ESSAYS ON NEGATIVITY BIAS IN DECISION MAKING: THE ROLE OF COMPLEMENTARY VALUES IN ATTRIBUTE FRAMING EFFECTS

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To My Beloved Husband, Sinan

I am truly thankful for having him in my life.

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This dissertation consists of four essays pertaining to consumer judgment and decision making. It explores the importance of the *valence description* of an attribute in the context of the *attribute framing effect*. Attribute framing effect is a well-known phenomenon which refers to the tendency to evaluate an attribute presented in positive terms more favorably than the same attribute presented in negative terms (Levin, Schneider and Gaeth 1998).

Prior research on framing effects has consistently used the *complementary* type of attributes in order to manipulate attribute valence. The present dissertation defines *complementary attributes* in terms of two key aspects: (i) positivity or negativity of information is determined by different attribute labels (e.g., *success* vs. *failure* rates); and (ii) different attribute values induce the same performance level when defined with different labels in positive and negative frames (e.g., *90% success rate* vs. *10% failure rate*). According to the conceptualization of the present dissertation, such a complementary structure of framed attributes results in three important impacts on evaluations, each of which is explored in a separate chapter: (i) *inference effect* (Essay 1), (ii) *number polarization* (Essay 2), and (iii) *reverse-associations* (Essay 3). The final chapter (Essay 4) concludes with the implication of valence framing on *non-complementary* attributes.

Attribute framing effects rely on the fact that positively (vs. negatively) framed attributes carry positive (vs. negative) information. However, the main premise in Essay 1 is that an attribute frame may not convey *either* positive *or* negative information due to the

complementary structure of framed attributes. In fact, attribute frames can evoke positivity and negativity, *simultaneously*. When confronted with a positively framed attribute, decision makers not only make evaluations based on the given positively framed attribute, but also infer the negatively framed attribute, which has not been supplied. Essay 1 examines the validity of such an *inference* proposition and its consequences in the domain of attribute framing. Findings reveal that assessing positive and negative associations together lead to a significant *negative* impact on evaluations.

According to the prominent explanation for attribute framing effects, when confronted with a positively framed attribute, triggered affective associations are more favorable than when confronted with a negatively framed attribute (e.g., Levin and Gaeth 1988; Levin, Schneider and Gaeth 1998). In an attempt to understand the role of attribute values in framing effects, Essay 2 and 3 advance alternative explanations that account for the impact of numbers and that builds on the premise that numbers can change attribute framing effects. Essay 2 reveals that numbers may influence the *amount/strength* of associations; consequently, the framing effect increases when more/stronger associations are triggered. Essay 3 shows that numbers may affect the *valence* of triggered associations—the framing effect may decrease significantly, even reversing in some instances.

Essay 4 discusses the generalization of framing effects to the *non-complementary* type of attributes, i.e., when the effects of inference and numbers on the framing effect have been eliminated. Findings indicate that framing effects are not limited to complementary type of attributes, rather non-complementary attributes are also susceptible to attribute framing. Moreover, framing effect is more prominent in terms of inherently positive attributes (e.g., food quality) as opposed to inherently negative attributes (e.g., commuting distance). Also, attributes with more ambiguous value ranges (e.g., noise level of a vacuum cleaner) lead to stronger framing effects as compared to more definite value ranges (e.g., commuting time).

The findings of the current investigation provide important implications for product positioning, product labeling, and advertising messages.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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1. INTRODUCTION

While the human mind is capable of many things, fully rational and flawless execution of decision processes is not among its strongest talents. On the one hand, people may often fail to recognize the relevance or significance of information while making their decisions and eventually the wrong or irrelevant information may drive their evaluation and judgment processes. In choice decisions, for instance, choices are susceptible to the manner in which options are presented. Hence, an abundance of information does not guarantee good decision-making; in some cases, it might even worsen it. On the other hand, even if the knowledge is accurate, its conversion into a decision is usually subject to various biases—how one *feels* in the moment, *evaluates* the available information, or *makes trade-offs* under a particular decision context.

The classic model of decision making does not account for the aforementioned biases. Many economists and philosophers have maintained the principle that people are strictly rational (e.g., Von Neumann and Morgenstern 1974). In classical economic theories, there is an assumption that people act rationally when making evaluations and arriving at conclusions. However, with behavioral economics and decision making studies, decision makers are inclined to irrational actions when interpreting a piece of information and reacting to it. This often occurs as a consequence of making judgments based more on biasing influencers (e.g., emotions, mental shortcuts) than on the rational processing of information. Biasing influencers are referred to as cognitive biases (e.g., Kahneman and Tversky 1972) — one of which is the focus of the present dissertation: the *framing effect*.

1.1. The Framing Effect

Judgments are often influenced by the language a person uses, a phenomenon behavioral economists call the framing effect (Tversky and Kahneman 1981). As to the metaphor behind the concept, similar to how *framing* works in human decision making, frames in an artwork have a significant role in focusing attention on the painting it encapsulates: different frames may highlight different parts of a certain painting. So, simply by emphasizing certain colors in a painting, a frame can sway how a person views the painting and has the power to concentrate interest on a specific feature of it.

In the domain of decision making, *framing effect* refers to the fact that decision makers are strongly and consistently affected by the way that a piece of information is presented. Something as seemingly simple as how information is presented can influence decision makers' interpretations of and reactions to that information. Therefore, final judgments can be based on said information.

In the psychological domain of judgment and decision making, framing has received considerable attention and is regarded as having major implications for the *Rationality Debate* (e.g., Shafir and LeBoeuf 2002). Illogicality in human decision making is often due to framing effects. Framing is integral to influencing a message's communication in the context of a specific audience. This communication message may be a question, an objective statement, or an attribute defining an item or an event.

For instance, advertisers specialize in leveraging language to frame messages that will achieve a particular outcome. Specific words elicit particular reactions; therefore, the aim is to implement vernacular that engenders a positive frame for any given product. High-end auto sales may use words like, "luxurious" and "well-appointed" while sidestepping

"expensive" and "over-priced." Similarly, an advertisement for a used car might insert copy like, "affordable" and "dependable" as opposed to "cheap" and "sturdy."

Advertising uses this strategy consistently; however, politics are even more fertile advertising grounds for employing framing effects. Case in point, the constantly changing buzzwords and political terminology, invented and reinvented to root in public opinion's positive side. Frank Luntz, a well-respected political consultant, and known for his work with Republican candidates on framing various talking points and buzzwords, makes them more palatable to the public. The shift from "global warming" to "climate change" is an example of Luntz's re-framing.

1.2. Valence Framing on Attributes

The way a message is *framed* often has a significant impact on how decision makers process that message and react to it. Hence, decision makers may respond differently to different descriptions of the same decision problem (Frisch and Jones 1993). In other words, framing problems impacts decision makers' perceptions and evaluations (Levin and Gaeth 1988; Heath, Chatterjee, and France 1995). Strong empirical evidence for framing effects include changing preferences between certain and uncertain options solely based on how options are communicated (Kahneman and Tversky 1979), despite the fact that both options mean the same amount of cost to consumers, e.g., experiencing difficulty in accepting a surcharge than foregoing a discount (Thaler 1980). In the context of sales promotions, for instance, consumers' purchase intentions have been found to change depending to how discount information is framed (Diamond and Johnson 1990; Kahneman and Tversky 1979).

The *framing effect* refers to a broad domain, which is beyond the scope of the current dissertation. The present discussion is limited to the "*valence framing effects*, wherein the frame casts the same critical information in either a positive or a negative light" (Levin, Schneider and Gaeth 1998, p. 150). Levin, Schneider, and Gaeth (1998) provide a taxonomy of framing effects into three categories: attribute framing, risky choice framing, and goal framing.

Risky choice framing entails two options in a forced-choice task. The two options are characteristically gambles that can be designated via quantities and possibilities of expansion or loss. In *goal framing*, an activity (e.g., wearing seatbelts) is encourage of subjects. This request includes a portrayal of either the *advantages* of participating or the *disadvantages* of *not* participating. In *attribute framing*, a distinct attribute of a particular object is defined as either a positively valenced proportion or a comparable negatively valenced proportion. The subject evaluates the entity described. The typical finding is a *valence-consistent shift* (Levin, Schneider and Gaeth 1998): Objects designated as a positively valenced proportion are typically appraised more positively than objects referred to as the negatively valenced proportion.

In a classic framing example, when consumers are faced with a decision between two packages of ground beef, one labeled '*80% lean'* and the other '*20% fat'*, which would more likely to be more appealing to them? Keep in mind, the meat is exactly the same; however, most consumers would pick '*80% lean'*. Another example of the framing effect is when a program that has '*50% probability of success*' is regarded as being more favorable than one that has a '*50% chance of failure*', despite the fact that they both indicate the same performance.

What about products that are worded as 99% pure? Would people feel the same if the same branding stated 1% impurities? It is the same product: both expressions imply the same meaning. However, the phrasing of the questions elicits different responses.

Regarding politics, strategists frame information when they emphasize, minimize, or blur information, depending on the goal. For example, an incumbent who was not present to vote on 14 important issues sounds much worse than conveying a near perfect attendance record. Framing is quite effective in the political arena — political marketing agencies know that smear campaigns and negative ads work, as viewers will have an emotional response to them, irrespective of whether they like them. This is important because a portion of of the viewing or listening audience will allow their emotions to prevail over rationality.

This dissertation offers intriguing evidence in terms of the extent where *numerical information* (i.e., attribute values) modulates the impact of *valence description* of information (i.e., attribute labels) on the evaluation process, or, the *valence framing effect*. Moreover, the question is posed as to whether it is possible to manipulate attribute valence without changing attribute values and labels across framing conditions. If so, does positive framing result in significantly more favorable evaluations than negative framing? Findings highlight the importance of incorporating numerical information within the evaluative models of positive and negative information.

1.3. Focus of The Present Dissertation: Attribute Framing in Marketing

Broadly-speaking, framing is an essential to communication processes. Marketing is a perfect example of such. Because, framing effects are influential, they have an impact on consumers. Although prior research provides ample evidence for attribute framing effects

(e.g., Levin and Gaeth 1988; Levin, Johnson, Russo and Deldin 1985; Levin et al. 1998), evidence is based on laboratory studies, which does not necessarily accurately represent real-world applications. In real life, attribute framing has been constantly employed in the marketplace, especially in product descriptions. However, there is a great variation across the types of attributes, as well as products, in the marketplace. The current dissertation questions whether framing implications in the marketplace might differ in terms of effectiveness and product diversity.

Therefore, in order to make a prediction for the comparisons between different product categories with different product combinations, it is necessary to consider both the effect of associative processing and numbers on evaluations. Next, I discuss differences across products and attributes that might be relevant to framing effects in the marketplace.

1.3.1. Different types of framing practices

Despite the extensive evidence for the superior performance of positive frames over negative ones in producing favorable responses (e.g., Levin and Gaeth 1988; Levin et al. 1998), positive framing is not the only strategy that marketers have been using on product descriptions. Negative framing is also widely common. For example, Figure 1.1 shows an example of a framing application on yogurt products, while Figure 1.1 depicts an example of using negative frames while describing product attributes. Previous findings on valence framing effects would recommend avoiding the use of '*2% milk fat'* (negative framing) due to the potential negative associations that will be triggered in consumers' minds (e.g., Levin and Gaeth 1988; Levin, Johnson, Russo and Deldin 1985; Levin et al. 1998). According to those findings, such negative associations will be more likely to be converted into unfavorable evaluations for this product, hence the likelihood of purchasing will decrease. Marketing strategies are often revised in response to the reactions in the market; yet, we see a

number of such applications of negative framing in the marketplace. Therefore, one may ask whether and why research findings on framing effects contradicts real life framing strategy applications?

Moreover, as can be seen on Figure 1.1, some products provide both positive and negative label information. While previous research does not predict the effectiveness of using both positive and negative cues *simultaneously*, it seems reasonable to assume that providing them together will lead to more favorable responses (as compared to giving only the negative piece of information), resulting in less favorable responses than providing only the positive piece of information. What kind of an advantage would it bring to provide the negatively framed attribute (e.g., 15% fat) in addition to the positively framed information (e.g., 85% lean)?

Figure 1.1: Examples of Positive Framing, Negative Framing, Both

Such variety in attribute framing practices is a clear contradiction with the robust finding of the favorability of positive frames over the negatives – the valence framing effect. These various applications bring sales effectiveness of different attribute framing strategies into question.

1.3.1. Different product combinations

It is no surprise that different products have different combinations of favorable and unfavorable ingredients. For instance, the percentage of fat content ranges between 5% and 30% for meat products, whereas the range is between 0% and 4% for dairy products. One may ask if consumers exposed to the positively framed attribute will make more favorable evaluations than those exposed to the negatively framed attributes for *both* of these product categories. In other words, do framing effects depend on numbers, i.e., attribute values, or are they merely a function of valence, i.e., attribute labels?

On the one hand, research explaining the framing effects with associative processing would predict no different framing effect between those different product combinations. Krishnamurthy, Carter, and Blair (2001) state that positively framed options "generate more positive associations and thus seems more attractive than negatively framed options" (p. 383). Hence, with no prediction on any possible impacts of attribute values on judgments, the associative processing explanation suggests that positive associations are triggered by positively framed labels and converted into favorable evaluations, as opposed to unfavorable ones.

On the other hand, the answer would possibly be *no* according to findings of Janiszewski et al. (2003), who suggest that framing effects "depend on the range and level of reference values used to evaluate attribute information" (p. 311). Specifically, they found that when the range of reference values is narrower (vs. wider) for a positive frame, attribute values beyond anticipated performance levels support the positively (vs. negatively) framed information and attribute values below expected performance levels favor the negatively (vs. positively) framed information. Although their research is relevant, Janiszewski et al. (2003) provide insights *only* on how small versus big numbers in positive versus negative framing

conditions are evaluated differently, omitting how the number effect may *interact with* framing effects on evaluations, which is a limitation to their research.

1.3.2. Different product types

Products vary in terms of the percentages of favorable and unfavorable components to which they are made. Positive and negative framing on such products refer to presenting them *only* with the percentage and the label of favorable and unfavorable components, respectively. The percentage of the favorable component relative to that of the unfavorable component is what brings variety to products in terms of the valence framing effect.

Some products are composed of a greater part of a favorable component. For example, the lean part of ground beef is significantly greater than the fat part. On the contrary, some products may have the favorable component to a smaller amount compared to the unfavorable component. In meat pasta sauce, given that meat is the favorable component, the source is composed of mostly tomato sauce rather than meat.

More specifically, consumers may want the amount of fat to be minimal while evaluating ground beef and milk. In these examples, the fat percentage in ground beef and milk is an unfavorable component and is relatively smaller than the lean percentage of the products. It is important to notice that, in those examples, what is favorable is relatively *greater* than what is unfavorable. In contrast, when judging pasta sauce, consumers may like the meat portion to be more. In the context of chocolate, one may prefer a greater percentage of cocoa (on the assumption that they like bitter chocolate better than the milk chocolate). Hence, the meat in pasta sauce and cocoa in chocolate are favorable components. In these examples, the favorable component is relatively *smaller* than unfavorable components. Prior studies on framing effects would be silent to make any predictions as to whether the framing effect would differ between these two examples.

The variation among product specifications is analogous to the perceived attractiveness of probabilistic events. Consider two gambles: one has a '70% chance of winning' and the other has '10% chance of winning'. In the former, it is more likely to win than lose, whereas in the latter, losing is more likely than winning. Hence, the former game may be considered as an *inherently attractive* gamble, while the latter as *inherently unattractive*. The question of interest in the present dissertation is whether the valence consistent shift (Levin, Schneider and Gaeth 1998) will hold for *both* games, no matter if the inherent valence is positive or negative. In the context of product evaluations, I ask the following question: Are consumers more likely to evaluate positively framed attributes more favorably, irrespective of *inherent valence* of the attribute, i.e., whether the favorable component is *greater* or *smaller* than the unfavorable component?

1.3.3. Different attribute types

Although positive versus negative framing can still be employed, not all product descriptions are described in percentage terms (e.g., all natural flavors vs. no artificial flavors). For some products, it is not even possible to put the attributes in percentages (e.g., crunchy rice, real fruit pieces, regulating digestive system vs. easing digestive problems). This being the case, is it still possible that consumers are susceptible to valence manipulation on attributes in decision making processes? Or, is valence framing only applicable as long as attributes are presented in terms of percentages? The present dissertation focuses on those questions and offers insights regarding the role of attribute framing in the marketplace.

1.4. Goal of The Present Dissertation: Exploring The Role of Attribute Complementarity on Framing Effects

In its broadest sense, the goal of the present dissertation is to understand the role of numbers on framing effects. In particular, the objective is to explore the impact of complementarity (i.e., percentage structure) of positively and negatively framed attributes on evaluations. In four essays, the present paper investigates the role of attribute values (numbers) on framing effects, above and beyond the effect of attribute labels (valence).

Previous studies have only used a certain type of attribute, termed *complementary,* which frames the information valence either positively or negatively. As discussed, in the complementary attributes, *different* attribute labels (e.g., success vs. failure rates) and *complementary* attribute values (e.g., 90% vs. 10%) have to be used in order to highlight either positive or negative aspects of the same attribute. Such a complementary structure in framed attributes is particularly important because it forces the attributes in positive and negative frames to be *dependent* on each other. For instance, performance of a product might be conveyed as '*90% success rate*' or '*10% failure rate'*. When there is an increase in the success rate, there must be a proportional decrease of the same amount in the failure rate, so that attributes in positive and negative framing conditions convey the same information. Hence, attribute values in positive and negative framing conditions always have to be *complementary* to each other, i.e., sum to 100%.

As previous research suggests, the framing effect is based on emotional responses, which are evoked by attribute labels (e.g., Levin and Gaeth 1988; Levin et al. 1985; Levin et al. 1998). The main thesis of this dissertation is that the *complementarity* structure of attributes has important influences on these emotional responses, and consequently, on final evaluations. Given the fact that prior studies have only used the complementary attributes, it

is posited that observed framing effects might be, at least partially, misattributed to the impact of attribute labels. This leads to the main hypothesis:

The complementarity of positively and negatively framed attributes has a significant impact on the framing effects. This effect is driven by the attribute values and is different from the effect of attribute labels. However, impacts of attribute labels and attribute values interact with each other, leading to a compound effect on final evaluations.

To clarify, imagine that a person wants to buy a pair of headphones and is looking at online product reviews for an alternative, Brand A. Imagine further that the online reviews are provided in terms of '*percentage of satisfied customers*' who have purchased the product previously. According the the vast amount of evidence in the attribute framing literature, one will be more likely to buy Brand A, if presented with the review information given as the *percentage of satisfied customers,* as opposed to *percentage of dissatisfied customers*.

Likewise, previous findings on framing effect would also predict that one will make more favorable evaluations for all four alternatives in Table 1.1 to some extent which is not comparable to one another, when confronted with the percentage of satisfied (vs. dissatisfied) customers. In other words, comparisons among the strength of framing effects on evaluation of these alternatives cannot be made based on the existing research on framing. In this dissertation, it is argued that the strength of the framing effect will vary for each alternative, depending on the attribute values in positive and negative framing conditions.

