively processing information in the decision context and incorporating it with information purposefully retrieved from experience, familiarity, and knowledge. Unfortunately, this line of reasoning leaves little room for the more passive, automatic, and intuitive thought processes that generally affect judgment and decision making. This section begins with the argument that more explanatory success might be found through an exploration of System 1 processes, and concludes

with the specific suggestion that asymmetrically dominated decoys might be better understood through a path of decision fluency.

Figure 6. Summary of Attributes Associated with Dual Systems of Thinking ǂ

System 1	System 2
Unconscious / Preconscious	Conscious
Implicit	Explicit
Automatic	Controlled
Low Effort	High Effort
Rapid	Slow
High Capacity	Low Capacity
The Default Process	An Intervening Process
Holistic, Perceptual	Analytic, Reflective
Non-Verbal	Linked to Language
Modular Cognition	Fluid Intelligence
Associative	Rule-Based
Domain Specific	Domain-General
Contextualized	Abstract
Pragmatic	Logical
Parallel	Sequential
Stereotypical	Egalitarian
Independent of General Intelligence	Linked to General Intelligence
Independent of Working Memory	Limited by Working Memory Capacity

ǂ Summarized from (Evans, 2008)

Figure 6 lists common information processing characteristics referenced from social and cognitive psychology, behavioral economics, and philosophy literatures, and categorizes them under two information processing routes, generically referred to as Systems 1 and 2 (for a review, see Evans, 2008). Standard dual-process theory suggests that System 1 and 2 processes operate with a default-interventionist relationship. Less effortful, System 1 processes are activated first, and are intervened upon by System 2 processes under certain conditions. If we consider consumer choice as a generic form of individual choice, then there is a substantial body of literature on non-effortful, System 1 effects on judgment and choice that are potential influences on the attraction effect. Indeed, results from the moderators discussed thus far suggest that less

effortful, more automatic, processes are involved in the creation of the attraction effect. For example, stronger attraction effects are observed with decision makers who are:

- More likely to use in intuition (Mao & Oppewal, 2009, 2012)
- Cognitively depleted or resource constrained (Pocheptsova et al., 2009)
- Forced to use a perceptual mode of stimulus processing (Hamilton et al., 2007)
- Reliant on brand loyalty and popularity (Mishra et al., 1993), and country of origin (Chuang & Yen, 2007) as heuristic cues.

In addition, we would expect an attenuated attraction effect when decision makers use more conscientious, deliberate, System 2 process. And indeed prior research supports that the attraction effect is substantially reduced or mitigated when decision makers:

- Operate under a more cautious, conservative, prevention mode of decision making (Mourali et al., 2007; Malkoc et al., 2008)
- Are forced to deliberate their decision (Hamilton et al., 2007)
- Exhibit high levels of task involvement, (Mishra et al., 1993).

Based on the premise that System 1 processes tend to accentuate, and System 2 processes mitigate the attraction effect, future research can do well to identify new moderators in context manipulations that trigger shifts from one system of thinking to another.

If the attraction effect does stem from a System 1 process, we must then ask ourselves what processes and mechanisms could the decoy trigger to create increased preference for the Target. A potentially fruitful avenue to explore is how increased processing fluency, driven by the presence of the decoy, can impart positive affect onto the Target.

Fluency

Fluency refers to a general ease or difficulty that accompanies the reaction to a stimulus. (Dis)fluency has been shown to trigger changes in judgment and decision making, and has been shown to fully explain the strength of other decision context effects, such as the compromise effect (Novemsky, Dhar, Schwarz, & Simonson, 2007). As applied to the attraction effect, fluency may be the vehicle through which positive affect is created and then imparted on to the Target. Theoretically, the presence of the decoy can increase processing fluency through similarity and subjective dominance. A subjective dominance relationship creates a salient, readily available easy justification between options (Novemsky et al., 2007). Similarity (between T and D) may operate as repeated exposure of a singular option type, facilitating conceptual processing of both T and D (Zajonc, 1968). In addition, similarity between T and D may also make the Target more cognitively accessible and easier to recall from memory. From an empirical standpoint, there is already physiologically evidence of decision fluency in the presence of a decoy (Hedgecock & Rao, 2009).

Increased processing fluency could then be translated into various forms of positive affect thereby increasing preference for the target. For example, increased processing fluency has been shown to:

- Increase general liking (Bornstein, 1989; Schwarz, 2004; Zajonc, 1968)
- Improve judgments of truth and trustworthiness (for a review, see Schwarz, 2004)
- Increase feelings of familiarity (e.g. Whittlesea et al., 1990)

- Be interpreted as increased prevalence or popularity[4]

Any one of these fluency-induced positive affects can help increase preference. But why would this positive affect be associated with the Target and not the Competitor?

First, in the context of {T,C,D}, fluency would be created through similarity and subjective dominance only when evaluating {T,D}, but not {T,C} or {C,D}. In fact, evaluations of {T,C} and {C,D} are physiologically (Hedgecock & Rao, 2009) and cognitively (Luce, Bettman & Payne, 2001) *dis*fluent. Second, attribution of positive affect generally occurs through simultaneous activation. If positive affect is experienced while evaluating the Target, consumers will, by default, assume the Target to be the source of that positive affect. This 'aboutness principle' of inference asserts consumers naturally assume the thoughts that come to mind while thinking about a concept are relevant to that concept (Higgins, 1998; for a review see Schwarz, 2004).

Thus, the positive sense of ease that comes with fluency is likely attributed to and interpreted as liking or preference for the Target. Under this framework, there is no range- or frequency-based valuation or analysis to arrive at a preference. Of the existing explanations, affect-as-information is most similar to subjective dominance explanations. However the major difference between the two types of explanations is that affect-as-information is reliant upon experienced positive affect, not justification, as the source of preference.

The affect-as-information explanation can be tested by manipulating processing fluency and then measuring preference for the Target. Decreasing Target fluency is expected to decrease liking, familiarity, and/or trustworthiness, and should decrease preference for the Target and

[4] This belief operates through the availability heuristic where the more fluently content is processed, the more prevalent it is assumed to be in the real world (outside of the decision context) (Tversky & Kahneman, 1973).

dampen or neutralize the attraction effect. Increasing the relative fluency of the Competitor should also weaken the attraction effect. Empirically, Competitor fluency can be increased by subconsciously priming decision makers with a stimulus that is closely related, but not comparable, to the Competitor. Target processing can be made more disfluent by presenting the Target and Decoy pair in a more difficult to interpret font, color or scale. Neither of these manipulations should affect the thought content of the decision set, but should impact processing fluency to reduce the attraction effect.

Summary

Research on the attraction effect can benefit from the application to a generic dual-processing framework such as those found in cognitive and social psychology, philosophy, and behavioral economics. Current attraction effect research primarily operates under the premise that the decision maker uses only conscientious, deliberate, System 2 thought processes. Sparse consideration is given to the role that unconscious, rapid, automatic, System 1 thought processes may play in the formation of the attraction effect. Normatively perfect choices are rarely made because consumers are routinely, subconsciously, influenced by the decision context and the information, associations, and emotions that the choice context may activate.

There is still much research to be conducted on the attraction effect. If consumer preference is indeed constructed and not revealed, a diverse pool of metacognitive influences must also be considered. Moods, emotions, affect states, fluency, and individual differences should all be examined as potential explanatory variables of the attraction effect. Context effects such as the compromise and deferral effects have been shown to be mediated through processes chosen based on changes in decision fluency, and there is little reason to believe attraction effect processes are not mediated through similar paths. As discussed in this review, the processing

implications of fluency states maps well to current findings on the attraction effect, and hold great potential in helping to explain the automatic and affectual components of the attraction effect.

CHAPTER II: EXPERIMENTAL RESULTS & EFFECT FRAGILITY

INTRODUCTION

Decoys are choice options that are purposefully designed to affect the choice share of other options without the intention of actually being chosen (e.g. Choplin & Hummel, 2005; Dhar & Glazer, 1996; Pettibone & Wedell, 2000; Simonson, 1989). One of the most commonly researched types of decoy is the asymmetrically dominated decoy, introduced in 1982 by Huber, Payne and Puto (HPP). In a three option choice set, an asymmetrically dominated decoy is a choice option that is wholly dominated by a target option, but not by a competitor option (HPP, 1982). HPP demonstrated that in the presence of an asymmetrically dominated decoy, choice share could be shifted from a competitor option to the asymmetrically dominating target. This share shift was referred to as the asymmetrically dominated decoy effect, and is now more commonly referred to as the attraction effect.

From a marketer perspective, the attraction effect has been touted as a potentially powerful marketing tactic that can be used to increase market share at the expense of a given competitor. Textbooks and business best-sellers have widely offered the attraction effect as a readily implementable marketing tool. For example:

> "Here's a real-world example….How did buyer befuddlement turn into larger-than-expected purchase so quickly? The answer: decoy marketing. In this case, the decoy was unintentional but there are lots of ways that marketers can use the technique to steer customers toward a decision….Sometimes…customers have difficulty deciding between alternatives. To get the product they need, they require a nudge in one direction or another. [The] decoys nudged me toward the jumbo can at the same price, and the deal was closed." (Dooley, 2011).

and…

> "Changing the alternatives in the consideration set can have a major impact on the consumer's decision. For example, a good brand can look even better when an inferior brand is added to the consideration set. This attraction effect occurs because the inferior brands increase the attractiveness of the dominant brand, making the decision easier." (Hoyer & MacInnis, 2010).

Given the theoretical and practical potential of the attraction effect, the original purpose of this study was two-fold: to demonstrate the effect's applicability to hospitality choice scenarios, and to examine the robustness of the attraction effect across differences in cognitive dispositions. Based on prior research that suggests the attraction effect to be the result of low-effort, automatic, cognitive processes (Mao & Oppewal, 2012; Pocheptsova, Amir, Dhar, & Baumeister, 2009), it was expected that individuals more inclined to process intuitively (as opposed to cognitively) would be more likely to exhibit the attraction effect. In the process of creating and testing stimulus material for the original study, it became apparent that reliably reproducing an attraction effect is a more difficult, and tenuous process than is suggested by the existing literature.

This study tested a total of 23 product classes under 74 different product scenarios. Overall, an attraction effect could be created at a better than chance level, but could not be consistently created, or even re-created from new or previously successful stimulus. Even after parsing experiment results by measures of intuitive and cognitive tendencies, still no consistent attraction effect was exhibited at statistically significant levels. The repeated failure to reproduce the attraction effect casts doubt on the robustness of the effect, and brings into question the practical applicability of asymmetrically dominated decoys as an effective, real-world marketing tool. As such, the renewed purpose of this study is to add new null results to the body of attraction effect literature, and to discuss practical limitations of the effect for future researchers and marketers.

EXPERIMENT METHODS

The current study is comprised of eleven separate experiments, each of which is comprised of multiple attraction effect choice scenarios. An explanation of study methods begins with an overview of the stimuli, participants, and procedures used across all experiments. It is

then followed by details on experiment-specific stimulus and design. The section concludes with a discussion on the metrics and measures used to determine the size and existence of an attraction effect.

Overview of Choice Scenarios

The stimuli used in each successive study was refined to include choice scenarios that more closely mirrored that of past, successful experiments. Overall, the experiments tested 86 individual choice scenarios and covered 17 product as well as six service categories. Full reproductions of stimuli have been included in Appendix 1. All experiments were executed as between-subject designs to avoid within-subject memory-based response biases and other external influences that might have occurred between test-retest periods.

Each choice scenario had at least two test conditions: a two-option control condition, and a three-option decoy-condition where one control-condition option was positioned as an asymmetrically dominating target option. Most choice scenarios also administered a third test condition where the remaining control-condition option was positioned as the asymmetrically dominating target option. At a minimum, two pieces of data were collected for each subject-choice scenario combination:

- Choice Scenario Treatment Condition: Whether the subject was given the control condition (two-options), or decoy A or decoy B conditions (three-option choice sets where either A was positioned as the dominating target, or B was positioned as the dominating target, respectively)
- Choice: The option the subject chose from the provided alternatives.

Other data collected varied by experiment, but generally included participant demographics and performance on traditional psychographic scales. A more detailed description of these data is provided in subsequent sections specific to each experiment.

For each experiment, the order in which options were listed for each choice set was randomized. Similarly, subject assignments to treatment conditions were randomized for each choice scenario. For example, subjects could be asked to choose between a two item control set for some items, and a decoyed choice set for others. This randomization scheme is a departure from prior attraction effect survey methods, but should provide stronger internal validity, as each subject is not assigned specifically to either a control or decoy condition for all choice scenarios[5].

Product Choices

Each product within a choice set was described on two attributes (such as price and quality). To subtly emphasize the dominance relationship between the target options and their respective decoys, several choice sets used a third, qualitative attribute dimension such as brand to make the target and decoy seem more similar to each other than to the competitor. For example, a control condition set of wines included the choice between two French wines:

- Bottle of white, Bordeaux wine for $25.00
- Bottle of red, Bordeaux wine for $45.00

Here, the attribute dimensions to choose between were wine type (red or white Bordeaux) and price ($25 or $45). The decoy for the red Bordeaux was listed as:

- Bottle of red, Finger Lakes, NY wine for $45.00

[5] Given that most attraction effect research was conducted prior to the wide availability of computers and the Internet, the majority of reported studies were administered in a paper/pen format. The development of more sophisticated online survey administration tools have allowed for question order and choice option order randomization that was simply not practical with paper/pen survey methods.

The bottle of *red* Bordeaux, well known as a world-class wine, subjectively dominated the relatively unknown bottle of New York State red.[6] In the three-item choice set, the two Bordeaux wines were not considered to be the dominating/dominated choice pair. Here, two attribute differences between the two Bordeaux options (price and color type) are available whereas only one attribute difference exists between the two red wines (region only).

Products and services used for choice scenarios were selected according to consumption relevance to subjects, ability to be reasonably differentiated on two attribute dimensions, and either their comparability to past research stimulus or extensibility to practical applications. Thus, the products and services used incorporate modern-day attribute dimensions and relevant consumer products. For example, price and calorie counts for common fast food options (Experiments 2, 4, and 5), flights and checked luggage fees (Experiments 2 and 4), and laptop computers with hard disk capacity and battery life (Experiment 7).

Scenarios drawn from past research were filtered and adjusted to maintain product and attribute relevance for modern consumers. For example, from HPP's original stimulus, the beer scenario price range was adjusted from $1.80-$3.40 to $7.80-$9.00 per six-pack (Experiments 7 and 8); and photography film (developing time and color fidelity attributes) and CRT TV set (percent distortion and reliability rating attributes) were excluded due to product and attribute relevance issues. Exact duplicates of past choice scenarios were included in most experiments. In general, experiments in this study were conducted as constructive replications of the attraction effect. Further detail on the specific stimulus used for each experiment is provided in the Methods Section, and all choice scenarios are reprinted with explanatory annotations in Appendix 1.

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[6] The same subjective wine quality manipulation was tested a second time with a more obvious quality manipulation where the decoy wines were from Llano, TX.

Experiment-Specific Stimuli Description

This section details the survey stimulus and the execution format of each experiment within the study. Notable departures from prior attraction effect experiment methods include the repeated use of an online subject pool recruited through MTurk, and the randomization of within-subject choice scenario treatment condition. All but one experiment in this study (Experiment 4) was administered in an online format, and only Experiment 2 was conducted on a student subject pool. Figure 7 summarizes features of each experiment.

Figure 7. Summary of Experiment Methods

Experiment	**1**	**2**	**3**	**4**	**5**	**6**		**7**	**8**	**9**		**10**	**11**	
Format	Online	Online	Online	Paper/Pen	Online	Online		Online	Online	Online		Online	Online	
Subject Pool	Convenience	Undergrad	Mturk	Gen. Pop.	Mturk	Mturk		Mturk	Mturk	Mturk		Mturk	Mturk	
Personality Scale	REI (Short)	REI (Long)	None	None	CRT	CRT		CRT	CRT	CRT			CRT	
# of Choice Scenarios	9	11	3	12	6	1	1	5	6	1	1	1	1	1
Presentation Order														
Scenarios	Randomized	Randomized	Fixed	Fixed	Randomized	Randomized		Randomized	Randomized	Randomized		Randomized	Randomized	
Options	Randomized	Randomized	Fixed	Fixed	Randomized	Randomized		Randomized	Randomized	Randomized		Randomized	Randomized	
Sample Size Range per Scenario														
Control	26-30	67-84	60	56	69-78	53	23	58-69	77-107	102	98	74	143	66
Decoy A	30-37	65-87	58	60	65-90	47	31	60-70	69-92	73	96	84	133	55
Decoy B	26-34	65-95	NA	NA	66-86	NA	46	57-68	75-100					
Total Sample Size	90	232	118	116	227	100		192	263	175	194	158	276	121

Experiment One used a web-based interface where each subject was presented with a total of 18 questions (seven food-related consumer choice sets, and eleven personality-based questions) on a single, scrolling web page. The 90 participants in Experiment One were drawn from a convenience sample of the author's acquaintances. The subjects were generally college educated, geographically dispersed throughout the United States, solicited through online, social media channels, and were naïve to the intent of the survey.

Participants first made product choices, and were then given Need for Cognition (NFC) and Faith in Intuition (FI) questions from the shortened Rational Experiential Inventory (REI) (Epstein, Pacini, Denes-Raj, & Heier, 1996). REI questions were presented as a series of scales

where participants were asked to move a slider from zero to ten corresponding to how well each statement represented their beliefs. Zero corresponded to "Completely False" and ten was "Completely True").

At the end of the REI, participants were asked whether they considered themselves well informed and conscientious about food. This question was posed because prior research has shown that knowledge, familiarity, and experience with stimulus product categories may attenuate the attraction effect (Sen, 1998), and each product choice sets used in Experiment One was food and beverage related. Subsequent statistical analysis between self-declared "foodies" and "non-foodies" revealed no statistical difference in the lack of attraction effect results. After completing the personality portion of the experiment, participants were shown a message acknowledging the completion of the survey. No compensation or remuneration was provided for participation.

Experiment Two was administered in an online format. 257 Subjects were solicited from two introductory undergraduate marketing courses at a large, east-coast university, and were compensated with course credit for their time. Though solicited in class, participants were not required to complete the survey in the classroom setting. Participants were presented with ten choice scenarios which included food and beverage consumer products, and hospitality services such as hotel stays, cruise packages, and airline flights. Six of the ten choice sets were structured with three treatment conditions each (control, decoyed for one control option 'A,' and decoyed for the other control scenario 'B'), similar to those in Experiment One. The remaining four choice sets were structured with seven treatment conditions each; the same three conditions as previously listed (control, asymmetric decoys for options A and B), and the remaining four

conditions tested relatively inferior decoy positions for options A and B, but were not used for the purposes of this study.

After making selections from the eleven product choice sets, subjects were presented with Pacini & Epstein's full, 40-question Rational Experiential Inventory (REI) test (Pacini, & Epstein, 1999). REI prompts were presented with the same sliders as in Experiment One. At the end of the REI, participants were directed to a message indicating completion of the survey.

Experiment Three consisted of a three-question online survey. A total of 118 participants were solicited through Amazon.com's Mechanical Turk (MTurk) service, and compensated $0.50 for their time. Similar to the structure used in past attraction effect research, participants were randomly assigned to either a control (n=60) or decoy (n=58) treatment condition. Participants did not receive mixed-sets of scenarios. Each participant was given either all three-option (decoyed) or all two-option (control) scenarios. In addition, the order in which options were presented within each choice scenario was fixed in a non-randomized manner. The procedures, though still executed online, more closely mimicked those used in prior off-line attraction effect studies.

Experiment Four was a twelve-question, paper-based survey administered in-person at a public commons area in a moderate-sized, up-state New York town. A total of 116 participants were randomly assigned to receive either the control or decoy treatment condition. Participants in the control condition made selections from two-option choice sets. Decoy condition participants made selections from three-item choice sets where the third option was always an asymmetrically dominated decoy for either the first or second option. Each participant was compensated with $1 and a small candy bar for completing the survey. Six of the twelve choice sets were content replications of stimuli from Experiments One, Two or Three.

The Experiment Five survey was a single-page, eleven-question web-based survey administered through MTurk. The survey was comprised of (in order of appearance) the three-question Cognitive Reflection Test (CRT) (Frederick, 2005), six product choice scenarios, and two demographic questions (educational attainment and gender). The order in which the product choice scenario questions and treatment conditions were presented was randomized.

Three of the six choice scenarios were presented pictorially with breakfast pastry, breakfast sandwich, and two-liter soda options shown in full color. Product pictures were not identified by name, and target/decoy relationships were implied by photographic similarity in product type. For example, the control set for breakfast pastries consisted of a wedge of coffee cake and a plain scone. The respective decoys were a square of coffee cake and a non-descript fruit scone. Other than pictorial differences, products were described only by their calorie counts and either fat or sugar content.

The CRT is a series of three, relatively simple word problems designed to elicit an initial, incorrect, reflexive answer that upon even minimal deliberation, leads the subject to a cognitively simple, correct solution[7]. The test measures a subject's propensity to make decisions in a deliberative (versus intuitive) manner. Starting with Experiment 5, the CRT replaced the REI as the cognitive measure of choice for two reasons: at three questions in length, the CRT was easier to administer than the REI, and as a behavioral, rather than self-report measure, the CRT was more likely to be an unbiased measure of subjects' cognitive tendencies.

Experiment Six was a single-page, seven-question, web-based survey. 100 subjects were recruited through MTurk, and each compensated $0.75 for their participation. The survey

[7] The three questions of the CRT are: Q1: A bat and a ball cost $1.10. The bat costs $1.00 more than the ball. How much does the ball cost? Q2: If it takes 5 minutes for 5 machines to make 5 widgets, how long would it take 100 machines to make 100 widgets? Q3: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? Correct (Incorrect intuitive) Answers: Q1: 5(10)cents; Q2: 5(100)minutes; Q3:47(24)days.

consisted of the CRT, two demographic questions (gender and educational attainment), and two choice scenarios. The choice scenarios were exact replicas of successful attraction effect scenarios described by Ariely (2008), and included subscription options for *The Economist*, and pictures of dating prospects. Subjects were randomly assigned treatment conditions independently for each question. Ariely's stimulus material for date prospects included only portraits of males; as such date prospect scenarios were analyzed using only the 54 responses from participants identified as female.

Experiment Seven was a five-question web-based survey. Each question was presented on a new page. 192 Subjects were recruited through MTurk, and each compensated $0.75 for their participation. CRT and demographic questions were identical to those in Experiments Five and Six. Product choice scenarios for Experiment Seven were structured to maximize the likelihood of generating an attraction effect, with less concern for creating scenarios with a practical application. Based on the results of attribute placements from previous stimulus in this series of experiments, decoys were structured to be identical to their targets except on one attribute dimension[8]. In addition, choice scenarios used simplified, generic, vague product descriptions – evaluable on only the two attribute dimension provided to the participant. For example, the laptop choice scenario, modeled after a desktop computer scenario used by Wedell & Pettibone (1996), was described and evaluable only on processing capacity (RAM in gigabytes) and hours of battery life. Beer was evaluable only on six-pack price and a generic, numerical quality rating.

Experiment Eight was conducted as a six-question web-based survey. The experiment format, implementation, and content were the same as that with Experiment Seven, except a sixth question, duplicating a soda choice scenario described by Ariely (2008) was added. The

[8] Except for the last choice scenario on steaks, where the decoy differed on both cut and price attributes. However, the decoy options were of the same inferior cut (sirloin), but were offered at prices slightly below that of the Target in both cases.

purpose of the experiment was to reproduce the strongest attraction effect scenarios from Experiment Seven, with a larger sample size, and also to reproduce the soda attract effect described by Ariely. 263 Subjects completed the survey in full.

Experiment Nine was a ten-question web-based survey administered to an MTurk-recruited subject pool. Subjects first completed the three-question Cognitive Reflection Test, followed by two attraction effect choice scenarios, two filler questions, two demographic questions (gender and years of education), and a final manipulation check. Of the two attraction effect choice scenarios tested, one was a replication of the bottle price/*Wine Spectator* score scenario used in Experiments 5, 7 and 8, and the second was an adaptation of the same scenario, using wine labels and the same prices as the bottle price/*Wine Spectator* score scenario. Target, competitor and decoy wine labels were pre-tested and selected based on their perceived quality differences (on a five-point scale where five was the highest quality level: μ=3.6, 2.2, 4.0; sd=0.06, 0.07, 0.06, respectively; $F(2,744)=205.4$, $p<0.0001$). 204 subjects completed the survey, and 175 (86%) passed a manipulation check.

Experiment Ten tested a single choice scenario under two fluency conditions. The baseline choice scenario was a replication of stimulus used by Park & Kim (2005) for refrigerators as presented on freezing time and annual running cost attributes. 224 participants were recruited through Amazon.com's MTurk online participant pool service to complete a dedicated survey for the purposes of this study. Participants were required to have a United States IP address to access the survey. Participants were compensated $0.75 for their participation, which averaged 2.35 minutes. 109 participants received the low fluency (difficult to read font) condition, and 115 received the normal, high fluency (regular-readability font) condition.

Experiment Eleven was comprised of two choice scenarios and a manipulation check. The first choice scenario was a replication of the high fluency refrigerator scenario tested in Experiment Ten. The second scenario was a choice between binoculars presented on magnification power and price dimensions. Both the refrigerator and binocular scenarios were reproduced from stimulus reported to have created successful attraction effects by Park & Kim (2005). Subjects were recruited from MTurk, and compensated $0.75 for their time. 205 subjects completed the survey, and 185 (90%) passed the manipulation check.

Data Across Experiments

Contrary to the methods used in many prior studies (e.g. Ha, Park, & Ahn, 2009; Mao & Oppewal, 2012; Mourali, Böckenholt & LaRoche, 2007) data were *not* combined across choice scenarios in the regressions nor the chi-squared analyses (e.g. HPP, 1982; Huber & Puto, 1983). The decision not to combine data across product scenarios is not without precedent (Mishra, 1990), and was made for two reasons.

First, because of the wide variety of products and product categories tested in this study, subject motives and reactions to choice scenarios would likely vary too widely to combine in a single data set. Prior research shows that consumers evaluate and judge products differently based on individual levels of involvement (Zaichkowsky, 1985 & 1988) and hedonic versus utilitarian beliefs (Crowley, Spangenberg & Hughes, 1992) about those products. And indeed, prior studies show that in general, the relative desirability of one option over another varies by attribute type (Bodalo, Gennaioli, & Chleifer, 2011), and attribute magnitude and salience (Tsetsos, Chater, & Usher, 2012). Different products and attributes can reasonably trigger different decoy affects, judgments and behaviors in different people.

