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Sources of Brand Decline

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Sources of Brand Decline


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An abstract of
a dissertation submitted to the Faculty of the Graduate School of Emory University in
partial fulfillment of the requirements for the degree of
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**Abstract**

Sources of Brand Decline

By: Adina N. Barbulescu

Brands are important assets for companies and contribute significantly to company revenues. Firms, however, need to steadily preserve and nurture brands in order to continue to appropriate a brand's value. Thus, firms invest in brand management activities, such as advertising, to maintain or increase the value of brands.
Managers should also be mindful of actions that deem a brand less desirable to consumers, or weaken the brand. Brand decline refers to the weakening of the brand in consumers' minds in terms of consumer attitudes and intentions to purchase a brand. While a number of factors may lead to a brand's decline, I focus on two sets of factors. The first factor relates to consumers' knowledge of the brand and its structure. The second factor revolves around consumers' experiences with a brand over time. I investigate these two issues in two essays that comprise the dissertation.
In Essay 1, I argue that different knowledge structures consumers have for brands leads them to be differentially vulnerable to competitor actions, resulting in greater or lower change in brand attitude. Consumers' knowledge of brands is comprised of brand associations (or nodes) and potential causal linkages among these nodes. I argue that in the absence of causal linkages, consumers are more likely to negatively change their attitude towards the brand following a competitor challenge on one of the brand's nodes. Furthermore, I argue that the degree to which causal linkages prevent brand attitude reduction depends on their (1) directionality (i.e., whether the challenged node is a cause or effect of other nodes), and (2) multiplicity (i.e. the number of causal linkages between the challenged node and other nodes).
I hypothesize that when a competitor claims superiority with respect to a brand's "effect" node (i.e., one that consumers believe is caused by one or more other brand nodes) there is lower reduction in brand attitude than when a competitor claims superiority with respect to a "cause" node (i.e., one that consumers believe causes other brand nodes). In addition, brand attitude reduction is hypothesized to be lower when the challenged node is believed to be caused by many (as opposed to a few) other brand nodes. On the other hand, brand attitude reduction is hypothesized to be greater when consumers believe the challenged node causes many (as opposed to a few) other nodes.
A brand need not decline only under the pressure of competitors. In Essay 2, I argue the pattern of consumers' sequence of experiences with a brand can lower the likelihood of brand repurchase. A brand becomes increasingly weak when consumers expect low levels of brand performance in the future (i.e., point expectation) or considerable variability in the level of these performances (i.e., range expectation) (Rust et al. 1999).
I extend this stream of literature and argue a brand's decline, measured as low likelihood of brand repurchase, is also determined by the *distribution* of consumers' range expectation above and below the point expectation of brand performance. Asymmetric distributions arise when consumers' range expectation is not symmetrically distributed

around the point expectation–that is, consumers have uneven expectations that a brand will exceed or underperform their expectation for brand performance (i.e., point expectation). I propose that asymmetric distributions of the range expectation (i.e., asymmetric uncertainty) impact the longevity of consumers' relationship with the brand. I argue that elements of temporal sequences of brand experiences, such as the presence of a trend and peak are sources of asymmetric uncertainty. I identify managerial actions, such as the provision of promises by the company that reduce the degree of asymmetric uncertainty.

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**Essay One**

**Changes in Brand Attitude in Response to Competitor Claims:**

**The Role of Brand Knowledge Structure**

*ABSTRACT*

Consumers' knowledge of brands is comprised of brand associations (or nodes) and potential causal linkages among these nodes. For example, many consumers associate the Volvo brand name with "safety," "surround airbags," and "steel cage." In addition, many consumers also believe Volvo is "safe" <u>because</u> it has "surround airbags" and a "steel cage."

In this essay I argue that in the absence of such causal linkages, consumers are more likely to negatively change their attitude towards the brand following a competitor challenge on one of the brand's nodes (e.g., "safety"). Furthermore, I argue that the degree to which causal linkages prevent brand attitude reduction depends on their (1) directionality (i.e., whether the challenged node is a cause or effect of other nodes), and (2) multiplicity (i.e. the number of causal linkages between the challenged node and other nodes).

I hypothesize that when a competitor claims superiority with respect to a brand's "effect" node (i.e., one that consumers believe is caused by one or more other brand nodes) there is lower reduction in brand attitude than when a competitor claims superiority with respect to a "cause" node (i.e., one that consumers believe causes other brand nodes). In addition, brand attitude reduction is hypothesized to be lower when the

challenged node is believed to be caused by many (as opposed to a few) other brand nodes. On the other hand, brand attitude reduction is hypothesized to be greater when consumers believe the challenged node causes many (as opposed to a few) other nodes.