Product A		**Product B**		**Product C**		**Product D**	
Positive Framing	Negative Framing	Positive Framing	Negative Framing	Positive Framing	Negative Framing	Positive Framing	Negative Framing
70% satisfied	30% dissatisfied	90% satisfied	10% dissatisfied	30% satisfied	70% dissatisfied	75 points *the more, the better*	75 points *the less, the worse*
(+) > (-)		**(+) >> (-)**		**(+) < (-)**		**(+) > (-)**	

Table 1.1: Alternatives varying in customer reviews

First, Brand B has a greater percentage of satisfied customers than does Brand A. Therefore, it is put forth that the asymmetry in responses to positive and negative information varies with attribute performance, such that more different attribute values in positive and negative conditions result in stronger framing effects. As a result, a stronger framing effect on evaluations of Brand B than those of Brand A is expected. Furthermore, Brand A has a greater percentage of satisfied customers than that of dissatisfied customers. In contrast, Brand C has a greater portion of dissatisfied customers than satisfied. In other words, while Brand A has a satisfactory performance (i.e., having more satisfied than dissatisfied customers), Brand C has a rather unsatisfactory performance (i.e., having more dissatisfied than satisfied customers). In the current conceptualization, Brand A has a *positive inherent valence* while Brand C has a *negative inherent valence*. The thought is that attribute framing effects decrease, and may even be reversed, when the evaluated item is inherently negative (i.e., having a *greater negative* and *smaller positive* attribute value). Therefore, the positive framing might even hurt evaluations of Brand C, and as a result, negative framing might lead to more favorable evaluations than positive framing. Prediction are explained through the filter of *reverse associations*, which are negative in valence but triggered by positively framed attributes.

Finally, it is assumed that reviews are provided with a different criterion, based on the number of satisfied and dissatisfied customers for Brand D, rather than the percentage of satisfied versus dissatisfied customers. Interpreting the given score to infer favorable or unfavorable performance of the given product occurs as follows: *greater numbers indicate a more satisfactory performance* versus *smaller numbers indicate a more dissatisfactory performance*. Prior research does not predict whether and why this definition would affect evaluations. According to the present dissertation, however, exposure to the description presented in positive terms will increase the perceived favorability of the product while being exposed to the negatively termed description will decrease its favorability – even though the attribute values in positive and negative valence conditions are identical.

1.5. Overview of The Present Dissertation

This dissertation consists of four essays, three of which examine a different aspect of complementarity in positively and negatively framed attributes as well as their impacts on evaluations. More specifically, positively and negatively framed attributes have: (i) different labels, leading to an *inference* effect; (ii) different (complementary) values, leading to a *number polarization* effect; and (iii) may cause *valence-incongruity* between attribute labels (i.e., framing valence) and the inherent attribute valence, generating *reverse-associations* in minds. The first three essays explore these effects, respectively. In the final essay, the complementarity effect is controlled, which has been shown to interact with framing effects on evaluations in the aforementioned ways. To do so, positivity and negativity on *non-complementary* attributes are manipulated, capturing only the effect of attribute labels (i.e., framing) on judgments. Next, is provided a brief overview of each essay.

1.5.1. Different labels on complementary attributes: inference

Attribute framing effects violate the principle of description invariance, i.e., identical situations will be assessed in the same manner, notwithstanding of problem description (Tversky and Kahneman, 1986). Hence, description invariance principle suggests that equivalent descriptions, such as *75% lean* and *25% fat*, should lead to identical evaluations; however, studies on attribute framing effects indicate that positively termed *75% lean* label results in more favorable responses than does the negatively termed *25% fat* label of the same attribute. Most of the research to date has focused on the explanations, causes and boundary conditions of attribute framing effects, while the question of what makes an attribute frame *positive* or *negative* has been overlooked.

Essay 1 endeavors to fill this gap by examining the *valence description* of an attribute frame in the way that has been specified in prior research. Specifically, in reviewing the past studies on framing, attribute valence has been manipulated via only one type of an attribute: *complementary* attributes. In the complementary attributes, different attribute labels (e.g., success vs. failure rates) and complementary attribute values (e.g., 90% vs. 10%) are used in order to highlight *either* positive *or* negative aspects of the same attribute.

However, due to the complementary structure, an attribute frame does not necessarily convey *either* positive *or* negative information. In fact, attribute frames, as used in previous studies, can evoke positivity and negativity *simultaneously*. More specifically, it is proposed that due to such complementary structure of framed attributes, in the context of positively framed attributes (e.g., 50% positive reviews), decision makers not only make evaluations based on the positively framed attribute, but also *infer* the negatively framed attribute (e.g., 50% negative reviews). Likewise, when presented with a negatively framed attribute (e.g., 10% fat), decision makers may infer and process also the positively framed attribute (e.g.,

90% lean). Therefore, in this essay, the validity of such an *inference* proposition is examined, further exploring its consequences in the domain of attribute framing as well as in multi-attribute evaluations.

Results of four experiments reveal important findings that would actually contradict the intuition, which would suggest that positive cues presented with the negative should *increase* the overall favorability of the evaluated item. Results suggests that simultaneous processing of positive and negative cues decrease the attractiveness of the evaluated item, and consequently hurt final evaluations. By implementing prompted and free association writing procedures, exposure to either negatively or positively framed attributes triggers *both* positive and negative thoughts. Moreover, positive attributes are shown to be more likely to evoke negative thoughts than negative attributes are likely to evoke positive ones. As a result, assessing positive and negative associations together results in a significant negative impact on evaluations. The proposed effect of simultaneous processing of positive and negative cues on single-attribute evaluations to multi-attribute evaluations may be generalized to multi-attribute evaluations, such that the negative effect of inference is resistant to the impact of added positive attributes. Findings provide important insights as to implications of attribute framing in the marketplace.

1.5.1. Different values on complementary attributes: number polarization

Previous research has shown that decision makers evaluate positively framed attribute information more favorably than negatively framed attribute information. Research has attributed this finding to the affective associations triggered by attribute *labels* (e.g., Levin et al. 1998) without accounting for any possible influence of attribute *values.* Other studies have explained framing effects with attribute *values* (e.g., Janiszewski et al. 2003), without determining the influence of attribute *labels*. Taking both attribute *labels* and *values* into

account, Essay 2 submits an alternative explanation through the filter of a comprehensive framework for attribute framing effects.

In the proposed framework, both label and value of an attribute are significant factors, contributing to attribute framing effects on evaluations. Specifically, the amount and strength of associations, evoked by a positively or negatively framed attribute, are functions of attribute numbers as well as labels. To the extent that those associations are then converted into evaluations, both attribute numbers and labels should be considered as drivers of attribute framing effects.

The main thesis in Essay 2 is that framing effects are driven by attribute labels, while attribute values moderate this relationship by affecting the amount and strength of associations evoked by attribute labels. Results of three experiments provide support for this proposition. Specifically, as attribute values in positive and negative framing conditions grow farther in distance from each other (e.g., 80% and 20% vs. 50% and 50%), attribute labels result in an attenuated framing effect. This finding is explained with *number distortion*, i.e., that is objective attribute values are distorted in one's mind such that the smaller attribute value is overweighted and the greater attribute value is underweighted. Importantly, overweighted values will result in more elaborate thinking and thorough evaluations. As a result, a smaller attribute value will trigger more/stronger associations, irrespective of whether the attribute frame is positive or negative. For the underweighted values, the opposite will be the case—less/weaker associations will be evoked. Therefore, consumers will be more likely to make biased evaluations when evaluating a framed ground beef with *70% lean* versus *30% fat* labels than when they are evaluating a bottle of milk with *98% non-fat* versus *2% fat* labels.

Synthesizing previous results across different studies on attribute framing finds that while significant, affective associations evoked by attribute labels are not the only factors behind the framing effect; attribute values play a significant role on framing effects as well. The current study provides important insights as to sales effectiveness of message framing across product categories, among which there is a significant variation in terms of product specifications, e.g., the percentage of fat content ranges between 5% and 30% for meat products, whereas the range is between 0% and 4% for dairy products.

1.5.2. Valence-incongruity on complementary attributes: reverse-associations

Previous studies on attribute framing have documented a robust valence-consistent shift, whereby positively valenced options (e.g., 75% success rate) are preferred over equivalent negatively valenced options (e.g., 25% failure rate). However, this research has typically explored how *valence of attribute labels* influences judgments, omitting the possible impact of the *inherent valence* of an attribute (e.g., 70% success and 30% failure rate indicate inherently positive valence, 30% success and 70% failure rate indicate inherently negative valence). Moreover, framed attributes have typically included a greater favorable component and a smaller unfavorable component across framing conditions in prior research (for exceptions, see Janiszewski, Silk, and Cooke 2003), such as 70% lean vs. 30% fat of ground beef (e.g., Johnson 1987), or 10% chance of winning vs. 90% chance of losing (e.g., Loke and Tan 1992).

Essay 3 examines how *label valence* interacts with the *inherent valence* of attributes to influence judgments. That is, the framing effect on evaluations, not only for inherently positive items (i.e., favorable part is greater than the unfavorable part) but also for inherently negative items (i.e., unfavorable part is greater than the favorable part) are studied. In cases where framed attribute is inherently negative and attribute label is presented in positive

terms, the framing effect is diminished and may even be reversed. This phenomenon is referred to as the *valence-incongruity* effect because similar to the well-known behavioral and perceptual contrast effects in psychology (e.g., Cialdini 1993; Crusius and Mussweiler 2012; Dijksterhuis et al. 1998; Schubert and Hafner 2003), findings suggest that the influence of positive and negative cues on evaluations may vary with the existence of other cues with different valence.

Drawing on the Associative-Propositional Evaluation model (Gawronski and Bodenhausen 2011) inherent valence of an attribute generates propositional beliefs that are considered relevant for an evaluative judgment, which may be consistent or inconsistent with the associations activated in memory. If outcomes of associative and propositional processes are inconsistent with each other, then such a conflict will likely hurt final evaluations, in spite of the positive associations (evoked by positive framing), or positive inherent valence of an attribute. As a consequence, positive associations will be converted into *unfavorable* evaluations, which are called *reverse associations*.

In line with predictions, results of four experiments reveal that decision makers think of reverse-associations regarding an inherently negative attribute (e.g., for a student performance: a greater number of the wrong answers than of the correct ones) when presented in a positive frame, as compared to a negative frame. As a result, decision makers evaluate the positively framed attribute less favorably than the negatively framed attribute. As to the underlying processes of this negative effect, decision makers rely on affective cues from negatively framed attribute labels when inherent valence is positive. In contrast, decision makers rely on propositional cues in the context of the negative inherent valence when the attribute is framed positively. In addition, attribute performance moderates the

proposed conflict such that the valence-incongruity effect is most pronounced when both frame valence and inherent valence are negative and attribute performance is unfavorable.

1.5.3. Framing effect on non-complementary attributes

In attribute framing studies, some characteristic of an object or event serves as the focus of the framing manipulation (Levin et al. 1998). For example, burger patties have been the subject of the framing manipulation in many of the past studies (e.g., e.g., Levin and Gaeth 1988; Levin et al. 1998). The positively framed attribute may be the *lean percentage*, while the negatively framed attribute may be the *fat percentage* of the patties. It is important to note that in positively and negatively framed attributes, information valence is elicited with *different* labels in positive and negative frames (e.g., success vs. failure rates). Moreover, attribute values in positive and negative framing conditions are *complementary* to each other (e.g., 90% and 10% summing up to 100%). Thus, attribute framing is essentially manipulating information valence by using two different attributes in positive and negative framing conditions. For example, student performance is an attribute that may be described in positive terms as *percentage of correct answers* and in negative terms as *percentage of wrong answers*, where the percentages of correct and wrong answers show the same performance. The present essay refers to those types of attributes as the *complementary* attributes.

To date, attribute framing effects have been revealed only through the complementary type of attributes. Hence, previous research on framing cannot predict whether using *different* labels or values across attribute frames (i.e., complementary attributes) is necessary, *or* whether focusing the decision maker on more positive or negative aspects leads to positive-negative asymmetry in responses; which makes it possible to use the *same* labels and values in positive and negative frames (i.e., non-complementary attributes). Essay 4 aims to answer these questions. More specifically, this research examines whether the robust finding of

valence-consistent shift in attribute framing effects (Levin et al. 1998) will prevail also on the *non-complementary* attributes, which are not defined in percentage terms, e.g., battery life of a smartphone, screen resolution of a laptop, amount of sugar in a bottle of jam.

Results of three experiments indicate that (i) non-complementary attributes are susceptible to attribute framing, (ii) framing effect is more prominent on inherently positive attributes (e.g., food quality) than inherently negative (e.g., commuting distance), and (iii) attributes with more ambiguous value ranges (e.g., noise level of a vacuum cleaner) lead to stronger framing effects as compared to more definite value ranges (i.e., commuting time). These findings may provide important implications for product positioning, product labeling, and advertising messages.

2. INFERENCE IN ATTRIBUTE FRAMING EFFECTS: HOW CO-ACTIVATION OF POSITIVE AND NEGATIVE ASSOCIATIONS HURTS EVALUATIONS

2.1. Introduction

Why do decision-makers evaluate ground beef more favorably when they read the packaging description of *75% lean* versus *25% fat* (Levin and Gaeth 1988); or, why are they willing to allocate more funds to research teams, when team performance is framed in terms of *success rates* rather than *failure rates* (Duchon et al. 1989)? Levin, Schneider, and Gaeth (1998) explain this phenomenon with *valence-based associative processing*—that is, negative framing triggers more negative associations than positive framing triggers positive associations. Donovan and Jalleh (1999) tested this explanation and found that seeing a pack of ground beef with the *75% lean* resulted in participants writing more positive expressions, (e.g., *healthy, good for you)*, whereas, seeing the *15% fat* elicited more negative expressions (e.g., *unhealthy, bad for you, yuck)*.

Attribute framing effects violate the principle of *description invariance* (Tversky and Kahneman 1986), which states identical problems will be evaluated in the same way, regardless of the description. Hence, description invariance principle suggests that equivalent descriptions, such as *75% lean* and *25% fat*, should lead to identical decisions. Most of the research to this date has focused on the explanations, causes and boundary conditions of attribute framing effects, while the essential question of *what makes an attribute frame positive or negative* has been overlooked. This essay aims to fill this gap by examining the *valence description* of an attribute frame, similar to how it has been specified in prior research: framing an attribute in positive vs. negative terms. The main premise guiding this research is that an attribute frame does not necessarily convey *either* positive *or* negative

information. In fact, attribute frames, as used in previous studies, can evoke positivity and negativity simultaneously. Therefore, in this research the validity of such an *inference* proposition is examined, further exploring its consequences in the domain of attribute framing.

2.2. Explanations for Attribute Framing Effects and Mixed Findings

The attribute framing effect may be about how a question is asked, how information about a situation is presented, or how a decision is described (Levin et al. 1998). It has been observed across different judgment types, such as item and performance evaluations or gambles. Item evaluations describe performance using a positively or negatively valenced attribute label, such as automobile judgments (Levin, Jasper and Gaeth 1996) and ground beef (Levin and Gaeth 1988). Performance evaluations describe performance in terms of success versus failure rates, as indicated in evaluations of job programs (Davis and Bobko 1986), project teams (Dunegan 1993), medical management (Levin et al. 1988), and condom use (Linville, Fischer, and Fischhoff 1993). Likewise, gamble outcomes can be described in terms of the probability of winning or losing (Levin et al. 1985; Levin et al. 1986).

The most fundamental explanation of framing effects may be attention-driven (Keren 2012). Capacity limitations of the cognitive system (e.g., Baumeister et al. 2001) force decision makers to make some selection in allocating their attention among various stimuli. Consequently, decision makers can only attend to a limited number of stimuli, or aspects of a stimulus, at a given point in time or given matter. Framing operates as a zoom lens (Eriksen and James 1986), focusing decision makers' attention on some, but not other aspects of the stimulus. The final decision changes according to the valence of the focused aspects.

For example, in goal framing, engaging in an activity might be recommended by emphasizing the advantages of participating, or the corresponding disadvantages of not participating. Levin et al. (1998) show that emphasizing the disadvantages of not participating is more persuasive than stating the advantages of engaging in that activity. Similarly, in attribute framing effects, attention is directed to certain aspects of an attribute while suppressing others. It enhances a particular interpretation of the given attribute and results in a specific response to that information. More specifically, positive frames direct attentional resources to favorable evaluations, while negative frames cue the decision process toward unfavorable evaluations.

The present research focuses on attribute framing effects. Previous research suggests that attribute information is encoded relative to its descriptive valence; thus, attribute framing effect is an *encoding bias* (e.g., Levin et al. 1985; Levin and Gaeth 1988). Specifically, it is suggested that positive framing leads to an encoding of the attribute information that is likely to trigger favorable associations in memory, whereas negative framing of the same attribute leads to encoding that elicits unfavorable connotations (e.g., Levin et al. 1988). Levin et al. (1998) provide empirical support for such an *associative model* in order to explain attribute framing effects. They gave subjects four scenarios with attribute framing manipulations, asking them to rate pairs of positive and negative words presented in alphabetical order, after reading each scenario. They next calculated an index by subtracting the total ratings for positive words from that of negative words, finding that the index was significantly higher in the positive (vs. negative) framing conditions. The main conclusion was that positive framing leads to positive encoding, which highlights positive aspects of the given attribute, while negative framing results in negative encoding, which highlights negative aspects of the same attribute. Attribute framing effects arise from the asymmetry between evaluations in positive

and negative framing conditions as a result of the difference between the associations triggered during the encoding phase.

Levin et al. (1998) provide an extensive review of the prior work, concluding that valence-consistent shift is a homogenous phenomenon, wherein the positive framing of attributes leads to more favorable evaluations than negative framing. Despite the empirical support for the significant attribute framing effects, prior findings also suggest that attribute framing effects can actually be mitigated in several contexts. For instance, strongly held attitudes, or high involvement in the decision making process, are less susceptible to attribute framing effects (e.g., Levin, Schnittjer and Thee 1988). Marteau (1989) did not find framing effects across an assortment of problems involving decisions related to abortion. Levin, Schnittjer and Thee (1988) found that the general incidence of cheating was rated higher by participants who received the phrase, *65% of the students had cheated during their college career* as compared to participants who received, *35% of the students had never cheated*; however, no difference was found between conditions when participants were asked to indicate whether they themselves would change their own answers on an exam, or turn in a cheater.

Similarly, attribute framing effects are routinely found when someone else's performance is described in terms of percentage correct versus percentage wrong (e.g., Levin 1987; Levin, Johnson, Russo and Deldin 1985), but there is typically no framing effect when decision makers estimate their own performance using these different terms (e.g., Schneider 1995; Sniezek, Paese and Switzer 1990; Koriat, Lichtenstein and Fischhoff 1990). In these instances, the framed attributes apparently receive no significantly different weights across positive and negative framing conditions, and attribute framing effects become negligible.

Despite the range of application domains in attribute framing research, the *format* of positively and negatively framed attributes was identical in the aforementioned studies: attribute values were given in percentages and attributes were framed with different labels in positive and negative valence conditions. In the present essay, this type of attribute is referred to as a *complementary attribute,* and it is suggested that there is a significant impact of complementarity structure of attributes on framing effects, above and beyond the impact of the attribute labeling (valence) on evaluations. This impact can account for the mixed findings of attribute framing effects observed in previous research.

2.3. Valence Framing in Complementary Attributes

In attribute framing studies, some characteristic of an item or event serves as the focus of (valence) framing manipulation (Levin et al. 1998). Typically, a single attribute within any given context is the subject of valence framing (e.g., student performance in a test). Levin et al. (1998) defined attribute framing as "describing situations in terms of success versus failure rates" (p. 159). Valence framing implies the use of *two different attributes* in positive and negative framing conditions. For example, *number of correct* and *wrong answers* in a test may be a positively and negatively framed attribute, respectively, indicating performance of a student. Such framed attribute pairs are basically components of an attribute, as student performance in the previous example.