Second, combining data across products would average out strong attraction effects and mask insignificant effects, making indistinguishable which choice scenarios are effective and which are not. A common practice described in the literature is to aggregate share change data across all product scenarios in a study, detect an aggregated attraction effect, and conclude that the effect is significant for all tested product classes. However, many multi-product studies which have reported aggregated and product-level results have often revealed product-level insignificance while aggregated results showed a significant attraction effect.

Because practitioner application of the attraction effect would generally focus on affecting share change on single products or choice options at a time, all statistical analyses related to determining the existence of attraction effects were conducted on a per-choice-scenario, per-experiment basis. Data were not aggregated across product types.

Measure of Interest

The existence and strength of an attraction effect for each choice scenario were measured as the difference between the (assumed normative) control-condition and decoyed-condition choice shares for target X and competitor Y. Chi-squared tests were performed on each decoy scenario to determine whether the difference between control and decoyed scenarios were statistically significant.

The control condition (Set A), is comprised of choices X and Y, with the proportion of subjects choosing option X from A, and Y from A written, respectively, as:

$$\frac{X_A}{X_A+Y_A} = (X \propto A) \approx p(X,A) \tag{5a}$$

and

$$\frac{Y_A}{X_A+Y_A} = (Y \propto A) \approx p(Y,A) \tag{5b}$$

p(X,A) is assumed to be the proportion of subjects that chose X from set A, and is expressed as $(X \propto A)$. A treatment condition of choice Set B, where the decoy Z_X is asymmetrically dominated by option X, is expressed as $\{X, Y, Z_X\}$. The proportion of subjects that chose X and Y from the decoyed choice Set B, excluding any share that may have been captured by the decoy, are defined respectively as:

$$\frac{X_B}{X_B+Y_B} = (X \propto B) \approx p(X,B) \quad (6a)$$

and

$$\frac{Y_B}{X_B+Y_B} = (Y \propto A) \approx p(Y,B) \quad (6b)$$

The significance test for share differences caused by the presence of an asymmetrically dominated decoy was a chi-square test conducted between the observed choice shares of options X_B and Y_B, and the expected choice shares given a sample size $(X_B + Y_B)$. The expected choice share of X and Y are expressed as:

$$E(X_B) = p(X,A) * (X_B + Y_B) \text{ or } \frac{X_A}{X_A+Y_A} * (X_B + Y_B) \quad (7a)$$

and

$$E(Y_B) = p(Y,A) * (X_B + Y_B) \text{ or } \frac{Y_A}{X_A+Y_A} * (X_B + Y_B) \quad (7b)$$

The contingency table used for the chi-squared test in this series of studies is shown in Figure 8, and the chi-squared statistic used is thus expressed as:

$$\chi^2 = \frac{(X_B-E(X_B))^2}{E(X_B)} + \frac{(Y_B-E(Y_B))^2}{E(Y_B)} \text{ with df} = 1 \quad (8)$$

Figure 8. Attraction Effect Contingency Table for Chi-Squared Test

	Observed Share w/Decoy Present	Expected Share
Choice Count of X	X_B	$E(X_B) = \frac{Y_A}{X_A+Y_A} * (X_B + Y_B)$
Choice Count of Y	Y_B	$E(Y_B) = \frac{X_A}{X_A+Y_A} * (X_B + Y_B)$
Total	$(X_B + Y_B)$	$(X_B + Y_B)$

RESULTS

General analyses and observation are first presented on the experimental data as a whole. Next, statistical results and analyses are presented on scenario-level data for each for the eleven experiments. Finally, data aggregated by similar or identical choice scenarios are analyzed for relevant scenario-specific traits.

Chi-Squared Evaluation

Chi-squared analyses were used to determine if decoyed choice shares differed from expected choice share. Consistent with prior studies, decoy shares were excluded from the chi-squared analysis, leaving a two by two matrix of target and competitor shares in controlled versus decoyed conditions (df=1). Choice probability and chi-squared results from each experiment choice scenario are summarized in Figure 9, and presented in descending order of statistical significance. Overall, attraction effects were observed across scenarios at a proportion better than chance. Based on chi-squared analyses, 11 of the 91 (12.1%) choice scenarios produced statistically significant (at $p<0.05$) attraction effects for the Target. Compared to expectations based on chance, the number of observed positive attraction effects observed was moderately, statistically significant ($\chi^2_{(1)}=2.87$; $p=0.09$), and no scenarios produced statistically

significant effects for the Competitor. However, 32 (35.2%) of the 91 scenarios did produce non-significant, relative share *decreases* for the Target – a percentage that is statistically significantly less than the 50% that would be expected based on chance ($\chi^2_{(1)}$=4.07; p<0.05).

Choice scenarios that involved bottles of wine were the most represented among statistically significant scenarios across this study. Four of the eleven statistically significant scenarios were of bottles of wine. However the four scenarios were observed out of a pool of 18 bottle-wine scenarios conducted across this study, and of the 18 bottle of wine scenarios, five produced non-significant share shifts that favored the competitor. Overall, based on a chi-squared analysis, the study was able to create the attraction effect at better-than-chance rates, but the effect was not consistently reproducible across scenarios.

Figure 9. Chi-Squared Summary Results by Choice Scenarios

	Exp#	Scenario ID Number	Product	Attribute Dimension A	Attribute Dimension B	Observed Count: Control C	Control T	Control (n)	Decoyed C	Decoyed T	Decoyed D	Decoyed (n)	Relative % Share: Control C	Control T	Decoyed C	Decoyed T	χ^2	p-value	Effect Direction
1	8	**E8Q3D1**	Wine (Bottle)	Price	Quality Score	47	45	92	14	68	0	82	51.1%	48.9%	17.1%	82.9%	22.03	**0.000**	
2	8	**E8Q1D1**	Beer (Six-Pack)	Price	Quality Score	79	14	93	63	50	0	113	84.9%	15.1%	55.8%	44.2%	20.30	**0.000**	
3	7	**E7Q3D1**	Wine (Bottle)	Price	Quality Score	33	31	64	12	46	0	58	51.6%	48.4%	20.7%	79.3%	12.46	**0.000**	
4	2	**E2Q2D2**	Wine (Bottle)	Price	Quality Score	50	27	77	31	47	2	80	64.9%	35.1%	39.7%	60.3%	9.86	**0.002**	
5	1	**E1Q9D2**	Steak	Quality (Type)	Price	14	16	30	2	19	5	26	46.7%	53.3%	9.5%	90.5%	7.92	**0.005**	
6	7	**E7Q4D1**	Restaurant	Distance	Quality Score	28	32	60	16	53	1	70	46.7%	53.3%	23.2%	76.8%	7.87	**0.005**	
7	5	**E5Q1D2**	Beer (Six-Pack)	Price	Quality Score	38	38	76	25	59	0	84	50.0%	50.0%	29.8%	70.2%	6.85	**0.009**	
8	8	**E8Q2D1**	Laptop	RAM	Battery Life	33	85	118	10	68	3	81	28.0%	72.0%	12.8%	87.2%	6.29	**0.012**	
9	2	**E2Q34D1**	Cruise	Price	Length	84	14	98	42	18	1	61	85.7%	14.3%	70.0%	30.0%	5.69	**0.017**	
10	5	**E5Q3D2**	Restaurant	Distance	Quality Score	47	27	74	32	39	9	80	63.5%	36.5%	45.1%	54.9%	4.97	**0.026**	
11	5	**E5Q2D2**	Wine (Bottle)	Price	Quality Score	25	48	73	13	55	2	70	34.2%	65.8%	19.1%	80.9%	4.09	**0.043**	
12	8	**E8Q4D1**	Restaurant	Distance	Quality Score	63	31	94	55	47	3	105	67.0%	33.0%	53.9%	46.1%	3.50	0.061	
13	4	**E4Q5D1**	Wine (Bottle)	Price	Quality Score	25	31	56	12	33	15	60	44.6%	55.4%	26.7%	73.3%	3.47	0.062	
14	7	**E7Q1D1**	Beer (Six-Pack)	Price	Quality Score	53	16	69	41	25	0	66	76.8%	23.2%	62.1%	37.9%	3.44	0.064	
15	2	**E2Q8D2**	Hotel	Distance	Price	25	43	68	16	55	6	77	36.8%	63.2%	22.5%	77.5%	3.38	0.066	
16	7	**E7Q1D2**	Beer (Six-Pack)	Price	Quality Score	16	53	69	6	47	0	53	23.2%	76.8%	11.3%	88.7%	2.86	0.091	
17	6	**E6Q1D1**	Date Prospect	Facials A	Facials B	11	2	13	9	7	0	16	84.6%	15.4%	56.3%	43.8%	2.70	0.101	
18	2	**E2Q6D2**	Flight	Stops	Price	42	40	82	29	46	4	79	51.2%	48.8%	38.7%	61.3%	2.49	0.114	
19	7	**E7Q2D1**	Laptop	RAM	Battery Life	15	43	58	10	57	2	69	25.9%	74.1%	14.9%	85.1%	2.32	0.127	
20	11	**E11Q1D1**	Binoculars	Price	Power	84	59	143	66	67	3	136	58.7%	41.3%	49.6%	50.4%	2.18	0.140	
21	2	**E2Q6D1**	Flight	Stops	Price	40	42	82	41	27	3	71	48.8%	51.2%	60.3%	39.7%	1.98	0.159	Competitor
22	7	**E7Q3D2**	Wine (Bottle)	Price	Quality Score	31	33	64	24	42	2	68	48.4%	51.6%	36.4%	63.6%	1.94	0.164	
23	8	**E8Q5D2**	Steak	Cut	Price	13	43	56	5	36	18	59	23.2%	76.8%	12.2%	87.8%	1.90	0.168	
24	2	**E2Q10D2**	Frozen Entrée	Type, Calories	Price	53	34	87	22	23	6	51	60.9%	39.1%	48.9%	51.1%	1.75	0.186	
25	4	**E4Q3D2**	Entrée	Calories	Price	31	25	56	19	26	15	60	55.4%	44.6%	42.2%	57.8%	1.72	0.189	
26	5	**E5Q3D1**	Restaurant	Distance	Quality Score	27	47	74	20	55	21	96	36.5%	63.5%	26.7%	73.3%	1.66	0.197	
27	9	**E9Q2D1**	Wine (Bottle) Labels	Price	Quality Score	35	67	102	32	41	29	102	34.3%	65.7%	43.8%	56.2%	1.63	0.201	Competitor
28	4	**E4Q6D1**	Chinese Takeout	Protein	Price	10	46	56	4	40	15	59	17.9%	82.1%	9.1%	90.9%	1.57	0.210	
29	8	**E8Q3D2**	Wine (Bottle)	Price	Quality Score	45	47	92	48	71	1	120	48.9%	51.1%	40.3%	59.7%	1.55	0.213	
30	8	**E8Q6D2**	Soda	Brand	NA	74	70	144	62	78	5	145	51.4%	48.6%	44.3%	55.7%	1.44	0.231	
31	1	**E1Q2D2**	Sandwich	Calories	Price	8	18	26	10	11	5	26	30.8%	69.2%	47.6%	52.4%	1.40	0.237	Competitor
32	10	**E10Q1D1**	Refrigerators	Operating Cost	Freeze Time	36	38	74	48	35	0	83	48.6%	51.4%	57.8%	42.2%	1.37	0.243	Competitor
33	4	**E4Q10D1**	Hotel	Distance	Price	24	31	55	30	25	5	60	43.6%	56.4%	54.5%	45.5%	1.31	0.252	Competitor
34	8	**E8Q1D2**	Beer (Six-Pack)	Price	Quality Score	14	79	93	8	77	1	86	15.1%	84.9%	9.4%	90.6%	1.31	0.253	
35	2	**E2Q4D1**	Entrée	Type	Price	53	14	67	41	17	7	65	79.1%	20.9%	70.7%	29.3%	1.18	0.277	
36	1	**E1Q2D1**	Sandwich	Calories	Price	18	8	26	19	15	3	37	69.2%	30.8%	55.9%	44.1%	1.11	0.292	
37	11	**E11Q3D1**	Refrigerators	Operating Cost	Freeze Time	30	36	66	20	35	21	76	45.5%	54.5%	36.4%	63.6%	0.94	0.332	
38	2	**E2Q10D1**	Frozen Entrée	Type, Calories	Price	34	53	87	20	43	13	76	39.1%	60.9%	31.7%	68.3%	0.85	0.356	
39	2	**E2Q34D2**	Cruise	Price	Length	14	84	98	13	53	5	71	14.3%	85.7%	19.7%	80.3%	0.84	0.359	Competitor
40	4	**E4Q8D1**	Flight	Stops	Price	25	31	56	26	23	10	59	44.6%	55.4%	53.1%	46.9%	0.74	0.389	Competitor
41	2	**E2Q1D1**	Wine (Bottle, Red)	Quality	Price	32	52	84	33	41	2	76	38.1%	61.9%	44.6%	55.4%	0.69	0.407	Competitor
42	5	**E5Q5D2**	Pastry	Type	Calories/Fat	52	17	69	56	13	2	71	75.4%	24.6%	81.2%	18.8%	0.68	0.409	Competitor
43	2	**E2Q12D1**	Chinese Takeout	Fat	Price	47	28	75	43	19	6	68	62.7%	37.3%	69.4%	30.6%	0.67	0.412	Competitor
44	8	**E8Q6D1**	Soda	Brand	NA	71	73	144	72	61	2	135	49.3%	50.7%	54.1%	45.9%	0.65	0.422	Competitor
45	4	**E4Q1D1**	Flight	Price	Fees	17	39	56	21	35	4	60	30.4%	69.6%	37.5%	62.5%	0.64	0.425	Competitor
46	7	**E7Q5D1**	Steak	Cut	Price	53	11	64	51	7	17	75	82.8%	17.2%	87.9%	12.1%	0.63	0.426	Competitor
47	3	**E3Q3D1**	Wine (Bottle)	Price	Quality Score	17	43	60	16	29	13	58	28.3%	71.7%	35.6%	64.4%	0.62	0.430	Competitor
48	9	**E9Q1D1**	Wine (Bottle)	Price	Quality Score	25	73	98	20	76	4	100	25.5%	74.5%	20.8%	79.2%	0.60	0.440	
49	6	**E6Q2D2**	The Economist	Price	Features	47	6	53	36	7	4	47	88.7%	11.3%	83.7%	16.3%	0.50	0.480	
50	1	**E1Q6D1**	Beer (Pint)	Size	Price	19	8	27	22	6	1	29	70.4%	29.6%	78.6%	21.4%	0.49	0.485	Competitor
51	5	**E5Q6D2**	Soda	Calories	Sugars	61	16	77	66	13	0	79	79.2%	20.8%	83.5%	16.5%	0.48	0.488	Competitor
52	1	**E1Q8D2**	Pizza	Delivery Time	Quality	23	7	30	15	7	4	26	76.7%	23.3%	68.2%	31.8%	0.46	0.496	
53	8	**E8Q2D2**	Laptop	RAM	Battery Life	85	33	118	73	23	0	96	72.0%	28.0%	76.0%	24.0%	0.44	0.507	Competitor
54	1	**E1Q8D1**	Pizza	Delivery Time	Quality	7	23	30	10	23	1	34	23.3%	76.7%	30.3%	69.7%	0.39	0.534	Competitor
55	2	**E2Q4D2**	Entrée	Type	Price	14	53	67	18	53	24	95	20.9%	79.1%	25.4%	74.6%	0.38	0.535	Competitor
56	3	**E3Q2D1**	Pizza	Delivery Time	Quality	13	47	60	10	48	13	71	21.7%	78.3%	17.2%	82.8%	0.37	0.544	
57	3	**E3Q1D1**	Steak	Cut	Price	13	47	60	12	33	13	58	21.7%	78.3%	26.7%	73.3%	0.35	0.552	Competitor
58	2	**E2Q2D1**	Wine (Bottle)	Price	Quality Score	27	50	77	21	48	3	72	35.1%	64.9%	30.4%	69.6%	0.35	0.552	
59	4	**E4Q12D2**	Steak	Cut	Price	24	32	56	21	22	17	60	42.9%	57.1%	48.8%	51.2%	0.35	0.554	Competitor
60	7	**E7Q2D2**	Laptop	RAM	Battery Life	43	15	58	41	18	6	65	74.1%	25.9%	69.5%	30.5%	0.31	0.577	
61	7	**E7Q4D2**	Restaurant	Distance	Quality Score	32	28	60	30	32	0	62	53.3%	46.7%	48.4%	51.6%	0.30	0.585	
62	4	**E4Q4D2**	Beer	Quality/Size	Price	24	32	56	17	28	11	56	42.9%	57.1%	37.8%	62.2%	0.27	0.605	
63	4	**E4Q11D1**	Fish Entrée	Type & Quality	Price	25	31	56	16	24	20	60	44.6%	55.4%	40.0%	60.0%	0.21	0.650	
64	1	**E1Q7D1**	Entrée Salads	Protein, Price	Calories	5	20	25	8	24	2	34	20.0%	80.0%	25.0%	75.0%	0.20	0.655	Competitor
65	1	**E1Q1D1**	Wine (Bottle, Red)	Quality (Region)	Price	13	14	27	8	11	11	30	48.1%	51.9%	42.1%	57.9%	0.16	0.685	
66	2	**E2Q7D1**	Vacation Package	Length	Features & Price	22	52	74	19	52	1	72	29.7%	70.3%	26.8%	73.2%	0.16	0.691	
67	4	**E4Q2D1**	Pizza	Delivery Time	Quality	18	38	56	17	42	1	60	32.1%	67.9%	28.8%	71.2%	0.15	0.698	
68	2	**E2Q11D1**	Flight	Carrier, Stops	Price	58	51	109	27	27	3	57	53.2%	46.8%	50.0%	50.0%	0.15	0.699	
69	5	**E5Q1D1**	Beer (Six-Pack)	Price	Quality Score	38	38	76	29	33	0	62	50.0%	50.0%	46.8%	53.2%	0.14	0.706	
70	2	**E2Q8D1**	Hotel	Distance	Price	43	25	68	50	33	4	87	63.2%	36.8%	60.2%	39.8%	0.14	0.707	
71	8	**E8Q4D2**	Restaurant	Distance	Quality Score	31	63	94	29	66	0	95	33.0%	67.0%	30.5%	69.5%	0.13	0.717	
72	6	**E6Q1D2**	Date Prospect	Facials A	Facials B	2	11	13	5	20	0	25	15.4%	84.6%	20.0%	80.0%	0.12	0.728	Competitor
73	5	**E5Q6D1**	Soda	Calories	Sugars	16	61	77	12	53	3	68	20.8%	79.2%	18.5%	81.5%	0.12	0.729	
74	2	**E2Q11D2**	Flight	Carrier, Stops	Price	51	58	109	30	31	3	64	46.8%	53.2%	49.2%	50.8%	0.09	0.765	Competitor
75	1	**E1Q7D2**	Entrée Salads	Protein, Price	Calories	20	5	25	20	6	4	30	80.0%	20.0%	76.9%	23.1%	0.07	0.789	
76	2	**E2Q12D2**	Chinese Takeout	Fat	Price	28	47	75	26	40	5	71	37.3%	62.7%	39.4%	60.6%	0.06	0.802	Competitor
77	5	**E5Q5D1**	Pastry	Type	Calories/Fat	17	52	69	13	44	5	62	24.6%	75.4%	22.8%	77.2%	0.06	0.810	
78	2	**E2Q7D2**	Vacation Package	Length	Features & Price	52	22	74	50	23	5	78	70.3%	29.7%	68.5%	31.5%	0.05	0.815	
79	1	**E1Q6D2**	Beer (Pint)	Size	Price	8	19	27	9	19	0	28	29.6%	70.4%	32.1%	67.9%	0.04	0.840	Competitor
80	5	**E5Q4D2**	Sandwich	Calories	Fat	46	25	71	38	22	5	65	64.8%	35.2%	63.3%	36.7%	0.03	0.863	
81	2	**E2Q1D2**	Wine (Bottle, White)	Quality	Price	52	32	84	39	23	3	65	61.9%	38.1%	62.9%	37.1%	0.02	0.902	Competitor
82	4	**E4Q7D1**	Soda	Type	Price	25	31	56	26	31	3	60	44.6%	55.4%	45.6%	54.4%	0.01	0.917	Competitor
83	1	**E1Q9D1**	Steak	Quality (Type)	Price	16	14	30	13	12	7	32	53.3%	46.7%	52.0%	48.0%	0.01	0.922	
84	4	**E4Q9D2**	Phone Plan	Minutes	Price	8	48	56	6	38	16	60	14.3%	85.7%	13.6%	86.4%	0.01	0.926	
85	5	**E5Q4D1**	Sandwich	Calories	Fat	25	46	71	29	52	6	87	35.2%	64.8%	35.8%	64.2%	0.01	0.939	Competitor
86	8	**E8Q5D1**	Steak	Cut	Price	43	13	56	41	12	31	84	76.8%	23.2%	77.4%	22.6%	0.01	0.943	Competitor
87	7	**E7Q5D2**	Steak	Cut	Price	11	53	64	7	33	11	51	17.2%	82.8%	17.5%	82.5%	0.00	0.967	Competitor
88	1	**E1Q3D1**	Wine (Bottle)	Price	Quality Score	25	2	27	24	2	0	26	92.6%	7.4%	92.3%	7.7%	0.00	0.969	
89	1	**E1Q3D2**	Wine (Bottle)	Price	Quality Score	2	25	27	2	26	6	34	7.4%	92.6%	7.1%	92.9%	0.00	0.970	
90	1	**E1Q1D2**	Wine (Bottle, White)	Quality (Region)	Price	14	13	27	13	12	3	28	51.9%	48.1%	52.0%	48.0%	0.00	0.992	
91	5	**E5Q2D1**	Wine (Bottle)	Price	Quality Score	48	25	73	52	27	3	82	65.8%	34.2%	65.8%	34.2%	0.00	0.992	Competitor

Choice scenarios are labels in the format: Experiment(E), Question(Q), and Decoy Version(D). For example, the decoy version targeting the first option, in the second question of the fifth survey is expressed as (E5Q2D1).

‡ Significant at the p<0.01 level.

* Significant at the p<0.001 level.

Regression Results

As part of the original intent of this study, regression analyses were then conducted to control for subject's intuitional tendencies based on either CRT scores (Experiments 5, 7, 8, and 9) or FI scores (Experiments 1 and 2).

An Ordinary Least Squares (OLS) regression was conducted for each choice scenario where information on individual differences in thinking preference was collected. Whether the participant chose the target option was the dependent variable. Experiments 1 and 2 included measures of Need for Cognition (NFC) and Faith in Intuition (FI), and Experiments 5 through 9 included respondent scores on the Cognitive Reflection Test. Choices made in identical product scenarios, but across different experiments, were collapsed and analyzed as if executed in the same experiment. Forty-six separate regressions were conducted where Target Choice was regressed against decoy condition and thinking style. The baseline regression equation used for experiments with CRT data, can be expressed as:

$$Choice\ of\ Target = \beta_0 + \beta_1 DecoyCondition + \beta_2 Intuition + \beta_3 Decoy * Intuition + \in \quad (9)$$

Where each variable is defined as:

- Choice of Target – a binomial indicator of whether the Target option was chosen. A zero indicates the Target was not chosen, and '1' indicates the Target option was chosen.
- Decoy Condition – a dummy variable where '1' indicates the decoyed condition where a Target-favoring decoy was present. Statistical significance on this variable would indicate the presence of an attraction effect.
- Intuition – the subject's CRT score from 0 to 3 where a higher number represents a more intuitive disposition.

For Experiments 1 and 2, where NFC and FI data were collected, the regression equation is expressed as:

$$Choice\ of\ Target = \beta_0 + \beta_1 DecoyCondition + \beta_2 Intuition + \beta_3 Decoy * Intuition + \beta_4 NFC + \beta_3 Decoy * NFC + \beta_5 NFC * Intuition + \beta_6 Decoy * NFC * Intuition + \in \quad (10)$$

Where variables are the same as detailed in Equation (9), *except*:

- Intuition – is represented as a continuous variable from 0 to 5 based on a Faith in Intuition score, where higher numbers represent a more intuitive disposition.
- NFC – represents the subject's Need For Cognition score from 0 to 5, where a higher number represents a greater disposition towards cognitive processes[9].

Summary regression results are presented in Figure 10, and are grouped by choice scenario. The interaction between the decoy's presence and intuitive tendencies was relatively predictive of Target preference in three scenarios: one of two breakfast sandwich scenarios (t=-2.56; p=0.01), and two of five wine scenarios (t=-1.88; p=0.061 and t=-2.01; p=0.046) were statistically significant. However, all three scenarios produced coefficients counter to expectations. The results from these three scenarios suggest the presence of the decoy turned intuitive subjects *away* from the Target option, in a reverse attraction or 'repulsion' effect. Yet even within these product scenario types, a repulsion effect was also not consistently reproducible.

Of the 26 scenarios that included a need for cognition measure, two scenarios (Steaks and Vacations) exhibited moderately significant repulsion (t=-1.35; p=0.09) and attraction effects (t=3.78; p=0.10), respectively. These sparse, inconsistent, and otherwise weak results suggest the

[9] Note – The NFC and FI scales measure different processes that are not mutually exclusive to each other. A subject can exhibit a propensity for both thinking processes (Epstein et al., 1996).

CRT, FI, and NFC do not measure cognitive tendencies that are relevant to the creation of an attraction effect. These lack of results are in direct contradiction to Mao & Oppewal's (2012) finding that individuals with higher faith in intuition are more susceptible to the attraction effect.