The study's hypotheses are generally supported. Contrary to expectations, however, I find that a competitive challenge of a high multiplicity "effect" node leads to greater reduction in brand attitude. Two potential explanations of this result are empirically investigated: (1) competitor appropriation of the brand's knowledge structure and (2) change in relative importance of brand nodes due to their multiplicity and directionality. My findings support the second explanation.

*INTRODUCTION*

Consumers' brand associations play an important role in consumers' subsequent brand decisions. Brand associations have been shown to affect consumers' attitude toward brands (Keller 1993, Keller 1998), evaluations of brand extensions (Broniarczyk and Alba 1994) and responses to competitors' persuasion attempts (Pechmann and Ratneshwar 1991). Prior research has found that the favorability, uniqueness and strength of the brand associations affect the degree of consumer reactions (Keller 1993).

In addition to storing brand associations (hereafter "nodes") in their memory, consumers may also store causal linkages among the nodes. For example, many consumers believe that Volvo is "safe" and that is has a "surround airbags." Importantly, however, many consumers *also* believe Volvo is "safe" *because* it has "surround air bags." That is, consumers believe there is a causal linkage between these two brand nodes. Similarly, in the yogurt category, consumers believe Activia yogurt promotes "digestive health" *because* it has "probiotic culture," "low fat," and "natural" ingredients (Figure 1). However, consumers' brand knowledge need not always include casual linkages among brand nodes. For example, many consumers associate Stoneyfield yogurt with "organic," "gluten free," "tasty," and "environmentally conscious" but do not believe these brand nodes are causally connected (Figure 2).

[Insert Figures 1 and 2 About Here]

Whereas prior research acknowledges the possible presence of linkages among brand nodes in consumer memory, there has been little investigation of their effect on

brand preference. In his seminal work, Keller (1993) acknowledges a potential congruent, correlation-type linkage between brand nodes. He argues such linkages could affect consumer learning of new brand nodes and impact how these nodes change following competitor actions. Krishnan (1996) proposes that presence of linkages between a brand's nodes is an indicator of brand equity. Techniques that integrate brand knowledge maps recognize the presence of linkages between brand nodes. Henderson et al. (1998) use analytical methods to infer co-occurring linkages between brand nodes. Roedder John and colleagues (2006) introduce a method for deriving consensus brand maps which allows for linkages among brand nodes.

The purpose of this study is to extend this line of research by investigating the effect of causal linkages among brand nodes on brand-related decisions. I argue that the absence of causal linkages between brand nodes yields greater negative change in brand attitude following a competitor challenge (i.e., a competitor claiming to be superior to the brand with respect to one of the brand nodes). Furthermore, I argue the level of brand attitude change is a function of two properties of causal linkages—directionality and multiplicity. Directionality of a causal linkage with respect to the brand node refers to whether its causal linkage(s) are inbound, pointing to the node (i.e, node is an effect) or outbound, pointing away from the node (i.e., node is a cause). Multiplicity refers to the number of causal linkages between a brand node and other brand node(s).

I hypothesize that when a competitor claims superiority on an "effect" brand node (i.e., a node that consumers believe is caused by one or more other nodes), consumers are less likely to change their brand attitude than when the challenge focuses on a "cause" node (i.e., one that consumers believe causes other nodes).  In addition,

brand attitude reduction is proposed to be lower when the challenged node is caused by many other brand nodes as opposed to few; on the other hand, brand attitude reduction is hypothesized to be greater when the challenged node is believed to cause many other nodes, rather than few.

In the following sections I review prior literature that supports the presence of causal linkages in human memory and their impact on cognitive tasks. This is followed by a theoretical development of causal linkages and their effect on brand attitude change following a competitor challenge. The method section presents three studies along with their results. I conclude with a discussion of these findings and future research suggestions.

## HUMAN MEMORY FOR CAUSAL LINKAGES

Prior research has shown that individuals learn and store causal linkages in their memory. When learning new (product) categories, individuals store not only defining features of categories, but also how these features are related (e.g., Rosch 1978; Medin et al. 1982; Barsalou 1993). Moreover, consumers tend to provide reasons for the correlations they perceive between features based on their knowledge of how the world works (Murphy and Medin 1985). Ahn and colleagues (2002) find the correlations to be of causal nature.