According to the proposed conceptualization in this essay, an attribute is a *complementary* attribute when it is defined in terms of two components, one of which is more favorable than the other. Note that the degree of favorability of an attribute component should be interpreted with caution, since the plausible range for favorability/unfavorability is essentially context-dependent. For instance, although aloe-vera (vs. soap) may be regarded as

the favorable component of a moisturizing soap, nobody would like a 100% aloe-vera soap. On the contrary, as for a student performance evaluation, 100% correct answers would be the most favorable performance value. Thus, the acceptable range includes 100% favorable component in the latter, but not in the former example.

Therefore, any attribute that constitutes one favorable and one unfavorable component is referred to as a complementary attribute. For instance, suppose a teacher is evaluating students based on test performance. Performance scores might be reported in terms of the *percentage of correct* or *wrong answers* of students. Performance of a student increases (vs. decreases) with a greater number of correct (vs. wrong) answers. In the context of purchasing a pair of headphones, for example, before deciding which one to pick, one checks the online reviews for available options. Product reviews might be given in terms of the *percentage of satisfied* or *dissatisfied customers*. The attractiveness of an alternative increases (vs. decreases) as more customers have been satisfied (vs. dissatisfied) with it.

Complementary attributes are mostly, but not necessarily, structured in percentage terms. Attribute values in these components always sum into a *single whole*, which might be an attribute (e.g., Johnson 1987), a program (e.g., Davis and Bobko 1986), or a group of entities such as a class of students (e.g., Loke and Tan 1992) or users of a product (e.g., Beach et al. 1996). Despite different plausible ranges across attributes, the relationship between positive/negative attribute values and overall favorability can be clearly described as the following: *favorability increases with an increase in one component (e.g., correct answers), and decreases with an increase in the other component (e.g., wrong answers).* This is an important definition because it addresses how positivity and negativity can be manipulated in an attribute. In this research, two effects are proposed that may arise from

using complementary attributes in attribute framing effects: (i) *inference* of the other component, and (ii) *co-activation* of positive and negative associations.

2.3.1. Possibility of inference

Framed attributes are components of a whole (e.g., 100%), which are essentially opposites of each other: one component is regarded as positive (e.g., increasing the percentage of meat in meat pasta sauce is valuable) while the other component is perceived as negative (e.g., increasing tomato sauce percentage in meat pasta sauce is unfavorable). In other words, framing manipulation is providing *only* one component of a complementary attribute (e.g., 99% clear signal), but not the other component (e.g., 1% signal distortion). When presented with a framed attribute, decision makers are likely to infer the other component of that attribute. For example, given the percentage of correct answers, (x)%, one may simply calculate the percentage of wrong answers, (100-x)%. Considering the fact that previous studies on attribute framing have always used complementary attributes, the possibility of *complementary-inference* is missing from the literature, and therefore merits investigation. More specifically, when exposed to a positively (negatively) framed attribute, decision makers may infer the negative (positive) complement of that attribute.

Inference of the complementary attribute is not rational since there is no benefit in terms of the additional informational value of the complementary attribute, even though there is a definite cost related to additional cognitive work. However, for high-involvement decision processes, and/or when the need for information processing is high, decision makers may be willing to make such inferences. In the current context, that would imply that a decision maker who is not satisfied with the existing information may seek additional information, consequently calculating and evaluating the complementary attribute as if it provides a new piece of information.

Evidence from neuroscience is also aligned with the partial independence of positive and negative evaluative mechanisms or systems (Berntson, Boysen and Cacioppo 1994; Gray 1987; Gray 1991). Evaluations have traditionally been conceptualized as falling along a bipolar dimension. That is, evaluations of the positive and negative information have been regarded as being equally actuated, making the bipolar rating scale the measure of evaluation (Cacioppo and Berntson 1994). However, previous research shows that the underlying mechanisms of negativity and positivity are in fact separable and partially distinct from each other (e.g., Cacioppo and Berntson 1994; Larsen, McGraw and Cacioppo 2001). Therefore, using a bipolar valence dimension (*either* more positive *or* more negative) as a summary outcome may limit our understanding of the positive-negative asymmetry in decision making processes, when that asymmetry uses complementary attributes.

Given the asymmetric responses to positive and negative information, I expect that inference likelihood changes across positively versus negatively framed attributes. Previous studies indicate that decision makers perceive negative information to be more accurate than positive information (e.g., Hilbig 2009), and find negative instances more informative and persuasive than positive ones (e.g., Meyerowitz and Chaiken 1987; Peeters and Czapinski 1990). Accordingly, it is hypothesized that inferring the negative-complement when a positively framed attribute is given becomes more likely than inferring the positive-complement when a negatively framed attribute is given.

Hypothesis 1: *Decision makers will be more (vs. less) likely to infer the complementary attribute when they are given a positively (vs. negatively) framed attribute.*

As discussed earlier, and according to valence-based association processing explanation, positive framing triggers more favorable associations and supports more favorable evaluations; negative framing evokes more negative associations and supports less

favorable evaluations (Levin et al. 1998). In contrast to this explanation, the proposed inference hypothesis suggests that positively framed attributes might trigger negative associations and negatively framed attributes might trigger positive associations. Considering both the valence-based associative processing hold true, and inference is significant in attribute framing manipulations, the questions becomes: *how do these two combine to form the overall evaluations?* One prediction could be an additive model, which forecasts that final evaluations to be an additive sum of the individual impacts of the triggered positive and negative associations. Next, the consequences of inferring complementary attribute while processing a positively or negatively framed attribute information are discussed.

2.3.2. Coactivation of positive and negative associations

Intuitively, it may not seem surprising that when positive and negative associations are simultaneously triggered in one's mind, the overall impact of those associations on evaluations is the sum of the individual effects of each of those associations. As a result, negative associations decrease the favorability of final evaluations that positive associations produce, and positive associations decrease the unfavorability of final evaluations that negative associations produce.

This is how Levin et al. (1998) tested the role of valence-based encoding in attribute framing effects. They asked subjects to rate positive and negative terms after reading positively or negatively valenced scenarios. They then created an Associative Valence Index by summing the ratings for negative terms and subtracting that from the sum of positive terms. Their results showed that this index was significantly higher in the positive attribute framing condition than in the negative attribute framing condition.

Intuitively, the attribute framing effect should decrease as a result of the inference possibility – as the difference between favorability of evaluations in positive and negative

framing conditions will decrease. However, the intuition might be incorrect through the filter of negativity dominance research (Rozin and Royzman 2001). Negativity dominance refers to the fact that "the holistic perception and appraisal of integrated negative and positive events (or objects, individuals, hedonic episodes, personality traits, etc.) is more negative than the algebraic sum of the subjective values of those individual entities" (Rozin and Royzman 2001, p. 298-299). For negativity dominance to apply, a favorable and an unfavorable experience should occur together. Demonstrating the importance of negativity dominance on the enjoyment of a cup of soup, for instance, Kanouse and Hanson (1972) suggested that "negative components of a complex object are overweighed only when the good and the bad are found together in one object, when they are inseparable" (p. 58). In other words, as Royzman (2000) noted, in order to observe the negativity dominance principle, the negative and positive stimuli must be intermingled. In the context of attribute framing, employing a complementary attribute satisfies the condition of having "negative and positive components as co-occurring constituents of a single whole" (Rozin and Royzman 2001, p. 299).

As a consequence of the inference effect, having *both* positive and negative associations changes relative impacts of those associations on final evaluations, and, consequently affects the framing effect. Different from intuition that follows from the additive sum of the impacts of positive and negative associations, the current study proposes that positive and negative associations interact with each other.

A piece of negative information is perceived to be more unfavorable when presented with a positive piece of information, than a piece of positive information is perceived to be more favorable when presented with a negative piece of information. Relative evaluation of positives and negatives is key in the proposed interaction effect. As a result of a comparative evaluation, negative information paired with positive complement will seem more negative.

Similarly, positive complement may seem more positive when processed with its negative complement. However, this study puts forward that when both negative and positive complements are present, positive complement signaling favorable aspects of the attribute actually seem more of an imperfect, inadequate aspect, rather than a favorable complement, compared to it would seem in the absence of a negative complement. In other words, emphasis on the negative aspect of an attribute influences the positive complement in a way that positive seems not good enough. The presence of a negative aspect of an attribute simply brings an upper bound, reflecting the maximum possible performance of it, reminding one that it has not been achieved by the positive complement due to the existence of the negative complement. In essence, is the result of the inadequacy of the positive complement, rather than the influence of the negative complement. Therefore, the positive complement actually seems less positive when the negative complement is also present, while negative complement seems more negative when positive complement is also present. Accordingly, the second hypothesis is formulated as follows:

Hypothesis 2: *As a result of the complementary inference, the combined effect of positive and negative associations on final evaluations will be more negative than the sum of the individual effects of positive and negative associations on evaluations.*

Figure 2.1 illustrates the hypotheses on the influence of complementarity on attribute framing. The proposed conceptual model is a version of the valence-consistent model that incorporates (i) complementary inference and (ii) negative interaction effect between positive and negative associations as a result of such an inference.

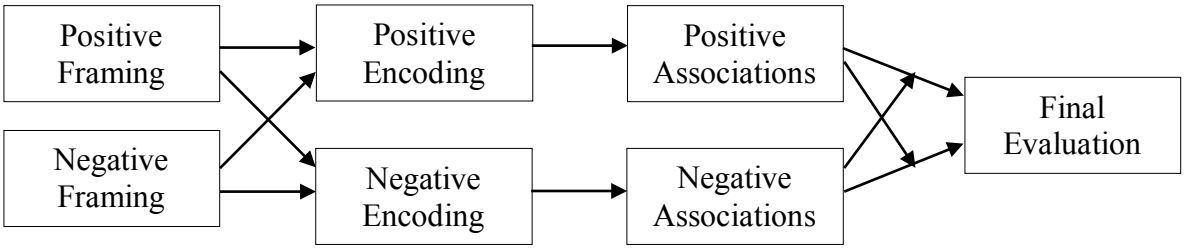

Figure 2.1: Conceptual Framework

It is important to note that simultaneous processing of positive and negative cues completely depends on the extent of complementary inference. In the next section, I discuss whether and how the negative subtraction effect may be generalized to multi attribute evaluations, wherein positivity and negativity are implied explicitly via distinct attributes, i.e., no inference effect.

2.4. Experiment 1

Experiment 1 employs a manipulation that directly examines the extent of complementary inference across four different contexts and whether it varies with attribute framing. Response measures are ratings, and strength and number of associations, when the complementary inference is likely to take place (i.e., positive and negative framing conditions) versus when there is no possibility of complementary inference (i.e., both negatively and positively framed attributes are provided together). Associations are used to pinpoint the significance of complementary inference, and ratings serve as an indirect test of the interaction effect.

2.4.1. Method

93 undergraduate students participated in the experiment, run in 6 sessions conducted at Koc University. Each session involved an unrelated paper and pencil survey tasks in addition

to the current. Participants received course credit for their participation to the session, which took about 20-30 minutes to complete.

Experiment 1 constituted two framing conditions (positive and negative) and a third condition wherein both the positive and negative stimuli were provided together. Four different contexts (sound system, printer, candidate and intern) were presented to all subjects and the order of the contexts was randomized.

The sound system context asked participants to assume that they were shopping for a sound system and saw a particular sound system, *Brand K.* They were asked to evaluate Brand K based on its *sound quality*. In the positive framing condition, participants read the description of the evaluation criterion, "*sound quality is measured with the clear signal rate; it indicates the ratio of clear sound to music signal*". In the negative condition, they read "*sound quality is measured with the signal distortion rate; it indicates the ratio of noise to music signal*". In a third condition, participants read the descriptions of both *clear signal* and *signal distortion* as sound sound quality indicators.

The printer context was identical to sound system context in experimental procedure and design. Participants evaluated the *printing performance*. Specifically, in the positive framing condition, participants read that "*Product K has performed 89% of the jobs satisfactorily - no paper jam, good quality print, etc.*". Participants in the negative framing condition read that "*Product K has performed 11% of the jobs unsatisfactorily - paper jam, quality issues, etc.*". Participants assigned to the third condition were presented with both positively and negatively framed printing performance criteria.

In the candidate and intern contexts, participants were asked to imagine that they were the manager of a consulting company and that they were assessing job applicants and evaluating interns, respectively. In both contexts, the evaluation criterion was the "*% of*

complete tasks - on time and successful" or "*% of incomplete tasks - late and unsuccessful*" that were assigned to the applicant (and intern) over the last two-months. In all contexts, participants had to state a rating score on a 7-point bipolar scale (*1 = very unattractive; 7 = very attractive*). Attribute values for all contexts and the corresponding results are presented in Table 2.2.

As the final question, participants assigned to positive or negative framing conditions were asked whether they have thought about the complementary attribute while evaluating the item. For instance, in the sound system context, they read "*have you thought about the 1% of signal distortion (vs. 99% of clear signal) when you were evaluating Bran K"*. They were given three choices: "*yes*", "*no*" and "*I am not sure*". Participants assigned to the third condition were not asked this question.

2.4.2. Results and discussion

Each participant produced an average of 2.22 entries (*SD* = .53) in positive framing condition, an average of 2.34 entries (*SD* = .56) in negative framing condition and an average of 3.80 entries (*SD* = 1.17) in 'both' framing condition.

Each argument was rated by two doctoral students who were not informed about the purpose of the study and the experimental condition. The inter-rater reliability (see Cronbach's alphas, below). They rated each association evaluating its overall positivity (*r* = .85) and negativity (*r* =.79) on separate scales. Raters were initially provided with a brief definition of positivity and negativity, and were instructed to rate each participant's responses based on the volume and intensity of the entries on 4 levels (*0 = no entry or no relevance; 1 = low; 2 = moderate; 3 = high*). They were then asked to rate a pilot sample of arguments. As part of their training, their ratings were subsequently discussed with them to ensure that they had a complete and clear understanding of the volume and intensity criteria to be used.

For example, both raters coded the entry of "*clear, readable, bright colors*" and "*good*" as "*3*" and "*1*" on the positivity scale, respectively; and they coded "*not a professional, clearness of the music being interrupted*" and "*failure*" as "*3*" and "*1*" on the negativity scale, while both "*i have no idea*" and "—" were coded as "*0*". Ratings on positivity and negativity scales were kept separate for each participant for inference and interaction effect analysis.

It is important to note that the present experiment was conducted on paper. Therefore, the order of association and rating tasks was not enforced. Rather, the questions were provided on the same page, allowing participants to refer to their previous answers and even change them. In fact, 5 participants (two in negative, three in positive framing conditions) changed the rating scores either by writing "*sorry*", "*wrong*" over the old response or by simply scratching over it. The clean marks were assumed to be the final responses and taken into the analysis. I note that writing down associations may possibly increase the elaboration on the attribute information, which may influence framing effect to the extent that more elaborative thinking increases complementary inference.

I first look at the probability of complementary inference in attribute framing effects. Negative associations produced in positive condition and positive associations produced in negative condition were both significantly greater than zero in all contexts, indicating a significant complementary inference. Self-report measures also confirmed that inference was significant. After the "*not sure*" responses were excluded, results revealed that participants in positive framing condition have thought about the negative attribute more than those in negative framing condition thought about the positive attribute; $X^2(1, N = 46) = 4.92$, $p = .04$ for the sound system context; $X^2(1, N = 57) = 7.12$, $p = .01$ for the printer context; $X^2(1, N = 47) = 3.61$, $p = .08$ for the candidate context; and $X^2(1, N = 44) = 4.49$, $p = .05$ for the intern context (see, Figure 2.2 for percentages).

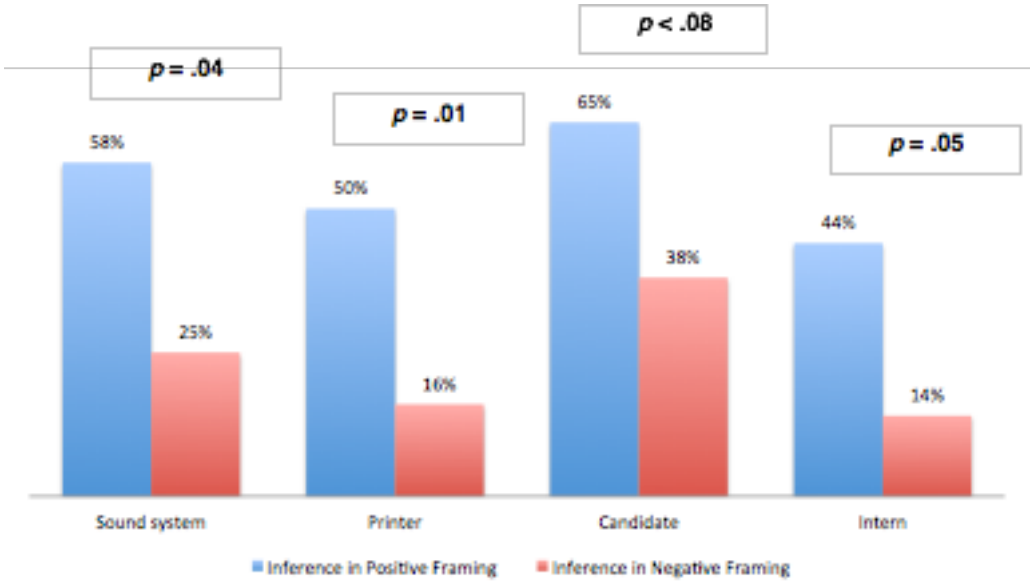

Figure 2.2: Self-report measures of inference

Also, the results validate the valence-based associative processing underlying the attribute framing effects (Levin et al. 1998). A paired sample test indicated that participants in the positive framing condition produced significantly more positive associations than they produced negative associations. Similarly, participants in the negative framing condition produced more negative (vs. positive) associations. However, associations produced by participants who received both positive and negative attribute information (hereafter, participants in the '*both*' condition) were not significantly different from each other. Moreover, a further ANOVA analysis indicated that positive associations produced in positive condition and negative associations produced in negative condition were significantly smaller than positive and negative associations produced in the '*both*' condition, respectively.

Scenario	Positive *(negative)* attribute level	Associations Across Framing Conditions: Negative associations in positive condition	Positive associations in negative condition	Test of difference (ANOVA)
Sound system	99% *(1%)*	$M = .63$, $SD = .13$	$M = .30$, $SD = .10$	$F(1,60) = 3.80$, $p = .056$
Printer	89% *(11%)*	$M = .53$, $SD = .12$	$M = .27$, $SD = .08$	$F(1,60) = 3.28$, $p = .075$
Candidate	79% *(21%)*	$M = .91$, $SD = .14$	$M = .43$, $SD = .11$	$F(1,60) = 6.91$, $p = .011$
Intern	69% *(31%)*	$M = 1.0$, $SD = .13$	$M = .30$, $SD = .09$	$F(1,60) = 18.73$, $p < .001$

Table 2.1: Attribute values and associations

The second analysis examines Hypothesis 1. Results showed that participants in positive framing condition produced significantly more negative associations than participants in negative condition produced positive associations for candidate and intern contexts. However, this effect was only marginally significant for sound system and printer contexts (see Table 2.1).