Figure 10. Regression Results: Choosing Target by Choice Scenario Attributes

			Model				Intercept				Decoy Condition				Intuition				Decoy X Intutition				Need for Cognition (NFC)				Decoy X NFC			
		Product	n	R^2	F	P>F	Coef.	RSE	t	p	Coef.	RSE	t	p	Coef.	RSE	t	p	Coef.	RSE	t	p	Coef.	RSE	t	p	Coef.	RSE	t	p
Experiments 5, 7, 8, 9	D1	Beer	488	0.03	5.66	**0.00**	0.205	0.044	4.67	**0.00**	0.137	0.06	2.11	**0.04**	0.015	0.02	0.62	0.54	0.017	0.04	0.47	0.64								
	D2	Beer	446	0.02	3.91	**0.01**	0.796	0.044	18.06	**0.00**	0.107	0.06	1.91	**0.06**	-0.022	0.02	-0.88	0.38	-0.039	0.03	-1.15	0.25								
	D1	Bfast Sndwch	161	0.02	1.12	0.34	0.633	0.111	5.72	**0.00**	-0.161	0.14	-1.13	0.26	-0.007	0.05	-0.12	0.91	0.090	0.07	1.25	0.21								
	D2	Bfast Sndwch	139	0.06	3.46	**0.02**	0.283	0.105	2.70	**0.01**	0.325	0.16	2.07	**0.04**	0.032	0.05	0.61	0.55	-0.185	0.07	-2.56	**0.011**								
	D2	Economist	100	0.01	0.19	0.91	0.130	0.071	1.83	**0.07**	-0.009	0.10	-0.08	0.93	-0.013	0.04	-0.32	0.75	0.033	0.06	0.55	0.58								
	D1	Laptop	326	0.02	1.97	0.12	0.759	0.051	15.01	**0.00**	0.072	0.07	1.02	0.31	-0.023	0.03	-0.80	0.42	0.025	0.04	0.63	0.53								
	D2	Laptop	337	0.01	0.89	0.45	0.241	0.051	4.76	**0.00**	-0.032	0.07	-0.47	0.64	0.023	0.03	0.80	0.42	0.017	0.04	0.40	0.69								
	D1	Pastry	148	0.02	0.99	0.40	0.756	0.097	7.83	**0.00**	-0.158	0.14	-1.11	0.27	-0.071	0.05	-1.46	0.15	0.115	0.07	1.60	0.11								
	D2	Pastry	172	0.01	0.39	0.76	0.211	0.090	2.34	**0.02**	-0.076	0.11	-0.67	0.50	-0.002	0.05	-0.05	0.96	0.008	0.06	0.14	0.89								
	D1	Restaurant	484	0.02	3.35	**0.02**	0.509	0.051	9.98	**0.00**	0.069	0.07	0.97	0.33	-0.023	0.03	-0.79	0.43	0.046	0.04	1.16	0.25								
	D2	Restaurant	460	0.01	1.51	0.21	0.493	0.051	9.68	**0.00**	0.147	0.07	1.99	**0.05**	0.015	0.03	0.52	0.61	-0.045	0.04	-1.10	0.27								
	D1	Soda	337	0.00	0.28	0.84	0.731	0.054	13.53	**0.00**	-0.066	0.09	-0.75	0.45	-0.025	0.03	-0.81	0.42	0.034	0.05	0.73	0.47								
	D2	Soda	367	0.01	0.82	0.49	0.258	0.053	4.85	**0.00**	0.098	0.08	1.25	0.21	0.022	0.03	0.71	0.48	-0.062	0.04	-1.47	0.14								
	D1	Steak	333	0.01	0.97	0.41	0.181	0.048	3.73	**0.00**	-0.071	0.06	-1.19	0.23	0.005	0.03	0.17	0.87	0.006	0.04	0.16	0.87								
	D2	Steak	309	0.04	3.93	**0.01**	0.786	0.051	15.55	**0.00**	-0.166	0.08	-2.10	**0.04**	0.001	0.03	0.04	0.97	-0.008	0.05	-0.18	0.86								
	D1	Wine	440	0.06	11.73	-	0.484	0.051	9.42	**0.00**	0.328	0.07	4.82	**0.00**	0.002	0.03	0.07	0.95	-0.073	0.04	-1.88	**0.061**								
	D2	Wine	506	0.02	2.67	**0.05**	0.517	0.051	10.07	**0.00**	0.101	0.07	1.46	0.15	-0.009	0.03	-0.33	0.74	0.016	0.04	0.42	0.67								
	D1	Wine Labels	212	0.06	4.79	**0.00**	0.054	0.067	8.08	**0.00**	-0.072	0.10	-0.74	0.46	0.063	0.04	1.42	0.16	-0.120	0.06	-2.01	**0.046**								
	D1	Wine	212	0.01	0.40	0.76	0.760	0.063	12.16	**0.00**	-0.041	0.04	-1.05	0.30	-0.041	0.04	-1.05	0.30	0.035	0.06	0.62	0.53								
Experiments 1 & 2	D1	Beer	123	0.08	2.33	**0.03**	-3.058	3.419	-0.89	0.37	-1.063	3.73	-0.28	0.78	0.433	0.45	0.96	0.34	0.269	0.49	0.54	0.59	0.569	0.57	0.99	0.32	0.217	0.63	0.34	0.73
	D2	Beer	120	0.03	0.82	0.57	2.520	3.329	0.76	0.45	-0.157	4.29	-0.04	0.97	-0.252	0.44	-0.57	0.57	-0.005	0.56	-0.01	0.99	-0.387	0.55	-0.70	0.49	0.054	0.72	0.07	0.94
	D1	Coffee	165	0.09	2.83	**0.01**	0.881	8.526	0.10	0.92	9.797	10.88	0.90	0.37	-0.138	1.80	-0.08	0.94	-2.005	2.29	-0.88	0.38	-0.223	1.54	-0.15	0.89	-1.494	2.00	-0.75	0.46
	D2	Coffee	167	0.03	0.63	0.73	1.018	7.754	0.13	0.90	-3.571	12.08	-0.30	0.77	-0.057	1.63	-0.04	0.97	0.856	2.59	0.33	0.74	-0.002	1.40	0.00	1.00	0.413	2.19	0.19	0.85
	D1	Cruise	162	0.08	2.18	**0.04**	2.177	4.087	0.53	0.60	7.316	9.45	0.77	0.44	-0.605	0.90	-0.67	0.50	-1.302	2.00	-0.65	0.52	-0.453	0.77	-0.59	0.56	-1.462	1.76	-0.83	0.41
	D2	Cruise	172	0.05	1.73	0.10	2.248	5.072	0.44	0.66	9.860	9.47	1.04	0.30	-0.132	1.11	-0.12	0.91	-2.416	2.09	-1.15	0.25	-0.183	0.95	-0.19	0.85	-1.884	1.75	-1.08	0.28
	D1	Entrée	362	0.09	5.36	**0.00**	-0.916	1.184	-0.77	0.44	0.366	1.72	0.21	0.83	0.237	0.19	1.24	0.22	-0.157	0.26	-0.59	0.55	0.105	0.21	0.50	0.62	-0.017	0.30	-0.06	0.96
	D2	Entrée	390	0.03	1.86	**0.08**	2.340	1.361	1.72	**0.09**	0.984	2.43	0.41	0.69	-0.306	0.21	-1.46	0.15	-0.262	0.43	-0.60	0.55	-0.247	0.25	-1.00	0.32	-0.205	0.43	-0.48	0.64
	D1	Flight	323	0.02	1.05	0.40	-7.525	5.567	-1.35	0.18	14.333	9.01	1.59	0.11	1.582	1.20	1.32	0.19	-2.906	1.91	-1.52	0.13	1.551	1.02	1.51	0.13	-2.642	1.63	-1.62	0.11
	D2	Flight	338	0.02	1.21	0.29	10.442	5.563	1.88	**0.06**	-6.192	9.67	-0.64	0.52	-1.986	1.20	-1.65	**0.10**	1.099	2.08	0.53	0.60	-1.910	1.02	-1.87	**0.06**	1.167	1.79	0.65	0.52
	D1	Frozen Entrée	182	0.04	1.48	0.18	-2.664	8.856	-0.30	0.76	12.204	11.20	1.09	0.28	0.646	1.89	0.34	0.73	-2.200	2.41	-0.91	0.36	0.589	1.60	0.37	0.71	-2.205	2.05	-1.08	0.28
	D2	Frozen Entrée	157	0.05	1.57	0.15	7.546	8.090	0.93	0.35	3.979	12.48	0.32	0.75	-1.502	1.72	-0.87	0.38	-0.530	2.66	-0.20	0.84	-1.306	1.45	-0.90	0.37	-0.760	2.24	-0.34	0.74
	D1	Hotel	156	0.02	0.42	0.89	-10.175	8.064	-1.26	0.21	16.577	14.89	1.11	0.27	2.113	1.67	1.27	0.21	-3.492	3.14	-1.11	0.27	1.910	1.46	1.31	0.19	-2.962	2.75	-1.08	0.28
	D2	Hotel	146	0.03	0.54	0.80	10.120	8.081	1.25	0.21	-10.499	10.17	-1.03	0.30	-1.898	1.67	-1.14	0.26	2.253	2.15	1.05	0.30	-1.777	1.46	-1.22	0.22	1.949	1.85	1.05	0.30
	D1	Pizza	66	0.05	0.57	0.78	-0.982	3.679	-0.27	0.79	-1.843	4.58	-0.40	0.69	0.296	0.52	0.57	0.57	0.114	0.63	0.18	0.86	0.258	0.60	0.43	0.67	0.320	0.77	0.42	0.68
	D2	Pizza	57	0.09	1.44	0.21	0.736	3.182	0.23	0.82	-4.354	3.48	-1.25	0.22	-0.124	0.46	-0.27	0.79	0.552	0.49	1.12	0.27	-0.091	0.52	-0.18	0.86	0.921	0.59	1.56	0.13
	D1	Restaurant	65	0.12	2.25	**0.04**	-0.440	3.251	-0.14	0.89	3.604	3.92	0.92	0.36	0.105	0.39	0.27	0.79	-0.329	0.52	-0.63	0.53	0.091	0.55	0.17	0.87	-0.481	0.67	-0.72	0.47
	D2	Restaurant	55	0.07	0.87	0.53	3.094	3.092	1.00	0.32	-6.447	3.85	-1.67	0.10	-0.309	0.37	-0.83	0.41	0.799	0.49	1.65	0.11	-0.498	0.52	-0.95	0.35	1.038	0.64	1.63	0.11
	D1	Steak	66	0.10	1.40	0.22	-3.761	3.248	-1.16	0.25	8.136	4.67	1.74	**0.09**	0.411	0.44	0.94	0.35	-0.987	0.61	-1.63	0.11	0.676	0.56	1.22	0.23	-1.353	0.79	-1.70	**0.09**
	D2	Steak	58	0.09	0.82	0.57	3.408	4.094	0.83	0.41	-3.430	5.07	-0.68	0.50	-0.299	0.54	-0.55	0.59	0.378	0.69	0.54	0.59	-0.456	0.69	-0.66	0.51	0.589	0.83	0.71	0.48
	D1	Vacation	155	0.04	1.44	0.20	6.677	10.100	0.66	0.51	-21.729	12.59	-1.73	**0.09**	-1.290	2.18	-0.59	0.55	4.389	2.69	1.63	0.11	-1.060	1.82	-0.58	0.56	3.775	2.27	1.66	**0.10**
	D2	Vacation	161	0.03	0.66	0.71	-7.194	9.529	-0.75	0.45	8.025	13.33	0.60	0.55	1.702	2.04	0.83	0.41	-1.762	2.86	-0.62	0.54	1.375	1.70	0.81	0.42	-1.260	2.42	-0.52	0.60
	D1	Wine	411	0.06	5.47	**0.00**	2.102	1.027	2.05	**0.04**	0.152	1.57	0.10	0.92	-0.178	0.16	-1.15	0.25	-0.061	0.23	-0.26	0.79	-0.237	0.19	-1.27	0.20	0.021	0.28	0.08	0.94
	D2	Wine	466	0.06	4.70	**0.00**	-0.543	0.961	-0.56	0.57	2.509	1.68	1.50	0.14	0.072	0.15	0.48	0.63	-0.422	0.26	-1.60	0.11	0.111	0.17	0.65	0.52	-0.380	0.29	-1.29	0.20
	D1	Sandwich	66	0.04	0.82	0.58	-2.457	2.007	-1.22	0.23	1.910	4.00	0.48	0.64	0.389	0.29	1.36	0.18	-0.281	0.52	-0.54	0.59	0.480	0.35	1.38	0.17	-0.294	0.68	-0.43	0.67
	D2	Sandwich	55	0.21	6.48	**0.00**	-1.147	2.412	-0.48	0.64	1.965	4.23	0.46	0.64	0.176	0.31	0.56	0.58	-0.335	0.56	-0.60	0.55	0.206	0.40	0.51	0.61	-0.279	0.72	-0.38	0.70

NOTES: For the sake of brevity, NFC x Intuition and NFC x Intuition x Decoy interactions (β_5 and β_6) are not shown, as neither interaction term produced statistically significant results. Intuition measures for Experiments 5, 7 & 8 were Cognitive Reflection Test (CRT) scores (Frederick, 2005), and Faith in Intuition (FI) (Epstein et al., 1996) scores for Experiments 1 &2. Robust standard errors (RSEs) are reported to compensate for potential sources of heteroscedasticity.

GENERAL DISCUSSION

The results from this study suggest that it is possible to create attraction effects at a rate greater than chance. However, it is difficult to create a consistent attraction effect across any one product or service class as no unifying theme(s) as to what might contribute to an attraction effect were identifiable from the data. After controlling for individual differences in intuitive and cognitive processing tendencies, still no consistent attraction effect could be identified. The lack of a consistently reproducible attraction effect across experiments is counter to the expectations implied and reported by prior research findings. This section explores why this study's results differ from that of prior findings, and concludes with a discussion on how these null results impact the effect's usability in real-world scenarios, and suggests avenues of future research.

Differences in Methods

Though useful insight was gained through this study, the inconsistency in producing an attraction effect is puzzling. The section begins with a discussion of the departures from traditional attraction effect methodologies, and how they may contribute to the study's inability to consistently replicate the results found in the existing literature.

Stimulus Materials

Initial experiment choice scenarios were designed to reflect consumer options prevalent in hospitality industry contexts. Products and services, and their corresponding attribute dimensions and values were chosen based on a balance between relevance to practical application and replication of prior, successful attraction effect stimulus. For example, true to previous stimulus, initial scenarios utilized numeric attributes such as price, rating scores, calorie and fat counts, and delivery times. Though it is possible that the failure of these hospitality scenarios stem from product- or attribute-specific idiosyncrasies, subsequent experiments which

incorporated products, attributes, and specific choice options reported to have created attraction effects in prior studies, also failed to create consistent attraction effects (See Appendix 1 annotations for a list of product and attribute replications).

Participants

Prior research on the attraction effect has generally been conducted on student populations. In this study, only Experiment Two utilized a student population. Experiment One and Four participants were non-student samples solicited through social media channels or from a town-commons area, respectively. For all other experiments, participants were recruited through Amazon.com's Mechanical Turk (MTurk), Human Intelligence Tasks (HITs) service[10]. MTurk participant responses have been shown to be at least as reliable as those collected through other subject pools (Buhrmester, Kwang, & Gosling, 2011; Horton, Rand & Zeckhauser, 2012), and potentially more demographically diverse than the typical American college sample pool (Buhrmester, Kwang, & Gosling, 2011). Though MTurk participants behave much like traditional experiment subject pools, they have been shown to have slightly different demographics and personality traits than student and general populations. In general, MTurk subjects are (Goodman et al., 2012):

- Less extroverted and have slightly lower self-esteem than other populations at large;
- More geographically diverse, likely to be international, older, and have English as a second language than a typical community or student sample population; and
- Slightly less likely than students (but just as likely as a general population) to process cognitively, but more likely than students to process intuitively.

[10] Experiments 1, 2, and 4 were recruited from a convenience sample, undergraduate student population, and an in-person general population survey, respectively. All other participants were recruited through MTurk.

If anything, given a slight bias toward intuitive processing, MTurk participants were expected to exhibit stronger, more consistent attraction effects across product and service classes than with student populations. However, this study's results do not conform with this expectation.

Researchers have also been able to replicate many classic behavioral economic and social psychology effects through MTurk subject pools. For example MTurk subjects have also been shown to fall prey to framing effects and conjunction fallacies (Paolacci, Chandler, & Ipeirotis, 2011), and their reaction to subliminal primes, and performance on prisoners' dilemma tasks are also similar to that of off-line student participants (Horton, Rand & Zeckhauser, 2012).

MTurk subject pools have also been criticized for their possibly skewed value of money. That participants are often willing to complete HITs for as little as $0.05 for 10 minutes of their time, has been cautioned as an indication for cheapness. In response to such criticism, recent research has shown MTurk participants to have spending behaviors and beliefs about money similar to that of traditional student populations, and to be only slightly thriftier than the general population (Goodman et al., 2012). Based on these similar monetary beliefs, MTurk subjects were expected to respond to choice scenarios in a manner not unlike in prior studies.

Figure 11. Subject Profiles by Experiment: Means and Standard Errors

Experiment	1	2	5	6	7	8	9
Personality							
* Need for Cognition	6.96(1.3)	6.46(1.1)	-	-	-	-	-
* Faith in Intuition	7.03(1.5)	5.71(0.7)	-	-	-	-	-
** Cognitive Reflection Test	-	-	1.66(1.12)	1.33(1.10)	1.22(1.17)	1.39(1.15)	1.13(1.12)
Demographic							
Gender (% Female)	-	-	57.8%	54.0%	45.3%	40.8%	40.0%
Average Education (Yrs)	-	-	15.12(1.95)	-	14.88(1.99)	14.94(1.80)	15.01(3.43)

* 10=Hi; 0=Lo; ** 3=Hi Intuition; 0=Lo Intuition
Mean Values (Standard Error)
Personality and demographic data were not collected for experiments 3, 4, 10 or 11.

Finally, the overall participant profile of this study was not out of the ordinary. Education level and gender information was collected for Experiments Five through Nine, and

psychographic measures (either the REI or CRT) were gathered for all experiments except for Experiments Three, Four, Ten and Eleven. Summary statistics on subject demographics are presented in Figure 11. In general, the subject population did not exhibit extraordinary demographic or psychographic traits. Though a smaller portion of subjects in later experiments were female, the over-all proportion across the study was not atypical (48% female across Experiments Five through Nine; $\chi^2_{(1)}$=0.684; p=.41; n=846). Subjects reported a slight inclination toward both cognitive processing (NFC μ_{exp1}=6.9; μ_{exp2}=6.9) and faith in intuition (FI μ_{exp1}=7.0; μ_{exp2}=5.7). Behaviorally, subjects in Experiments Six, Seven, Eight and Nine were slightly more inclined to suppress initial, intuitive reactions for more deliberative responses (CRT μ_{exp6}=1.33; μ_{exp7}=1.22; μ_{exp8}=1.39; μ_{exp9}=1.13). This level of deliberative processing is consistent with that observed through prior research (Goodman et al., 2012). Subjects from Experiment Five responded more intuitively (CRT μ_{exp6}=1.66) than expected. Average educational attainment was approximately three years of college (μ=15 years), and is comparable to studies conducted on student populations.

Overall, there is little reason to believe that the participant pool used for the experiments in this study contributed to the inability to produce a consistent attraction effect.

The Measure of Interest – Decoy Share

The operationalized measure for the attraction effect used in this study does not include share captured by the decoy. Arguably, the decoy share can be added to that of the dominating (Target) option under the assumption that a single entity reaps the benefit when either the target or decoy is chosen (for example the decoy may be a higher margin option developed as an extension to an existing product line). Inclusion of the decoy share would overstate the observed

difference between control and treatment conditions. As an independent, irrelevant alternative, the decoy share is expected to be zero, and if so, the following would be true:

$$p(T,\{T,C,D\}) = p(T+D,\{T,C,D\}) \quad \text{because} \quad p(D,\{T,C,D\}) = 0. \tag{11}$$

Yet in practice it is quite common for an asymmetrically dominated decoy to gain some share for itself[11]. Whenever the decoy share is greater than zero, then $p(T+D,\{T,C,D\}) > p(T,\{T,C,D\})$, and the Target share would be exaggerated. The resulting chi-squared measure would also be overstated and therefore erroneously report an attraction effect where one does not actually exist. A handful of prior studies have indeed combined Decoy and Target shares together (Appendix 3). Despite the prior precedent in combining share, the decoy and target shares were not combined for statistical analyses of this study for several reasons.

First, combining the Decoy and Target shares assumes the two options were designed to have a mutually beneficial relationship to each other. Excluding the decoy share from the target share eliminates such an assumption. For example, Ross Perot's entry in the 1992 presidential election has been argued to have initiated an attraction effect boost for Bill Clinton (Pan, O'Curry, & Pitts, 1995); yet Perot's votes clearly cannot be combined with Clinton's, nor was Perot's campaign designed specifically to benefit the Clinton campaign.

Second, if the decoy share were combined with that of the target, the resultant share would obscure the source of the share shift to the decoy. For example, whether the new target share was gained at the expense of the competitor, or if the target lost share to the decoy (but just happened to lose a smaller proportion to the decoy than the competitor) would be unclear.

[11] Of the 53 attraction effect studies reviewed for this paper, 51 studies (96.2%) reported at least one choice scenario where the asymmetrically dominated decoy garnered share in the {T,C,D} condition.

Excluding the decoy from the share analysis provides for a clearer preference relationship between competitor and target options.

Overall, combining the decoy and target shares makes it easier to create an attraction effect as share shifts to the target would seem larger and are therefore more likely to be statistically significant. This analytical difference, though only used in a handful of prior studies, likely still contributes to the perceive strength and prevalence of the effect in the existing literature.

Effect Size Measurement & Choice of Control Condition

The current study applies a more conservative standard by which to measure the size and existence of the attraction effect: the difference between the Target's share in a two-option {T,C} control versus in a three-option Target-decoyed set $\{T,C,D_T\}$. The two-option control-condition target share was used as a base to measure the attraction effect in HPP's original study (also see a review by Mishra, 1993). However, many researchers have since used a more lenient metric where the Target-decoyed share (from set $\{T,C,D_T\}$) is compared against the Target's share in a Competitor-decoyed scenario (from set $\{T,C,D_C\}$). Of the 53 attraction effect studies reviewed for this paper, 18 (34.0%) reported results based on target share differences between $\{T,C,D_T\}$ and $\{T,C,D_C\}$conditions[12]. From a theoretical perspective, the use of a three-option control condition is not inappropriate as the share-base does appropriately signal the existence of an attraction effect when competitor share shifts to a target in the presence of a decoy. However, the three-option control was not used in this study for two reasons.

First, using a three-option control condition to detect the existence of an attraction effect is liberal as it combines the creation of two attraction effects to define the existence of one

[12] A full list of the 18 studies referred to are listed in Appendix Four.

attraction effect. Specifically, the method combines the share change from a target share-base that has been depressed by the presence of a potential attraction effect that favors the competitor, with a target share that has been augmented by a second attraction effect that favors the target. Calculating share change in this way potentially exaggerates the size of the attraction effect as it is actually the combination of two attraction effects.

Second, from a practitioner point-of-view, a Target-decoyed versus Competitor-decoyed metric could only be effective if a marketer's decoy successfully increased share to the intended Target while simultaneously, a competitor has also successfully increased share to the Competitor option in the presence of its own relevant decoy. A two-decoy, simultaneous share-gain scenario is impossible under real market conditions since it necessitates concurrent share gain by both the Target and the Competitor in the presence of two asymmetrically dominated decoys. Thus, from a real-world application perspective, share change should be calculated based on the Target's share in a two-option {T,C} choice scenario.

The prevalent use of a three-option control condition could be one reason why significant attraction effects appear more often in the literature than this study's findings would suggest. Though a $\{T,C,D_T\}$ versus $\{T,C,D_C\}$metric does accurately detect the presence of an attraction effect, this study still employs the two-option control condition because the stricter baseline will likely be more meaningful in applied settings.

Aggregation of Choice Scenarios & Statistical Power

In this study, data were not aggregated across choice scenarios. The decision not to aggregate differs markedly from much of the existing literature as the practice is prevalent. Of the 53 attraction effect studies reviewed, 21 (39.6%) (Appendix Five lists these studies) reported significant attraction effects based on data that had been aggregated across at least two different

choice scenarios. Though aggregation helps to increase statistical power, and reduces the probability of encountering a Type-II error, the technique presents several methodological concerns. Aggregation obscures possible product- and attribute-specific moderators or mediators of the effect[13], makes the effect seem more prevalent than perhaps it actually is, and makes statistical assumptions that potentially weaken analytical validity.

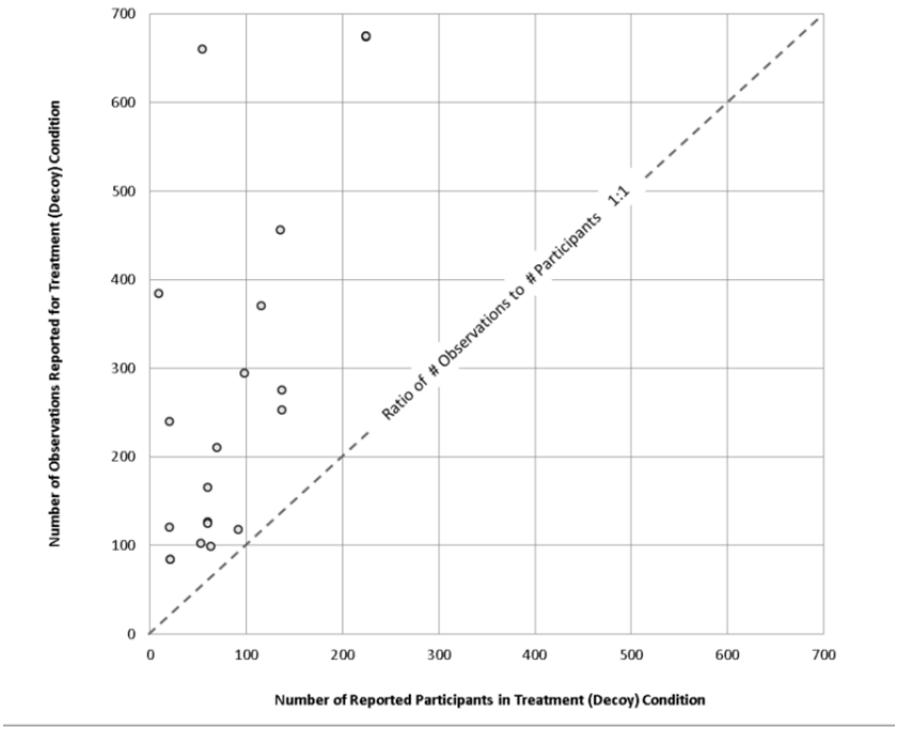
Aggregating multiple choice scenarios into a single analysis increases overall statistical power. For example, in an experiment with 50 participants and two treatment conditions (a decoyed and a control condition), a single choice scenario would yield 25 participants per decoyed and control condition. If each participant was given four choice scenarios and the data were then aggregated across all scenarios, then each condition would have 25 x 4 or 100 observations. Instead of reporting four choice scenarios with an n=25 per treatment condition; a typical aggregated analysis would report one overall experimental attraction effect with participant-choice as the unit of measure and an n=100 per treatment condition.

Figure 12 plots the ratio of observations per participant for studies that reported aggregated data. The dotted line in the figure demarcates a 1:1 ratio, on and below which no data aggregation occurs. Of the 21 studies that reported aggregated data, 14 reported enough information on 22 separate experiments to determine that the average aggregated experiment combines the results of 3.23 choice scenarios per participant. All other factors being equal, this approximate three-fold increase in observation count effectively increases the null hypothesis rejection-region from $\sigma > 1.64$ to $\sigma > 0.921$ at an $\alpha = 0.05$, making it easier to reject a null

[13] The practice of aggregating data across different products and attributes may also obfuscate the potential moderating effects of contextual factors such as product type, attribute dimension, and attribute value. Product-specific variability in attraction effect susceptibility has been well documented in prior research (e.g. Heath & Chatterjee, 1995; Mao & Oppewal, 2012; Mishra, 1990; Ratneshwar, Shocker & Stewart, 1987), but has yet to be explicitly examined in the literature. Attribute dimensions that reflect price, quality, and riskiness are routinely used in attraction effect studies, and are particularly influential in determining what choice processes are used. By its nature, aggregation prevents more specific examination into product and attributed related decision-making differences.

hypothesis of no significant target share change in the presence of a decoy, and easier to accept the alternative that an attraction effect exists. An analysis of statistical power across these 22 experiments suggests that the increased observation count enables a test for an average effective share change of 1.7%, a much smaller share change than the 12.46% that was first reported by HPP and Huber & Puto (1983).