Several studies have found consumers' memory of casual linkages to play the predominant role in the performance of cognitive tasks (e.g., typicality judgments and memory recall). In the learning literature, causal relatedness is found to improve

recognition and memory recall, outperforming referential relatedness (Keenan et al. 1984). Consumers also seem to use the previously learned causal linkages to make inferences about properties or features of members of same product categories (Gentner 1989; Gelman 2003, Rehder and Burnett 2005), determine category membership (Rehder and Hastie 2004), and categorize new products (Ahn and Medin 1992, Ahn et al. 2000).

From among the causal, semantic and correlation linkages consumers use to connect constructs, causal linkages have the highest impact on cognitive tasks (Ahn and Medin 1992). Causal linkages have been shown to be a stronger predictor of category construction, categorization of new exemplars, free-sorting, and typicality judgments than both correlation and similarity linkages (Ahn et al. 2000).

*THE STRUCTURE OF CAUSAL LINKAGES AMONG BRAND NODES*

Anderson (1983) and Anderson and Bower (1976) suggest that consumers' brand knowledge is structured as an associative network. According to their theory, consumers' knowledge is comprised of concept nodes, or units of information, connected by associative paths. Based on this model, I propose that consumers' knowledge of brands is composed of brand nodes as well as potentially a set of causal linkages among these nodes.

I argue that while consumers may store causal linkages between a brand's nodes, such a cognitive structure is not ubiquitous. A consumer may have a causally connected knowledge structure for some brands (e.g., many causal linkages among the brand nodes), but store no linkages among the nodes of other brands. Consumers may learn and

acquire causal linkages between a brand's nodes following advertising that promotes such linkages, brand descriptions by other users, or own brand experience.

The objective of the study is to investigate the effect of causal linkages in consumers' memory on brand attitude change following a competitor's challenge, regardless of the source of causal linkages. I investigate different patterns of causal linkages present in consumers' memory of brands as captured by three properties; (i) presence (or absence) of causal linkages, (ii) their directionality and (iii) multiplicity. I discuss each in turn.

*Absence vs. Presence of Causal Linkages*

I argue that the presence of causal linkages between a brand's nodes increases consumers' ability to recall a brand's nodes. Consumers tend to remember causally coherent stories to a greater extent than causally unrelated stories, as shown in both free recall and cued recall task studies (Black and Bern 1981, Keenan et. al 1984). Their recall is facilitated by an understanding of how the facts are related (Alba and Hutchinson 1987).

The spreading-activation theory of memory (Collins and Loftus 1975) would suggest that following a competitor's challenge on a brand node, consumers tend to recall other brand nodes causally linked to the challenged node to a greater extent. For example, following a competitor challenge on Activia's "digestive health," consumers would be more likely to recall Activia's other brand nodes that are causally linked to "digestive health" (i.e., "low fat," "probiotic culture," and "natural") than nodes that are not linked to it.  In turn, the increased recall of brand information provides consumers with more

information to defend an initial brand attitude, resulting in lower attitude change (Pham

and Muthukrishnan 2002). Thus:

$H_1$: Following a competitor challenge, consumers change their attitude towards a brand to a greater extent in the *absence* of causal linkages between the brand's challenged node and other nodes than in the presence of these linkages.

*Directionality of Causal Linkages*

The directionality of a causal linkage captures the asymmetry of these linkages

(Waldmann and Holyoak 1992; Waldmann 2000). Consumers see a brand node with

inbound causal linkages as an "effect" node, and a brand node with outbound causal

linkages as a "cause" node. For example, in Activia's knowledge structure, "digestive

health" is an "*effect*" node, and "probiotic culture" is a "*cause*" node (Figure 1). Ahn and

Kim (2001) argue people perceive causes and effects differently in performing cognitive

tasks, such as assigning a new member to a category.

The direction of a causal linkage also determines whether a node receives support

or validation from another node (i.e., is an "*effect*" node) or if the node is instrumental in

supporting or validating another brand node (i.e., is a "*cause*" node). I argue that when a

competitor challenges a supported or validated node (i.e., an "effect"), consumers are

likely to recall the "causes" that validate the "effect" and thus counter argue competitor's

claim. For example, when a competitor challenges Activia on "digestive health,"

consumers are able to retrieve "causes" of "digestive health" (i.e., "low fat," "probiotic

culture," and "natural") and counter argue the competitor's claim. On the other hand,

when the competitor challenges a brand node perceived to be a "cause," consumers

cannot use any of the remaining brand nodes to validate the "cause" node; on the

contrary, a challenge on a "cause" node may be viewed as a subsequent challenge on the

"effects" of the "cause." If a competitor were to challenge Activia on "natural"

ingredients, consumers would not be able to support Activia's "natural" node with any

other brand nodes (i.e., "causes"); moreover, consumers may perceive the competitor's

challenge on "natural" ingredients as a challenge on "digestive health" (i.e., the effect of

the "natural" brand node).