Given these results, a further analysis was performed. Both the positive and negative associations were coded as "0" indicating a participant having produced no associations or produced only neutral ones. They were coded as "1" when participant produced at least one relevant association. A chi-square analysis indicated no significant difference between positive and negative inference for the candidate and intern contexts. The difference was significant for sound system ($p = .056$) and only marginally significant for printer ($p = .075$) when associations were judged based on volume. When there is at least one relevant entry the significance was $p = .083$ and $p = .127$, for sound system and printer. I explain these findings with the variation in attribute polarization across contexts. Specifically, decision maker engages in a more thorough evaluation process when exposed to negative (vs. positive) attribute, but the likelihood of such an engagement is lower when the attribute polarization is high (vs. low).

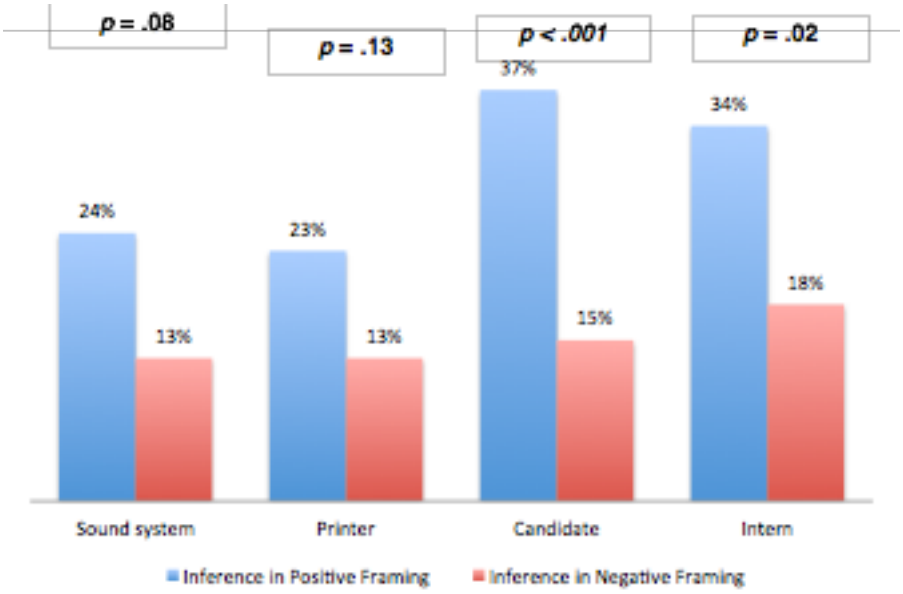

Figure 2.2: Inference effect (association volume and intensity)

The third analysis examined the framing effect on ratings showing an indirect evidence for the interaction effect of positive and negative associations on ratings (see Table 2.2). Given the previous results that participants produced both negative and positive associations in the 'both' condition, the intuitive expectation for ratings in the 'both' condition would be the following: participants who saw both the positive and negative attributes give *smaller* ratings compared to those who only saw positive attributes, and give *greater* ratings relative to those who only saw the negative attributes.

	Rating Scores Across Framing Conditions			
Scenario	Positive	Negative	Positive and negative	Rating size comparisons*
Sound system	$M = 5.69$, $SD = .69$	$M = 4.27$, $SD = 1.46$	$M = 5.29$, $SD = 1.47$	Neg <<< Both < Pos
Printer	$M = 6.00$, $SD = 1.22$	$M = 3.87$, $SD = 2.15$	$M = 4.87$, $SD = 2.17$	Neg < Both << Pos
Candidate	$M = 5.53$, $SD = 1.29$	$M = 4.20$, $SD = 1.16$	$M = 3.52$, $SD = 1.12$	Both << Neg <<< Pos
Intern	$M = 5.09$, $SD = 1.12$	$M = 4.23$, $SD = 1.04$	$M = 3.61$, $SD = .99$	Both << Neg <<< Pos

<<< indicates significance at $p < .01$; << indicates significance at $p < .05$; < indicates significance at $p < .10$

Table 2.2: Ratings and comparisons

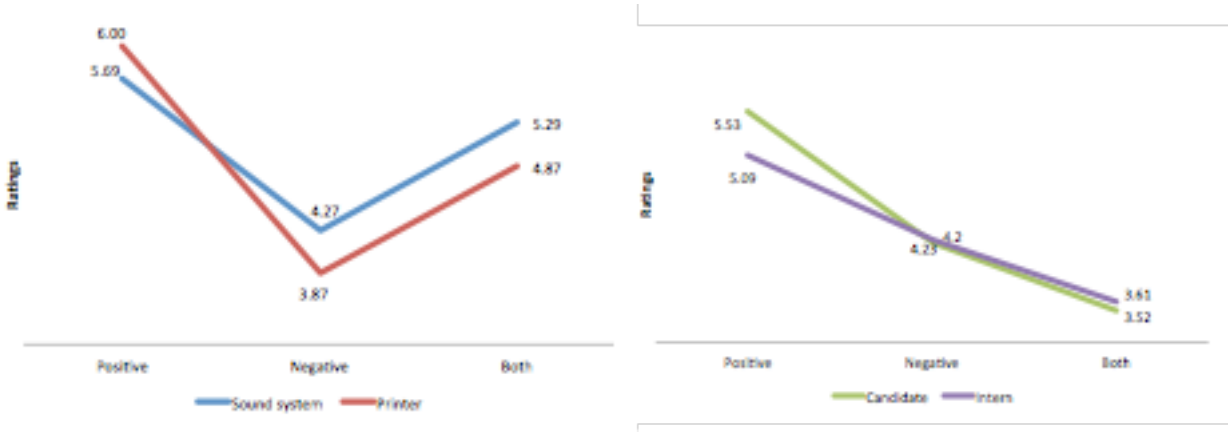

Figure 2.3: Interaction effects on ratings

For the sound system and printer, this was indeed the pattern. However, for the candidate and intern contexts, I found an interesting comparison pattern (see Figure 2.4), which would be explained with the interaction effect proposed in Hypothesis 2.

2.5. Experiment 2

Experiment 1 measured associations and ratings and showed the differential impact of framing (i) on associations, indicating an inference effect and (ii) on ratings, implicitly indicating an interaction effect of positive and negative evaluative processes. What has not been considered is the complete process of decision making, starting from exposure to stimulus, passing through the valuation stage and finally responding with a rating score.

Experiment 2 uses a design that explores the three evaluation stages simultaneously. Doing so, it directly testes whether inference of the complementary attribute is indeed stronger for positive (vs. negative) attributes, *Hypothesis 1,* and whether co-activation of positive and negative thoughts leads to a negative interaction effect on ratings, *Hypothesis 2*.

Two (positive vs. negative framing) between-subject conditions were employed. As in Experiment 1, participants were asked to write down the associations and indicate a rating score. The association-task was similar to the follow-up study of Donovan and Jalleh (1999) with one particular difference. In their study, associations that were triggered in response to positively and negatively valenced words in the absence of any context. In particular, they collected *"free associations to the words lean, fat and fat-free, without stating any food context*" (Donovan and Jalleh 1999, p.623, *italics original*). Whereas, in the current study, participants first read the cover story and then wrote down the associations. Given the objective of exploring the underlying process of the framing effects, the design of the current experiment should be as similar to those in earlier framing studies as possible. Associations intended to be obtained here are merely the outcomes of an intermediate evaluation process. Hence, participants need to be exposed to the same framing manipulation while writing association as they would be while rating. Ratings were the final responses.

2.5.1. Method

Participants were 59 undergraduate students of Koc University, who performed a series of decision-making tasks including the present experiment. They received course credit for their participation in the experiment, which took around 30 minutes.

Contexts	Manipulations	
	Positive Framing	Negative Framing
Scanner scenario Imagine that you are searching online for a new scanner and found one. You have the following information:	**80% of jobs performed successfully** - good quality, fast processing, etc.	**20% of jobs performed unsuccessfully** - quality issues, freezing processes, etc.
Programmer scenario Imagine that you are the manager of a software company and evaluating programmers based on their perfomence over the last 2-monts:	**75% complete tasks** - on time and successful	**25% incomplete tasks** - late and/or unsuccessful
Microwave scenario Imagine that you need to buy a microwave and found this one. Cheking our the user reviews, you see the following information:	**70% positive** feedback	**30% negative** feedback
Student scenario Imagine that you are a professor at a university and evaluating you students based on their perfomance in the final exam:	**60% correct** answers	**40% wrong** answers

Table 2.3: Stimuli for Experiment 2

Participants were randomly assigned to one of the two framing conditions (positive vs. negative). Four contexts (scanner, programmer, microwave, student) were employed within subjects and the order of these contexts was randomized. Design was the same in all contexts. The cover stories, stimulus values and definitions are presented in Table 2.3. Attribute values for each context were pretested. Framing stimulus constituted complementary attributes, in which the favorable and unfavorable components of the attribute were identified in percentage terms. Participants were assigned to one of the two framing conditions (either positive or negative) and first did association-writing task. Completing the association task, they were asked to indicate a rating score on a 7-point likert scale.

2.5.2. Results and discussion

Participants produced an average of 1.52 entries (*SD* = .34) in positive framing condition and an average of 1.84 entries (*SD* = .33) in negative framing condition. The same

procedure as described in Experiment 1 was used for training the raters. Two raters blind to the experimental manipulations classified the entries as in Experiment 1. Judgments by the two raters were overall highly consistent (r = .81 for positives, r = .77 for negatives). In addition to coding the associations based on their valence and intensity, I specified them in terms of (i) *direct associations*, those having the same valence with attribute framing, and (ii) *inferred associations*, those having the opposite valence with attribute framing. Framing manipulation is specified as "1" for positives and "2" for negatives. The interaction term is the product of the numbers of positive and negative associations, revealing a zero unless both were produced by the same participant. 22% of associations in the scanner context, 41% in the programmer and microwave contexts, and 27% in the student context, both the positive and negative associations emerged together.

One sample t-test was performed to examine the inference effect in complementary attributes, Hypothesis 1. Participants presented with positively (vs. negatively) framed attributes produced a significant amount of negative (vs. positive) associations in all contexts: for scanner context, M = 121, SD = 14.2, $t(33) = 2.10$, p = .034; for programmer context, M = 121, SD = 14.2, $t(33) = 2.10$, p = .034; for microwave context, M = 121, SD = 14.2, $t(33)$ = 2.10, p = .034; for student context, M = 121, SD = 14.2, $t(33) = 2.10$, p = .034.

I further tested the framing effect on complementary inference and found support for Hypothesis 1. Model 2 in Table 3a indicates a significant negative impact of framing on inference. *Inference* variable, that I incorporated in the regression analyses, refers to the associations that were initially coded based on their volume/intensity and that had the opposite valence with the given attribute framing. In three out of four contexts, participants produced significantly more negative associations when positive attribute was given than they produced positive associations when negative attribute was given. Therefore, results

support the inference hypothesis.

		Scanner		Programmer		Microwave		Student		Hypothesis Testing
		Coefficient	*(Std. error)*	Coefficient	*(Std. error)*	Coefficient	*(Std. error)*	Coefficient	*(Std. error)*	
Model 1	*DV = Associations*									
	Constant	0.23	*0.41*	0.13	*0.37*	0.07	*0.07*	-0.37	*0.35*	Theory is supported *Framing effect on associations is positive*
	Framing	**0.85**	*0.26*	**0.78**	*0.22*	**0.93**	*0.21*	**1.13**	*0.22*	
		R square = .170 *F*(1, 57) = 11.67 *p* < .001		*R* square = .126 *F*(1, 57) = 8.18 *p* = .006		*R* square = .284 *F*(1, 57) = 22.57 *p* < .001		*R* square = .322 *F*(1, 57) = 27.04 *p* < .001		
Model 2	*DV = Inferrence*									
	Constant	**1.12**	*0.30*	**0.79**	*0.30*	**1.29**	*0.33*	**0.75**	*0.28*	H1-a is supported Framing effect on inference is negative
	Framing	**-0.46**	*0.19*	-0.27	*0.18*	**-0.41**	*0.21*	**-0.29**	*0.17*	
		R square = .081 *F*(1, 57) = 5.03 *p* = .029		*R* square = .051 *F*(1, 57) = 3.08 *p* = .085		*R* square = .060 *F*(1, 57) = 3.65 *p* = .061		*R* square = .073 *F*(1, 57) = 4.48 *p* = .039		
Model 3	*DV = Ratings*									
	Constant	**6.45**	*0.46*	**6.37**	*0.55*	**5.40**	*0.54*	**5.56**	*0.54*	H1-b is supported *Interaction effect is negative and significant*
	Framing	**-0.98**	*0.29*	**-1.07**	*0.33*	**-0.83**	*0.35*	**-1.08**	*0.33*	
	Interaction	**-0.51**	*0.18*	**-0.21**	*0.11*	**-0.23**	*0.12*	**-0.23**	*0.11*	
		R square = .29 *F*(2, 56) = 11.16 *p* < .001		*R* square = .189 *F*(2, 56) = 6.54 *p* = .003		*R* square = .195 *F*(2, 56) = 6.77 *p* = .002		*R* square = .195 *F*(2, 56) = 6.78 *p* = .002		
Model 4	*DV = Ratings*									
	Constant	**6.82**	*0.50*	**6.08**	*0.57*	**5.21**	*0.62*	**5.26**	*0.58*	H1-a is partially supported *Inference effect is significant in 2 contexts*
	Framing	**-1.34**	*0.30*	**-1.32**	*0.36*	**-0.83**	*0.42*	**-1.10**	*0.41*	
	Associations	0.22	*0.15*	**0.41**	*0.20*	0.06	*0.23*	0.14	*0.20*	
	Inferrence	**-0.37**	*0.21*	0.30	*0.24*	0.14	*0.22*	**0.47**	*0.26*	
	Interaction	**-0.45**	*0.18*	**-0.40**	*0.14*	**-0.24**	*0.12*	**-0.37**	*0.13*	
		R square = .376 *F*(4, 54) = 8.015 *p* < .001		*R* square = .256 *F*(4, 47) = 4.65 *p* = .003		*R* square = .199 *F*(4, 54) = 3.36 *p* = .016		*R* square = .252 *F*(4, 54) = 4.54 *p* = .003		

Table 2.4: Regression results

In order to test the interaction effect is significant on ratings, a multiple regression analysis was conducted (see Model 3 in Table 2.4). Interaction measure was specified at the individual level as the product of the numbers of positive and negative association participants indicated. The results of the regression indicated that the framing and interaction variables explained an average of 22% of the variance in all of the four contexts. It was found that interaction significantly predicted ratings (β = -.30, p < .05, *on average*), as did attribute

framing (β = -.99, p < .05, *on average*).

Finally, a mediational analysis was performed to test the theoretical prediction that attribute framing was driving variations in final ratings through triggered and inferred associations. To establish mediation with two mediators, four regression analyses were performed (Baron and Kenny 1986). First two models used the independent variable, attribute framing, to predict the two mediators: associations and inference. In the third model, framing was used to predict the dependent variable, ratings while the interaction effect on ratings was controlled for. Other than estimating the interaction effect on ratings, (*Hypothesis 2)*, the third model enabled us to partial out the possible negativity dominance influence from framing effects. The fourth model incorporated the independent variable and the mediators simultaneously to predict the dependent variable. If there is mediation, all four regression analyses should be significant (p < .05), as was the case here, except for the '*inference models*' in the programmer and microwave contexts. As I discussed above, the first two regression analyses showed that framing significantly influenced both associations, (β = .92, p < .05, *on average*), and inference, (β = -.36, p < .05, *on average*).

2.6. Conclusion and General Discussion

While prior research on attribute framing effects (e.g., Levin, Schneider, and Gaeth, 1998) has predominantly examined the drivers and boundary conditions of the effect, the present research focuses on the valence description of an attribute. Attribute valence in previous research on framing effects has consistently used the *complementary* type of attributes, where positivity or negativity of information has been determined by different attribute labels (e.g., success vs. failure rates) and complementary attribute values (e.g., 90% vs. 10%). In the present research, I argue that due to the complementary structure of framed

attributes, when confronted with a positively (vs. negatively) framed attribute, decision makers not only make evaluations based on the positively (vs. negatively) framed attribute, but also infer the negatively (vs. positively) framed attribute.

Results of the two experiments converge to the main finding that simultaneous processing of positive and negative cues decreases the attractiveness of the evaluated item and consequently hurts final evaluations. In particular, using prompted and free association writing procedures, I find that exposure to either negatively or positively framed attributes triggers both positive and negative, while positive attributes are more likely to evoke negative thoughts than negative attributes evoke positive. As a result, assessing positive and negative associations together leads to a significant negative impact on evaluations.

2.6.1. Further research

Further research might explore whether a contrast occurs between positive and negative, negative is the one that draws more attention; hence, positive is suppressed with negativity. For instance, if a consumer has had a satisfactory experience with a brand, he or she might evaluate negative signals for another product of the same brand more carefully than if a very unsatisfactory experience with that brand had been the result, because a possible unsatisfactory performance is expected—so is a piece of negative information. Another example surround a promising student's percentage of wrong answers would be evaluated more negatively, as compared to the percentage of correct answers evaluated positively. The same prediction would hold untrue if the student was already lazy. This prediction emerges from negativity bias, negative dominance, and contingency effects.

Previous research on impression formation reveals that feelings based on a mixture of positive and negative characteristics are regarded as more negative than would be predicted from the scale values of the characteristics when studied distinctly (e.g., Hamilton and

Huffman 1981; Hamilton and Zanna 1972; Hodges 1974; Levin and Schmidt 1969; Miller and Rowe 1967; Wyer and Watson 1969). Kanas (1984) noted that "negative adjectives may lead to contextual shifts in meaning more often than positive ones do" (p. 703), suggesting that power of negatives in changing the context is greater than that of positives, with no discussion of the valence of the context. This study further suggests that for attribute framing effects, although small big numbers are over-weighted, they do not help increase total item favorability.

Those attributes contribute to final evaluations individually; impacts may influence each other based on their valences. To illustrate, the difference between positive/positive and positive/negative item evaluations for two attribute evaluations will be greater than the difference in positive/negative and negative/negative item evaluations. Hence, the impact of a negative attribute accompanied with a positive attribute should be more negative than the impact of a positive attribute accompanied with a negative attribute is positive.

As a preliminary test of this prediction, I conducted an experiment with two objectives: (i) to show negatively framed attributes lead to less favorable ratings when paired with a positively (vs. negatively) framed attribute, and (ii) attribute framing effect (or the negativity bias) between positive/positive pair and positive/negative pair are greater than the one between positive/negative pair and negative/negative pair. I note that if there were no significant interaction effects between these attribute pairs, the framing effect between those should have been (i) positive in the former and (ii) equal in the latter case. Therefore, the former is a more conservative test of the interaction effect in multi-attribute evaluations.

In this experiment, the congruency between the attributes had to be manipulated. As an initial test of my predictions, I chose to use items defined with two attributes, resulting in a 2 (first attribute: positive vs. negative framing) by 2 (second attribute: positive vs. negative

framing) between-subject design. Three contexts (air conditioner, laptop, candidate) were manipulated within-subject and the order of the appearance was randomized. For laptop and air conditioner, the cover story explained that the goal of the study was to investigate consumer evaluations for laptops and air conditioners. Respondents were then presented with the descriptions of the two attributes and asked to evaluate based on a 9-point scale.

In the candidate context, respondents were told to imagine that they were the manager of a computer software company and were looking for a computer programmer who can write in a special computer language named KD. The procedure in the student context was similar to that of the candidate context, except for the cover story. In both contexts, participants were then given the descriptions of the attributes and told that they had four candidates for the position differing only in those attributes and were asked to evaluate individuals based on a 9-point likert scale, changing from '*extremely poor* to '*extremely good*'.