Figure 12. Ratio of Participants to Observations Reported in Aggregated Studies

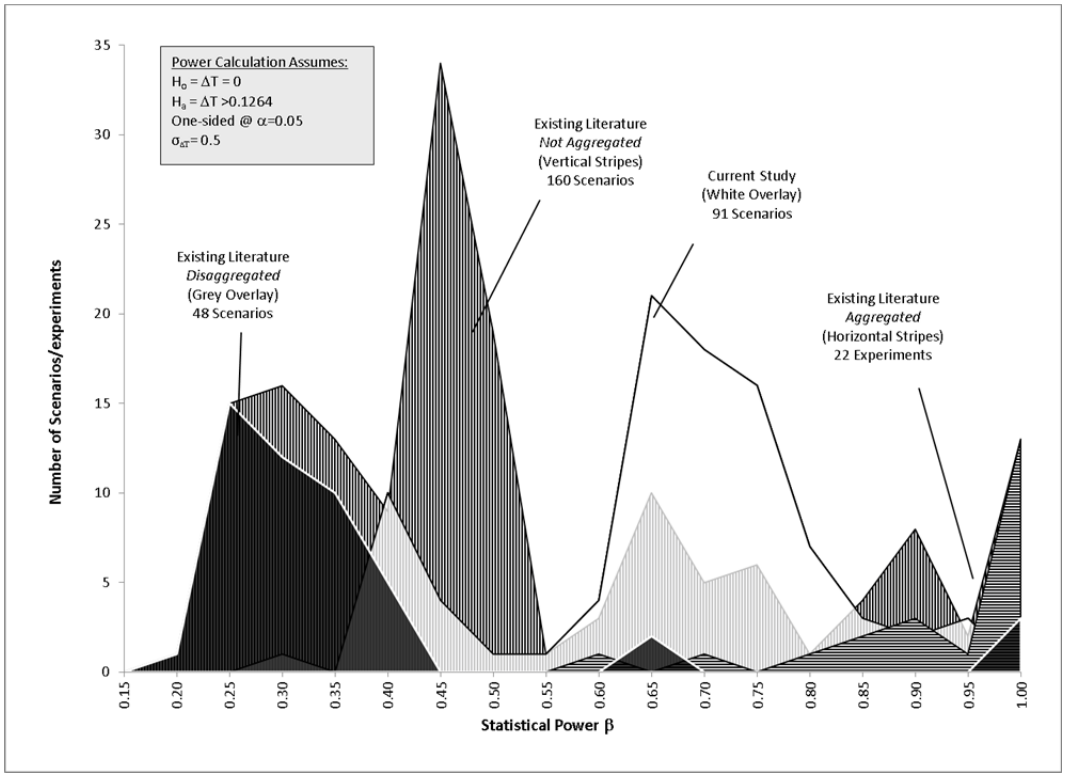


Data points represent 22 experiments from the 14 studies that reported enough aggregated data to calculate statistical power. Ratios are based on particpant and observation counts reported for the decoy condition for each study. Studies that do not aggregate data across scenarios would have a ratio of 1:1, and would lie on the dotted line in the figure above.

A full power analysis was then conducted to evaluate to the level of statistical power of the current study, and how it compares to that of prior studies. To facilitate the comparison of statistical power across groupings of choice scenarios, conservative assumptions were made to standardize the power calculation. Calculation of statistical power includes the assumption that the mean effect size for the Attraction Effect is a 12.64% target share gain, the average effect

size observed by HPP and Huber & Puto (1983) in their seminal papers on the subject. To provide a comparable power estimate across scenarios, an assumption was made to standardize the effect size standard error to 0.5 instead of applying the pooled standard error for each scenario. Though using 0.5 as a fixed estimate for the standard error removes scenario-level information about each sample's variability, its use also allows for easy comparison of statistical power across scenarios, and also provides a very conservative basis for detecting the effect size.

Figure 13. Distribution of Statistical Power: Existing Literature & Current Study



Scope of Literature	n	Power (1-β) Mean	Stdev
Existing Literature	53		
Individual Scenarios	160	0.342	0.189
Aggregated Studies	14		
Aggregated Experiments	22	0.917	0.115
Disaggregated Scenarios	48	0.304	0.236
Current Study-Indiv'l Scenarios	91	0.640	0.142

Statistical power for each scenario is calcuated based on a one-sided alpha=0.05 with H_a=0.1264, which is the average Target share increase observed in HPP's original 1982 introduction of the effect, and Huber & Puto's follow-up study in 1983. An overall standard error of the effect of 0.5 was applied to standardize the power analysis across scenarios.

On average, the choice scenarios tested in this study had lower statistical power than in aggregated studies (aggregated studies: $1\text{-}\bar{\beta}$ =0.92; σ=0.115; n=22; current scenarios: $1\text{-}\bar{\beta}$ =0.64;

σ=0.142; n=91). However, once aggregated studies are examined on a per-scenario basis, the current study actually has greater statistical power. The average power of a disaggregated scenario from the existing literature (1-$\bar{\beta}$ =0.30; σ=0.236; n=48 scenarios), and of scenarios from the existing literature at large (1-$\bar{\beta}$ =0.34; σ=0.189; n=160 scenarios). Figure 13 compares the power distribution of:

- Aggregated experiments (shown in horizontal stripes; n=22),
- Scenarios once they have been disaggregated from those 22 experiments (dark grey overlay; n=48),
- Scenarios from the current literature which were not aggregated (shown in vertical stripes; n=160)[14], and
- Individual scenarios from the current study (shown in a white overlay; n=91).

Once aggregate studies were separated into their respective, individual scenarios, the resulting power distribution is skewed, with the majority of scenarios having a statistical power of less than 0.50. Overall, it appears that the increased statistical power associated with data aggregation has enabled the declaration of statistical significance.

Aggregation of Choice Scenarios & Independence of Observation

Aggregating multiple observations for each participant may also violate statistical assumptions inherent in the chi-square and regression metrics used in most attraction effect studies. Specifically, the repeated measures design used in most aggregated studies violates independence of observations.

[14] The 160 individual studies included in this analysis do not reflect many product scenarios which were said to have been tested, but were reported as a single, aggregated choice effect. Disaggregated product results could not be obtained from such studies, and could not be included in the analysis.

Data aggregation, as reported in the existing literature, can violate independence of observations in two ways. First, when scenarios are presented in a static order across participants, potential sequence or carryover effects may exert an influence on how latter choices are made. Though participants may be randomly assigned to a treatment or control condition, the repeated measures made of those participants are not. What was assumed to be completely independent observations may unwittingly exhibit Markov sequence characteristics where each observation is affected by the previous scenario. The current study avoids such potential sequence effects by randomizing both presentation order and treatment condition for each choice scenario for each participant.

Second, because each participant is responsible for multiple observations in the data aggregation, the responses for that participant would likely be correlated – collectively tinted by the attribute preferences, experiences, knowledge and decision making biases of that decision maker[15]. Repeated measures from a single source cannot be considered as a randomized observation, but should be considered as part of clustered samples with several scenarios per cluster (Cliff & Ord, 1981). Strong correlation within clusters and greater dispersion between clusters (as exhibited by differences in variance and means between clusters) increases the chance of Type-I errors caused by data aggregation. For example, if results are clustered by product scenario, the more consistently a decoy works for a given product, and the more variability there is in decoy effectiveness between products, the greater the chance of a Type-I error. Similarly, if clustered by participant, the more consistent each person is in their decision making (high correlation), and the less similarity there is between each person (greater dispersion

[15] Individual differences in susceptibility to the attraction effect have been demonstrated in the literature. For example, participant susceptibility have been shown to stem from social strati (white vs. blue collar) (Heath & Chatterjee, 1995) and cognitive tendencies (Mao & Oppewal, 2012)

between participants), the greater the chance data aggregation will lead to a false positive result. Simulations from other fields of study show that, under certain correlation and dispersion conditions, conducting a chi-squared test on aggregated data can result in a 20% to 100% chance of a Type-I error (Garson & Moser, 1995). Without a better understanding of inter-product and subject-specific variability with decoy effects, the more conservative analytical option would be to *not* aggregate choice data across scenarios, and to randomize treatment condition between participants *and* scenarios. As such, the current study does not aggregate data across scenarios, and does randomize treatment condition between participants and scenarios; to do so invites a greater likelihood of Type-I errors.

Overall, several methodological differences exist between the current studies and those used in prior research. Some differences, such as participant type, stimulus materials, and exclusion of decoy share, are not likely reasons why this study failed to find a consistent attraction effect. However, two common practices used in prior research: the prevalent use of a three-option control condition, and the aggregation of multiple choice scenarios, makes it easier to create an attraction effect, and easier to detect smaller effect sizes, respectively. While the use of a three-option control condition is a valid and understandable methodological choice for theory building, its use potentially creates the illusion that the attraction effect is more robust and prevalent than is actually possible in real consumer environments. However, the practice of aggregating data across multiple choice scenarios does not contribute to theory-building, and arguably obscures potential product and attribute-specific moderating effects. Data aggregation potentially sacrifices insight into product and attribute affects at the altar of increased statistical power, and should be avoided when possible. The current study takes a conservative methodological approach and does not aggregate repeated measures, and bases goodness-of-fit

comparisons on a two-option control condition. Together, these methodological choices may have made it more difficult, though more ecologically valid, to create and detect an attraction effect.

Implication for Practitioners

The results from this study are not promising for practitioners who hope to employ asymmetric decoy tactics as a way to increase market share for a targeted product. Though attraction effects can be created with asymmetrically dominated decoys, the effect is inconsistent and not readily reproducible. Moreover, empirical guidance on what factors are necessary to create the effect, remains elusive. Without better insight into how the effect is created, practitioners would remain at a loss on how to design and position a decoy for effective implementation. Without an ability to purposefully create and control the effect, blind execution of an asymmetric decoy strategy may result in marketing resources wasted on an ineffective decoy, or even worse, result in a decoy that creates a repulsion effect (Hoeffler, Malkoc & Hedgcock, 2010) that encourages share shift from the target product to the competition.

Implications for Future Research

Prior research suggests the attraction effect is robust and easily reproducible with various products on various attribute dimensions. However, the findings from this study suggest the effect is actually quite fragile, and dependent upon factors that have yet to be fully explained. Differences in experiment design and analytical methods partially explain the difficulty experienced in reproducing the effect.

Participant dispositions and stimulus materials (choice scenarios tested) should not have significantly affected results. However this study's operationalized definition of the attraction effect (excluding the decoy share, and as compared to a two-option control condition) does set a

stricter benchmark by which to acknowledge the existence of an effect. In addition, the decision not to aggregated data across choice scenarios creates a more detailed measure that is perhaps more informative for future theory-building on product- and attribute-related causes of the effect. Researchers who choose to aggregate multiple scenarios per participant should consider adjusting statistical tests to account for the effects of intra-cluster correlation. A Koehler-Wilson (1986) adjustment as described by Garson and Moser (1995) is just one way to adjust a chi-squared analysis to significantly reduce the potential of Type-I errors.

In the end, the difficulty creating consistent attraction effects under these stricter methods reveals a fragility that would preclude the effect from becoming a practical marketing tool. Until underlying contributing factors of the phenomenon are better understood, researchers would be unable to provide the specifications or guidance that is necessary to create an attraction effect in a non-academic environment.

CHAPTER III: A META-ANALYSIS

INTRODUCTION

The asymmetrically dominated decoy effect, otherwise known as the attraction effect, is a widely studied consumer choice context effect. The attraction effect is said to occur when, in a two-option choice set, the added presence of an asymmetrically dominated decoy (an option that is dominated by only one of the two, non-decoy options), initiates preference share shift from the non-dominating option to the asymmetrically dominating option (Huber, Payne, & Puto, 1982). The attraction effect occurs counter to prevalent decision research assumptions such as the independence of irrational alternatives, and regularity – assumptions which imply that an irrelevant option should be ignored, and relevant new options should proportionally cannibalize share from existing options (Luce, 1959).

That a choice scenario can be manipulated to generate an attraction effect should hold great appeal for both academics and practitioners. Insight into how an attraction effect is created can help academics better understand the processes and factors involved with how consumer preferences are constructed, and how they are affected by context. For practitioners, the attraction effect holds potential for when there is interest to advance a target option over that of a competitor. For example, sales and marketing professionals may want to shift market share from a lower margin item to a higher margin item; policy advocates may wish to increase the appeal of one form of legislation over another; and hiring managers may want to encourage recruitment of one candidate over another.

Despite the academic and practical potential that comes with understanding the attraction effect, wholly satisfactory empirical and theoretical explanations of how the effect is created, still remain elusive. Many theories exist on the decision making processes which underlie the effect (e.g. Mao & Oppenwal, 2012; Pocheptsova et al., 2009; Simonson, 1989). However,

because of the relatively weak effect size (e.g. Chapter 2); the inconsistent reproducibility of the effect (e.g. Mishra, 1990; Simonson & Tversky, 1992; Tentori et al., 2001); and the pervasive use of different stimulus, experimental methods, and reporting metrics (see examples discussed in Chapter 2), it is difficult to reproduce prior work, test theoretical explanations, or extract conceptual trends across the literature. As such, the current study takes a *condition-seeking* strategy and asks under what conditions are attraction effects more likely to be observed (Greenwald et al., 1986). Instead of trying to explain whether or why the attraction effect occurs, this condition-seeking approach is designed to describe the circumstances that accompany the appearance of the attraction effect. This form of exploration is a useful paradigm for when a literature is potentially stymied by confirmation bias (Greenwald, 1986). In the end, the aim is to distill the necessary and sufficient conditions to create attraction effects so that researchers can design more effective and extensible experiments to more systematically test for the sources and moderators of the attraction effect.

METHOD

Study Retrieval

A search for academic articles relevant to the attraction effect was conducted online through three electronic databases and channels: JSTOR, EBSCO, and Google Scholar. JSTOR searches were narrowed to the following journal databases: America Studies, Business, General Science, Health Policy, Health Sciences, Law, Psychology, Public Policy, Sociology, and Statistics. EBSCO searches were narrowed to include only "Scholarly (Peer Reviewed) Journals." Google Scholar searches were conducted across the service's entire accessible pool of listings. Across these sources, full text searches were conducted on broad terms that could be related to

the attraction effect such as: *attraction effect, asymmetrically dominated decoy*, and *asymmetric decoy*. A search was also conducted for articles that referenced or cited the original (*Huber, Payne & Puto, 1982*) work on the effect. The search was narrowed to articles produced after the publication date of Huber, Payne, & Puto's seminal paper (June 1982), through August 2012. A list of the search terms used and the number of articles returned for each search are listed in Figure 14.

Figure 14. Literature Search Summary Results by Search Term and Database

Database	Attraction Effect	Asymmetrically Dominated Decoy	Asymmetric Decoy	Huber, Payne, Puto	Cites Original Work: HPP, 1982
EBSCO	*173*	*16*	*2*	*296*	*256*
JSTOR	15,486	*48*	*127*	*179*	*70*
Google Scholar	764,000+	1,410	2,960	*844*	*873*

For results shown in italics, abstracts were read and manually filtered for relevance reference.

In Figure 14, the article counts shown in italics were all read for applicability to the attraction effect. When a reading of the abstract did not readily reveal applicability, a reading of the full article was conducted until a determination could be made on the article's relevance to the attraction effect.

In addition to an online database search, manual reviews were conducted on the reference lists of recent studies and the table of contents of journals with the most attraction effect publications. Manually reviewed journal contents covered the publication period between June 1982 and July 2012 for the following journals:

- *Advances in Consumer Research*
- *Journal of Consumer Psychology*
- *Journal of Consumer Research*
- *Journal of Marketing Research*

- *Marketing Letters*
- *Organizational Behavior and Human Decision Processes*

Manual reference list and journal index checks did not result in articles that were not already identified through the online database search.

Overall, the literature reviewed through August 2012 produced 75 articles. An additional, in-press article was received during the writing of this meta-analysis. Thus in total, 76 articles were read and evaluated for adherence to the inclusion and exclusion criteria. Citations and inclusion/exclusion notes for each of the 76 articles are listed in Appendix 6. For the remainder of this meta-analysis, studies will be referenced by their index number shown in Appendix 6, unless otherwise noted by their full citation.

Inclusion Criteria

Included studies were restricted to primary (original), controlled experiments of asymmetrically dominated decoy choice scenarios. As such, quantitative simulations (15,16,17,52), panel discussions (54), and other, non-asymmetrically dominated decoy experiments (73) were excluded as these methods do not provide experimental data on consumer choice in asymmetrically dominated decoy scenarios. Studies and articles were examined on a per-experiment and then on a per-choice scenario basis. That is, a single article that includes multiple studies or experiments may have one, a portion of, or all of its experiments included in the meta-analysis. A choice scenario was included if attribute ratings, choice shares, and number of observations were provided for each option in each treatment condition.

The share shift measure used in this study is the same that was described in HPP's original work, and is the difference between the Target's share in a two-option control choice set {T,C} and its share in a Target-favoring decoy choice set $\{T,C,D_T\}$. Share shifts that were

reported as the difference between the Target's share in a Target-favoring decoy choice set $\{T,C,D_T\}$, and its share in a Competitor-favoring decoy choice set $\{T,C,D_C\}$were excluded from this study. Experiments that provided only enough information to base share change on the difference between Target-decoyed and Competitor-decoyed conditions were excluded because such comparisons exaggerate the potential size of the effect relative to two-option and three-option comparisons; it is also more likely to signal the existence of an effect where one would not exist if a more conservative {T,C} metric was used. As such, studies that utilized a decoy-condition to decoy-condition comparison metric were excluded (7, 10, 20, 51, 68).

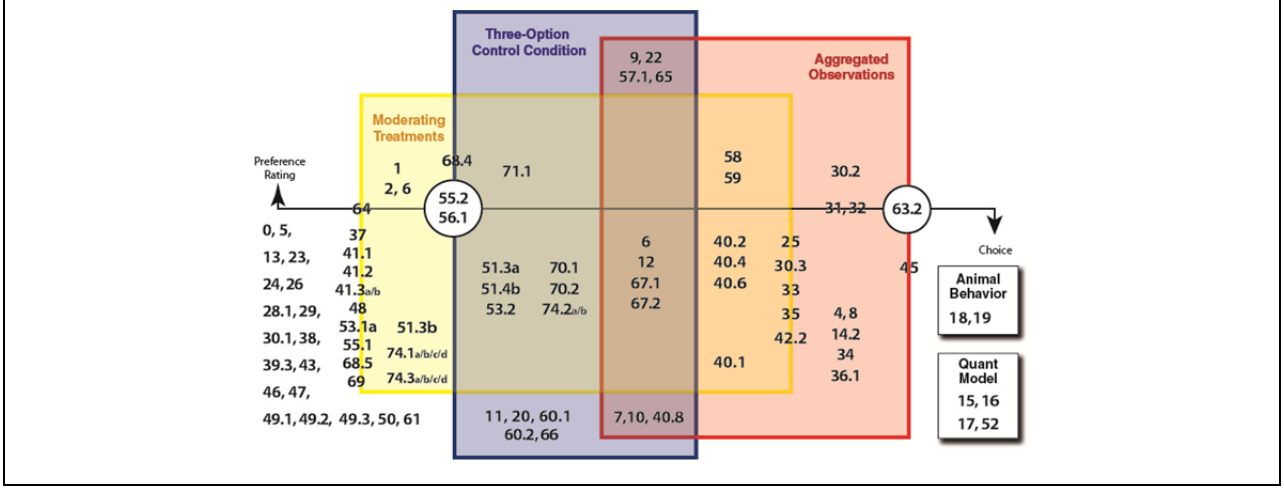
Only experiments where participants were required to make an actual choice between options, were included. Though preference-related dependent variables were recorded during the coding process, only actual choice data was included in the meta-analysis. Thus, experiments which used preferences scores, point allocations, or other form of numeric judgment as dependent variables were excluded (58, 59, 63.2, 70, 76). Choice share metrics were included over preference share metrics because the use of point allocations or preference scores measure a different construct than choice. Ultimately, actionable choice share is of more importance to marketers and practitioners than affective preference scores, so it behooves the researcher to measure and report a generally desired end-metric (choice) over a metric designed to infer choice through preference. Scenarios where attribute dimension valuation were the dependent variable, were also excluded (71.2, 71.3).

In order for data to be aggregated across choice scenarios, the assumption must be made that consumer decision making processes are the same across products types, attribute formats and attribute dimension. However, it is not uncommon to find variable effect sizes and differences in significance levels for different product and attribute types and attribute values

reported in a single multi-scenario study (eg. Huber, Payne & Puto, 1982; Mao & Oppenwal, 2009; Mourali, Böckenholt, Laroche, 2007). Studies that only reported aggregated choice data were excluded. However, studies that aggregated choice scenario data for statistical analyses, but that still provided disaggregated choice data that could be analyzed on a scenario-by-scenario basis were still included in the meta-analysis (eg. Huber, Payne & Puto, 1982).

Finally, studies must have reported fundamental experimental data such as sample size and enough data to derive quantitative choice shares for both control and experimental conditions. Articles that did not report enough data to determine such data were also excluded (40, 62). The classification of articles (and their composite experiments) reviewed for this meta-analysis, is visually presented in Figure 15. Scenarios from the experiments listed in the bottom-left corner, and those straddling the bottom-left corner of the "Moderating Treatments" and bottom-right corner of the "Aggregated Observations" areas, were included in the final meta-analysis.

Figure 15. Included Studies – Venn Diagram of Major Experiment Feature



Of the 76 articles read, 50 were fully coded for inclusion in this meta-analysis. The 50 articles included 78 relevant attraction effect experiments, which in turn produced 257 unique attraction effect choice scenarios. In addition to the 76 articles examined from the existing

literature, eleven unpublished attraction effect experiments were conducted by the author, and were added to the meta-analysis data set. The eleven unpublished experiments are comprised of 91 separate choice scenarios. Thus, in total, the current meta-analysis includes data from 89 separate experiments, comprised of 348 choice scenarios. Ultimately, the unit of analysis in the current study is a single choice scenario.

Data Extraction & Coding

A coder[16] was recruited and compensated to provide verification and consistency on the information extraction from the literature. The author trained the coder, and three test studies (studies 23, 26, 42) were co-coded by the author and the coder as part of the training process. The remaining 73 studies were coded independently by both the author and the coder. Discrepancies between the coder and author were resolved through discussion. Overall, the agreement rate between the coder and the author was 84.1% across all criteria for the 76 studies.

One objective of this meta-analysis is to quantitatively evaluate how traditional experiment factors are related to the existence of the attraction effect. General criteria on experimental design factors to include were derived from the meta-analysis guidelines put forth by the APA Publications and Communications Board. The data compiled from each study used in this meta-analysis includes, at a minimum, the descriptive traits outlined by the APA (American Psychological Association, 2009). Beyond the general meta-analytic guidelines specified by the APA, study descriptors unique to the attraction effect literature were also coded and include aspects of experiment design, stimulus material, and analytical methods. Attraction effect-specific factors were chosen based on whether those elements were described in HPP's

[16] Prior to the coding assignment, the coder was not familiar with either the attraction effect. The coder's educational background includes a Juris Doctorate from a major East Coast university.

seminal work on the subject, and whether those elements were commonly emphasized or reported on the attraction effect literature. In addition, factors deemed to potentially contribute to sample heteroskedasticity, data heterogeneity, analytical variation or other forms of effect size differences were also coded. Figure 16 summarizes the information components coded for the current meta-analysis.

Attributes

Choice attribute dimensions were recorded, and each attribute used to describe choice options was coded for unit of measurement (example units of measure include dollars, minutes, and rating score), maximum and minimum scale values (for example an attribute could be rated on a scale of 0 to 100 or 1 to 10), and maximum and minimum option values (for example, though the rating scale potentially ranges from 0 to 100, the highest rated option might only be 75). Whether attribute values were presented as a positive or negative attribute to be maximize or minimize, was also recorded. For example, quality scores, car miles per gallon and discount percentages, would be expected to be maximized whereas price, grams of fat, and distance from destination would be expected to be minimized. Whether the attribute was presented or represented in a quantitative, qualitative or visual manner was also recorded. Result from the existing literature suggest that the attribute range (maximum and minimum levels) (HPP; Huber & Puto, 1983), mode of presentation (e.g. Choplin & Hummel, 2002 & 2005; Hamilton et al., 2007; Simon & Tversky, 1992), valance (Malkoc et al., 2008 & 2012), and descriptiveness (Ratneshwar et al., 1987) may affect both the creation and the magnitude of the attraction effect. Overall, sixteen different attributes were recorded.

Figure 16. Data Extraction – Coding Guidelines

APA Journal Article & Meta-Analytic Reporting Standards

Descriptive Information

1. Study authors
2. Year of publication
3. Intended(starting), and actual sample size
4. Whether stimulus material were presented in randomized order
5. What format were choice scenarios presented (online or paper/pen)
6. Which statistical test(s) were employed

Study Descriptors - *Participant Characteristics*

7. Recruitment country
8. Student or adult participant population
9. Compensation method

Attraction Effect-Specific Study Descriptors

Study Descriptors - Attributes

1. Attribute dimensions
2. What format was the attribute presented: quantitative/qualitative/or visually represented.
3. The scale (max/min) of the attribute dimensions
4. The scale units of the attribute dimensions

Study Descriptors – Choice Options

5. What product or service was the participant asked to make a choice on?
6. What was the relative rank of the option's value on each attribute?
7. Target, Competitor, and Decoy attribute values

Study Descriptors - Experimental & Analytical Methods

8. Did the control condition have two or three options
9. Number of scenarios tested per participant
10. Were other manipulations tested/exerted on the experiment
11. Were control and treatment conditions between or within subjects

Effect Size and Dependent Variables

12. Whether choice scenarios were reported in the aggregate or as individual scenarios
13. What metric does the dependent measure (choice, point allocation or preference rating)
14. Target, Competitor, and Decoy choice counts

Meta-analysis independent variables derived from coded attributes

1. Maximum and minimum attribute values shown
2. Percent difference of Decoy attribute values from existing choice set
3. Decoy type: range and/or frequency decoy

Product/Scenario Attributes

4. Hedonic and utilitarian value of product/service in choice scenario
5. Durable or Non-Durable status of the product/service
6. CPI *major group* and *item strata* classifications
7. Positive or negative attribute desirability
8. Was attribute value conveyed through a qualitative or quantitative presentation format

Choice Options

The product or service that was central to each scenario was recorded, as were the attribute values for each choice option. Overall, 79 product or service types were recorded, and the seven most prevalent products or services are (in descending order, number of scenarios in parentheses): beer(44), cars(33), restaurants(24), wine(14), televisions(13), apartments(10), and batteries(9). Findings from the existing literature demonstrate product-specific variations in the

existence and magnitude of the attraction effect (for examples, see: HPP, 1982; Mao & Oppewal, 2012). As such, the current study also classifies each product/service along hedonic/utilitarian and durable/non-durable dimensions, and Consumer Price Index (CPI) major groups and item strata. Hedonic/Utilitarian (HED/UT) measurements were made based on the scales put forth by Voss, Spangenberg, & Grohmann (2003)[17], and durable/non-durable classifications and CPI classifications were made based on guidelines put forth by the United States Bureau of Labor Statistics (BLS, 1997).