> $H_2$: Following a competitor challenge, consumers change their attitude towards a brand to a greater extent when the challenge targets a "cause" node as opposed to an "effect" node.

*Multiplicity of Causal Linkages*

Multiplicity refers to the number of causal linkages between a brand node and the

brand's other nodes. In the Activia example (Figure 1), the "digestive health" node has

high multiplicity because it is causally linked to three other brand nodes in consumer's

memory. On the other hand, the "probiotic culture" node has lower multiplicity because it

is causally linked to only one other brand node in the consumer's memory. The higher the

number of causal linkages around an "effect" node, the higher is the likelihood of a

consumer recalling the connected nodes. In turn, greater recall of the linked "cause"

nodes increases the support or validity for the challenged node (Collins and Loftus 1975;

Anderson 1983; Waldmann 2000). As such, the consumer is likely to change his/her

brand attitude to a greater extent than when the multiplicity of the challenged node is

smaller. Thus:

> *$H_{3a}$: The smaller the multiplicity of an "effect" node targeted by a competitor's challenge, the greater the brand attitude change.*

However, when a competitor challenges a "cause" node with low multiplicity, I

expect the opposite effect—I expect a consumer to change his/her brand attitude to a

*lower* extent for the following reason. When a competitor challenges the "cause" node, consumers are more likely to recall the "effect" nodes linked to it (Collins and Loftus 1975; Anderson 1983). Furthermore, because the challenged "cause" node supports or validates these multiple other brand nodes, the competitor challenge on the "cause" node in effect challenges these "effect" nodes as well. As such, the consumer is likely to change his/her attitude toward the brand to a greater extent than when multiplicity is relatively low. Thus:

> $H_{3b}$: *The greater the multiplicity of a "cause" node targeted by a competitor's challenge, the greater the brand attitude change.*

## STUDY 1

To test the effect of consumer memory of causal linkages between a brand's nodes on brand attitude change, I manipulated consumer knowledge of a fictitious brand of solar garden lights.

I chose two causal structures—common effect and common cause (Figure 3)—that consumers think about more naturally (Ahn 1999, Ahn et al. 2000, Rehder and Hastie 2004, Kiel 2006). The common effect structure is characterized by a common effect (i.e., a node that caused by all other nodes in the network). The brand knowledge structure depicted in Figure 1 for the Activia brand is a common effect structure, where the "digestive health" node is caused by the brand's all other nodes. Conversely, a common cause structure is characterized by a common cause, or a node that causes all other brand nodes.

[Insert Figure 3 About Here]

*Method*

      *Participants and Design*. Two hundred and thirty-six undergraduate students at a major U.S. university participated in the study in exchange for a $5 gift certificate. They were randomly assigned to one of the four between-subject conditions in a $2 \times 2$ factorial design (directionality $\times$ multiplicity) or to a control condition (absence of causal linkages) (Figure 4).

[Insert Figure 4 About Here]

      *Procedure*. The experimental procedure follows the pretest-posttest control group design proposed by Haugtvedt et al. (1994) and Pham and Muthukrishnan (2002). The study included two sessions conducted 60 minutes apart, at the beginning and end of an undergraduate business class. In the first session, participants received favorable consumer reviews of a fictitious solar garden light, *Solight*. Five brand nodes ("energy efficient," "does not overheat," "battery recharges quickly," "warm shade of light," and "limited flickering") described the brand. Participants in the treatment conditions were explicitly informed of causal linkages between the five brand nodes (Figure 5). Participants in the control condition were not informed of any causal linkage. The directionality of causal linkages was manipulated such that "energy efficient" was communicated as a "cause" or an "effect," and connected to either one or four other brand nodes. At the end of the first session participants reported their attitude towards *Solight* and answered questions to verify they had acquired a correct knowledge structure (see Appendix A).

[Insert Figure 5 About Here]

In the second session (following the class session), participants were informed of a superiority claim of a new solar garden light that was similarly priced. Participants read that a competitor conducted an internal product testing study, according to which its new product was "20 to 30% more energy efficient than *Solight*". Participants in all conditions received this competitor challenge. Following this additional information, participants were asked to rate the *Solight* brand. Respondents concluded the study by recalling any information they had received about the *Solight* brand.