Results revealed that in air conditioner and laptop contexts, results indicated a significant framing effect between positive/positive pair and positive/negative pair are greater than the one between positive/negative pair and negative/negative pair ($p < .05$). However, in the candidate context, the difference was insignificant. Note that the air conditioner and laptop context manipulated attribute framing via non-complementary attributes, whereas candidate context framing manipulation used a non-complementary attribute. I suggest that high polarization between positive and negative attributes (73% success vs. 36% failure '*knowledge'* and 75% success vs. 15% failure for '*skill'* attribute) may be the reason for stronger framing effect compared to the interaction effect. Further research may explore these predictions.

3. THE ROLE OF ATTRIBUTE VALUES ON ATTRIBUTE FRAMING EFFECTS: NUMBER DISTORTION

3.1. Introduction

Positive framing of an attribute directs encoding of data that can arouse affirmative associations in recall, while negative framing of the same attribute is likely to cause an encoding that evokes critical links (Levin and Gaeth 1988). As a result, a positively framed attribute will be evaluated more favorably than the same attribute framed negatively (Levin et al. 1998). Attribute framing effects have been observed across many different types of judgments, such as product evaluations, performance assessments and gambles.

Product evaluations describe performance using a positively or negatively valenced attribute label, such as judgments about ground beef (Levin and Gaeth 1988) and automobiles (Levin, Jasper and Gaeth 1996). Performance evaluations describe performance in terms of success versus failure rates, and have been shown in evaluations of condom use (Linville, Fischer and Fischhoff 1993), industry project teams (Dunegan 1993), medical treatments (Levin et al. 1988), and job placement programs (Davis and Bobko 1986). Gamble outcomes can be described in terms of the probability of winning or losing (Levin et al. 1985; Levin et al. 1986).

Levin et al. (1998) explain attribute framing effects with *valence-based associative processing*, which may be summarized as "positive encoding highlights positive aspects of the information and negative encoding highlights negative aspects" (p. 164). Donovan and Jalleh (1999) have found that seeing a pack of ground beef with the *75% lean* had participants to write more positive expression, such as *healthy, good for you*, whereas, seeing

the *15% fat* made them write more negative expressions, including *unhealthy, bad for you, yuck*.

A recent stream of research has shown that numbers are important factors explaining the difference in responses to positively and negatively framed attributes (e.g., Freling, Vincent and Henard 2014). For example, Janizewski et al. (2003) suggested that framing effects are determined by the range and level of reference values employed to appraise attribute information. Specifically, they found that when the range of reference values was narrower for a positive frame as compared to a negative frame, attribute values exceeding expected performance levels favored the positively framed information; and attribute values below expected performance levels favored the negatively framed information. In the Janiszewski et al. (2003) framework, however, different responses in positive and negative conditions were only explained with the range of reference values evoked by attribute values. Although findings accounted for the impact of numbers on framing effects, they did not investigate the label (valence) effects, which is a limitation of the study.

The current research regards both the label and value of an attribute as significant factors contributing to framing effects on evaluations. Furthermore, impacts of labels and values on evaluations are considered as the result of two distinct evaluation processes that interact with each other. That is, the amount and strength of associations are functions of attribute numbers as well as labels. To the extent that those associations are then converted into evaluations, both numbers and labels of attributes become influencers of attribute framing effects. Previous research lacks an integrated examination of both attribute label and value effects on evaluations.

The remainder of the paper is organized as follows. The next section explains how and why attribute numbers contribute to attribute framing (label) effects on evaluations. Two

hypotheses are put forward and alternative explanations are discussed. In the subsequent section, experimental evidence for hypotheses are presented and a general discussion is provided at the end.

3.2. Why Do Numbers Matter in Attribute Framing Effects?

An attribute encompasses two main components that convey some interpretable information together (Floridi 2010): (i) *number* or *value*, indicating a performance score for an attribute and (ii) *label* or *description*, providing a context that makes the performance of that attribute meaningful. Prior research on attribute framing has used attribute values that have different labels and values in positive and negative framing conditions. Levin et al. (1998) define attribute framing as "describing situations in terms of success versus failure rates" (p. 159). The success and failure rates are clearly not identical attribute labels. Likewise, attribute values in positive and negative frames are different from each other, unless the success/failure rate is 50%. Aside from being different, attribute values in positive and negative framing conditions are *complementary* to each other: *x%* value in positive framing requires *(100-x)%* value in negative framing condition in order to imply the same performance.

Accordingly, an attribute may be framed in positive or negative terms as long as it can be separated into two opposing (favorable and unfavorable) components. Attribute values in these components always sum into a single whole (e.g., 100 percent of ingredients; total number of school days). In prior work, the single whole is an attribute (e.g., Johnson 1987), a program (e.g., Davis and Bobko 1986), a group of entities such as a class of students (e.g., Loke and Tan 1992), or users of a product (e.g., Beach et al. 1996).

In the present research, these types of attributes are termed *complementary* attributes. Framing effects occur when objectively equivalent performance values (e.g., *70% lean* and *30% fat* are equally healthy and taste identical) are converted into different subjective evaluations (e.g., *70% lean* is healthier than *30% fat*; *30% fat* is more delicious than *70% lean*). It is important to notice that complementarity of positively and negatively framed attributes causes them to be *bounded* together. For example, a student's test score should find balance between correct and wrong answers in terms of equaling to the total number of questions in the test. In another example, as a performance measure of medical treatment, *survival rates* and *mortality rates* should sum to 100%. When there is an increase in the survival rates, there must be the same amount of decrease in the mortality rates, and vice versa. Differing from the previous studies, in this essay, the present essay examines whether the strength of framing effects on evaluations varies with respect to attribute values. More specifically, the current investigation puts forth that when the decrease in one of the framed attributes is not responded (in terms of evaluations) with an equal level of an increase in the other framed attribute, the strength of the framing effect will change.

3.2.1. Attribute labels generating different sensitivities versus mindsets

In attribute framing effects, labels trigger favorable or unfavorable associations, depending on whether they are framed in positive and negative terms (e.g., Levin and Gaeth 1988; Levin, Johnson, Russo and Deldin 1985; Levin et al. 1998). Greater sensitivity to negatives, as compared to positives, in decision making, can explain attribute framing effects such that impact of negative associations triggered with negatively framed attribute information will have a greater impact than those of positive associations triggered with positively framed attributes. This explanation clarifies how framing effect occurs and is based

on associations and their relative influence on decisions, however, does not make any predictions on whether the amount and strength of associations vary.

The present essay proposes a different account as to how attribute framing effects occur. According to the proposed account, although attribute labels determine whether the evaluation will take place in a positive or a negative domain, associations are the products of attribute performance (value) in that domain—not the domain itself. As a result, numbers can change attribute framing effects, as they may influence the number/strength of associations. Thus, the framing effect increases (vs. decreases) in the instance where more/stronger (vs. less/weaker) associations are triggered. This prediction implements the Cumulative Prospect Theory, which refers to distortions in probability judgments. The impact of (stronger or weaker) associations of divergent valences on decisions is different from the impact of framing on evoking associations.

3.2.2. Attribute values as probabilities

According to the proposed framework in this research, attribute values in positive and negative frames are handled as *probabilities*, not *outcomes*. That is, attributes represented in percentage terms are processed in a similar way to uncertain or risky events. Decision makers try to make an overall judgment, implicitly combining these two aspects. For instance, *90% positive feedback* from product users signals the probability of satisfaction, whereas *10% negative feedback* indicates a possible dissatisfaction from that product *if* that product is purchased. In the example of ground meat, the *lean percentage* of a package shows how much the customer will possibly *like* it, while the percentage of fat is an indicator of how likely it will be *disliked*. Therefore, the positively framed attribute, which is regarded as the positive component of the attribute, increases the satisfaction that will be derived from the product, whereas the negative component reflects the possible likelihood of dissatisfaction.

This study draws on the probability weighting function in Cumulative Prospect Theory rather than the value function in Prospect Theory and Cumulative Prospect Theory.

3.2.3. Number distortion

Prospect theory was originally proposed to explain the rules decision makers follow in choice decisions when conditions are uncertain (Kahneman and Tversky 1979; Tversky and Kahneman 1981). Specifically, outcomes of risky prospects are evaluated by a subjective value function that has three essential aspects: (i) reference dependence, (ii) diminishing sensitivity, and (iii) loss aversion. Tversky and Kahneman (1991) later extended prospect theory to explain decision making processes in riskless choice tasks, such as choosing among consumer products or job candidates.

Three reference points in framed (complementary) attribute pairs are put forward. The first two encompass endpoints, 0% and 100%, which serve as natural and implicit reference points. The third value is the average performance on that attribute. Kahneman and Tversky (1979) found that the weighting function is susceptible to fluctuations in probability near endpoints 0 and 1, but is unaffected to middle region deviations in probability. The weighting function is not well behaved at the end points; it displays lessening sensitivity in terms of probability changes. In other words, the function is somewhat sensitive to variations in probability near 0 and 1 endpoints, but is relatively insensitive to probability changes in the middle area.

Values that are distant from these reference points become less sensitive. For instance, 20% unfavorable performance (i.e., attribute value in negative framing condition) may be perceived as 25%. There may be s a shifting point on which this distortion disappears, where the objective value becomes equal to subjective value. Research on subjective probability has shown that this number is 1/3 for probabilities (Tversky and

Kahneman 1992; Prelec 1998); however, the current investigation maintains that this number depends on the reference point for an average performance. Thus, is context-dependent for attribute evaluations. For the purposes of the present research, it is sufficient to only assume that this number is closer to the middle—around 50%.

Number effects on framing relate also to the measurement of the framing effects. Framing effect refers to the asymmetry between evaluations in positive and negative conditions. Therefore, whatever makes evaluations more similar to each other across valence conditions, actually decreases the framing effect. Positive and negative framing highlights relate to how the item performs on a favorable or unfavorable aspect, respectively. Consider two products, B performing better than A. For Product A, the positively framed attribute signals that the product performs *well* on a favorable aspect; when the attribute is in the negative frame, the product becomes performing *less poorly* on an unfavorable aspect. The comparison in this example contains a hypothetical reference point, which is around 50%, therefore, is closer to Product A than to Product B. For, Product B, the positively framed attribute signals that the product performs *very well* on a favorable aspect; when the attribute is in negative frame, the product performs *much less poorly* on an unfavorable aspect, relative to the hypothetical reference point.

The framing effect is calculated as the difference between the evaluations of the positively and negatively framed attributes. The above example shows that differences in evaluations become more prominent as performance increases. That is, attribute values in both positive and negative framing approach the best possible points (either 0% or 100%). Thus, the first hypothesis, i.e., number distortion in attribute framing effects, is as follows:

Hypothesis 1: *Stated (objective) attribute values are distorted as perceived values such that smaller attribute values (< 50%) are overweighted and larger (>50%) attribute values are underweighted.*

Wong and Kwong (2005; 2006) have shown that the perceived differences between two alternatives loom larger when equivalent attribute information is expressed in a large ratio frame, as compared to when it is expressed in a small ratio frame. As an example, 80% vs. 90% success in the positive frame will be translated as 20% vs. 10% failure in the negative frame; however, comparing 80 with 90 is not the same as comparing 20 with 10. The researchers explain their findings in terms of value function—particularly the diminishing sensitivity principle of the Prospect Theory (Wong and Kwong 2005; Wong and Kwong 2006). Hence, in their framework, the attributes are accounted for as values rather than probabilities. Moreover, their framework is silent when attribute pairs sum up to 100%. For example, a comparison between 70% and 30% will be equal in positive and negative frames, thus small versus big ratio hypothesis will not predict a difference between those pairs. Then the question becomes, is comparing 70 and 30 along a positive dimension the same as comparing them along a negative dimension? The current essay explores single attribute evaluations (not comparisons), on the basis of mental associations.

In this subsection, how attribute values are perceived differently in positive versus negative framing conditions were discussed, in light of comparison of numbers with a reference point, presumably 50%. Next, how these distorted values are converted into associations are covered.

3.2.4. Numbers moderating associations

In the framework of the present research, the distortion is about attribute values—specifically, evaluation of values relative to the average value, as well as the two end points.

Distorted values produce mental associations, such that attribute values close to the (middle) reference point as opposed to the end points will help the attribute label trigger more and/or stronger associations.

Janiszewski et al. (2003) suggested that framing effects depend on the range and level of reference values used to evaluate attribute information. Specifically, they found that when the range of reference values is narrower (vs. wider) for a positive frame, attribute values above expected performance levels favor the positively (vs. negatively) framed information; likewise, attribute values below expected performance levels favor the negatively (vs. positively) framed information. Although findings of Janiszewki et al. (2003) account for the impact of numbers on framing effects, they do not investigate the label (valence) effects. In their framework, different responses in positive and negative conditions are only explained with the range of reference values evoked by attribute values. However, if framing effects could be explained only with the range of reference values, then there should be no change in 50% positive vs. 50% negative case, which they have not shown or discussed. Prior research, however, demonstrates a significant framing effect for such cases (e.g., McKenzie and Nelson 2003).

In the current research, the labels and numbers are examined together. I suggest that more polarized values indicate more extreme performances. For instance, a student having *90% correct* (or *10% incorrect*) answers might have a more extreme performance than a student having only *50% correct* (*incorrect*) answers in a test. An extremely good or extremely bad performance triggers more emotional response (e.g., Lewicka, Czapinski and Peeters 1992), evoking a greater number of and/or stronger associations in mind. Fiske (1980) show that extreme information lead deeper elaborations, finding that information extremity increases involvement.

Note that two assumptions are made in the example above: (i) Associations are linearly converted into evaluations and ratings, and (ii) distortion might be about valence. If the smaller value, e.g., 30%, is in the negative frame, then it is likely that more negative associations are made than are positive associations, when 30% was in the positive frame. Therefore, the value-association relationship might be different for positive and negative frames. However, the weighting function estimates for gains; the loss weighting function that has, on average, a similar shape, seems to be somewhat higher and less curved (Tversky and Kahneman 1992). This effect is not hypothesized; the data will reveal if this would be a correct prediction. I formulate the second hypothesis, i.e., converting distorted attribute values into associations, as follows:

Hypothesis 2: *More extreme performances (successful or unsuccessful) evoke stronger and/or greater number of associations than more balanced (average) performances.*

The proposed effect of number distortion works in the same direction with the label effect— in the way that it adds up to that. In line with the previous findings (e.g., Levin et al. 1998), I show that positive labels produce positive associations; but, I also argue that this process is a function of numbers. The relation of the proposed effect might be additive or multiplicative with the label effect, which becomes an empirical question, left to the data to show that relationship.

As an alternative explanation, performance extremity might be proposed. Previous research provides mixed findings on extremity effect on attribute framing and negativity bias, which are arguably results of mental associations differentially evoked by positively versus negatively valenced attributes. On the one hand, research has shown that extremity decreases framing effects. The rationale for this might be that more extreme performances are more diagnostic, and evaluations based on that information are less susceptible to framing effects.

On the other hand, findings in negativity bias literature, providing evidence for an attenuated bias in judgments with more extreme attribute values. For instance, Wojciszke, Brycz and Boreknau (1993) find the extremity of a trait as another potent influence, acting as a moderator of the negativity bias effect on impressions. Irrespective of whether perceived extremely increases or decreases attribute framing effects, the relationship between polarized values and perceived extremity should be examined in order to properly explain the role of numbers on framing effects.

3.3. Experiment 1

Due to its central role in the framing research, I used a gambling context to discover the shifts in subjective weights with attribute labels and performance values. Also, winning/losing probabilities provided credibility of scenarios involving very high levels of unfavorably and low levels of favorability.

Participants were instructed to imagine that they were deciding the rules of a gamble which included two games. Different levels of winning/losing probabilities manipulated the superiority and inferiority in performance conditions. I expected that participants would determine higher payoffs for less (vs. more) desirable winning/losing probabilities. Therefore, the negativity bias would predict the payoffs to be higher for losing (vs. winning) probabilities. The inferiority bias, or the loss aversion, would predict greater payoff differences between the levels of inferior gambles compared to those of superior gambles. The proposed attention shift model would predict smaller negativity bias for more (vs. less) favorable probabilities and smaller inferiority bias for losing (vs. winning) labels.

3.3.1. Method

136 M-Turk participants answered a series of questions, including the present experiment, and were compensated with 1.30$ for their participation. The average response time was 20 min. to complete the questions of the present experiment.

This experiment used a mixed design with 2 label framing (positive vs. negative) between-subject and 2 performance (superior vs. inferior) x 2 level (high vs. low) within-subject design. Participants were instructed to imagine that they were deciding the rules of a gamble which included two games. The first game was the benchmark stimulus which was a coin toss and the second game was the main stimulus which involved throwing a dice. In the coin toss game, the payoff was already set to *20$* with a minimal participation cost of *1$*. Participants were asked to make the two games equally attractive. In order to do so, they needed to determine a payoff amount for the given winning/losing probability revealed the dice game. Table 3.1 shows the stimuli used in this experiment. Each participant rated 4 games with different probabilities, while the label was either '*winning*' or '*losing*' probability. Games were presented one at a time and in a random order. Range of payoff amount was between 0$ and 50$.

		Rule of: *winning* (in positive) *losing* (in negative)	Inferred Probability of: winning (in positive)	losing (in negative)
Game 1: Coin toss	*Reference point*	When tails comes up	50%	50%
Game 2: Throwing a dice	*Inferior performance*	<u>High level:</u> Only when number 6 comes up on the dice	17%	83%
		<u>Low level:</u> When a number equal to or greater than 5 comes up on the dice (5 or 6)	33%	67%
	Superior performance	<u>Low level:</u> When a number equal to or greater than 3 comes up on the dice (3, 4, 5 or 6)	67%	33%
		<u>High level:</u> When a number equal to or greater than 2 comes up on the dice (2, 3, 4, 5 or 6)	83%	17%

Table 3.1: Manipulations of Experiment 1

In addition to the payoff amounts, dependent variables included (aided) recall measures. After indicating a payoff amount, participants were asked a few unrelated questions. Then, they were reminded of the gambling question and given two multiple choice questions formulated in the following sentence: "*please pick one or more of the following rules which is/are different from the rules you set earlier in this experiment, in order to match the coin toss game*".

One of the choices measured the recall accuracy for attribute performance, i.e. recall of numbers on the dice, and the other measured the accuracy in recall of attribute label, i.e. recall of winning/losing rule. The final dependent measure was the response time each participant spent for the rating and recall tasks separately.

3.3.2. Results and discussion

In all performance conditions, participants assigned higher payoffs to losing probabilities than to corresponding winging probabilities. Moreover, expect for in high-level inferior (83%) and low-level superior (66%) winning probabilities, the payoff levels were participants indicated significantly different payoff amounts from 20$, which is the amount to be won in the coin toss game (i.e., reference condition).

I expected that participants will indicate a higher (vs. lower) payoff amounts to games they perceive to have lower winning probabilities, or higher losing probabilities, therefore, to supposedly more unfavorable games. Consistent with my predictions, participants in the negative framing condition indicated higher payoffs than 20$ to losing probabilities for superior performances, i.e. for games with lower losing probability. However, as the losing probability increased, i.e. for the inferior games, the payoff amount indicated in the inferior negative conditions were not increased. Moreover, winning probabilities in the inferior conditions were significantly higher than 20$. I interpret these findings as a support for the third hypothesis: for inferior performances the attractiveness of the positive framing decreases, and even becomes detrimental for the overall evaluations.