The absolute magnitude of each choice option was also coded. If an attribute was presented without a quantitative magnitude, a relative ranking (e.g. 'High,' 'Medium,' or 'Low') based on the options available in the choice set was assigned. Finally, based on either the quantitative or qualitative values coded, each option was also described as the dominating, compromise, or weakest option of an attribute dimension.

Experiment Design

Aspects of experiment design were examined to determine whether control condition choice sets were comprised of two or three options; designs were within- or between-subjects; and whether each participant was responsible for multiple choice scenarios responses. If subjects contributed to more than one choice scenario, then whether random assignment to treatment condition occurred on the scenario- or participant-level was also recorded.

When data were reported by subsample, each subsample was coded separately in an effort to provide insight into potential moderating factors of the attraction effect. For example, student versus senior citizen (Kim & Hasher, 2005) and MBA versus undergraduate student

[17] The full measurement scale and procedures used to determine the hedonic and utilitarian dimensions of each product and service type are detailed in Appendix 7.

populations (Heath & Chaterjee, 1995) were coded separately (so four population subsamples from two studies) to provide more detail on the effect across different subject pools. The most prevalent subsamples identified in the data set are students, adults, and general online (opposed to in-person) populations.

To provide a common ground for comparisons, experiments were also evaluated for moderating treatments. Experiments with moderating treatment conditions (for example forced justification, resource depletion, or decision time restrictions) were coded, but those scenarios were excluded from the overall analysis. Control conditions that were free from moderating influences were, however, included in the analysis.

Dependent Variable Coding

The dependent variable for each experiment was coded as choice, preference rating, point allocation, or other. Scenarios which used preference rating and point allocation measures were coded, but excluded from the analysis. Choice information was extracted as share counts for all scenario options in both control and treatment conditions. In instances where share percentages were reported (but not choice counts), choice counts were calculated based on scenario sample size and share percentages. Scenarios were excluded when choice counts were not reported or could not be calculated from reported information. Results that were aggregated across more than one choice scenario were disaggregated if possible, or excluded from the analysis.

Definition of Effect Size

The attraction effect is generally described as a market share shift to a target option in the presence of an asymmetrically dominated decoy. For the purposes of this study, market share is defined as choice share of a Target (T) option from a two-option choice set, and then from a

three-option, decoyed choice set excluding share captured by the decoy. The effect size was then expressed as the relative Target share ratio between the two- and three-option conditions:

$$Effect\ Size\ Ratio\ of\ Scenario\ i = ESR_i = \frac{{}^{T_{test}}/_{(T_{test}+C_{test})}}{{}^{T_{ctrl}}/_{(T_{ctrl}+C_{ctrl})}} \quad (12a)$$

And the variance for the single scenario effect size is:

$$Variance\ of\ ESR_i = V_i = \left(\frac{{}^{C_{test}}/_{T_{test}}}{C_{test}+T_{test}} + \frac{{}^{C_{ctrl}}/_{T_{ctrl}}}{C_{ctrl}+T_{ctrl}}\right) \quad (12b)$$

The magnitude of the effect size is measured relative to the Target's share in the control condition. An attraction effect is said to exist when Equation 12a is statistically greater than one, and a repulsion effect exists when the measure is statistically less than one. Several nuances are worth noting with this set of definitions:

1. **Target share, in control and treatment instances, is calculated relative to the share of a single competitor option**. In scenarios where the decoy garners share in the {T,C,D_T} condition, share counts for the decoy are excluded from the analysis. In addition, scenarios that offer more than two options in the control condition, or more than three options in the treatment/decoy condition, were excluded.

2. **The share change comparison is made based on a two-option control condition.** Choice scenarios in the literature that did not provide a two-option control condition with which to base a share change on, were excluded.

3. **'Shift' may refer to choice changes either within or between subjects.** Though the term 'shift' may imply a within-subject preference change, limiting the operational definition in this way would preclude the inclusion of many relevant studies.

Independent Variables

The independent variables incorporated into the current meta-analysis reflect aspects of experimental design and stimulus development that may affect the size and existence the attraction effect. Figure 17 defines and details the 15 independent variables coded for the meta-

analysis; Figure 18 summarizes the composition of the data set based on categorical groupings of major independent variables; and Appendix 9 graphs the distribution of scenarios by experiment year.

Figure 17. Summary of Independent Variables

Variable (Code)	Example / Detail
Stimulus: Characteristics	
1. Product/Service Type (PROD)	1. Six-packs of beer, vacation packages, cars, restaurants
2. Hedonic Rating (HED)	2. Composite rating based on Voss, et al. (2003)
3. Utilitarian Rating (UT)	3. Composite rating based on Voss, et al. (2003)
4. CPI Classification(CPI)	4. Two-letter code. 1st =Major group, 2nd=Item Strata
5. Durable Product (DUR)	5. 1=Durable; 0=Non-durable. Based on Statistics (1997)
6. Target Control Condition Share (CTRLSHR)	6. Percent share captured by the Target in the control condition
Stimulus: Dominant Attribute	
7. Visual (DVIS)	7. 1=Visual; 0=Written representation of attribute
8. Qualitative (DQUAL)	8. 1=Qualitative value; 0=Quantitative value represented
9. Quality-Based (DQB)	9. 1(0)=Attribute is(not) a measure of quality
10. Price-Based (DPB)	10. 1(0)=Attribute is(not) a measure of price
11. Premium to Competitor (DP2C)	11. Target's attribute superiority relative to Competitor (%)
12. Premium to Decoy (DP2D)	12. Target's attribute superiority relative to Decoy (%)
Experiment Design &Background	
13. Within Subjects(WIN)	13. 1=Within subjects; 0 = Between Subjects
14. Student Sample(STUD)	14. 1=Student participants; 0=Non-student participants
15. Publication Year (YR)	15. Indexed to (HPP, 1982) t=0

Of note, the scenarios included in this study were generally tested on American (78%), student populations (65.8%) using a paper/pen format (63.4%), between-subjects (85.4%) format. Sixty-six percent of all scenarios were retrieved from published journal articles (28.7% from the *Journal of Consumer Research* alone). Ninety-one of 129 total unpublished scenarios were coded from experiments conducted by the author.

Figure 18. Descriptive Summary of Studies & Coded Variables

Survey Format	n	%
Paper	222	63.8%
Online	114	32.8%
Not Disclosed	12	3.4%
Total	348	100%

Article Publication	n	%
Not published in a journal	119	34%
Journal of Consumer Research	106	30%
Journal of Consumer Psychology	35	10%
Organizational Behavior and Human Decision Processes	26	7%
Journal of Marketing Research	18	5%
Psychology & Marketing	11	3%
Unpublished?	7	2%
Cognition	6	2%
Quarterly Journal of Experimental Psychology	4	1%
Psychological Science	4	1%
Marketing Letters	3	1%
Advances in Consumer Research	3	1%
Cyberpsychology, Behavior, and Social Networking	2	1%
Journal of Travel Research	2	1%
Land Economics	1	0%
Journal of Applied Psychology	1	0%
Total	348	100%

Subject Design	n	%
Between	298	85.6%
Within	50	14.4%
Total	348	100%

Country of Experiment	n	%
USA	275	79.0%
USA/Asia	25	7.2%
USA/Canada	4	1.1%
Canada	6	1.7%
Taiwan	2	0.6%
UK	12	3.4%
Australia	8	2.3%
Not Disclosed	8	2.3%
Italy	4	1.1%
China/Australia	3	0.9%
Netherlands	1	0.3%
Grand Total	348	100%

Subject Pool	n	%
Student	223	64.1%
Online	89	25.6%
Adults	32	9.2%
Not Disclosed	3	0.9%
Convenience	1	0.3%
Total	348	100%

CPI Major Groups & Item Strata	n		%
Food & Beverage (F)			
Alcoholic Beverages at Home (FW)	62		
Food Away From Home (FV)	42		
Juices & Nonalcoholic Drinks (FN)	15		
Beef & Veal (FC)	8		
Sugar & Sweets (FR)	5		
Processed Fruits & Vegetables (FM)	3		
Bakery Products (FB)	2		
Fresh Fruits (FK)	2		
Other Foods (FT)	2		
		141	40.5%
Recreation (R)			
Video & Audio (RA)	32		
Recreational Services (RF)	16		
Photography (RD)	15		
Other Recreational Goods (RE)	9		
Sporting Goods (RC)	3		
Recreational Reading Materials (RG)	2		
		77	22.1%
Transportation (T)			
New & Used Motor Vehicles (TA)	33		
Public Transportation (TG)	7		
		40	11.5%
Housing (H)			
Rent of Primary Residence (HA)	10		
Appliances (HK)	8		
Tools, Harware, Outdoor Equipment & Supplies (HM)	7		
Loding Away From Home (HB)	4		
Housekeeping Supplies (HN)	2		
Other Household Equipment & Furnishings (HL)	2		
Furniture & Bedding (HJ)	1		
		34	9.8%
Education & Communication (E)			
Telephone Serivce (ED)	5		
Information Technology, Hardware & Services (EE)	9		
		14	4.0%
Other Goods & Services - Personal Care Products	5	5	1.4%
Apparel - Women's Apparel	2	2	0.6%
Not CPI Classified	35	35	10.1%
TOTAL	**348**	**348**	**100.0%**

STATISTICAL METHODS

The use of choice scenario as the unit of analysis, coupled with the wide variety of experimental methods and moderators employed in the literature, carries with it several methodological issues. This section details the statistical issues encountered, and methods chosen to resolve those issues.

Inter-Study Scenario Correlations

Two potential sources of misspecification with the current data set is that multiple effect size ratios may come from a single experiment, and multiple experiments may have been sourced from a single study. The current data set includes several instances where multiple choice scenarios were extracted from a single 'parent' study or experiment. For example, HPP (1982) reported results for 24 different product choice scenarios in one study. All of the scenarios from that study were the result of the same experimental procedures, conducted on the same participant pool. Combining multiple dependent variables from a single source (such as a single experiment or study) violates the statistical assumption of independence of observations because inter-study observations may be correlated to one-another. Thus, to check for possible within-study correlations, Ljung-Box tests were conducted on studies with more than three scenarios. The resultant Q-statistics do not indicate statistically significant within-study scenario correlations (p's>0.20). From this standpoint, the meta-regressions conducted did not actively seek to correct for auto-correlation within studies.

Data Heterogeneity & Sample Heteroscedasticity

Given the wide range of experimental methods, designs, and stimulus found in the literature, as well as previously reported findings on group-wise moderation of the attraction

effect, the data were pre-tested for signs of heterogeneity and heteroscedasticity. Overall results on scenario effect size ratios suggest significant heterogeneity between studies (Cochran's $Q_{df=382}$= 1275; p=0.00). Approximately 70% of the overall observed variation in effect size ratio was attributable to heterogeneity between studies (I^2 = 70.1%). The remaining 30% of variation is attributable to between-scenario differences observed within studies. These results suggest a random-effects model is more appropriate than a fixed-effects model for explaining contributing factors to the effect, and that mean effect size estimates would be more accurately reported by subgroups, and not on the entire dataset as a whole.

To ensure equality of variances across analysis groups, Levene (1960) and Brown & Forsythe (1974) tests were conducted using Stata's `robvar` command. Group-wise tests were conducted and the resultant W_0, W_{50}, and p-values are summarized in Figure 19. Statistically significant W-statistics suggest rejection of the null hypothesis that the groups have the same variance. The data exhibits general equality of variance when grouped across publication year, CPI major group, and between/within subject design. However, the data exhibited significant heteroscedastic tendencies when grouped by CPI item strata, primary author, and subject population type (e.g. Students versus Online versus Adult populations). However, the Levene and Brown-Forsythe[18] statistics resulted in conflicting assessments of heteroscedasticity for groupings by study, primary-author and CPI item strata. The conflicting results suggest that the underlying distribution of effect sizes between these groups is skewed or otherwise influenced by outliers in the data. A sub-analysis was conducted and a determination was made to keep all observation in the dataset (see Appendix 8 for the discussion to this decision). However, to

[18] The Levene statistic (W_0) measure equality of variance about the mean, and the Brown-Forsythe statistic (W_{50}) measures about the median. The null hypothesis under each test is of *homo*scedasticity, that variances are equal across groups.

compensate for the heterogeneity and heteroscedasticity in the data, the meta-regressions in this study:

- Used robust standard errors to calculate all summary mean effect sizes,
- Covariates were included to account for subgroups that exhibited significant and marginally significant heteroscedasticity, and
- The effect size variable was regressed under log transformation.

Figure 19. Tests of Homoscedasticity by Groupings

	ESR			Levene			Brown-Forsythe		
Equality of Variance by Grouping	Mean	StDev	df	W_0	p>F		W_{50}	p>F	
Subject Population Type	1.261	0.546	(4, 343)	3.522	0.008	*	3.182	0.014	*
Study Number	1.252	0.551	(47, 300)	1.572	0.014	*	1.078	0.347	
Author	1.252	0.551	(33, 314)	1.618	0.020	*	1.093	0.339	
CPI Item Strata	1.233	0.542	(28, 319)	1.581	0.034	*	1.016	0.446	
Year	1.275	0.563	(19, 328)	1.572	0.061	†	1.348	0.151	
CPI Major Group	1.233	0.542	(7, 340)	1.721	0.103		1.294	0.252	
Between/Within Subject Design	1.252	0.551	(2, 345)	1.515	0.221		1.162	0.314	
Country of Study	1.246	0.553	(10, 337)	0.656	0.765		0.524	0.873	

NOTE: These effect size ratios were not computed with robust standard errors, and as such their means are higher than those reported in the meta-regression discussed later.

Estimation of Overall Effect Size

The overall effect size ($\overline{ES}$) is calculated as a weighted average of the scenario-level effect sizes defined in Equation 12a. The weights in the weighted average take into account possible intra-study correlation between scenarios. Equations 13a, 13b, and 13c formally define the overall mean effect size, robust variance estimate, and the weights assigned to each scenario effect size (Hedges, Tipton, & Johnson, 2010):

$$\overline{ES} = \frac{\sum_{j=1}^{m}\sum_{i=1}^{k_j} w_{ij} ESR_{ij}}{\sum_{j=1}^{m}\sum_{i=1}^{k_j} w_{ij}} \tag{13a}$$

$$V^R = \frac{\sum_{j=1}^{m} w_j^2 (\overline{ESR_j} - \overline{ES})^2}{\left(\sum_{j=1}^{m} w_j\right)^2} \tag{13b}$$

$$w_{ij} = \frac{1}{(V_{\cdot j} + \tau^2) * [1 + (k_j - 1)\rho]} \tag{13c}$$

Where $\overline{ES}$ is the overall weighted average effect size and V^R is the overall robust variance estimate of m number of studies which contain k number of scenarios and:

- ESR_{ij} is the i^{th} scenario effect size of study j;
- $\overline{ESR_j}$ is the mean effect size for study j
- w_j is the sum of all w_{ij} for a study j (i.e. the total weight of study j)
- w_{ij} is the weight assigned to each choice scenario i belonging to study j
- $V_{\bullet j}$ is the average variance of all scenarios in study j
- τ^2 is a measure of unexplained between-study variance, and
- ρ is an unconditional correlation multiplier between estimates.

Models were run as log-transformed, random-effects meta-regressions with robust standard errors as implemented by the `robumeta` command in Stata 12.0 (Hedberg, 2011). As intra-study scenario correlations (ρ*'s)* are unknown, and are generally unreported in the literature, a range of correlations from zero to 0.9 were tested with each model to check for effect size sensitivity to a changes in ρ. No significant coefficient or standard error sensitivity was detected across the range of ρ*'s*.

All regressions were conducted under log transformation for two reasons. First, changes in $\overline{ES}$ are not linear in nature. As a ratio of probabilities, when the Target share is small, changes in the effect size ratio are also small; however, as Target share increases, the effect size ratio increases at an increasing rate. Application of a log transformation enables $\overline{ES}$ to be modeled with liner covariates despite its non-linear distribution. Second, because $\overline{ES}$ is a probability ratio, a valid regression model must predict a non-negative effect size ratio. A log transformation ensures the range of predicted ratios is bounded between zero and positive infinity. Taking the log transformation into consideration, the general structure of the meta-regressions tested take on the following form:

$$\ln(\overline{ES}) = \beta_0 + \beta_1 Covariate_1 + \cdots + \beta_x Covariate_x + \varepsilon \quad (14)$$

The model began with a null meta-regression whose β_0 represents the overall weighted mean effect size. Covariates were then added to the null model to test for moderating experimental design and stimulus features.

RESULTS

Null and multivariate meta-regressions were conducted, and a summary of the results is provided in Figure 20. Results indicate evidence of a general attraction effect. Based on the null model (Null Model in Figure 20), the average effect size observed in the literature is a 14.7%. That is, on average, the Target's share in the presence of an asymmetrically dominated decoy is 14.7% greater than when no decoy is present (β_0 = 0.137; t_{348}=3.48; p=0.001). Of the covariate models tested, the Target's relative share strength in the control condition was found to be a significant predictor of attraction effect size (Model 8) ($\beta_{relstrengthctrlcond}$ = -0.120; t_{46}=-5.68; p=0.000). That the coefficient $\beta_{relstrengthctrlcond}$ is negative indicates that as the Target garners greater share over the Competitor in the control condition, the weaker the attraction effect becomes. For example at a 60.5% choice share (the mean control condition share observed in the meta-analysis, which corresponds to a 1.528x control-share ratio relative to the Competitor), the expected Target decoy-condition share gain predicted under the model is 16.97%:

$$\ln(EffectSizeRatio) = 0.34 - 0.12\beta_{relstrengthctrlcond} \quad (15)$$

$$= 0.34 - 0.12 * 1.528 = 0.1566$$

Effect Size Ratio $= e^{0.1566} = 1.1697$

Attraction Effect $= 1.1697 - 1 = 0.1697 = 16.97\%$

Because effect size was modeled under a log-transformation, the expected effect size has a non-linear relationship to changes in the Target's share in the control condition. As such, expected attraction effect sizes are graphed as a function of Target share in the control condition (dotted line) and relative share ratio (x-axis) in Figure 21. The difference between the expected/modeled Target share (solid black line) and the control-condition share indicates the Target share change when an asymmetrically dominated decoy is added. Above a 2.83x Target control-share ratio (corresponding to a 73.9% Target control condition share), the model predicts a repulsion effect where the presence of an asymmetrically dominated decoy repels share away from the Target.

The relative position between the Target and Competitor options appears moderately related to the size and existence of the attraction effect in two very specific ways. Targets that dominate their Competitor and Decoy on a price attribute are marginally more likely to exhibit an attraction effect. Price-dominating Targets exhibited an average 14.8% share increase in the decoy condition ($\beta_{pricedomination}$= 0.138; t_{43}=1.70; p<0.10). Targets that dominate by maximizing a desirable attribute (as opposed to minimizing an undesirable attribute) were also marginally more likely to exhibit an attraction effect of a 15.5% share gain ($\beta_{maximizeattribute}$= 0.144; t_{43}=1.87; p<0.07).

No other aspects of experiment design or item characteristics were significantly related to differences in the overall effect size. Students were no more likely than other populations to exhibit the effect ($\beta_{student}$= 0.056; t_{46}>0.71; p=0.48), and between-subject designs were no more likely to exhibit the effect than within-study designs ($\beta_{between}$= 0.060; t_{46}=1.14; p=0.26). The effect appears unrelated to whether the choice stimulus is a durable or non-durable good ($\beta_{durable}$= 0.046; t_{46}=0.61; p>0.54); what general monetary value the choice scenario addresses ($\beta_{priceamount}$= 0.000; t_{45}=1.36; p=0.179); or whether the choice was for options hedonic ($\beta_{hedonic}$= 0.000;

t_{46}=0.01; p=0.991) or utilitarian in nature ($\beta_{utilitarian}$= -0.007; t_{46}=-0.27; p=0.791). Furthermore, Targets that dominated on objective (as opposed to subjective or ratings-based) attributes, did not reveal any other significant relationships. When hedonic and utilitarian measures were tested as interactions with whether the Target dominated on a quality or price attribute, none of the interactions were significant (p's >0.10). Attraction effect size does not depend on the joint influence of the hedonic or utilitarian nature of the product and whether the product dominates on quality or price attributes.

Figure 20. Meta-Regression Models

	log Effect Size Ratio					
Model Specification	**β**	**SE**	**t**	**df**	**p**	**n**
Null Model						
Intercept - All Data	0.137	0.039	3.480	47	**0.001** **	348
Experiment Design						
Model 1: Student Population						
Intercept	0.108	0.041	2.600	46	**0.012** *	
Student Population (v.Non-Students)	0.056	0.078	0.710		0.478	223
Model 2: Between-Subjects Design						
Intercept	0.080	0.053	1.490	46	0.143	
Between Subjects (v. within)	0.060	0.053	1.140		0.258	297
Primary Author						
Model 3: Primary Author						
Intercept	0.156	0.066	2.380	40	**0.022** *	
Yang, Sybil	-0.099	0.079	-1.260		0.216	91
Huber, Joel	0.048	0.086	0.560		0.575	48
Dhar, Ravi	0.036	0.082	0.440		0.663	28
Heath, Tim	0.115	0.108	1.070		0.292	27
Frederick, Shane	-0.221	0.066	-3.350		**0.002** **	25
Malkoc, Selin	0.055	0.066	0.830		0.411	18
Ratneshwar, Srinivasan	0.018	0.066	-0.280		0.782	14
Nature of Domination						
Model 4: Nature of Decoy Domination						
Intercept	0.045	0.074	0.600	43	0.550	
Maximizes Attribute (v.Minimizes)	0.144	0.077	1.870		0.069 †	155
Objective Attribute (v.Subjective)	0.031	0.078	0.490		0.629	115
Quality Attribute (v.Other)	-0.117	0.088	-1.330		0.192	37
Price Attribute (v.Other)	0.138	0.081	1.700		0.097 †	53

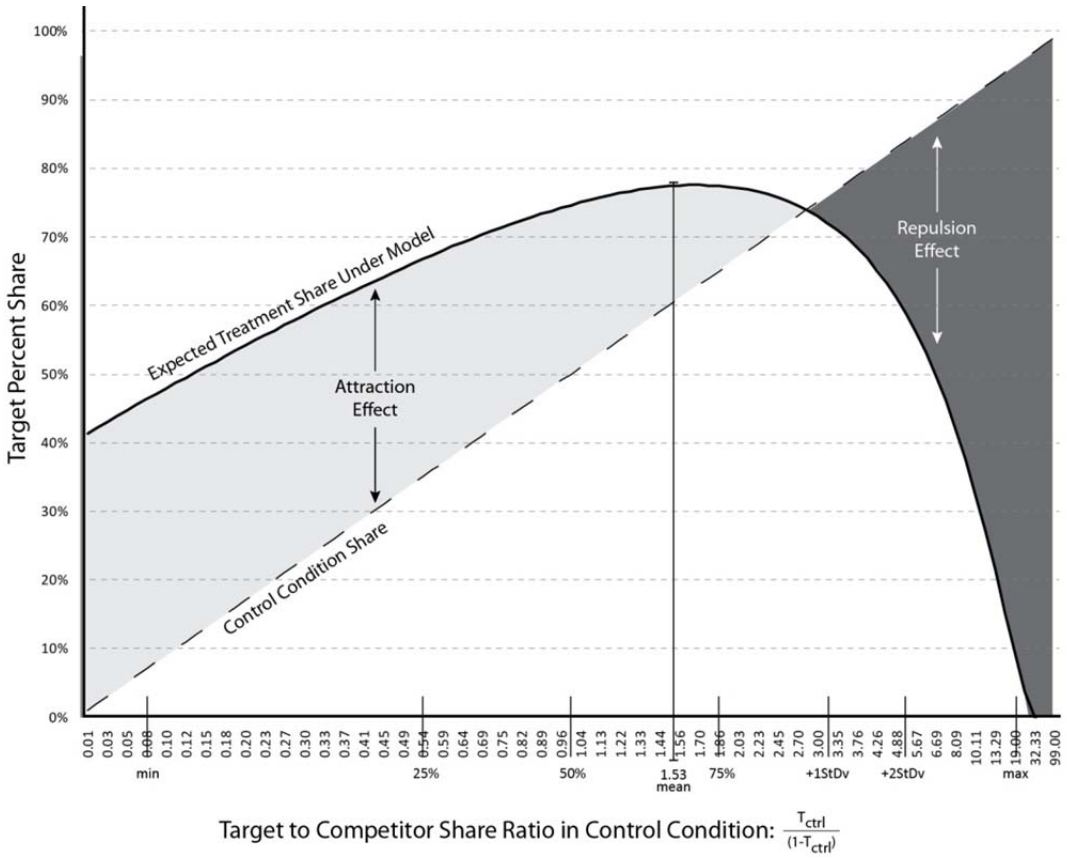
Note: n is the number of scenarios, not studies.
** Significant at the p<0.01 level; * significant at the p<0.05 level; † significant at the p<0.10 level

Figure 20 Continued. Meta-Regression Models

Model Specification	log Effect Size Ratio β	SE	t	df	p	n
Item Characteristics						
Model 5: Durable Product						
Intercept	0.125	0.047	2.690	46	**0.010** **	
Durable (v.Non-Durable Item)	0.046	0.076	0.610		0.545	88
Hedonic / Utilitarian						
Intercept	0.172	0.217	0.790	43	0.432	
Hedonic Score	0.000	0.031	-0.010		0.991	334
Utilitarian Score	-0.007	0.027	-0.270		0.791	334
Model 6: CPI Item Strata						
Intercept	0.143	0.063	2.270	42	**0.028** *	
Alcoholic Bevearge (FW)	-0.039	0.093	-0.420		0.677	62
Food Away From Home (FV)	0.024	0.098	0.240		0.808	42
Video & Audio (RA)	-0.066	0.122	-0.540		0.591	32
Recreationsl Services (RF)	-0.476	0.069	-0.690		0.494	16
Photography (RD)	0.953	0.083	1.150		0.257	15
Juice & Non Alcoholic Beverage (FN)	-0.010	0.083	-0.120		0.905	15
Model 7: Most Prevelant Items						
Intercept	0.136	0.047	2.900	42	**0.006** **	
Beer	0.023	0.096	0.240		0.811	44
Cars	-0.025	0.168	-0.150		0.883	33
Resaturants	0.091	0.117	0.780		0.44	23
Televisions	-0.283	0.365	-0.770		0.443	13
Apartments	-0.065	0.435	-0.150		0.883	10
Model 8: Strength of Target						
Intercept	0.340	0.041	8.310	46	**0.000** **	
Relative Strength in Ctrl Condition	-0.120	0.021	-5.680		**0.000** **	348
Model 9: Price Related Item Characteristics						
Intercept	0.128	0.044	2.920	46	**0.005** **	
Price Amount	0.000	0.000	1.340		0.185	156
Interactions						
Model 10: Quality Domination / Utilitarian / Hedonic						
Intercept	0.190	0.258	0.740	40	0.466	
Hedonic Score	0.002	0.034	0.060		0.953	
Utilitarian Score	-0.011	0.032	-0.350		0.728	
Quality Domination	0.240	0.459	0.520		0.604	
Quality Domination x Utilitarian	0.038	0.052	0.740		0.466	
Quality Domination x Hedonic	-0.089	0.083	1.060		0.293	
Model 11: Price Domination / Utilitarian / Hedonic						
Intercept	0.207	0.251	0.820	40	0.415	
Hedonic Score	0.004	0.034	0.110		0.913	
Utilitarian Score	0.019	0.031	-0.600		0.550	
Price Domination	0.131	0.362	0.360		0.720	
Price Domination x Utilitarian	0.068	0.040	1.680		0.100 †	
Price Domination x Hedonic	-0.087	0.058	-1.510		0.139	

Note: n is the number of scenarios, not studies.
** Significant at the p<0.01 level; * significant at the p<0.05 level; † significant at the p<0.10 level.