		Positive Framing		**Negative Framing**	
		Mean (std. dev.)	Test of diff. from 50%	Mean (std. dev.)	Test of diff. from 50%
Inferior performance	High level *(87% lose vs. 16% win)*	46.91 (16.54)	$p < .001$	20.0 (16.48)	*n.s.*
	Low level *(67% lose vs. 33% win)*	32.80 (12.14)	$p < .001$	22.58 (10.77)	$p = .06$
Superior performance	High level *(16% lose vs. 87% win)*	13.34 (8.44)	$p < .001$	35.52 (21.88)	$p < .001$
	Low level *(33% lose vs. 67% win)*	21.86 (9.61)	*n.s.*	28.35 (13.75)	$p < .001$

Table 3.2: Results of Experiment 1

I performed multiple regressions for positive and negative ratings, as well as for superiority and inferiority ratings. The regressions yielded the estimates of and for superior and inferior performances and positive and negative labels. In particular, I found that for inferior performances positive label yielded to greater payoff amounts than negative label (β = -.52, p < .001). Whereas for the superior performances the opposite pattern was shown (β = .44, p < .001). Also, I found that the difference between low and high performance levels was significant for positives (β = .192, p < .001), but not for negatives for inferior performances (i.e., winning probabilities: 33% or 16%).

For the superior performances (i.e., winning probabilities: 66% or 83%) a different pattern was shown, in support of the Hypothesis 3: performance level has a negative impact on payoff amounts for the positive superior condition (β = -.428, p < .001), but this effect is positive for the negative superior conditions (β = .440, p < .001).

3.4. Experiment 2

The present experiment tests the salience hypothesis, formulated in Hypothesis 2 and shows the reverse-negativity bias on evaluations in four contexts (exam, basketball player, delivery, project).

3.4.1. Method

The experiment took place in two different sessions. 147 and 86 undergraduate students participated in the first and second sessions, respectively. They received one course credit in exchange for their participation.

I combined results from two different sessions in order to test the salience hypothesis.

In the first session, I had 2 framing conditions (positive and negative) and the performance value was 50% in both conditions. In the second session, I manipulated performance level and attribute framing, thereby used a 2 framing (positive vs. negative) x 2 attribute performance (above 50% vs. 50% vs. below 50%) between-subjects design. In both sessions, there were four contexts (exam, basketball player, delivery, project) presented to each participant in a random order.

Results indicated a significant framing effect in all contexts for the superior performances as well as for the balanced (50% positive 50% negative) performances. In consisted with out salience hypothesis, H3, I found that ratings for the inferior performances, items in the negative framing condition received significantly higher ratings than the ones in the positive framing condition. I employed regression analysis to test the significance of the framing and performance interaction effect. Table 3.3 presents the performance values for all contexts.

3.4.2. Results and discussion

Three important results were revealed. First, in all contexts, I observed a significant framing effect in 50% performance condition. Second, in line with Hypothesis 1, the rating difference between positive and negative framing conditions were significantly lower for the '*50%'* condition than for the *'above 50%'* condition. Also, participants rated items in the *'above 50%'* condition more favorably than the items in the '*50%'* condition. Consistent with Hypothesis 2, this difference reflecting the superiority judgments was greater when items were presented in positive (negative) frames.

	Performance Levels	Mean (std. dev.) Positive Framing	Mean (std. dev.) Negative Framing	Test of difference		Hypothesis 3
Basketball						
	Superior [75% pos vs. 25% neg]	5.24 (.60)	2.16 (1.23)	$F(1, 47) = 123.84$	$p < .001$	
	Equal [50% pos vs. 50% neg]	4.81 (1.10)	4.00 (1.50)	$F(1, 145) = 13.93$	$p < .001$	*Supported*
	Inferior [38% pos vs. 62% neg]	2.76 (1.01)	4.65 (1.36)	$F(1, 46) = 29.99$	$p < .001$	
Delivery						
	Superior [62% pos vs. 38% neg]	4.28 (1.54)	1.67 (1.28)	$F(1, 47) = 41.65$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.81 (1.29)	2.80 (1.45)	$F(1, 145) = 19.36$	$p < .001$	*Supported*
	Inferior [38% pos vs. 62% neg]	1.68 (.74)	3.61 (1.26)	$F(1, 46) = 41.90$	$p < .001$	
Employee						
	Superior [82% pos vs. 18% neg]	5.92 (.57)	4.66 (1.55)	$F(1, 47) = 14.31$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.95 (1.41)	3.35 (1.34)	$F(1, 145) = 6.75$	$p < .01$	*Supported*
	Inferior [18% pos vs. 82% neg]	1.84 (.89)	4.78 (1.48)	$F(1, 46) = 70.92$	$p < .001$	
Student						
	Superior [62% pos vs. 38% neg]	3.84 (1.14)	3.04 (.91)	$F(1, 47) = 7.28$	$p < .01$	
	Equal [50% pos vs. 50% neg]	4.03 (1.35)	3.35 (1.39)	$F(1, 145) = 8.73$	$p < .001$	*Supported*
	Inferior [38% pos vs. 62% neg]	2.52 (.91)	3.69 (1.10)	$F(1, 46) = 16.16$	$p < .001$	

Table 3.3: Results of Experiment 2

Third finding concerns with out last hypothesis on the salience effect. In particular, results indicated that subjects judge the items with inferior performance (i.e., given in the '*below 50%'* condition) more unfavorably when they are framed positively (vs. negatively).

3.5. Conclusion and General Discussion

Previous research has shown that decision makers evaluate positively framed attribute information more favorably than negatively framed attribute information. Research has attributed this finding to the affective associations triggered by attribute *labels* (e.g., Levin et al. 1998), without accounting for any possible influence of attribute *values.* Other studies have explained framing effects with attribute *values* (e.g., Janiszewski et al. 2003), without determining the influence of attribute *labels*. Taking both attribute *labels* and *values* into account, the present research suggests an alternative explanation as well as a more integrated framework for attribute framing effects.

The main thesis is that framing effects are driven by attribute labels, while attribute values moderate this relationship by affecting the amount and strength of associations evoked by attribute labels. Results of two experiments reveal that as attribute values in positive and negative framing conditions grow farther apart (e.g., 80% and 20% vs. 50% and 50%), attribute labels cause an attenuated framing effect. This finding is explained by *number distortion*—that is, objective attribute values become distorted such that the smaller attribute value is overweighted and the greater attribute value is underweighted. Consequently, overweighted (vs. underweighted) values trigger more and stronger (vs. less and weaker) associations, and are converted into more *favorable* and more *unfavorable* evaluations, for *positively* and *negatively* framed attributes, respectively. As a synthesis of previous findings across different studies on attribute framing, I conclude that while significant, affective associations evoked by attribute labels are not the only drivers of the framing effect; attribute values also play a significant role. Findings of the present research provide important insights as to sales effectiveness of message framing across product categories where there is a significant variation in product specifications, e.g., the percentage of fat content ranging between 5% and 30% for meat products and the range is between 0% and 4% for dairy products.

4. VALENCE-INCONGRUITY IN ATTRIBUTE FRAMING EFFECTS: THE ROLE OF INHERENT VALENCE IMPLIED BY ATTRIBUTE VALUES

4.1. Introduction

Framing effects are well established in human judgment and decision-making research (for a review, see Levin, Schneider and Gaeth 1998). Such effects occur when logically or semantically equivalent descriptions lead to different responses. One of the most pervasive findings in the framing literature is the valence-consistent shift (Levin et al. 1998); that is, frames with positively valenced attributes (e.g., ground beef labeled as *75% lean*) are preferred over equivalent frames with negatively valenced attributes (e.g., ground beef labeled as *25% fat*), even though the two alternatives are identical (i.e., 75% lean = 25% fat) (Levin, 1987; Levin, Johnson, Russo and Deldin 1985).

The valence-consistent shift has generally been attributed to associative priming (Levin and Gaeth 1988; Levin et al. 1988; Mittal, Ross and Tsiros 2002; for exceptions, see Janiszewski, Silk and Cooke 2003; and Freling, Vincent and Henard 2014), with positive or negative labels encouraging the recruitment of similarly valenced information from memory. According to Krishnamurthy, Carter and Blair (2001), positive framing "generates more positive associations and thus seems more attractive than negatively framed options" (p. 383).

Prior research suggests that an attribute may be framed in positive or negative terms, as long as it can be separated into two different components: one relatively more favorable and the other relatively more unfavorable, which together sum to a *single whole* (e.g., 100 percent of ingredients; total number of school days). In prior research, the single whole has

mostly included a greater favorable component and a smaller unfavorable component across framing conditions (for exceptions, see Janiszewski, Silk and Cooke 2003). For example, framing manipulation has been on an attribute with a group of entities such as 70% lean vs. 30% fat of ground beef (e.g., Johnson 1987), or 10% chance of winning vs. 90% chance of losing (e.g., Loke and Tan 1992), and on ground beef having 75% lean and 25% fat (e.g., Levin and Gaeth, 1988). The key argument in the present essay is that the size of favorable and unfavorable components *relative to each other* determines the inherent valence of an attribute. More specifically, attributes consisting of a greater favorable component relative to the complementary unfavorable component are *inherently positive* attributes, with the converse also being true. Depending on the inherent valence of an attribute, the strength of attribute framing effects on evaluations may vary. The valence-consistent shift is a "reliable phenomenon" (Levin, Gaeth, Schreiber and Lauriola 2002, p. 413) for evaluations of attributes that are inherently positive. Therefore, in this essay, the framing effect on evaluations, not only for inherently positive items (i.e., favorable part is greater than the unfavorable part),but also for inherently negative items (i.e., favorable part is smaller than the unfavorable part) are studied. In cases where framed attribute is inherently negative and attribute label is presented in positive terms, a framing effect is diminished and may even be reversed. This phenomenon is referred to as the *valence-incongruity* effect because, similar to the well-known behavioral and perceptual contrast effects in psychology (e.g., Cialdini 1993; Crusius and Mussweiler 2012; Dijksterhuis et al. 1998; Schubert and Hafner 2003), findings of the present study suggest that the influence of positive and negative cues on evaluations may vary with the existence of other cues with different valence.

4.2. Conversion of Associations into Evaluations

The attribute framing effect has generally been attributed to associations evoked by the framed attributes, specifically with positive or negative labels encouraging the recruitment of similarly valenced information from memory (Levin and Gaeth 1988; Levin et al. 1988; Mittal, Ross and Tsiros 2002; for exceptions, see Janiszewski, Silk and Cooke 2003; and Freling, Vincent and Henard 2014). All explanations based on associative processing rely on the assumption that positive (vs. negative) associations are converted into favorable (vs. unfavorable) evaluations. Krishnamurthy, Carter, and Blair (2001) stated that positively framed options "generates more positive associations and thus seems more attractive than negatively framed options" (p. 383). Levin et al. (1998) concluded that "attribute framing is likely to influence the encoding and representation of information in associative memory, and this representational difference is viewed as the cause of *valence-consistent* shifts in responses" (p. 164).

Drawing on the Associative-Propositional Evaluation (APE) model (Gawronski and Bodenhausen 2011), I argue that there may be cases where the conversion takes place in the opposite direction: positive associations may lead to more unfavorable evaluations, while negative associations may lead to more favorable evaluations. In their APE model, Gawronski and Bodenhausen (2011) conceptualized two qualitatively distinct mental processes leading to behavioral outcomes: *associative* and *propositional* processes. They suggested that associative processes are defined as the activation of mental associations in memory, while propositional processes are described as the validation of the information that is inferred by activated connections, which is presumed to be steered by the principles of logical consistency (Gawronski and Bodenhausen 2011). Thus, the most important feature

that distinguishes between associative and propositional processes is the (in)dependency of subjective truth or falsity.

In the domain of attribute framing effects, the propositional process is the conversion of the associations into the final evaluations. The inherent valence of an attribute generates propositional beliefs that are considered relevant for an evaluative judgment, which may be consistent or inconsistent with the associations activated in memory. In line with Gawronski and Bodenhausen (2011), in case of consistency, it is reasonable to assume positive (vs. negative) associations are converted into more favorable (vs. unfavorable) evaluations. However, if outcomes of associative and propositional processes are inconsistent with each other, such a conflict will likely hurt final evaluations in spite of positive associations evoked by positive framing, or the positive inherent valence of an attribute. Consequently, positive associations will be converted into unfavorable evaluations, which are termed *reverse associations*.

In sum, the proposed conceptual framework entails that the inherent valence of an attribute is implied by attribute values and serves as a propositional cue. The inherent valence either attunes or contrasts with the valence of associations, triggered by attribute labels. In case of a conflict between these two valences, positive associations will be converted into unfavorable evaluations. Before developing the hypotheses, two important questions need to be addressed: (i) How would attribute values imply inherent attribute valence? (ii) Why would reverse associations occur as a result of a valence-based conflict? These questions are addressed in turn.

4.2.1. Inherent attribute valence implied by attribute values

What is key in this research is that numbers in positive and negative framing conditions are different attributes which are bounded together. For example, as a score of a

student in a test, the amount of *correct* and *wrong answers* should be equal to the total number of questions in the test, or as a performance measure of medical treatment, *survival rates* and *mortality rates* should sum to 100%. Importantly, the number of correct answers is a different attribute from the number of wrong answers in the same test. Likewise, the survival rate is a different piece of information than the mortality rate, although they convey the same information on the given medical treatment.

Attribute framing on products is similar. Ground beef is mainly composed of lean and fat parts, or a blueberry muffin essentially include some amount of blueberries and some muffin. As blueberry and muffin are two different ingredients, the percentage of blueberry is a different attribute from the percentage of muffin although they contain the same combination for a given blueberry muffin (on the assumption that there is no other ingredient in a blueberry muffin).

The fact that attributes framed in positive and negative terms are different attributes leads to an important conclusion with three possible cases. First, the favorable component of the attribute might be more salient than the unfavorable component, which means the value of the positively framed attribute is bigger than that of the negatively framed attribute. For those attributes, the inherent valence is positive, signaling a favorable attribute and/or item (or person, object, event, etc.) overall. Therefore, both 70% correct and 30% wrong answers on a test should be regarded as inherently positive attributes, signaling a potentially successful performance and/or student. As discussed earlier, most of the framing manipulations in the previous research are of this type.

Second, the favorable component of the attribute might be equal to the favorable component, which means values of both positively and negatively framed attributes are 50%. A few examples of this type have been used in the prior studies on attribute framing. For

those attributes, the inherent valence is neutral, signaling neither a favorable nor an unfavorable attribute and/or item.

Third, the unfavorable component of the attribute might be more salient than the favorable component, which means the value of the negatively framed attribute is bigger than that of the positively framed attribute. For those attributes, the inherent valence is negative, signaling an overall unfavorable attribute and/or item (or person, object, event, etc.). Therefore, both 30% of correct answers and 70% of wrong answers in a test should be considered as inherently negative attributes, signaling a potentially unsuccessful performance and/or student. Prior research provides only a few studies having examined that type of an attribute (e.g., Janiszewski et al. 2003). However, none has investigated whether and how such attributes might differ from inherently positive ones in terms of impact on framing effects. More formally, it is proposed that:

The inherent valence of an attribute: Framing of the greater attribute value determines the inherent valence of an attribute: inherent valence is positive (vs. negative), if the value in positively (vs. negatively) framed attribute is greater than 50%.

It is important not to confuse the inherent valence of an attribute with the perceived performance of that attribute. For example, an inherently neutral attribute, 50% correct answers of a student, might be below the acceptance level of success (e.g., 70% correct answers) and might be evaluated highly unfavorably. On the other hand, a blueberry muffin which includes 25% blueberries might be highly attractive, despite its negative inherent valence (i.e., composed of a greater unfavorable component, 25% of blueberries and 75% of muffin).

4.2.2. Valence-incongruity generating reverse associations

The present research defines reverse-associations as negative associations evoked as a result of the exposure to a positively framed attribute. For instance, associations such as failure, lazy, unsuccessful are reverse-associations, if they are triggered when confronted with a positively framed attribute, such as 30% correct answers in the final test. Note that although conceptually possible, the present framework does not formulate the opposite case, wherein a negatively framed attribute would trigger positive associations. Due to the greater impact of negative information, as compared to positive information on judgments, it is rather unlikely for a negative cue to trigger positive (vs. negative) thoughts in memory. Therefore, the present research describes reverse-associations as merely having negative valence.

As discussed earlier, attribute frames triggering associations are consequences of the associative process, whereas assessment of those associations, and specifically comparing them with inherent attribute valence, takes place in the propositional process. In their APE model, Gawronski and Bodenhausen (2011) explain that while associations can be initiated in memory irrespective of whether the information inferred by these associations is regarded as accurate or inaccurate, propositional processes are fundamentally concentrated on the *validity* of activated information. To do so, affective reactions are translated into the format of a propositional statement. For instance, a negative reaction toward object X is converted into propositional statements (e.g., *I dislike X*, *X is bad*). The degree that this proposition is stable in terms of other propositional beliefs that are considered significant for evaluation, it may be recognized in a verbally-reported, unambiguous appraisal. In the current research, this translates into the case where positively framed attributes have inherently positive valence, triggering positive associations; subsequently those associations are converted into favorable evaluations. In the negative framing condition, consistency would predict that negatively

framed attributes having a negative inherent valence, produce negative associations, are then converted into unfavorable evaluations.

Of main interest to the present research is the case where there exists a conflict between the associations and propositional cues. Gawronski and Bodenhausen (2011) further explain that if the propositional evaluation implied by the affective response is unpredictable with other prominent propositions that are considered important, the inconsistency has to be settled to circumvent cognitive dissonance (Festinger 1957). In such cases, consistency has to be restored, for example by denying one of the propositions (i.e., overturning the individual truth value of that proposition) or by seeking a supplementary proposition that solves the discrepancy. Rather than *how* decision makers resolve such a conflict, the focus of the present research is on the consequences of having inconsistent cues as to mental associations and inherent valence for an attribute. I argue that valence of the associations (and therefore the valence of the attribute frame) mismatches with the inherent attribute valence—final evaluations will be affected *negatively*. More formally, it is proposed:

Reverse-associations in attribute framing effects: Smaller attribute values trigger more negative associations than positive associations, when presented in positive frames than in negative frames.

The prediction entails greater sensitivity to negative information than to positive information in decision making. In addition, although has not been explicitly proposed in the APE model (Gawronski and Bodenhausen 2011), I expect that propositional cues will be more influential in decision-making, mainly because the propositional process is a confirmation stage that aims to build the link between associations and other cues. Other cues in the proposed conceptualization refer to the inherent attribute valence that is implied by

attribute values. Therefore, associations should be either confirmed and converted into evaluations, or rejected and reverse-associations converted into evaluations.

Greater attribute value determines the inherent valence of the evaluated attribute/item, similar to creating a context or domain as a basis for evaluations. Smaller attribute value, on the other hand, is merely additional information that is either *combined* with the inherent valence, or used to *update* it. In either case, the process of integrating a positive piece of information to a negative context is in question. Kanas (1984) notes that "negative adjectives may lead to contextual shifts in meaning more often than positive ones do" (p. 703), suggesting that power of negatives in changing the context is greater than that of positives. Accordingly, I posit that favorability of the overall evaluation will decrease, as a result of a valence-incongruity between the associations and inherent valence.

Based on this proposition, the hypotheses on the valence-incongruity effects influencing attribute framing effects in put forth subsequently.

4.2.3. Hypothesis development

I predict that attribute performance given in negative framing will seem more unfavorable than the same performance given in positive framing, for negative-smaller and positive-bigger values. For the positive-smaller and negative bigger values, the overall performance is rather unsatisfactory, so attribute performance should seem less unfavorable in positive than in negative framing. This finding is best viewed through the context of the valence-incongruity effect, which is asymmetric in terms of triggering positive versus negative associations, in favor of negative frames. In accordance with previous findings across different studies, I conclude that while significant, affective associations are not the only drivers of the framing effect, and attribute values play a significant role as well.

The proposed incongruity effect refers to the fact that decision makers engage in less favorable evaluations when the evaluation is based on a performance metric that performs poorly on a key performance indicator, versus a non-key performance indicator. As to the aforementioned student example, student incompetence may have become quite salient in that decision makers may infer that the student is incompetent. On the other hand, presenting student performance as performing poorly on an unfavorable aspect does not highlight student incompetence and is not damaging the final evaluations.

Hypothesis 1: *Stronger attribute framing effects will occur for inherently positive vs. negative attributes.*

4.2.4. The moderating role of attribute performance

Janiszewski et al. (2003) suggested that framing effects depend on the range and level of reference values used to evaluate attribute information. Specifically, they found that when the range of reference values was narrower (vs. wider) for a positive frame than a negative frame, attribute values above expected performance levels favor the positively (vs. negatively) framed information and attribute values below expected performance levels favor the negatively (vs. positively) framed information. Although findings account for the impact of numbers on framing effects, they did not investigate the label (valence) effects, since, different responses in positive and negative conditions are only explained with range of reference values evoked by attribute values. However, if framing effects could be explained by only the range of reference values, then there should be no change in 50% positive vs. 50% negative case, which they did not discuss. Prior research, however, demonstrates a significant framing effect for such cases (e.g., Dunegan 1993; McKenzie and Nelson 2003).

Hypothesis 2a: *For inherently positive attributes, stronger attribute framing effects will occur for above-the-average vs. below-the-average attribute performances.*

Hypothesis 2b: *For inherently negative attributes, attribute framing effects will occur for above-the-average attribute performances, and will reverse for below-the-average attribute performances.*

Therefore, the objective in the present essay is to investigate the impact of positive and negative inherent valence while examining how decision makers convert associations triggered by attribute labels, into final evaluations.

4.3. Experiment 1

Experiment 1 carries out multiple regression analyses to test the first hypothesis.

4.3.1. Method

225 M-Turk participants answered a series of questions in different sessions, including the present experiment. Participants were compensated with 1.20$ or 1.50$ for their participation, depending on the session they participated in. The average response time was 2.3 min. to complete the questions of the present experiment.

The experiment uses two levels of superiority and two levels of inferiority in positive and negative framing conditions, thereby creating a 2 framing (positive vs. negative) x 2 performance (superior vs. inferior) x 2 level (high vs. low) between-subjects design. Participants were randomly assigned to one of the eight experimental conditions and were asked to imagine that they were searching online for a hotel for their summer vacation. They were shown a webpage with of a particular hotel with the '*hotel guest feedback*' information and asked to rate the attractiveness of that hotel on a series of questions. The webpage also showed the '*average feedback on all hotels available in your search*' in order to establish a

reference point for evaluations. Participants in the positive framing condition were given the average of '*60% positive feedback*' information.

Superiority in positive framing condition was manipulated with '75%' and '90%' (i.e., 15% and 30% above the reference) for low and high performance levels, respectively. Inferiority was manipulated with '45%' and '30%' (i.e., 15% and 30% below the reference) for low and high performance levels, respectively. Participants in the negative framing condition were given the average of '*40% negative feedback*' information. Superiority in negative framing condition was manipulated with '25%' and '10%' (i.e., 15% and 30% below the reference) for low and high performance levels, respectively. Inferiority was manipulated with 55% and 70% (i.e., 15% and 30% above the reference) for low and high performance levels, respectively.

Dependent variables were "*how attractive do you think is this hotel?*", "*how likely would you book this hotel?*", "*what is the maximum amount that you would be willing to pay for this hotel ($ per night)?*". Responses in all questions were collected on a 13-point scale. For the attractiveness measure, the scale ranged from *1 (very unattractive*) to *13 (very attractive)*, for the purchase likelihood the two ends of the range were labeled with '*very unlikely*' and '*very likely*', and finally the responses for willingness to pay question were collected over the range of '*80$/night'* (minimum) and '*200$/night'* (maximum) on a dropdown scale, with an increase of 10$ in each level.

4.3.2. Results and discussion

I performed separate multiple regressions for superiority and inferiority ratings. First, I examined the framing and superiority judgments. Results indicated a significant framing effect on ratings (β = -1.40, $p < .05$) and greater sensitivity to performance changes for below-the-average performances (β = .22, $p < .05$) than for above-the-average performances

($\beta = .18, p < .05$).

Next, I tested the framing impact on ratings for superior versus inferior performances and found support H2a-b. Specifically, negative framing was found to be stronger than positive framing on ratings both for superior and inferior performances; but the difference between positive and negative framing was greater in superior performance ratings ($\beta = -1.83, p < .05$) than in inferior performance ratings ($\beta = -1.00, p < .05$).

Finally, I examined the superiority judgments in positive and negative framing conditions and found evidence for Hypothesis 2a. Results from regression analyses for ratings in positive and negative framing conditions showed that participants evaluated superior performances more favorably than inferior performances when attributes are framed positively ($\beta = .131, p < .05$) than negatively ($\beta = .116, p < .05$).

4.4. Experiment 2

4.4.1. Method

The experiment took place in two different sessions. 147 and 86 undergraduate students participated in the first and second sessions, respectively. They received one course credit in exchange for their participation.

I combined results from two different sessions in order to test the salience hypothesis. In the first session, I had 2 framing conditions (positive and negative) and the performance value was 50% in both conditions. In the second session, I manipulated performance level and attribute framing, thereby used a 2 framing (positive vs. negative) x 2 attribute performance (above 50% vs. 50% vs. below 50%) between-subjects design. In both sessions,

there were four contexts (exam, basketball player, delivery, project) presented to each participant in a random order.

Results indicated a significant framing effect in all contexts for the superior performances as well as for the balanced (50% positive 50% negative) performances. In consisted with out salience hypothesis, H3, I found that ratings for the inferior performances, items in the negative framing condition received significantly higher ratings than the ones in the positive framing condition. I employed regression analysis to test the significance of the framing and performance interaction effect. Table 4.1 presents the performance values for all contexts.

4.4.2. Results and discussion

Three important results were revealed. First, in all contexts, I observed a significant framing effect in 50% performance condition. Second, in line with Hypothesis 1, the rating difference between positive and negative framing conditions were significantly lower for the '*50%'* condition than for the *'above 50%'* condition. Also, participants rated items in the *'above 50%'* condition more favorably than the items in the '*50%'* condition. Consistent with Hypothesis 2, this difference reflecting the superiority judgments was greater when items were presented in positive (negative) frames.

	Performance Levels	Mean (std. dev.) Positive Framing	Negative Framing	Test of difference		Hypothesis
Basketball						
	Superior [75% pos vs. 25% neg]	5.24 (.60)	2.16 (1.23)	$F(1, 47) = 123.84$	$p < .001$	
	Equal [50% pos vs. 50% neg]	4.81 (1.10)	4.00 (1.50)	$F(1, 145) = 13.93$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	2.76 (1.01)	4.65 (1.36)	$F(1, 46) = 29.99$	$p < .001$	
Delivery						
	Superior [62% pos vs. 38% neg]	4.28 (1.54)	1.67 (1.28)	$F(1, 47) = 41.65$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.81 (1.29)	2.80 (1.45)	$F(1, 145) = 19.36$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	1.68 (.74)	3.61 (1.26)	$F(1, 46) = 41.90$	$p < .001$	
Employee						
	Superior [82% pos vs. 18% neg]	5.92 (.57)	4.66 (1.55)	$F(1, 47) = 14.31$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.95 (1.41)	3.35 (1.34)	$F(1, 145) = 6.75$	$p < .01$	*Supporte*
	Inferior [18% pos vs. 82% neg]	1.84 (.89)	4.78 (1.48)	$F(1, 46) = 70.92$	$p < .001$	
Student						
	Superior [62% pos vs. 38% neg]	3.84 (1.14)	3.04 (.91)	$F(1, 47) = 7.28$	$p < .01$	
	Equal [50% pos vs. 50% neg]	4.03 (1.35)	3.35 (1.39)	$F(1, 145) = 8.73$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	2.52 (.91)	3.69 (1.10)	$F(1, 46) = 16.16$	$p < .001$	

Table 4.1: Results of Experiment 2

Third finding concerns with out last hypothesis on the salience effect. In particular, results indicated that subjects judge the items with inferior performance (i.e., given in the '*below 50%'* condition) more unfavorably when they are framed positively (vs. negatively).

4.5. Experiment 3

4.5.1. Method

127 participants from an undergraduate subject pool took part in this experiment. They received one course credit in exchange for their participation.

The design of the experiment consisted of a between-subject manipulation of attribute framing (positive vs. negative) and attribute performance (above-the-average vs. below the average). In all conditions, a two-stage procedure was used. In the first stage, half of the participants were assigned to the positive framing condition and were asked to indicate an average performance value for the presented item in terms of a success rate (%), while the

other half in the negative framing condition were asked to indicate a failure rate (%) for an average performance.

Completing the first stage, participants answered a series of questions irrelevant to the present experiment. Finally, in the second stage, participants were asked to evaluate the attractiveness of the target items based on the provided success or failure rates. Unbeknownst to participants, the average success and failure rates revealed in the first stage were recorded to create the superior and inferior performance values for each participant. The superior performance value was 15% above the indicated average value, and the inferior performance was 15% below the average value revealed in the first stage. For example, if a participant's average success rate is 70%, the participant could receive either a 85% success rate (70% success + 15%) in a favorable performance value condition or a 55% (70% success - 15%) success rate in the unfavorable performance value condition.

4.5.2. Results and discussion

Results showed that the difference between the ratings in positive and negative framing conditions was significantly lower for the inferior (vs. superior) performance levels (Hypothesis 1b). Also, the difference between the ratings for the superior and inferior performance values was greater for positive (vs. negative) framing conditions (Hypothesis 2b). Table 4.2 presents the average ratings for each condition.

	Performance Levels	Mean (std. dev.) Positive Framing	Negative Framing	Test of difference	
Student					
	Superior	6.59 (.83)	5.65 (1.42)	$F(1, 62) = 10.26$	$p < .01$
	Inferior	4.18 (1.02)	4.00 (1.00)	$F(1, 61) = .466$	$p = .466$
Team					
	Superior	7.25 (.98)	6.56 (1.72)	$F(1, 62) = 3.84$	$p = .054$
	Inferior	5.15 (1.16)	3.64 (1.19)	$F(1, 46) = 25.7$	$p < .001$
Printer					
	Superior	6.84 (1.16)	5.90 (1.72)	$F(1, 62) = 6.46$	$p < .05$
	Inferior	4.96 (1.28)	4.03 (1.25)	$F(1, 46) = 8.60$	$p < .05$
Workshop					
	Superior	7.31 (1.17)	6.50 (1.66)	$F(1, 62) = 5.08$	$p < .05$
	Inferior	4.90 (1.08)	4.41 (1.45)	$F(1, 46) = 2.71$	$p = .137$

Table 4.2: Results of Experiment 3

What is interesting in three out of four contexts is that participants rated the inferior performance more favorable than the superior performance in negative framing condition. In the positive framing condition, however, the superiority judgments were as expected: superior performance received higher ratings than inferior performance.

4.6. Experiment 4

The present experiment tests the reverse framing effect hypothesis, formulated in Hypothesis 2b in four contexts (exam, basketball player, delivery, project).

4.6.1. Method

123 undergraduate students at Koc University participated in the present experiment. They received one course credit in exchange for their participation.

I combined results from two different sessions in order to test the salience hypothesis.

In the first session, I had 2 framing conditions (positive and negative) and the performance value was 50% in both conditions. In the second session, I manipulated performance level and attribute framing, thereby used a 2 framing (positive vs. negative) x 2 attribute performance (above 50% vs. 50% vs. below 50%) between-subjects design. In both sessions, there were four contexts (exam, basketball player, delivery, project) presented to each participant in a random order.

Results indicated a significant framing effect in all contexts for the superior performances as well as for the balanced (50% positive 50% negative) performances. In consisted with out salience hypothesis, H3, I found that ratings for the inferior performances, items in the negative framing condition received significantly higher ratings than the ones in the positive framing condition. I employed regression analysis to test the significance of the framing and performance interaction effect. Table 4.3 presents the performance values for all contexts.

4.6.2. Results and discussion

	Performance Levels	Mean (std. dev.) Positive Framing	Negative Framing	Test of difference		Hypothesis
Basketball						
	Superior [75% pos vs. 25% neg]	5.24 (.60)	2.16 (1.23)	$F(1, 47) = 123.84$	$p < .001$	
	Equal [50% pos vs. 50% neg]	4.81 (1.10)	4.00 (1.50)	$F(1, 145) = 13.93$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	2.76 (1.01)	4.65 (1.36)	$F(1, 46) = 29.99$	$p < .001$	
Delivery						
	Superior [62% pos vs. 38% neg]	4.28 (1.54)	1.67 (1.28)	$F(1, 47) = 41.65$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.81 (1.29)	2.80 (1.45)	$F(1, 145) = 19.36$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	1.68 (.74)	3.61 (1.26)	$F(1, 46) = 41.90$	$p < .001$	
Employee						
	Superior [82% pos vs. 18% neg]	5.92 (.57)	4.66 (1.55)	$F(1, 47) = 14.31$	$p < .001$	
	Equal [50% pos vs. 50% neg]	3.95 (1.41)	3.35 (1.34)	$F(1, 145) = 6.75$	$p < .01$	*Supporte*
	Inferior [18% pos vs. 82% neg]	1.84 (.89)	4.78 (1.48)	$F(1, 46) = 70.92$	$p < .001$	
Student						
	Superior [62% pos vs. 38% neg]	3.84 (1.14)	3.04 (.91)	$F(1, 47) = 7.28$	$p < .01$	
	Equal [50% pos vs. 50% neg]	4.03 (1.35)	3.35 (1.39)	$F(1, 145) = 8.73$	$p < .001$	*Supporte*
	Inferior [38% pos vs. 62% neg]	2.52 (.91)	3.69 (1.10)	$F(1, 46) = 16.16$	$p < .001$	

Table 4.3: Results of Experiment 4

Three important results were revealed. First, in all contexts, I observed a significant framing effect in 50% performance condition. Second, in line with Hypothesis 2a, the rating difference between positive and negative framing conditions were significantly lower for the '*50%'* condition than for the *'above 50%'* condition. Also, participants rated items in the *'above 50%'* condition more favorably than the items in the '*50%'* condition. Consistent with Hypothesis 2, this difference reflecting the superiority judgments was greater when items were presented in positive (negative) frames.

Third, results indicated that subjects judge the items with inferior performance (i.e., given in the '*below 50%'* condition) more unfavorably when they are framed positively (vs. negatively).

4.7. Conclusion and General Discussion

Previous studies on attribute framing have documented a robust valence-consistent shift, whereby positively valenced options (e.g., 50% success rate) are preferred over equivalent negatively valenced options (e.g., 50% failure rate). However, prior research has examined how valence of attribute labels influence judgments, omitting the possible impact of the inherent valence of an attribute (e.g., 70% success and 30% failure rate indicate inherently positive valence, 30% success and 70% failure rate indicate inherently negative valence).

The present research examines how *label valence* interacts with the *inherent valence* of attributes to influence judgments. Findings suggest a *valence-incongruity effect*, wherein the valence-consistent shift may be eliminated and even reversed when frame valence mismatches with the inherent valence of the attribute. This effect is explained with the

differential tendencies of decision makers to engage in associative and propositional processes while arriving at final judgments. Results of four experiments show that decision makers attend to more to affective cues from negatively framed attribute labels when inherent valence is positive. In contrast, they rely relatively more on propositional cues on the negative inherent valence when the attribute is framed positively. In addition, I show that attribute performance moderates the proposed valence-based conflict, such that the valence-incongruity effect is most pronounced when both frame valence and inherent valence are negative, and attribute performance is unfavorable.

5. GENERALIZING ATTRIBUTE FRAMING EFFECTS TO NON-COMPLEMENTARY ATTRIBUTES

5.1. Introduction

In attribute framing studies, some characteristic of an object or event serves as the focus of the framing manipulation (Levin et al. 1998). For example, burger patties may be the subject of the framing manipulation. The positively framed attribute may be the lean percentage, while the negatively framed attribute may be the fat percentage of the patties. In positively and negatively framed attributes, information valence is elicited with different labels in positive and negative frames (e.g., success vs. failure rates). Moreover, attribute values in positive and negative framing conditions are complementary to each other (e.g., 90% and 10%, summing up to 100%). Thus, attribute framing is essentially manipulating information valence by using two different attributes in positive and negative framing conditions. For example, student performance is an attribute that may be described in positive terms as *percentage of correct answers* and in negative terms as *percentage of wrong answers*, where the percentages of correct and wrong answers show the same performance. The present research, I refer to those types of attributes as *complementary* attributes.

In previous attribute framing studies, stimulus formulation has remained limited to complementary attributes. Therefore, the key questions surround (i) whether using different labels or values across attribute frames is necessary, or whether focusing the decision maker on more positive or negative aspects also leads to positive-negative asymmetry in responses, and (ii) whether this is possible using the same labels and values for positive and negative frames. In other words, will the framing effect still be significant when the complementarity in attributes is controlled for?

5.2. Non-Complementary Attributes

I define attributes that are not structured as a composition of two opposite terms as the *non-complementary attributes*. Labeling an attribute may convey negativity, which is different from the one that the value of that attribute may show. In particular, attribute label implies an intrinsically positive or intrinsically negative valence, which may be called a semantic cue for judgments. If an attribute is perceived as intrinsic positive, the item's attractiveness would increase and mostly favorable associations will be triggered. Conversely, if an attribute is perceived as intrinsic negative, aversiveness would increase and mostly unfavorable associations will be triggered for the item. Food quality of a restaurant could be an (intrinsically) positive attribute while driving time to that restaurant might be an (intrinsically) negative attribute.

5.2.1. Valence framing

Valence framing focuses decision makers on either positive or negative aspects of the evaluated attribute (or item). Attribute framing effects stems from a greater sensitivity to negatives, as compared to positives, in evaluations. Negative associations evoked by negatively framed attributes are weighted more heavily than positive associations evoked by positively framed attributes in evaluations.

This study examines whether complementary attributes create an overestimation of the valence framing effect on evaluations due to two aspects of complementarity. First, it is suggested that different labels used in positive and negative framing conditions actually refer to different attributes, while providing different criteria for evaluation. Combined with the different attribute values, unless it is 50%, those different positive and negative attributes convey the same information. For example, a 90% success rate and 10% failure rate of medical treatment induce the same performance level. However, 90% success rate is actually

a different criterion from 10% failure rate; the former being inherently favorable and the latter inherently unfavorable. Second, there is a natural yardstick serving as an upper bound; which is usually 100 since the components are structured in percentage terms. This upper bound corresponds to the best possible value for positive frames and the worst possible value for negative frames.

Therefore, the key question becomes how to manipulate valence in non-complementary attributes—more specifically, how to activate predominantly *positive* versus *negative* associations for a given attribute. Two ways of valence manipulation on non-complementary attributes are proposed, and discussed next.