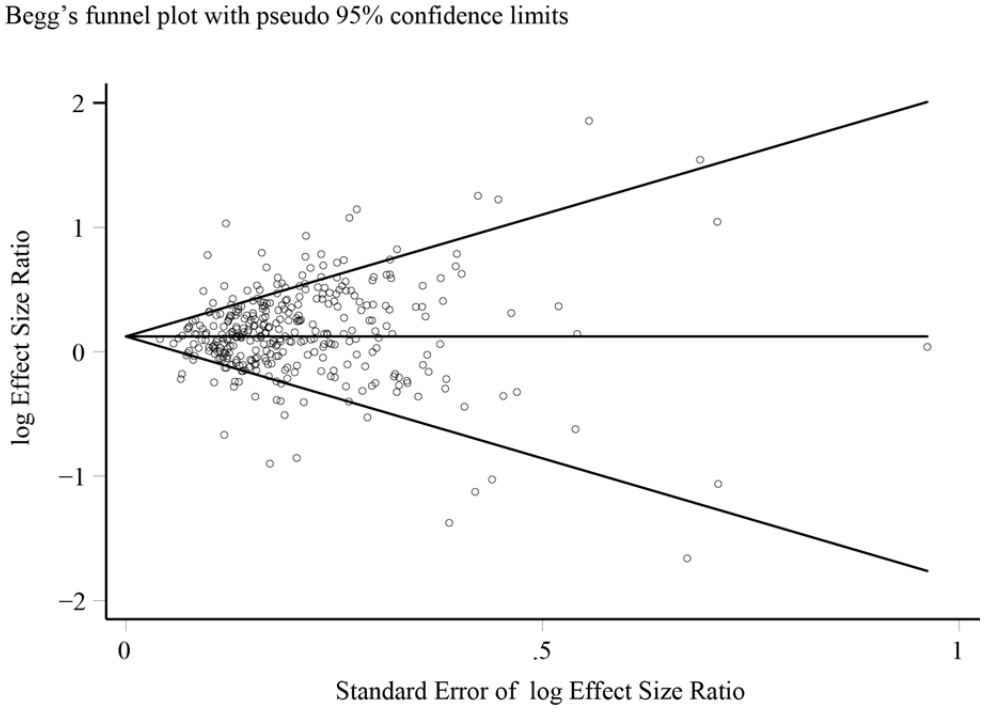
Figure 21. Target Control-Condition Share & Modeled Attraction Effect Size



Group-wise tests were also conducted for the seven most prolific primary authors, six most frequently tested CPI item stratus, and five most common product choice scenarios. Though earlier Levene and Brown & Forsythe tests suggested heterogeneity between CPI item stratus, none of the six most prevalent strata was statistically different than the others (p's>0.25). Between primary author groups however, only results from the group of 25 scenarios reported by one author (Shane Frederick) were significantly different than the rest of the literature ($\beta_{Frederick}$= -0.221; t_{40}=-3.35; p<0.01). When models were tested without the 25 Frederick scenarios, the results did not significantly differ from when the scenarios were included. As such, the Frederick studies were not excluded.

In general, across all models tested, the τ^2 was negligible, meaning the models were not able to account for the unexplained variances observed between studies, and suggests that there are other, yet-to-be-examined between-study factors that influence the magnitude of attraction effect sizes observed.

Figure 22. Begg's Funnel Plot for Meta-Bias Detection



Note: That several studies exist outside of the 95% confidence limits speaks to the heterogeneity of the data set and is not an indication of publication bias.

Test of Sample Bias

Readily available empirical findings can be skewed by reporting bias, where non-statistically significant results are less prevalent in published the literature. Non-significant results are simply less likely to be published or widely reported – a phenomenon referred to as the *file drawer problem* (Sterling, Rosenbaum & Weinkam, 1995). The current meta-analysis addresses the potential bias in two ways. First, the literature search included successful retrieval of non-journal published and unpublished experimental results - including results from a series of experiments

conducted by the author. Second, effect size data were subjected to an analysis of publication bias with a Begg's funnel plot (Figure 22) (Begg & Mazumdar, 1994). The distribution of scenario effect sizes was relatively symmetrical about the mean which implies the estimated effect sizes were relatively normally distributed, with few missing 'file-drawer' studies. Overall, the scenarios included in the meta-analysis appear to be a fair representation of the attraction effect literature.

DISCUSSION

The purpose of this study was to systematically analyze the conditions under which the attraction effect has been most commonly observed. The aim was to provide insight to the necessary and sufficient conditions to create the effect so that scholars may reliably reproduce the effect for future research purposes. Findings from a series of random-effects models support the existence of an overall attraction effect, and also yield an estimate of the overall attraction effect size. The results also reveal that more inherently market-share-dominant Targets benefit *less* from the addition of an asymmetrically dominated decoy than weaker, lower market-share Targets. This means the attraction effect is more likely to exist in situations where neither the Target nor Competitor is strongly preferred over the other.

Meta-analyses are only as comprehensive as the literature that they included and the data that are coded. That being said, the current meta-analysis is limited in several ways. First, many studies were excluded because scenario-level choice shares and stimulus could not be disaggregated from the reported data. Specifically, aggregated findings rarely reported the actual stimulus used or the scenario-level results obtained. The lack of scenario-level specificity resulted in the exclusion of over a dozen studies, and over a hundred scenarios. Second, from a

methodological standpoint, it is easy for researchers to test multiple scenarios in each experiment, but the resultant lack of independence between scenarios requires the use of robust standard errors which makes detecting small effect sizes more difficult. Even after excluding aggregated data, the current study still had to analyze a highly heterogeneous sample of scenarios. As such, the statistical methods used made study-level variance adjustments which changed the degrees of freedom from the scenario-level (300+ observations) to the study-level (48 observations). This loss in degrees of freedom precluded the ability to test for more intricate interactions in the data. Similarly, the use of robust standard errors made it more difficult to detect smaller effect sizes. To prevent such losses in statistical power and precision, future research into the attraction effect would do well to set more rigorous testing and reporting standards. For example, participants should be randomly assigned to treatment conditions for each choice scenario, as opposed to each participant being randomly assigned a single treatment condition to be applied across all choice scenarios. Full scenario attributes should also be disclosed, and all choice share counts reported.

Despite the limitations of the current study, the findings of this meta-analysis leave future researchers of the attraction effect with some useful information and cautionary guidance. First, the attraction effect does exist, and the average effect size can range from 14.7% - 17%, depending on the models tested, is not trivial if the effect is translatable to real-world application. The methods used to create a real, 14.7%-17% market share gain would be highly desirable tactics for marketers. Thus, research interest in this phenomenon is fully justified. However, the effect may not be large enough to find using sample sizes that are typical of studies in this domain. A post-hoc statistical power analysis was conducted based on Model 8 (Figure 20), which produces a slightly larger average effect size than the baseline model. Using Model 8's

average effect size of a 17.0% share gain (from 60.4% to 77.4% Target share), and the average observed Target to Competitor share ratio (1.528 times) reveals that a sample size of 217 observations would be necessary to detect the average observed effect size at a one-tailed alpha of 0.05 and power-level of 0.80. A minimum of 299 total observations would be needed to achieve a 0.90 power level[19]. Given these criteria, less than 10% of the scenarios included in the current meta-analysis would achieve a power of 0.80. Finding reliable, externally valid moderators and mediators of attraction effects will require even larger samples, so future researchers should use substantially larger sample sizes when studying this phenomenon.

Second, though the attraction effect exists, repulsion (negative attraction) effects have also been reported. In fact, Frederick, Lee & Baskin (n.d.) were able to produce a significantly different, reverse-attraction effect (a repulsion effect) across a reported 25 scenarios. The stimulus used in their experiments was designed to exhibit domination relationships without quantitative measure. For example, an ear-wax flavored jellybean was used as a decoy for a similar looking pineapple jellybean. Such subjective choice attributes were not unlike those found scattered throughout other studies, but the Frederick, Lee & Baskin study was unique in that all its scenarios were designed with more ecologically realistic choice options. Future researchers should test this and other unique attributes of the Fredrick, et al. stimuli in an effort to determine what conditions are responsible for repulsion effects.

Third, that neither strong preference for the Target nor Competitor should exist in order to create an attraction effect is consistent with moderating relationships reported by Pocheptsova, et al. (2009) and Mao & Oppenwal (2012). Pocheptsova and colleagues reason that resource

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[19] The full regression model used for the power analysis is: $\ln(EffectSizeRatio) = 0.34 - 0.12 * RelativeStrengthInCtrlCondition$. The power analysis was conducted using STATA 12.0's `powerlog` command which adjusts sample size requirements to reflect effect size difference across a logarithmic distribution.

depleted decision makers, when faced with a difficult decision, are more likely to utilize the asymmetrically dominating cue as information, and choose the Target. Similarly, Mao & Oppenwal reason that intuitive decision makers are more likely to rely on the asymmetrically dominating relationship to resolve difficult decisions as well. Both lines of reasoning suggest that difficult decisions – such as those not obviously skewed or preferred for the Target or Competitor – enhance the attraction effect because they increase the decision makers' reliance on intuitive, associational thinking. The meta-analytic finding that aggressive target dominance moderates the attraction effect supports this reasoning and suggests that researchers should further explore the role of intuitive and associational thinking in producing the effect. It also suggests that researchers should carefully design the Target and Competitor choice scenario to ensure neither option is overtly more desirable than the other because skewed desirability between the base options decreases the potential size of the effect and with it the power to detect reliable mediators and moderators of the effect.

APPENDICES

APPENDIX 1: STIMULUS & ANNOTATIONS

1a – Experiment One

Stimulus		Comments
Q	**In a restaurant, I am looking at the wine list:**	The presumption is that wine region is realistic, qualitative cue for quality. Choice sets from prior research have used subject, numerical scales as quality metrics.
A	Bottle of White, Bordeaux Wine: $25.00	
B	Bottle of Red, Bordeaux Wine: $45.00	
D_a	Bottle of White, Llano, TX Wine: $25.00	
D_b	Bottle of Red, Llano, TX Wine: $45.00	
Q	**While visiting a famous deli for lunch, I would order:**	Sandwich type (Philly Cheesesteak or Rueben) was used to signal similarities to encourage comparison and discovery of the asymmetrically dominating relationship.
A	Classic Philly Cheesesteak Sandwich: 750 calories, $7.95	
B	Traditional Rueben Sandwich: 650 calories, $8.25	
D_a	The Works Philly Cheesesteak Sandwich: 975 calories, $8.25	
D_b	The Super Rueben Sandwich: 675 calories, $8.95	
Q	**In a wine shop, I'm going to pick up a bottle for tonight's dinner:**	Wine Spectator scores were used as a more realistic operationalization of quantitative quality ratings.
A	Red Wine X: Wine Spectator Score: 95, Price: $55	
B	Red Wine Y: Wine Spectator Score: 90, Price: $37	
D_b	Red Wine W: Wine Spectator Score: 90, Price: $42	
D_a	Red Wine Z: Wine Spectator Score: 94, Price: $56	
Q	**In an upscale casual restaurant, I'm going to order a beverage with dinner:**	Two cues on product value are used. For beers, size (pint vs 12oz) and quality (microbrew vs big brand). For wines, only one qualitative quality (house wine vs region-specific Napa Valley) was used.
A	Napa Valley Cabernet Sauvignon: Wine by the Glass: $7.00	
B	Microbrew Beer: On tap, 1 pint: $6.00	
D_a	Coors: Bottle, 12 oz: $5.00	
D_b	House Red: Wine by the Glass: $6.50	
Q	**In the local American Bistro restaurant, you're about to order lunch:**	Use of calorie counts assumes subjects have an idea of what is a reasonable range of daily caloric intake.
A	Grilled Chicken Caesar Salad: 450 calories, $9.50	
B	Grilled Steak Caesar Salad: 450 calories, $10.75	
D_a	Crispy Chicken Caesar Salad: 775 calories, $9.50	
D_b	Flat Iron Steak Frites: 925 calories, $16.75	
Q	**Your friends are coming over and you're going to order pizza for everyone:**	Replication of prior research stimulus. Subsequent research also produced statistically significant results with the same stimulus.
A	Pizza Place P: Delivery Time: 45 minutes, Pizza Quality : High	
B	Pizza Place Q: Delivery Time: 25 minutes, Pizza Quality : Medium	
D_a	Pizza Place R: Delivery Time: 55 minutes, Pizza Quality : High	
D_b	Pizza Place S: Delivery Time: 30 minutes, Pizza Quality : Medium	
Q	**You're at a nice steakhouse and hungry. You plan on eating steak tonight:**	Qualitative measures of quality are inferred by the different cuts of meat. T-Bone is an inferior cut of the Porterhouse, and Sirloin is typically regarded as a tougher cut than a Filet Mignon.
A	Porterhouse: $42	
B	Filet Mignon: $37	
D_b	Sirloin: $36	
D_a	T-Bone: $41	

1b – Experiment Two

Stimulus		Comments
Q	**In a restaurant, you're looking at the wine list. Which would you choose?**	This scenario builds upon that in Experiment One, but controls for price differences. Only one attribute dimension is varied (qualitative evaluation of quality by region).
A	Bottle of Red, Bordeaux, France: $35.00	
B	Bottle of White, Bordeaux, France: $35.00	
D_a	Bottle of Red, Llano, TX: $35.00	
D_b	Bottle of White, Llano, TX: $35.00	
Q	**In a wine shop, you're going to pick up a bottle of red wine for tonight's dinner party. Which would you choose?**	This scenario builds upon that in Experiment One, by more clearly

A **B** **D_a** **D_b**	#1 Wine Spectator Score: 97, Price: $43 #2 Wine Spectator Score: 89, Price: $37 #3 Wine Spectator Score: 93, Price: $43 #4 Wine Spectator Score: 85, Price: $37	emphasizing the quality score difference and eliminating the price difference between decoy and target.
Q **A** **B** **D_a** **D_b**	**You're at an upscale restaurant and hungry. Which entree would you order?** Whole Steamed Lobster: $42 Filet Mignon: $37 Whole Steamed Blue Crabs: $41 Sirloin: $36	Designed to elicit a shift in entrée type based of protein quality. Price differentials were relatively small to promote comparison by protein type.
Q **A** **B** **D_a** **D_b**	**You're looking to book a cruise and found the following vacation packages. Which would you choose?** 7 Days, All Inclusive with Flights: $1200 3 Days, All Inclusive with Flights : $550 6 Days, All Inclusive, Flights NOT Included: $1100 3 Days, All inclusive, Flights NOT Included: $475	Dominating relationship presumes longer vacation durations are desirable, and flights are necessary and cost more than $100.
Q **A** **B** **D_a** **D_b**	**You're going to have a job interview out of town and will need to book a hotel room for the trip. You will not be reimbursed for the hotel room. You found the following deals online. Which would you choose?** Hotel X: 5 minutes away from interview site. $179/nt Hotel Y: 15 minutes away from interview site. $129/nt Hotel Z: 3 minutes away from interview site. $259/nt Hotel W: 35 minutes away from interview site. $119/nt	The choice scenario is the same as that used in prior research, but room prices were increased to better reflect current day prices.
Q **A** **B** **D_a** **D_b**	**You stop off at a local corner cafe for a caffeinated beverage. Which beverage would you order?** Cappuccino: $3.00, 250 calories Latte: $2.20, 550 calories Cappuccino: $3.00, 325 calories Latte: $2.50, 550 calories	Beverage type was used to signal product similarity. Between each target and decoy pair, only one attribute differs. A presumption is made that higher calorie counts are undesirable.
Q **A** **B** **D_a** **D_b**	**At the supermarket, you're about to buy a frozen entree for dinner. Which dinner would you choose?** Kraft Entree: $10.00, 20% Daily Calories Stouffer's Entree: $8.50, 55% Daily Calories Kraft Entree: $16.00, 20% Daily Calories Stouffer's Entree: $8.50, 70% Daily Calories	Brands were used to signal product similarity, and to encourage comparison between target and decoy. A presumption is made that higher calorie counts are undesirable.
Q **A** **B** **D_a** **D_b**	**You're about to book a cross country flight. Regardless of the frequent flyer account(s) you might have, which flight ticket would you book?** Virgin America: $575, Non-Stop United Airlines: $375, 2 Stops Virgin America: $650, Non-Stop United Airlines: $425, 2 Stops	Brands were used to signal product similarity, and to encourage comparison on the single differing attribute between target and decoy.
Q **A** **B** **D_a** **D_b**	**You're about to order some Chinese take-out. You choose to get the lunch combo with soup, egg roll, rice and:** Stir-fry Shrimp: $6.75, 3g fat Stir-fry Chicken: $5.75, 7g fat Shrimp Stir-fry : $7.00, 3g fat Chicken Stir-fry : $6.25, 7g fat	Product names are presented in a reverse order on decoy options, otherwise, only price varies between decoy and target options.
Q **A** **B** **D_a** **D_b**	**You're about to book a cruise ticket for you and a few friends. You would choose:** Princess Cruise lines: $1500, 15 days Norwegian Cruise lines: $500, 7 days Princess Cruise lines: $1700, 15 days Norwegian Cruise lines: $700, 7 days	Price is the only attribute to vary between target and decoy options. Repetition of brands was used to emphasize similarity between target and decoy options.

1c – Experiment Three

Stimulus		Comments
Q	**If you had to order one of the options from a restaurant menu (listed below), which would you choose?**	A reproduction of previous steak choice scenarios in the study. Flank steak was used as a more obvious quality decoy to Filet Mignon.
A	Filet Mignon, Price: $30	
B	Porterhouse Steak, Price: $42	
D_a	Flank Steak, Price: $28	
Q	**If you had to buy a bottle of wine to take over to a friend's house warming which of the following bottles would you choose?**	A variation on previous wine price/quality score manipulations. Scoring and price differences were exaggerated in this scenario to more fully highlight the quality dominance of Wine A.
A	Wine A: Price: $27, Wine Spectator score: 93 out of 100	
B	Wine B: Price: $13, Wine Spectator score: Not Scored	
D_a	Wine C: Price: $25, Wine Spectator score: 87 out of 100	
Q	**If you had to order a pizza, which establishment would you order from?**	A variation on the original pizza delivery scenario with quantitative measures of quality (previous scenarios used qualitative High, Medium, and Low quality ratings).
A	Place A: Average Delivery Time: 45 minutes; Quality: 10/10	
B	Place B: Average Delivery Time: 20 minutes; Quality: 6/10	
D_a	Place B: Average Delivery Time: 55 minutes; Quality: 9/10	

1d – Experiment Four

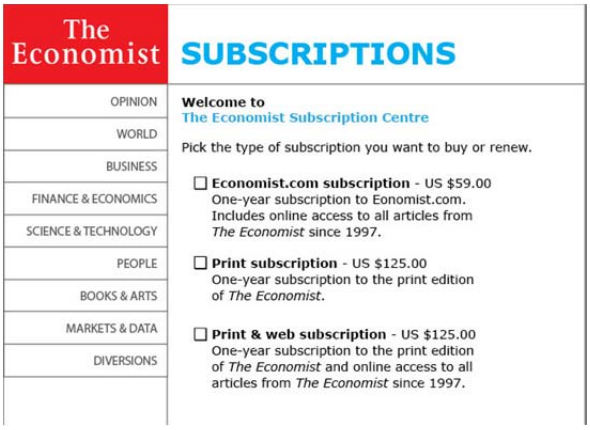
Stimulus				Comments
Q	**Which trans-ocean flight would you book?**			This scenarios is newly created for this study, but its format
	Price	**Meals**	**Check Luggage**	
A	Flight A $529	Included	Included	
B	Flight B $479	For Purchase	+ Fee	
D_a	Flight C $519	Included	+ Fee	
Q	**You would order pizza from which establishment?**			Another variation on a previous pizza delivery scenario. Here, qualitative quality ratings were given as opposed to quantitative ratings out of 10 points.
	Delivery Time	**Pizza Quality**		
A	Place A 45 Minutes	HIGH		
B	Place B 20 Minutes	MEDIUM		
D_a	Place C 55 Minutes	HIGH		
Q	**You would choose which lunch entrée?**			Calorie counts were chosen as a quantitative attribute due to its introduction as required consumer menu information on in many states.
		Calories	**Price**	
A	Chicken Salad	550 cal	$ 6.25	
B	Chicken Sandwich	400 cal	$ 7.50	
D_b	Chicken Wrap	450 cal	$ 7.75	
Q	**Which beverage would you choose with dinner?**			Value between option was differentiated by price, quality of beer and size. The decoy was designed to be of a lesser brand, and smaller in size, but slightly cheaper.
		Size	**Price**	
A	Napa Valley Cabernet	5 oz glass	$ 8.00	
B	Microbrew Beer, on Tap	1 pint	$ 6.00	
D_b	Bottle of Bud Lite	12 oz	$ 5.50	
Q	**Which bottle would you choose to give as a gift?**			A reproduction of previous wine price and score scenarios. Measured quality dominance was emphasized.
	Price	**Wine Spectator Score**		
A	Wine A $ 27	93		
B	Wine B $ 15	Not Scored		
D_a	Wine C $ 25	88		
Q	**Which Chinese take-out would you choose?**			Ostensibly, the three items are identical preparations of different protein types at different prices. Tofu is assumed to be a less desirable protein to chicken.
		Protein	**Price**	
A	Lo Mien	Chicken	$ 6.29	
B	Chow Mien	Beef	$ 7.79	
D_a	Lo Mien	Tofu	$ 6.29	

	If you had to buy one of the following, it would be:  $ 1.00 $ 1.00 $ 1.00 **A** **B** **D_a**	The soda choice scenario is based on experimental results described by Ariely (2008). The actual stimulus used in the original study was not provided, thus this products used for this study are an approximation based solely on Ariely's written descriptions.
Q **A** **B** **D_a**	**Which flight would you book?** **Number of Stops** **Ticket Price** Carrier A Non-Stop $ 550 Carrier B 2 Stops $ 450 Carrier C Non-Stop $ 539	This scenarios is newly created for this study, and was designed to test an attribute other than just price.
Q **A** **B** **D_b**	**Which cell phone plan would you choose?** **Anytime Minutes** **Price/Mo** Telecom A 1,200 $ 79.95 Telecom B 700 $ 35.95 Telecom C 500 $ 34.99	A non-food or beverage related scenario where with a very poor attribute trade-off for the decoy.
Q **A** **B** **D_a**	**Which hotel would you book for a business trip?** **Distance from** **Desired Destination** **Price/nt** Hotel A 0 minutes $ 159 Hotel B 25 minutes $ 99 Hotel C 10 minutes $ 179	The choice scenario is the same as that used in prior research (and previously in this study, but room prices and distances were exaggerated to make tradeoffs between the two attributes.
Q **A** **B** **D_a**	**Which entrée would you choose?** **Price** Grilled Flounder $ 15.25 Pan Seared Salmon $ 19.55 Deep Fried Tilapia $ 14.95	This question was designed to see if quality can be subtly conveyed through product type. Tilapia is unqualified inferior quality fish to both flounder and salmon. The tilapia is thus a low-quality, slightly lower price decoy.
Q **A** **B** **D_b**	**If you had to order one of the following, it would be:** Skirt Steak: $28 Filet Mignon: $35 Sirloin: $34	This question is a reproduction of the questions used in Experiment 3, though the decoy price was changed to make the similarity to option B more noticeable.

1e – Experiment Five

Stimulus		Comments
Q A B D_a D_b	**If you had to choose one of the following brands of beer to purchase, which one would it be? Average Quality Rating Scale: (100=Best; 0=Worst)** Price/sixpack : $7.80 Average Quality Rating: 50 Price/sixpack : $8.60 Average Quality Rating: 70 Price/sixpack : $9.00 Average Quality Rating: 70 Price/sixpack : $7.80 Average Quality Rating: 30	Another reproduction of HPP's original beer 6-pack scenario, with prices updated for current market prices.
Q A B D_a D_b	**Wine Spectator Rating Scale: (100=Best; 0=Worst)** Bottle Price: $43 Score: 97 Bottle Price: $37 Score: 89 Bottle Price: $37 Score: 85 Bottle Price: $65 Score: 97	This scenario builds upon previous experiments, and more clearly emphasizes the quality price difference and eliminating the price difference between decoy and target.
Q A B D_a D_b	**If you had to choose one of the following restaurants to dine at, which one would it be? Rating Stars: (5=Excellent; 0=Horrible)** Driving Distance: 25 minutes Number of Stars: 5 Driving Distance: 5 minutes Number of Stars: 3 Driving Distance: 35 minutes Number of Stars: 5 Driving Distance: 5 minutes Number of Stars: 1	An exact replication of the restaurant scenario in HPP's original study, which has since been replicated in numerous other studies.
	If you had to choose one of the following breakfasts to purchase, which one would it be?  320cal Fat: 14g **A** | 330cal Fat: 15g **B** | 480cal Fat: 21g **D_a** | 500cal Fat: 28g **D_b**	Fat and calorie differences were used as the primary attribute differentiators to see if consumers would switch between breakfast sandwich types. Pictures are of actual breakfast sandwich options from Starbucks.
	If you had to choose one of the following pastries to purchase, which one would it be?  340cal Fat: 9g **A** | 350cal Fat: 9g **B** | 490cal Fat: 18g **D_b** | 440cal Fat: 19g **D_a**	Fat and calorie differences were used as the primary attribute differentiators to see if consumers would switch between breakfast sandwich types. Pictures are of actual breakfast pastry options from Starbucks.
	If you had to choose one of the following sodas to purchase, which one would it be?  120cal/serving Sugars: 39g **A** | 165cal/serving Sugars: 45g **B** | 140cal/serving Sugars: 41g **D_a** | 170cal/serving Sugars: 50g **D_b**	The soda choice scenario is based on experimental results described by Ariely (2008). In addition to brand/flavor information, decoys were made even more inferior with higher sugar and calorie counts.

1f – Experiment Six

Stimulus		Comments
	 **A** **B** **D_a** **D_b**	Pictures are exact reproductions of stimulus described by Ariely (2008), and reported as having produced an attraction effect. D_a and D_b were digitally mis-shapened versions of A and B, respectively.
Q **A** **D_b** **B**		*The Economist's* pricing structure (posted on its website) was used by Kivets, Netzer, & Srunivasan (2004) Ariely (2008) to test the attraction effect. Both studies reported the presence of the $125 print subscription decoy shifted significant share to the similarly priced "Print & Web" subscription. The layout and copy used in the stimulus for this study is an exact replication of that shown by Ariely – except the color scheme was that of the actual *The Economist's* website (Ariely's book was printed in black and white).

1g – Experiment Seven

Stimulus		Annotations
Q **A** **B** **D_b** **D_a**	**If you had to choose one of the following brands of beer to purchase, which one would it be?** Average Quality Rating Scale: (100=Best; 0=Worst) Price/sixpack : $7.80 Average Quality Rating: 50 Price/sixpack : $8.60 Average Quality Rating: 70 Price/sixpack : $9.00 Average Quality Rating: 70 Price/sixpack : $7.80 Average Quality Rating: 30	Another reproduction of HPP's original beer 6-pack scenario, with prices updated for current market prices. Also tested in Experiments Five and Eight
Q **A** **B** **D_a** **D_b**	**You need a new laptop computer. All other things being equal about the options, which laptop would you choose?** 4 GB RAM 14 Hours Average Battery Life 2 GB RAM 24 Hours Average Battery Life 4 GB RAM 12 Hours Average Battery Life 2 GB RAM 20 Hours Average Battery Life	This is an updated version of a personal computer question used by (Ariely & Wallsten, 1995; Simonson & Tversky, 1992). The original versions used RAM/memory and memory/price, respectively.
Q **A** **B** **D_b** **D_a**	**If you had to choose one of the following bottles of wine to purchase, which one would it be?** Wine Spectator Rating Scale: (100=Best; 0=Worst) Bottle Price: $43 Score: 97 Bottle Price: $37 Score: 89 Bottle Price: $37 Score: 85 Bottle Price: $65 Score: 97	This scenario builds upon previous experiments, and is replicated in Experiments Five and Eight.
Q **A**	**If you had to choose one of the following restaurants to dine at, which one would it be?** Rating Stars: (5=Excellent; 0=Horrible) Driving Distance: 25 minutes Number of Stars: 5	An exact replication of the restaurant scenario in HPP's original study, which has since been

B **D_a** **D_b**	Driving Distance: 5 minutes Number of Stars: 3 Driving Distance: 35 minutes Number of Stars: 5 Driving Distance: 5 minutes Number of Stars: 1	replicated in numerous other studies.
Q **A** **B** **D_b** **D_a**	**If you were to order a steak, which steak would it be?** $42.00 - Porterhouse $35.00 - Filet Mignon $33.00 - Sirloin $41.00 – Sirloin	This is a variation of the questions used in Experiment 5, but also tests a decoy for the Porterhouse.

1h – Experiment Eight

Stimulus		Annotations
Q **A** **B** **D_b** **D_a**	**If you had to choose one of the following brands of beer to purchase, which one would it be?** Average Quality Rating Scale: (100=Best; 0=Worst) Price/sixpack : $7.80 Average Quality Rating: 50 Price/sixpack : $8.60 Average Quality Rating: 70 Price/sixpack : $9.00 Average Quality Rating: 70 Price/sixpack : $7.80 Average Quality Rating: 30	These questions are all replications of the stimulus in Experiment 7, and several have also been used in Experiment 5 and other experiments in this study.
Q **A** **B** **D_a** **D_b**	**You need a new laptop computer. All other things being equal about the options, which laptop would you choose?** 4 GB RAM 14 Hours Average Battery Life 2 GB RAM 24 Hours Average Battery Life 4 GB RAM 12 Hours Average Battery Life 2 GB RAM 20 Hours Average Battery Life	
Q **A** **B** **D_b** **D_a**	**If you had to choose one of the following bottles of wine to purchase, which one would it be?** Wine Spectator Rating Scale: (100=Best; 0=Worst) Bottle Price: $43 Score: 97 Bottle Price: $37 Score: 89 Bottle Price: $37 Score: 85 Bottle Price: $65 Score: 97	
Q **A** **B** **D_a** **D_b**	**If you had to choose one of the following restaurants to dine at, which one would it be?** Zagat Rating Score: (30=Excellent; 0=Horrible) Driving Distance: 25 minutes Zagat Score: 29 Driving Distance: 5 minutes Zagat Score: 21 Driving Distance: 35 minutes Zagat Score: 29 Driving Distance: 5 minutes Zagat Score: 17	
Q **A** **B** **D_b** **D_a**	**If you were to order a steak, which steak would it be?** $42.00 - Porterhouse $35.00 - Filet Mignon $33.00 - Sirloin $41.00 – Sirloin	
	Given that all the following sodas HAVE THE SAME PRICE. If you had to choose one of the following sodas to purchase, which would it be?  **A** **B** **D_a** **D_b**	The soda choice scenario is based on experimental results described by Ariely (2008). The scenario is similar to that presented in Experiment 5, however no information, other than brand and flavor (implied by the picture and brand) were given. The lack of nutritional content or other attribute was designed to simplify the scenario.

1i – Experiment Nine

Stimulus		Annotations
Q	**If you had to choose one of the following bottles of wine to purchase, which one would it be?**  A  B  D_b	Wine labels were pretested and chosen so their perceived quality scores were reflective of those in the text-based condition listed below. Wine labels were modified to identify only wine type, and removed mention of a specific grape varietal.
Q A B D_a D_b	**If you had to choose one of the following bottles of wine to purchase, which one would it be?** Wine Spectator Rating Scale: (100=Best; 0=Worst) Bottle Price: \$43 Score: 97 Bottle Price: \$37 Score: 89 Bottle Price: \$37 Score: 85 Bottle Price: \$65 Score: 97	The questions is a replications of the stimulus in Experiments 5,7, and 8.

1j – Experiment Ten

Stimulus		Annotations
Q A B D_b	**LOW FLUENCY CONDITION** **Based on the information provided about the following refrigerators, please select the one you would be most likely to purchase.** Freezing Time (in minutes): 10 minutes Running Cost (per year): \$46 Freezing Time (in minutes): 25 minutes Running Cost (per year): \$40 Freezing Time (in minutes): 10 minutes Running Cost (per year): \$60	The font and presentation were generally found to be more difficult to read, though it can still be read with some effort (Epley & Norwick, 2004; Novemsky, et al. 2007). A pretest of 226 participants confirmed that, on an ten-point scale ranging from "very easy to read," to "very difficult to read," the gray-scripted front was significantly more difficult to read than the same material presented in a standard black, and unscripted font (μ's=3.52 and 7.17; $t(224) = 11.84$, $p<0.0001$). The choice scenario is a replication of the stimulus described by Park & Kim (2005).
Q A B D_a	**HIGH FLUENCY CONDITION** **Based on the information provided about the following refrigerators, please select the one you would be most likely to purchase.** Freezing Time (in minutes): 10 minutes Running Cost (per year): \$46 Freezing Time (in minutes): 25 minutes Running Cost (per year): \$40 Freezing Time (in minutes): 10 minutes Running Cost (per year): \$60	

1k – Experiment Eleven

Stimulus		Annotations
	LOW FLUENCY CONDITION	The choice options in this scenario are replications of the stimulus described by Park & Kim (2005). The font-readability, fluency manipulation was based on the findings of (Epley & Norwick, 2004; Novemsky, et al. 2007), and replicated the manipulation used in experiment 10.
Q	**Based on the information provided about the following binoculars, please select the one you would be most likely to purchase.**	
A	*Minolta Model 500* *Features: 15x (15 times) magnification power, extra-wide field of view, very durable.* *$59.95*	
B	*Jason Model JX1* *Features: 9x (9 times) magnification power, average field of view.* *$22.95*	
D_b	*Minolta Model 200* *Features: 13x (13 times) magnification power, average field of view.* *$54.95*	
	HIGH FLUENCY CONDITION	
Q	**Based on the information provided about the following binoculars, please select the one you would be most likely to purchase.**	
A	Minolta Model 500 Features: 15x (15 times) magnification power, extra-wide field of view, very durable. $59.95	
B	Jason Model JX1 Features: 9x (9 times) magnification power, average field of view. $22.95	
D_a	Minolta Model 200 Features: 13x (13 times) magnification power, average field of view. $54.95	

APPENDIX 2: DECOY SHARE GAINS

Overall, decoys garnered choice share in 78.6% of the scenarios tested. To determine whether choice scenario characteristics influenced the likelihood a decoy would be chosen, a regression was conducted where decoy share (DShare) was regressed against experimental design features that might have encouraged decoy choice:

- *DLoPrice* – Whether the decoy was the lowest price option available.
- *Quality* – Whether one of the attribute dimensions was a quality feature.
- *Price* – Whether one of the variable attribute dimension was item price.
- *CtrlShrGap* – The share difference between the Target and Competitor in the control condition
- *QualMeasure* – Whether an attribute was defined in a qualitative, non-ordinal manner

The regression equation used can be expressed as:

$$DShare = \beta_0 + \beta_1 Quality + \beta_2 Price + \beta_3 DLoPrice + \beta_4 CtrlShrGap + \beta_5 QualMeasure + \in \quad (16)$$

A sample of 82 choice scenarios[20] spread across eight experiments points to two factors that coincide with decoy market share. The regression data are summarized in Figure 23. First, there is a significant effect on QualMeasure ($t=3.25$, $p<0.01$), which suggests the decoy is more likely to be chosen if one of the attribute dimensions is presented qualitatively (and not quantitatively). Second, the regression constant is statistically significant and positive ($t=2.34$, $p<0.03$), which suggests a portion of the population will likely choose the decoy option regardless of its attributes, or the attributes of the Target.

No other variables were statistically significant, which suggests the substantive type of attribute dimension (price or quality) used for the stimuli did not necessarily encourage subjects

[20] The two choice scenarios from Experiment Six where subjects chose from pictures of date prospects was excluded because the options did not have explicitly comparable attribute dimensions, and of the female subjects used for the overall data set (date prospects were of males), the decoy option was never selected.

to choose the decoy. Of particular note, the coefficient on whether the decoy was the lowest price option (DLoPrice), was not significant (t<-0.02; p=0.52), and the coefficient direction is counter to expectations if subjects were more likely to choose the cheapest option. The lack of significance, and negative coefficient on DLoPrice suggests that subjects did not choose the decoy option simply to minimize the price paid.

Figure 23. Regression Results: Decoy Share Across Choice Scenarios

Variable	β	SE	t-Stat	p-Value	
Constant	0.046	0.020	2.338	0.022	*
Quality	-0.001	0.021	-0.025	0.980	
Price	0.030	0.022	1.391	0.168	
DLoPrice	-0.015	0.023	-0.641	0.523	
QualMeasure	0.075	0.023	3.250	0.002	**
CtrlShrGap	0.036	0.022	1.591	0.116	

Model Adjusted $R^2 = 0.186$; $F(5,81) = 3.47$; $p<0.01$

* Significant at the p<0.05 level.
** Significant at the p<0.01 level.

APPENDIX 3: STUDIES COMBINING TARGET & DECOY SHARES

Kim, S. & Hasher, L. (2005). The Attraction Effect in Decision Making: Superior Performance by Older Adults, *Quarterly Journal of Experimental Psychology*, 58(1), 120-133.

Tentori, K., Osherson, D., Hasher, L., & May, C. (2001). Wisdom and aging: Irrational preferences in college students but not older adults. *Cognition*, 81(3), B87-B96.

APPENDIX 4: STUDIES REPORTING $\{T,C,D_T\}$ VS. $\{T,C,D_C\}$ DIFFERENCES

Fifty-three attraction effect studies were found to have reported participant choice share differences between two treatment conditions. Seventeen of the 53 studies reported target share change differences between a target-decoyed $\{T,C,D_T\}$ and a competitor-decoyed $\{T,C,D_C\}$ condition. These sixteen studies are:

Amaldoss, W., Bettman, J.R., & Payne, J.W. (2008). Biased but efficient: An investigation of coordination facilitated by asymmetric dominance. *Marketing Science*, 27(5), 903-921.

Ariely, D., & Wallsten, T.S., (1995). Seeking subjective dominance in multidimensional space: An explanation of the asymmetric dominance effect. *Organizational Behavior and Human Decision Making*. 63(3). 223-232.

Chatterjee, S., Roy, R., & Malshe, A.V., (2010). The role of regulatory fit on the attraction effect. *The Journal of Consumer Psychology*. 21. 473-481.

Dhar, R., & Glazer, R. (1996). Similarity in context: Cognitive representation and violation of preference and perceptual invariance in consumer choice. *Organizational Behavior and Human Decision Processes*, 67, 280–293.

Fasolo, B. Misuraca, R., McClelland, G.H., & Maurisio, C. (2006). Animation attracts: The attraction effect in an on-line shopping environment. *Psychology & Marketing*. 23(10). 299-811.

Hedcock, W., & Rao, A.R. (2009). Trade-Off Aversion as an Explanation for the Attraction Effect: A Functional Magnetic Resonance Imaging Study. *Journal of Marketing Research*, 46(1), 1-13.

Huber, J., & Puto, C. (1983). Market boundaries and product choice: Illustrating attraction and substitution effects. *Journal of Consumer Research*, 10(June) 31-44.

Khan, U., Zhu, M., & Kalra, A., (2011). When trade-offs matter: The effect of choice construal on context effects. *Journal of Marketing Research*. 48(1), 62-71.

Lin, C.H., Sun, Y.C., Chuang, S.C., & Su, H.J., (2008). Time pressure and the compromise and attraction effects on choice. *Advances in Consumer Research*. 35. 348-352.

McDonald, M.K. (2009). The influence of need for cognition on the asymmetric dominance effect. *Creating Knowledge*: *The LA&S Student Research Journal.* Vol.2, DePaul University. 27-29.

Pan, Y., O'Curry, S., & Pitts, R. (1995). The attraction effect and political choice in two elections. *Journal of Consumer Psychology*, 4(1), 85-101.

Pettibone, J. C., & Wedell, D. H. (2000). Examining models of nondominated decoy effects across judgment and choice. *Organizational Behavior and Human Decision Processes*, 81, 300–328.

Pocheptsova, A., Amir, O., Dhar, R., & Baumeister R.F. (2009) Deciding without resources: Resource depletion and choice in context. *Journal of Marketing Research*, 46(3), 344-355.

Ratneshwar, S., Shocker, A.D., & Stewart, D.W. (1987). Toward understanding the attraction effect: The implications of product stimulus meaningfulness and familiarity. *Journal of Consumer Research*. 13(4), 520-533.

Sedikides, C., Ariely, D., Olsen, N., (1999). Contextual and procedural determinants of partner selection: Of asymmetric dominance and prominence. *Social Cognition*. 17(2). 118-139.

Slaughter, J.E., Sinar, E.F., & Highhouse, S., (1999). Decoy effects and attribute-level inferences. *Journal of Applied Psychology*. 84(5), 823-828.

Wedell, D.H. (1991). Distinguishing among models of contextually induced preference reversals, *Journal of Experimental Psychology Learning, Memory, and Cognition*, 12(July), 767-778.

Wedell, D.H., & Pettibone, J.C. (1996). Using judgments to understand decoy effects in choice. *Organizational Behavior and Human Decision Making*. 67(3). 326-344.

APPENDIX 5: STUDIES REPORTING AGGREGATION ACROSS TWO OR MORE SCENARIOS

Twenty-one attraction effect studies reported share shifts based on data which was aggregated across at least two different scenarios for each participant. These studies are:

Amaldoss, W., Bettman, J. R., & Payne, J. W. (2008). Findings—Biased but Efficient: An Investigation of Coordination Facilitated by Asymmetric Dominance. *Marketing Science*, 27(5), 903-921.

Bhargava, M., Kim, J., & Srivastava, R. K. (2000). Explaining context effects on choice using a model of comparative judgment. *Journal of Consumer Psychology*, 9(3), 167-177.

Chuang, S. C., & Yen, H. R. (2007). The impact of a product's country-of-origin on compromise and attraction effects. *Marketing Letters*, 18(4), 279-291.

Dhar, R., & Glazer, R. (1996). Similarity in context: Cognitive representation and violation of preference and perceptual invariance in consumer choice. *Organizational Behavior and Human Decision Processes*, 67(3), 280-293.

Fasolo, B., Misuraca, R., McClelland, G. H., & Cardaci, M. (2006). Animation attracts: The attraction effect in an on-line shopping environment. *Psychology & Marketing*, 23(10), 799-811.

Hedgcock, W., & Rao, A. R. (2009). Trade-off aversion as an explanation for the attraction effect: A functional magnetic resonance imaging study. *Journal of Marketing Research*, 46(1), 1-13.

Hamilton, R., Hong, J., & Chernev, A. (2007). Perceptual focus effects in choice. *Journal of Consumer Research*, 34(2), 187-199.

Herne, K. (1997). Decoy alternatives in policy choices: Asymmetric domination and compromise effects. European *Journal of Political Economy*, 13(3), 575-589.

Highhouse, S. (1996). Context-dependent selection: The effects of decoy and phantom job candidates. *Organizational Behavior and Human Decision Processes*, 65(1), 68-76.

Huber, J. & Puto, C. (1983). Marketing boundaries and product choice: Illustrating attraction and substitution effects. *Journal of Consumer Research*, 10(1), 31-44.

Kardes, F. R., Herr, P. M., & Marlino, D. (1989). Some new light on substitution and attraction effects. *Advances in Consumer Research*, 16, 203-208.

Lehmann, D. R., & Pan, Y. (1994). Context effects, new brand entry, and consideration sets. *Journal of Marketing Research*, 31(3), 364-374.

Lin, C. H., Sun, Y. C., Chuang, S. C., & Su, H. J. (2008). Time pressure and the compromise and attraction effects in choice. *Advances in Consumer Research*, 35(3), 348-352.

Malaviya, P., & Sivakumar, K. (1998). The moderating effect of product category knowledge and attribute importance on the attraction effect. *Marketing Letters*, 9(1), 93-106.

Malaviya, P., & Sivakumar, K. (2002). The influence of choice justification and stimulus meaningfulness on the attraction effect. *Journal of Marketing Theory and Practice*, 20-29.

Mao, W., & Oppewal, H. (2012). The attraction effect is more pronounced for consumers who rely on intuitive reasoning. *Marketing Letters*, 23, 339-351.

Pan, Y., & Lehmann, D. R. (1993). The influence of new brand entry on subjective brand judgments. *Journal of Consumer Research*, 76-86.

Pechtl, H. (2009). Value structures in a decoy and compromise effect experiment. *Psychology and Marketing*, 26(8), 736-759.

Sedikides, C., Ariely, D., & Olsen, N. (1999). Contextual and procedural determinants of partner selection: Of asymmetric dominance and prominence. *Social Cognition*, 17(2), 118-139.

Van de Hoef, J.J. (2011). Bundle choice and the asymmetric dominance effect. (Unpublished masters thesis). Erasmus University – School of Economics, Rotterdam.

Wedell, D. H. (1991). Distinguishing among models of contextually induced preference reversals. Journal of Experimental Psychology: Learning, Memory, and Cognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 17(4), 767.

Yoon, S. O., & Simonson, I. (2008). Choice set configuration as a determinant of preference attribution and strength. *Journal of Consumer Research*, 35(2), 324-336.

APPENDIX 6: LITERATURE SEARCH RESULTS

A total of 76 academic articles were reviewed and evaluated for the purposes of this meta-analysis. The following are review comments pertaining to the classification, and pertinent attributes of each journal article.

1. Zenger, T. R., & Lawrence, B. S. (1989). Organizational demography: The differential effects of age and tenure distributions on technical communication. *Academy of Management Journal*, 32(2), 353-376.
   Scenarios describe each option on three attributes.

2. Chuang, S. C., & Yen, H. R. (2007). The impact of a product's country-of-origin on compromise and attraction effects. *Marketing Letters*, 18(4), 279-291.
   Country of origin (Study 1) and manufacturing country of origin (Study 2) (high quality and low quality) is used as a moderator condition under the presence of high quality target. Studies 3 and 4 test low-quality decoy. . No decoy shares reported, or exact n's for each condition. Share counts are based on reported share percentages and Total n's and number of randomized treatment conditions.

3. Highhouse, S. (1996). Context-dependent selection: The effects of decoy and phantom job candidates. *Organizational Behavior and Human Decision Processes*, 65(1), 68-76.
   Study 1: Asymmetrically dominated decoy was also a phantom decoy. Study 2: Aggregated results for the control and attribute weighting conditions.

4. Malaviya, P., & Sivakumar, K. (2002). The influence of choice justification and stimulus meaningfulness on the attraction effect. *Journal of Marketing Theory and Practice*, 20-29.
   Choices are aggregated across three products/scenarios. Individual results also available. Control is a no-choice-justification condition. Within subjects.

5. Kim, S., & Hasher, L. (2005). The attraction effect in decision making: Superior performance by older adults. *The Quarterly Journal of Experimental Psychology* Section A, 58(1), 120-133.
   Separates out older and college-aged subjects.

6. Bhargava, M., Kim, J., & Srivastava, R. K. (2000). Explaining context effects on choice using a model of comparative judgment. *Journal of Consumer Psychology*, 9(3), 167-177.
   Aggregated across different choice scenarios. No share numbers reported.

7. Wedell, D. H. (1991). Distinguishing among models of contextually induced preference reversals. *Journal of Experimental Psychology: Learning, Memory, and Cognition.* 17(4), 767.
   Three-option control condition. Aggregated across multiple scenarios.

8. Pechtl, H. (2009). Value structures in a decoy and compromise effect experiment. *Psychology and Marketing*, 26(8), 736-759.
   Aggregated over eleven types of decoyed placements.

9. Dhar, R., & Glazer, R. (1996). Similarity in context: Cognitive representation and violation of preference and perceptual invariance in consumer choice. *Organizational Behavior and Human Decision Processes*, 67(3), 280-293. *Three-option control condition, preference ratings. No observation count reported for scenarios. Observation count was estimated based on number of treatment conditions (Exp1: four;Exp2: three), 190 subjects. Aggregated and disaggregated information were reported. Exp 1 also included a neutral 3rd or 4th option in the control and treatment conditions, respectively. Exp2: excluded decoy condition C_4 as it was not asymmetrically dominated.*

10. Amaldoss, W., Bettman, J. R., & Payne, J. W. (2008). Findings—Biased but Efficient: An Investigation of Coordination Facilitated by Asymmetric Dominance. *Marketing Science*, 27(5), 903-921.
    Aggregated and individual scenarios presented. Use Study 1 only. Study two has many moderating features and a three-option control condition. Non-traditional choice options – expected payouts for self and opponent used as attributes.

11. Sedikides, C., Ariely, D., & Olsen, N. (1999). Contextual and procedural determinants of partner selection: Of asymmetric dominance and prominence. *Social Cognition*, 17(2), 118-139.
    Aggregated and individual scenarios. Three-attributes given for each product. Three-option and two-option control conditions. Study 2 did not report two-option versus three-option shares.

12. Amir, O., & Levav, J. (2007). Choice construction versus preference construction: The instability of preferences learned in context. *Journal of Marketing*, 45(2), 145-158.
    Moderating condition manipulated the effect of learned preference for an option. No choice share data reported for choice scenarios.

13. Mao, W., & Oppewal, H. (2012). The attraction effect is more pronounced for consumers who rely on intuitive reasoning. *Marketing Letters*, 1-13.
    Has both aggregated and individual scenario data. Reports results by need for cognition and faith in intuition scales for decision makers.

14. Lin, C. H., Sun, Y. C., Chuang, S. C., & Su, H. J. (2008). Time pressure and the compromise and attraction effects in choice. *Advances in Consumer Research*, 35(3), 348-352.
    Study 1 is only about compromise decoys. Study 2 is relevant to the attraction effect, but aggregates data across three product scenarios.

15. Schley, D. (2005). Minimized Regret is Sufficient to Model the Asymmetrically Dominated Decoy Effect. *Marketing Bulletin*, 16, 1.
    Quantitative model only. Not experimental results.

16. Pettibone, J. C., & Wedell, D. H. (2007). Testing alternative explanations of phantom decoy effects. *Journal of Behavioral Decision Making*, 20(3), 323-341.
Quantitative models, tests only phantom decoys.

17. De Clippel, G., & Eliaz, K. (2012). Reason-based choice: A bargaining rationale for the attraction and compromise effects. *Theoretical Economics*, 7(1), 125-162.
Quantitative model only. Not experimental results.

18. Bateson, M., Healy, S. D., & Hurly, T. A. (2002). Irrational choices in hummingbird foraging behaviour. *Animal Behaviour*, 63(3), 587-596.
Animal behavior – not human choice.

19. Royle, N. J., Lindström, J., & Metcalfe, N. B. (2008). Context-dependent mate choice in relation to social composition in green swordtails Xiphophorus helleri. *Behavioral Ecology*, 19(5), 998-1005.
Animal behavior – not human choice.

20. McDonald, M. K. The Influence of Need for Cognition on the Asymmetric Dominance Effect. *CREATING*, 27.
The control condition has three options. Do not include – the treatment condition was compared against 50/50 chance of choosing the target. There was no empirically-based control condition.

21. Masicampo, E. J., & Baumeister, R. F. (2008). Toward a physiology of dual-process reasoning and judgment: Lemonade, willpower, and expensive rule-based analysis. *Psychological Science*, 19(3), 255-260.
Physiological manipulation - control condition is neutral, without physiological change. Control condition also has three options.