5.2.2. Label and descriptive framing

In label framing, negativity can be implied through attribute *label* and/or *definition*. Attribute performance does not change across positive and negative frames. Instead, the label of that attribute is reversed across conditions, signaling positivity or negativity. As an example, an attribute for an air conditioner might be defined in positive terms as quietness, or in negative terms as noisiness. In both cases, performance value remains unchanged (e.g., 65 dB).

However, not all attribute labels are reversible. Indeed, few attributes may be defined with opposite labels, without sounding natural or being uncommon, such as *distance* vs. *closeness* or *weight* vs. *lightness*. As an alternative to attribute label-reversals, I suggest that the *description* of an attribute may be flipped in a way that some favorable versus unfavorable emphasis, or visuals, are created. Consequently, judgment is based on more positive or more negative thoughts. In particular, emphasizing a favorable situation in the process of evaluation would create a more positive mindset, while visualizing an unfavorable instance would trigger a more negative mindset. For instance, screen resolution through a

megapixel filter may be defined positively by *the higher the resolution, the sharper the vision* definition, and weight of a laptop may be defined negatively by *the heavier, the harder to carry*.

An attribute presented with a positive label or definition (e.g., how soon you can get an order, quietness measured in decibels, how long a battery lasts) will activate a positive-mindset, and subsequently the assessment; also, the comparison will take place over this positive mindset. An attribute description points out the direction where favorability increases, putting the decision-context in a positive domain. For example, *the shorter the commute, the sooner you get to your destination,* or *the longer the battery life, the longer you can use the device unplugged* make the decision maker think more positively. Although the innate valence of commute is unfavorable, whereas battery life is favorable, they are both described in a positive context. This type of framing corresponds to the gain domain in the value function (e.g., Kahneman and Tversky 1979).

On the contrary, explanations with respect to a potentially unfavorable situation evoke a more negative context for evaluations. That is, when an attribute presented with a negative label and/or definition (e.g., how long you have to wait, noisiness measured in decibels, how soon a battery dies), the negative-mindset will be activated and the evaluation will take place on a negative mindset. For instance, *fewer stars indicate lower quality*, or *the longer it takes, the longer you wait* make the decision maker think more negatively. This type of framing corresponds to the loss domain in the value function (e.g., Kahneman and Tversky 1979).

Framing effects explained with the association-based information processing suggest that attribute framing effects occur because information is encoded relative to its descriptive valence (Levin and Gaeth 1988; Levin, Johnson, Russo and Deldin 1985). That is, positive framing on an attribute will result in an encoding of the information that is likely to activate

favorable thoughts or associations in memory, whereas negative framing on the same attribute will lead to an encoding that activates unfavorable thoughts or associations (Levin et al. 1998). I posit that in attribute framing effects, it is the definition or the label of an attribute that serves as an encoder and produces negative or positive associations according to the valence framing. Those associations serve as encoders for the next step of the evaluation process and contribute to the final responses according to their valence: negative associations weigh heavier in the final responses, resulting in more unfavorable evaluation or stronger avoidance behavior than positive associations, which lead to favorable evaluations or approach behavior. Therefore, even if same attribute labels and attribute values are used in positive and negative conditions, the normalized weight of negative associations will be greater than the normalized weight of positive ones. Hence, I posit that:

Hypothesis 1: *Positively framed non-complementary attribute will lead to more favorable evaluations than the same, but negatively framed attribute.*

Next, *intrinsically positive* versus *intrinsically negative* attribute valence on the proposed framing effect on evaluations is discussed.

5.2.3. Inherent valence of an attribute

The negativity bias in the formation of overall evaluations, or the greater weight of negative attribute as compared with an equally extreme positive attribute, is a documented phenomenon in decision-making research (e.g., Lutz 1975; Rokeach 1968). Negativity bias can explain both producing more negative (vs. positive) associations and weighing those negative (vs. positive) associations more heavily when exposed to a negatively (vs. positively) framed attribute. Consequently, this differential processing of positively and negatively framed attributes results in more favorable responses for positively (vs. negatively) framed attributes. In the previous subsection, a novel manipulation technique,

non-complementary attribute can be framed positively and negatively, as previously discussed. What follows is a discussion regarding the impact of the inherent valence of an attribute.

Consider the previous *battery life* and *commuting distance* examples. The former is an inherently positive attribute while the latter is inherently negative. Therefore, valence manipulation on those attributes will be different. When an attribute is inherently positive, positive framing makes it look much better; negative framing makes it look worse, or less positive. For an attribute that is inherently negative, the opposite will hold: positive framing will make it look favorable, or less negative, and negative framing will make it look worse.

Therefore, label and descriptive framing effects are functions of the inherent valence of the framed (non-complementary) attribute. An attribute that is perceived as *intrinsic positive* would increase the evaluated item's attractiveness, triggering more favorable associations with it, whereas an attribute that is perceived as *intrinsic negative* would increase aversiveness and trigger unfavorable associations with the item—irrespective of items performance on that attribute. For example, while evaluating a restaurant, considering *food quality* as a criterion will trigger some favorable associations, beyond how that restaurant performs on food quality. In contrast, thinking about *distance* of that restaurant to your home, negative associations will be evoked even the distance is small.

In label framing, the name of the attribute changes even though the attribute remains equal across framing conditions—so does the inherent valence of that attribute. Thus, in positive framing, if the attribute is inherently negative (noise level of an air conditioner), replacing the *noise* word with its opposite *quietness* will evoke more favorable associations and evaluations. The same will hold for negative framing of an inherently positive attribute.

Descriptive framing manipulation introduces a description for attribute itself. It is important to note that this new information does not carry any additional informational value, but only uses either favorable or unfavorable words in the description in an attempt to shift the inherent valence of the attribute to be more positive or more negative. Positive information is more susceptible to the manipulation of words.

In the domain of impression formation, previous studies have shown that impressions based on a amalgamation of positive and negative traits are more negative than would be forecast from the scale values, if the traits are studied discretely (e.g., Hamilton and Huffman 1981; Hamilton and Zanna 1972; Hodges 1974; Levin and Schmidt 1969; Miller and Rowe 1967; Wyer and Watson 1969). Moreover, it has been also shown that attitudes are formed and changed through the integration of new information with existing cognitions or thoughts. Anderson (1965) found that when individuals were described with both favorable and unfavorable traits, the unfavorable ones decreased the overall impression rating more than a simple additive or averaging model would predict. Similar findings were provided by other researchers and a general pattern of negativity bias has been recognized (see Peeters and Czapinski 1990; Baumeister et al. 2001).

Pointing out the relation between valence and diagnosticity of information, Skowronski and Carlston (1989) stated that bad behaviors are more diagnostic than good ones merely because the classification requisites of stability are more strict for good than bad traits. In general terms, to be considered good, one has to be good all of the time, whereas to be considered as bad, a few bad acts are sufficient (Baumeister 2001). Likewise, Skowronski and Carlston (1992) posited that a single immoral behavior is more diagnostic, noting that to be morally good means to be consistently good, while immorality does not require consistent immorality. The power of influencing final state determines the extent of diagnosticity, which

in the context of attribute valence, which leads to the following conclusion: the greater diagnosticity of negatives originates from the diminishing effect of negatives on positive diagnosticity.

Weinberg's (1975) chain principle is analogous to the diagnosticity proposition. Chain principle suggests that the solidity of a system can be compared with that of a chain, and the chain's strength depends on the weakest link, while the strongest link is not important. It is crucial to notice how this conclusion differs from the inequality of positive and negative diagnosticity. However, neither the differential diagnosticity nor the chain principle can predict the underlying reasons for the valence-based interaction effects.

Research in social psychology also provides support for our prediction. Previous research has shown that negative first impressions are more difficult to change (Briscoe, Woodyard and Shaw 1967; Freedman and Steinbruner 1964). Kanas (1984) also suggests that negative adjectives may lead to contextual shifts in meaning more often than positive ones do. Relatedly, Baumeister et al. (2001) state that bad reputations are easy to attain, but tough to lose, whereas good reputations are hard to secure but easy to lose, suggesting that uncomplimentary characteristics attained through stereotype may be challenging to rid, in part due to a large number of observations necessary for disconfirmation. Findings confirm that bad is more robust than good: it takes more to overcome a bad versus a good trait, and more to alter a bad reputation. A similar finding has been shown in the domain of emotions by Lewicka, Czapinski and Peeters (1992). Specifically, they showed that subjects who were in a sad mood, or who are clinically depressed, required more information to make a decision. Therefore, the second hypothesis is formulated as follows:

Hypothesis 2: *Framing effect on an inherently positive non-complementary attribute will be greater than on an inherently positive non-complementary attribute.*

5.3. Experiment

The main objective of the current research is to examine the effect of complementarity in attribute framing. Hence, the present experiment was designed to rule out the inference and interaction effects by using non-complementary attributes for framing manipulation and to show whether positively framed non-complementary attribute will lead to more favorable evaluations than the same but negatively framed attribute.

5.3.1. Method

Data for this experiment were gathered via experimental sessions run at Koc University. A total of 143 students completed a set of unrelated tasks including the present study. 9 participants were unable to complete the attention task successfully, therefore their responses were excluded from the analysis, leaving 134 usable responses for analysis. Participants received course credit for their participation. It took between 25 and 30 minutes to complete the experiment.

The design of this experiment consisted of two different attribute framing (positive and negative) and six different contexts (washing machine, software, car, smartphone, dorm room, apartment). Before structuring the main experiment, I conducted a pretest with 42 participants to identify appropriate stimuli. Specifically, I wanted to control for the attribute importance by using moderately important attributes (e.g., size of an apartment and the distance to work) rather than extremely important (e.g., price of a smartphone) or extremely unimportant ones (e.g., color of a washing machine). Also, I determined performance values for each attribute by asking the participants to indicate a value for an average performance of the given attribute. Finally, for positive and negative framing manipulations, I wanted to determine the valence of the manipulated attributes. As it is rather obvious for some label reversals (e.g., *quietness* of a washing machine is favorable while *noisiness* is unfavorable;

the longer battery life is preferred over the shorter battery life), it needed clear verification for descriptive framing. To accomplish this task, I first identified several attributes for each context and asked participants to rate them based on their importance level while they are making judgments in the given context. For example, for the washing machine context, I included '*price*', '*color*', '*energy consumption*', '*reliability*' and '*noise level*'. Next, I specified two definitions for each attribute in all contexts (one being more favorable and other more unfavorable) and asked them to rate to what extent they would agree with the given statement. In the car context, for instance, the positive statement read '*the rarer the mandatory routine maintenance is, the better it is'* and the negative statement read '*the more often the mandatory routine maintenance is, the worse it is*'. Based on the analysis of the data, I chose the attribute labels and definitions depicted in Table 5.1.

Participants were assigned to one of the two framing (positive vs. negative) conditions randomly. They first read a brief cover story. In the washing machine context, participants in the positive framing condition were asked to evaluate a washing machine, Brand S, based on the following information: '*the lower the decibel is, the quieter the washer operates*'. Participants in the negative framing condition read the same description formulated negatively: '*the higher the decibel is, the noisier the washer operates*'. Only in the washing machine and software contexts, also the label was reversed across conditions: in positive condition, I used '*quietness: 51 dB*' label and in negative condition I used '*noisiness: 51 dB*' label. Questions in six contexts were presented in a random order. Table 5a presents the attributes and framing manipulation for all contexts.

	Attributes		Manipulations	
	Definition	Value	Positive Framing	Negative Framing
Washing machine	Quietness vs. noisiness	51 dB	The lower the decibe isl, the quieter the washer operates. Quietness: 51 dB	The higher the decibel is, the noisier the washer operates. Noisiness: 51 dB
Software	Reliability	1000 h	A greater number of hours shows longer working time without any interrupt, thus indicates a more reliable performance. Average time without interrupt: 1000 h	A smaller number of hours shows shorter time between failures, thus indicates a more unreliable performance. Average time between failures: 1000 h
Car	Maintanence frequency	6 mo	The lower the frequency is, the rarer the maintenance a car needs.	The higher the frequency, the more often the maintenance a car
Smartphone	Battery life	11 h	The longer the battery life is, the longer the battery lasts.	The shorter the battery life is, the sooner the battery dies.
Laptop	Weight	3.5 lbs	The lighter, the easier to carry.	The heavier, the harder to carry.
Apartment	Distance	5 mi	The smaller the distance is, the shorter you spend driving.	The greater the distance is, the longer you spend driving.

Table 5.1: Non-complementary framing stimuli

5.3.2. Results and discussion

An independent samples t-test was performed to compare ratings in positive and negative framing conditions for all contexts. In the washing machine context, there was a significant difference in the scores for positive framing (M = 5.29, SD = 1.78) and negative framing (M = 5.29, SD = 1.78) conditions; $t(132) = 2.14$, $p = .034$. These results suggest that label/descriptive framing has an effect on attractiveness ratings. Specifically, I find that when participants evaluate a washing machine based on its '*quietness level'*, they rate it more favorably than they evaluate the same machine based on its '*nosiness level'*.

In the software context, the analysis revealed a significant difference between the two framing conditions, $t(132) = 4.92$; $p < .001$. The sample means shows that participants in the positive framing condition scored significantly higher (M = 72, SD = 1.86) on attractiveness

rating than did subjects in the negative framing condition (M = 5.09, SD = 1.98); t(132) = 4.92, p < .001.

In the car context, participants who read about a maintenance frequency with the description of '*how often it is'* evaluated the car more favorably (M = 4.59, SD = 1.77) than participants who read the description of *'how rare it is'* (M = 4.00, SD = 1.39); t(132) = 2.15, p = .033.

Similarly, battery life of a smartphone seemed more attractive when the performance is described as '*how long it lasts*' (M = 4.00, SD = 1.39) than when the same performance is descriptor as '*how soon it dies*' (M = 4.00, SD = 1.39); t(132) = 2.19, p = .03.

In the apartment context, participants rated the attractiveness of a dorm room more favorably, when they read an implicit description of 'an attractive apartment would be'. Specifically, participants read the '*the greater the size, the more spacious*' description rated the apartment more favorably (M = 6.59, SD = 1.41) than did participants who read the '*the greater the size, the more spacious'* (M = 5.06, SD = 1.87); t(132) = 5.38, p < .001.

Finally in judging an apartment based on the commuting distance, results showed that when participants read the descriptive reminder on how to evaluate commuting distance in more positive terms, i.e. '*the smaller the distance, the shorter the commute'*, they rate it more favorably (M = 5.58, SD = 1.88) than they read a description in more negative terms, i.e. '*the greater the distance, the longer the commute'* (M = 4.95, SD = 1.81); t(132) = 1.96, p = .052.

	Attributes		Mean Ratings		*t* test	
	Definition	Value	Positive Framing (SD)	Negative Framing (SD)	Difference	*p* value
Washing machine						
	Quietness vs. noisiness	51 dB	5.29 (1.78)	4.63 (1.78)	$t[132] = 2.14$	$p = .034$
Software						
	Reliability	1000 h	6.72 (1.86)	5.09 (1.98)	$t[132] = 4.92$	$p < .001$
Car						
	Maintanence frequency	6 mo	4.59 (1.77)	4.00 (1.39)	$t[132] = 2.15$	$p = .033$
Smartphone						
	Battery life	11 h	5.26 (2.19)	4.42 (2.27)	$t[132] = 2.19$	$p = .03$
Dorm room						
	Size	225 sq. ft	6.59 (1.41)	5.06 (1.87)	$t[132] = 5.38$	$p < .001$
Apartment						
	Distance	5 mi	5.58 (1.88)	4.95 (1.81)	$t[132] = 1.96$	$p = .052$

Table 5.2: Framing effect on non-complementary attributes

5.4. Conclusion and General Discussion

To date, attribute framing effects have been revealed only through the complementary type of attributes, which are formulated in percentage terms, such as success or failure rates, indicating product performance. In the present paper, I examine whether the valence-consistent shift in attribute framing (Levin et al. 1998) will prevail also on non-complementary attributes, such as battery life of a smartphone. Findings of the present research reveal that: (i) even non-complementary attributes are susceptible to attribute framing, (ii) framing effect is more prominent on inherently positive attributes (e.g., food quality) than inherently negative ones (e.g., commuting distance), and (iii) attributes with more ambiguous value ranges (e.g., noise level of a vacuum cleaner) lead to stronger framing effects, as compared to more definite value ranges (e.g., commuting time). These findings may provide important implications for product positioning, product labeling, and advertising messages.

5.4.1. Limitations and future research

This research has thrown up many questions in need of further investigation. First of all, further work needs to be done to establish the relationship between the inherent valence of a non-complementary attribute and framing. To do so, the inherent valence of an attribute may be manipulated. For example, the distance to the airport might be manipulated so that it can convey an inherently positive or negative valence. Such that, the closer the distance to the airport might be more favorable for a frequent flyer, whereas a resident who lives close by to the airport might find a farther distance more favorable because of noise.

Moreover, it might be noteworthy to examine the impact of a defined range information framing effects. The current research would predict that a defined range information on an attribute decreases framing effect on non-complementary attributes. The salience of a certain range in a decision maker's mind varies across attributes with the decision maker's knowledge of, familiarity with, or experience in that attribute. What follow is an examination of the moderating role of range, and relatedly, familiarity with the attribute on framing effects.

Previous research has shown that expertise has a significant impact on attribute framing effects. The overarching conclusion surrounds familiarity decreases the reference range. Even if the sense of the plausible performance range is vague for both attribute types, evaluations on the attribute with an inherent performance range (i.e., 0% - 100%) will have a lower variance due to the increase in the ease of evaluation, thus a stronger impact on overall valuations. Hence, framing effects should be weaker when the hard-to-evaluate attribute implicitly signals a performance range, than when it does not. Taken together, a defined range, as well as prior information/experience should decrease framing effects in non-

complementary attributes as well, even more than in complementary attributes. The reference point is a function of familiarity with that attribute. Expertise might also be important.

Complementary attributes have an inherent yardstick (e.g., presence rate: 40%, absence rate: 60%), while non-complementary attributes do not (e.g., size: 750 sq. feet, distance: 30 miles). Having predefined boundaries, as in complementary attributes, decreases framing effects. Consider the following example. The sound quality of a sound system may be given as the .997% of clear signal or .003% of signal distortion, for positive and negative framing, respectively. Alternatively, the same performance could be given on an open-ended scale, having no upper bound as 100% and the interpretation of that scale could be given in positive or negative terms: .003 XYZ, *the lower XYZ, the higher the clear signal,* or, *the more XYZ, the higher the signal distortion*. In terms of this example, the question exists as to whether the framing effect will change when the sound quality is presented with complimentary attributes in percentages, versus with non-complementary attributes in a measure with no upper/lower bounds.

Note that the present research does not intent to compare framing effects in complementary vs. non-complementary attributes, but instead, to show a generalization of framing effects to a different attribute type. The effect of a predefined range of attributes to validate that framing effects work similarly in complementary and non-complementary attributes is of import. Hence, the moderating role of range, and relatedly, familiarity with the attribute for both complementary and non-complementary attributes is examined.

It is important to note that value range of an attribute differs with the context. Irrespective of whether an it is a complementary or non-complementary attribute, the plausible range for favorability/unfavorability is highly context-dependent. For instance, although aloe-vera vs. soap may be regarded as the favorable component of moisturizing,

nobody seeks a 100% aloe-vera soap. On the contrary, as for a student performance evaluation, 100% correct answers would be the most favorable performance value. Thus, the acceptable range includes 100% favorable component in the latter, but not in the former example. Further research might address to this issue by examining differential framing effectiveness for attributes with a greater vs. narrower plausible range.

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