22. Hedgcock, W., & Rao, A. R. (2009). Trade-off aversion as an explanation for the attraction effect: A functional magnetic resonance imaging study. *Journal of Marketing Research*, 46(1), 1-13.
Within-subject study with three-option control condition and choices aggregated across product conditions.

23. Huber, J., Payne, J. W., & Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of Consumer Research*, 90-98.
Individual and aggregated results reported. Within-subject design. Multiple decoy positions and products tested.

24. Simonson, I., & Tversky, A. (1992). Choice in context: tradeoff contrast and extremeness aversion. *Journal of Marketing Research*.
Microwave oven and pen scenarios are un-moderated attraction effect scenarios. Paper towel and tissue scenario were sensory-based.

25. Heath, T. B., & Chatterjee, S. (1995). Asymmetric decoy effects on lower-quality versus higher-quality brands: Meta-analytic and experimental evidence. *Journal of Consumer Research*, 22(3), 268-284.
Two populations of subjects: MBA students and blue collar workers tested on high versus low quality items.

26. Huber, J., & Puto, C. (1983). Market boundaries and product choice: Illustrating attraction and substitution effects. *Journal of Consumer Research*, 31-44.
Only Study 1 is relevant to the attraction effect. Disaggregated information is extractable from the data.

27. Slaughter, J. E., Kausel, E. E., & Quiñones, M. A. (2010). The decoy effect as a covert influence tactic. *Journal of Behavioral Decision Making*, 24(3), 249-266.
No choices were made. Subjects were asked to create a sample set to make the Target look desirable.

28. Hedgcock, W., Rao, A. R., & Chen, H. (2009). Could Ralph Nader's entrance and exit have helped Al Gore? The impact of decoy dynamics on consumer choice. *Journal of Marketing Research*, 46(3), 330-343.
Study 1 is relevant. Study 2 is on Phantoms. All have three-option control conditions.

29. Park, J., & Kim, J. (2005). The effects of decoys on preference shifts: The role of attractiveness and providing justification. *Journal of Consumer Psychology*, 15(2), 94-107.
"First Choice" conditions in experiments 1 and 2 are relevant.

30. Sen, S. (1998). Knowledge, information mode, and the attraction effect. *Journal of Consumer Research*, 25(1), 64-77.
Study 1 is relevant. Study two aggregates across American and Italian restaurants. Rating scales are used, and is within subjects. Study three uses choice and preference ratings.

31. Mishra, S., Umesh, U. N., & Stem Jr, D. E. (1993). Antecedents of the attraction effect: An information-processing approach. *Journal of Marketing Research*, 331-349.
No subject counts are reported. Attraction effect is defined against a baseline of expectations under Luce and similarity.

32. Kardes, F. R., Herr, P. M., & Marlino, D. (1989). Some new light on substitution and attraction effects. *Advances in Consumer Research*, 16, 203-208.
Judgment and choice are recorded. Results are aggregated across four scenarios.

33. Aaker, J. (1991). The negative attraction effect? A study of the attraction effect under judgment and choice. *Advances in Consumer Research*, 18(1), 462-469.
Between subject study on undergraduate students. Choice and judgment were dependent variables. Justification was the manipulation and a control without justification is reported.

34. Herne, K. (1997). Decoy alternatives in policy choices: Asymmetric domination and compromise effects. *European Journal of Political Economy*, 13(3), 575-589.

Student population, scenarios aggregated before reporting. Outside knowledge and information considered in decision making process.

35. Ha, Y. W., Park, S., & Ahn, H. K. (2009). The influence of categorical attributes on choice context effects. *Journal of Consumer Research*, 36(3), 463-477.
Within subjects. Aggregated and separated data available. The moderating condition manipulated whether a third attribute/feature was the same or different between the Target and Decoy. The manipulation created comparisons across three attribute dimensions, and was thus excluded.

36. Lehmann, D. R., & Pan, Y. (1994). Context effects, new brand entry, and consideration sets. *Journal of Marketing Research*, 364-374.
Study 1, decoys 1 and 1' are about the attraction effect. Study 2 uses a six-option control condition . Choices are aggregated. No moderators.

37. Pan, Y., O'Curry, S., & Pitts, R. (1995). The attraction effect and political choice in two elections. *Journal of Consumer Psychology*, 4(1), 85-101.
Study 1:choices described on three attributes. No aggregation. Between subjects design. Study 2 excluded because attribute ratings were defined by each subject.

38. Stewart, D. W. (1989). On the meaningfulness of sensory attributes: Further evidence on the attraction effect. *Advances in Consumer Research*, 16, 197-202.
Study 2 is poorly designed and excluded. Actual taste is used as a physiological attribute. Study 1 uses flat, dilute beer as a decoy for a nationally distributed pilsner. But the Target and Competitor beers were very different styles. Exclude.

39. Burton, S., & Zinkhan, G. M. (1987). Changes in consumer choice: Further investigation of similarity and attraction effects. *Psychology and Marketing*, 4(3), 255-266.
Case 3 is the only usable attraction effect study scenario. No attribute rating information is given. No specific observation count given per treatment condition. Observation count assumption made based on participant count.

40. Pettibone, J. C. (2012). Testing the effect of time pressure on asymmetric dominance and compromise decoys in choice. *Judgment and Decision Making*, 7(4), 513-523.
Deliberation time is varied, the normal condition has liberal time and is a usable baseline, but no appropriate control condition against which an ADE increase is measured, was reported. Aggregated results: across ten products.

41. Frederick, S., Lee, L., & Baskin, E. The Rules of Attraction. Available at: http://faculty.som.yale.edu/ShaneFrederick/Rules_of_Attraction.pdf
Moderating conditions include changes in numerical perception of the value attributes. Study 1 was flavored Kool-Aid and presented aggregated and individual results. Study 2 moderates via visual presentation forms, does not aggregate across conditions. Choices were of gambles. Study 3 creates attribute difference through photo quality.

42. Dhar, R., & Simonson, I. (2003). The effect of forced choice on choice. *Journal of Marketing Research*, 146-160.
The moderating condition gives subjects the option not to choose an option. Study 1 is not applicable to the attraction effect. Study 2 has a usable "forced choice condition," along with the moderating 'not to choose' condition as well.

43. Munro, A., & Popov, D. (2009). A Missing Link in Behavioural Economics? A Portmanteau Experiment on the Relevance of Individual Decision Anomalies for Households (No. 09/10). Department of Economics, Royal Holloway University of London.
Attraction effect data is detailed in Table 4.

44. van de Hoef, J. J. (2011). Bundle Choice and the Asymmetric Dominance Effect. Erasmus University.
Results separated by cognitive thinking primes. Mode of thinking manipulation is weak. Bundled versus single product scenarios are another moderating condition. Individual and aggregated results are reported.

45. Hamilton, R., Hong, J., & Chernev, A. (2007). Perceptual focus effects in choice. *Journal of Consumer Research*, 34(2), 187-199.
Experiment 1 is relevant to the attraction effect. Others are not.

46. Bateman, I. J., Munro, A., & Poe, G. L. (2008). Decoy effects in choice experiments and contingent valuation: asymmetric dominance. *Land Economics*, 84(1), 115-127.
Relevant data is reported in Table 1.

47. Kivetz, R., Netzer, O., & Srinivasan, V. (2004). Extending compromise effect models to complex buying situations and other context effects. *Journal of Marketing Research*, 262-268.
Test conditions reproduce Ariely's Economist subscription scenario. Exclude the three-attribute Xerox scenario.

48. Doyle, J. R., O'Connor, D. J., Reynolds, G. M., & Bottomley, P. A. (1999). The robustness of the asymmetrically dominated effect: Buying frames, phantom alternatives, and in-store purchases. *Psychology and Marketing*, 16(3), 225-243.
Include only Experiment 1. Experiment 2 tested phantom decoys. Excluded results on "what most others would choose" conditions as they did not represent individuals' choices.

49. Tentori, K., Osherson, D., Hasher, L., & May, C. (2001). Wisdom and aging: Irrational preferences in college students but not older adults. *Cognition*, 81(3), B87-B96.
Include Studies 1, 2, and 3. Results are separated by subject type: Students versus senior citizens.

50. Josiam, B. M., & Hobson, J. P. (1995). Consumer choice in context: the decoy effect in travel and tourism. *Journal of Travel Research*, 34(1), 45-50.
Choice sets are bundles of travel packages. Decoy and Target shared the same travel destination.

51. Khan, U., Zhu, M., & Kalra, A. (2011). When trade-offs matter: The effect of choice construal on context effects. *Journal of Marketing Research*, 48(1), 62-71.
Experiments 3 and 4b were on the Attraction Effect, however, 4b did not report choice share data, so was not includede

52. Sivakumar, K., & Raj, S. P. (1997). Quality tier competition: How price change influences brand choice and category choice. *The Journal of Marketing*, 71-84.
Model back-testing on POS data. Was not experiment based.

53. Mourali, M., Böckenholt, U., & Laroche, M. (2007). Compromise and attraction effects under prevention and promotion motivations. *Journal of Consumer Research*, 34(2), 234-247.
Include Study 1 only. Study 2 does not have an attraction effect control condition. Study 1 uses a two-option control condition. Additional moderation through prevention and promotion motivations. Study 3 was excluded because the control condition was a three-option set where the target was the compromise option.

54. Herr, P.M., & Kardes, F.R. (1989). Context effects in consumer judgment and choice. *Advances in Consumer Research*, 16, 195-196.
No experimental data reported – only a symposium discussion summary.

55. Ratneshwar, S., Shocker, A. D., & Stewart, D. W. (1987). Toward understanding the attraction effect: The implications of product stimulus meaningfulness and familiarity. *Journal of Consumer Research*, 520-533.
Attraction effect effectiveness is moderated with attribute and product familiarity and meaningfulness. Studies 1 and 2 included. Studies 3 and 4 only included ratings and verbal protocols and were excluded from the analysis.

56. Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research*, 158-174.
Study 1: beer and car scenarios are suitable for attraction effect, other products test the compromise effect. Study 2: dependent variable is justifiability rating, no choice is made. Study 3: is verbal protocol.

57. Yoon, S. O., & Simonson, I. (2008). Choice set configuration as a determinant of preference attribution and strength. *Journal of Consumer Research*, 35(2), 324-336.
Results are pooled across three products. Preference ratings are used. Experiment is within subjects. Compromise decoy conditions from Experiment 1 were excluded. Experiments 2 and 3 were excluded as they did not set out to report the share change associated with the attraction effect. Experiment 4 was excluded as its procedures include revealing the purpose of the decoy to participants to influence their choice.

58. Malaviya, P., & Sivakumar, K. (1998). The moderating effect of product category knowledge and attribute importance on the attraction effect. *Marketing Letters*, 9(1), 93-106.

Aggregate multiple decoy types and products. Participants are parsed by knowledge preference. No choices made, just preferences.

59. Sivakumar, K., & Cherian, J. (1995). Role of product entry and exit on the attraction effect. *Marketing Letters*, 6(1), 45-51.
Preference scales are used. Moderating condition is if the decoy is simultaneous or delayed entry. Within-subject design.

60. Choplin, J. M., & Hummel, J. E. (2005). Comparison-induced decoy effects. *Memory & Cognition*, 33(2), 332-343.
Choices only have a single attribute dimension. Choices are of shapes and lines. ADE is evaluated against expectations under chance. Experiment 3 used a similarity rating, not preference.

61. Heath, T., & Chatterjee, S. (1991). How entrants affect multiple brands: A dual attraction mechanism. *Advances in Consumer Research*, 18, 768-772.
The attraction effect decoy was said to be unavailable (phantom).

62. Zhou, L., Kim, C., & Laroche, M. (1996). Decision Processes of the Attraction Effect: A Theoretical Analysis and Some Preliminary Evidence. *Advances in Consumer Research*, 23, 218-224.
No quantitative results are reported, just coding of verbal protocols.

63. Pan, Y., & Lehmann, D. R. (1993). The influence of new brand entry on subjective brand judgments. *Journal of Consumer Research*, 76-86.
Study 1: Scenarios are of three-base options with an entrant – not the traditional attraction effect set-up. Attribute values are defined by the participant. Study 1 excluded.
Study 2: Choice and preferences are reported, aggregated scenarios across four products. Two types of decoy locations used.

64. Hsu, H.C., & Liu, W.L. (2011). Using decoy effects to influence an online brand choice: The role of price-quality trade-offs. *Cyberpyschology, Behavior, and Social Networking,* 14(4), 235-239.
Include "choice first," "decoy," and control conditions only. Exclude "inferior decoy" and attribute ratings-first conditions.

65. Wedell, D. H., & Pettibone, J. C. (1996). Using judgments to understand decoy effects in choice. *Organizational Behavior and Human Decision Processes*, 67(3), 326-344.
Preference ratings of attributes and options are reported. No individual scenario data by product is reported. All data is aggregated across 20 products. Exclude all studies – preference ratings only.

66. Slaughter, J. E., Sinar, E. F., & Highhouse, S. (1999). Decoy effects and attribute-level inferences. *Journal of Applied Psychology*, 84(5), 823.
Candidate options presented visually (video) – subjects to infer hiring quality from video.

67. Fasolo, B., Misuraca, R., McClelland, G. H., & Cardaci, M. (2006). Animation attracts: The attraction effect in an on-line shopping environment. *Psychology & Marketing*, 23(10), 799-811.
Includes moderating feature of animated stimulus. Experiments 1 and 2 aggregate across different animation conditions of T,C,D.

68. Pocheptsova, A., Amir, O., Dhar, R., & Baumeister, R. F. (2009). Deciding without resources: Resource depletion and choice in context. *Journal of Marketing Research*, 46(3), 344-355.
Experiment 4 uses three-option control condition, overall the experiment moderates resource depletion.
Experiment 5 uses the same moderation as experiment 4, but has a two-option control condition.
Exclude Experiment 1 – only two-option conditions; Experiments 2&3 – Compromise decoy

69. Chatterjee, S., Roy, R., & Malshe, A. V. (2011). The role of regulatory fit on the attraction effect. *Journal of Consumer Psychology*, 21(4), 473-481.
Prevention and promotion disposition priming of subjects with no neutral-mood control condition. Four scenarios tested.

70. Herne, K. (1998). Testing the reference-dependent model: an experiment on asymmetrically dominated reference points. *Journal of Behavioral Decision Making*, 11(3), 181-192.
Methods force ownership/endowment of the decoy option as a reference point. And allows choice between T,C,D after ownership. Three-option control condition. Assigned decoy 'reference point' values were manipulated. Design was not a traditional ADE choice option and was thus excluded from the analysis.

71. Ariely, D., & Wallsten, T. S. (1995). Seeking subjective dominance in multidimensional space: An explanation of the asymmetric dominance effect. *Organizational Behavior and Human Decision Processes*, 63(3), 223-232.
Experiment 1: Between subjects with a three-option control condition. Point allocations show preference.
Experiment 2: Attribute preference through point assignment. Does not test option choice or preference.
Experiment 3: Value setting on options, not directly relevant to attraction effect.

72. Pettibone, J. C., & Wedell, D. H. (2000). Examining models of nondominated decoy effects across judgment and choice. *Organizational Behavior and Human Decision Processes*, 81(2), 300-328.
Tests inferior, compromise and phantom decoys. Not directly relevant to the attraction effect.

73. Yeung, C. W., & Soman, D. (2005). Attribute evaluability and the range effect. *Journal of Consumer Research*, 32(3), 363-369.
Does not directly test the attraction effect. Only speculates on the attribute evaluability and its implication on range effect explanations of the attraction effect.

74. Malkoc, S.A., Hedgcock, W., & Hoeffler, S. (2012 In Press). Between a rock and a hard place: The failure among unattractive alternatives. *Journal of Consumer Psychology*. doi: 10.1016/j.jcps.2012.10.008.
Experiments 1-4 were included. Conditions which primed subjects with a vigilance *manipulation were not included as the manipulation was designed to emphasize one attribute over the other.*

75. Levav, J., Kivetz, R., & Cho, C. K. (2010). Motivational compatibility and choice conflict. Journal of Consumer Research, 37(3), 429-442.
Only Experiment 2 tests the attraction effect, but does not report choice share information. (Exp1&4 test the compromise effect; Exp3 moderates with choice deferral).

76. Mishra, S.K., (1990). The Attraction Effect: Definition, Causes, and Consequences. (Doctoral Dissertation, Washington State University, 1990).
{T,C,D} attribute values in the preliminary study did not represent a clear asymmetrically dominated decoy scenario. Choice share counts were not reported for the follow-up study.

APPENDIX 7: HEDONIC/UTILITARIAN ATTITUDES TOWARD PRODUCTS & SERVICE

Four-hundred sixty five participants were recruited through Amazon.com's Mechanical Turk Human Interaction Tasks (MTurk HIT) service. Participants were presented with a randomly generated list of 40 of the 79 test products/services, and asked to evaluate each product/service along Voss, Spangenberg, & Grohmann's (2003) five hedonic and/or utilitarian adjective pair scales. Figure 24 lists the ten adjective pair scales, and Figure 25 plots summary HED/UT measures for each of the 79 products/services surveyed. Between the 465 participants, each product/service type was evaluated at least 150 times on each HED/UT adjective pair.

Figure 24. HED/UT Scale: Adjective-Pair Detail

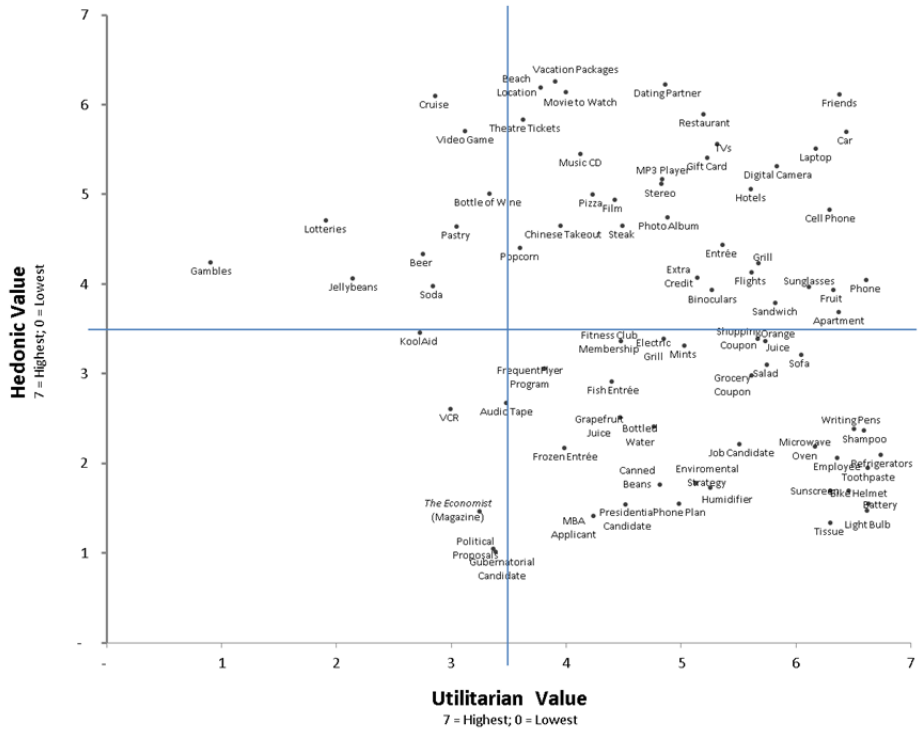
Hedonic Adjective Pairs

- Fun / Not Fun
- Exciting / Dull
- Delightful / Not Delightful
- Thrilling / Not Thrilling
- Enjoyable / Un-enjoyable

Utilitarian Adjective Pairs

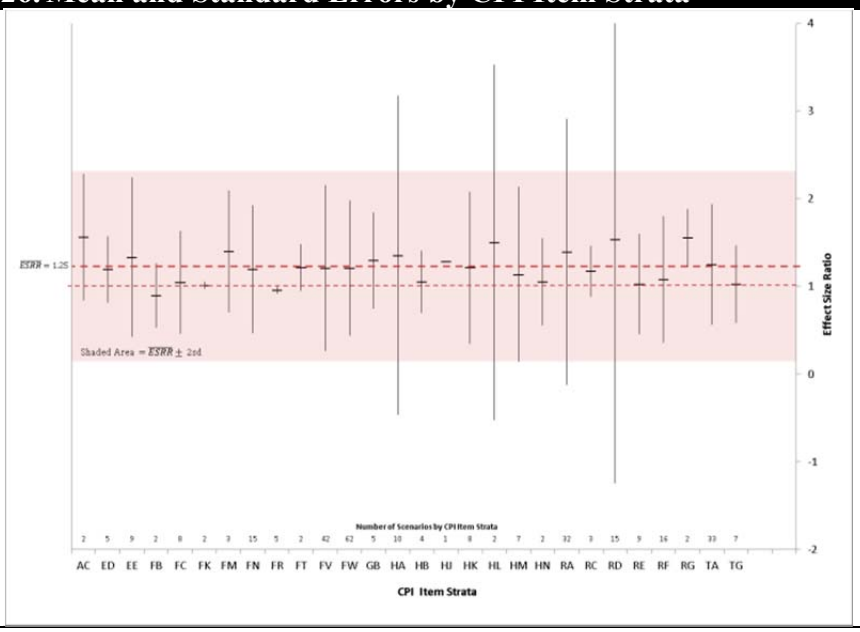
- Effective / Ineffective
- Helpful / Unhelpful
- Functional / Not Functional
- Necessary / Unnecessary
- Practical / Impractical

Figure 25. Products & Services: HED/UT Measurement Values



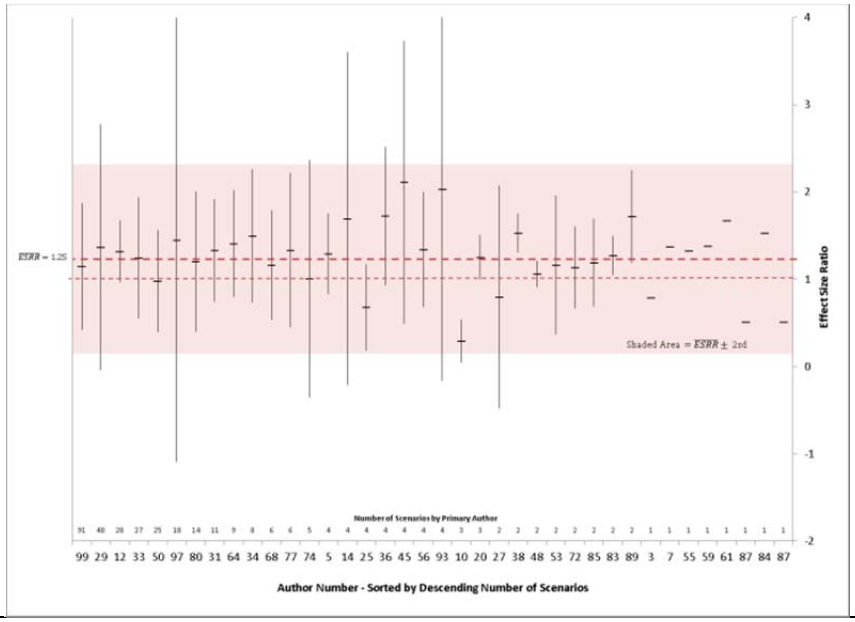
APPENDIX 8: HETEROSKEDASTICITY BY AUTHOR AND CPI ITEM STRATA GROUPINGS

Figure 26. Mean and Standard Errors by CPI Item Strata



CPI item strata groups with 95% confidence intervals beyond that of the average effect size ratio include: HA, HE, RA, and RD; representing 'Rental of Primary Residence,' 'Other Household Equipment & Furnishings,' 'Video & Audio,' and 'Photography' items.

Figure 27. Mean and Standard Errors by Author

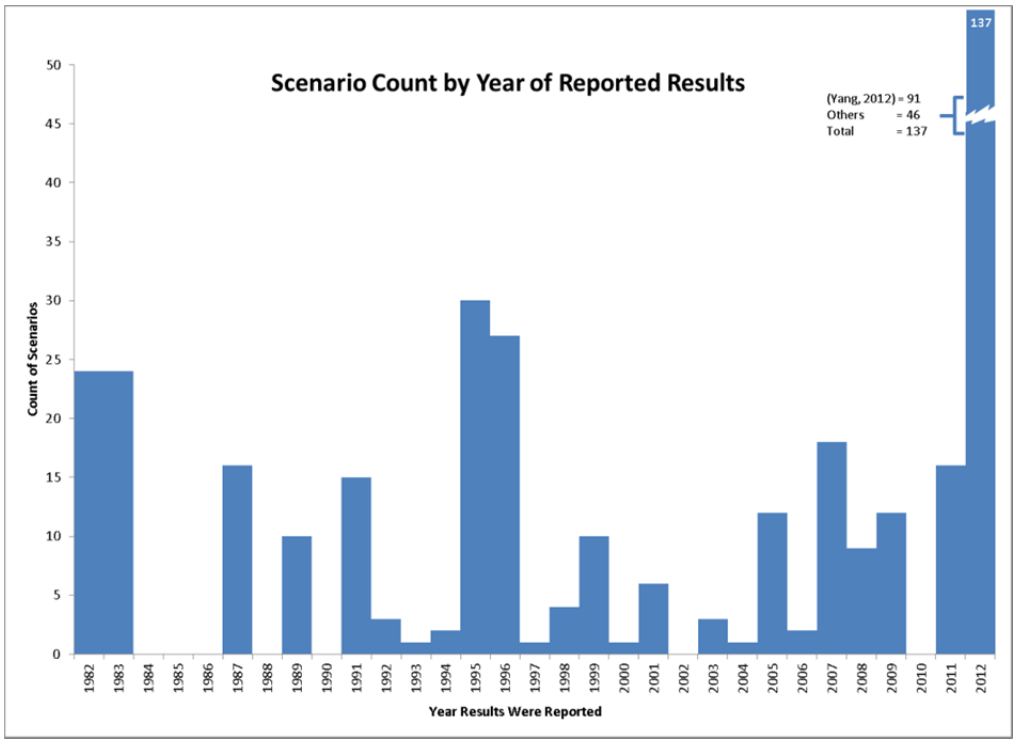


Author 97 (Malkoc, Hedgcock, & Hoeffler, 2012) moderated effect size through positive/negative framing of attributes. The positive/negative frames used are not unrepresentative of how attributes have been presented across other scenarios in the current literature.

Author 93 (Pocheptsova et al., 2009) observations included four scenarios, two of which were based on gift cards for two different retailers (WalMart and BuestBuy). The qualitative nature of the retail brands used in the scenarios was also no unrepresentative of other instances in the data where brands were used as an attribute differentiator.

APPENDIX 9: DATASET COMPOSITION BY YEAR

Figure 28. Descriptive Summary of Studies & Coded Variables



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