*Manipulations*. The manipulations were designed to create specific brand knowledge structures in consumers' memory. A relatively unfamiliar product category (solar garden lights) was chosen to minimize the existence of participants' a priori knowledge structure (of solar garden lights). This ensured limited influence of participants' a priori knowledge on manipulation effectiveness and brand evaluations. The study was conducted with undergraduate students who are unfamiliar with solar garden lights as compared to graduate students. Familiarity with the product category was measured on a 9-point scale anchored by "not at all familiar" (1) and "very familiar" (9). Participants also indicated whether they had previously bought a solar garden light. The importance of brand nodes in purchase decisions was measured on 9 point-scale anchored by "not at all important" (1) and "very important" (9).

In order to eliminate potential confounding factors in participants' brand evaluations the manipulations were designed with four major considerations in mind: (1) present participants with the same information content across all conditions; (2) present participants with the same amount of information (i.e., number of lines and number of

words); (3) mention the five brand nodes equal number of times across all conditions to obtain an equal node salience; and (4) present participants with the same competitor challenge (i.e. "20 to 30% more energy efficient that *Solight*"). Thus, the design assures that differences in message recall and attitude change are not influenced by differential amounts of information, repetition, or vividness (Reyes, Thompson, and Bower, 1980). Table 1 lists these criteria scores for each condition.

[Insert Table 1 About Here]

The first step in manipulating the presence or absence of causal structure of brand knowledge was to select relevant brand nodes that, at first glance, would not appear to be causally related. This step was needed to ensure that participants in the control condition were unlikely to infer any causal linkages between the brand's nodes. The second step involved selecting brand nodes that could be credibly connected in a causal manner in the treatment conditions. At the same time, these causal mechanisms were chosen such that they would not lead participants to infer unspecified causal linkages among the brand's nodes.

The third and most difficult step was to select brand nodes that could credibly cause one or more nodes and at the same time be caused by these nodes. The manipulation of the directionality and multiplicity of causal linkages together with the constraint of challenging the same node across all conditions required extremely versatile nodes. Specifically, the node challenged by the competitor had to occupy four different structural locations: low multiplicity effect, low multiplicity cause, high multiplicity effect, and high multiplicity cause. This was achieved by choosing "energy efficiency" as

the node to be challenged. Thus, in one condition, participants learned that "limited flickering" causes *Solight* to be "energy efficient", because "limited flickering" is accompanied by fewer electrical interruptions, which in turn saves energy. In a different condition, participants were informed that "energy efficiency" is a cause of "limited flickering" (i.e., because *Solight* is "energy efficient", it loses less energy while it is on, and thus results in fewer electrical interruptions and hence "limited flickering").

The fourth step in achieving cell equivalence was to ensure the causal mechanisms (e.g., "fewer electrical interruptions" that linked "energy efficiency" to "limited flickering") were mentioned in the control condition as well. Moreover, I had to ensure that participants in the control condition would not draw on these causal explanations and infer any causal linkages between the brand's nodes. To achieve this, I replicated the content of causal mechanisms (e.g., "fewer electrical interruptions") but omitted the causal connectors (i.e. "because", "causes"). I also chose to provide this additional information separated from its "effect." In the control condition, the information used as a causal mechanism between "limited flickering" and "energy efficiency" was presented as follows: "Besides providing light with limited flickering, Solight also has fewer electrical interruptions". I also ensured that the information of causal explanations were present in all treatment conditions as well. I followed the process described above for all the treatment conditions.

The last and fifth step ensured the five brand nodes were mentioned an equal number of times across all conditions. This assured that increased repetition of any brand node would not confound recall of brand information (measured at the end of the second session). I introduced needed repetition of nodes through sentences that provided no real

information (e.g., "lamps that 'do not overheat' operate at or below recommended temperatures"). Again, I ensured that this additional information was replicated in all conditions as well.

Several manipulation checks were included to ensure a correct appropriation of the causal structure by participants. Respondents were asked to identify the brand's five nodes from a list of nine nodes. Subsequently, they were asked to indicate if they had perceived the presence of linkages between the brand nodes; and if so, to describe how *Solight's* brand nodes were related to each other.

Special care was taken in administering the study to ensure that participants relied only on their memory when completing the tasks. Respondents answered these manipulation questions only after they had read the information about *Solight* and placed the booklet in an envelope. They were then instructed to place their answers in a separate envelope. The two booklets were marked with matching participant numbers.

*Dependent variables*. Participants were asked to rate their attitude toward the *Solight* brand at two points in time: (1) before competitor's challenge and (2) after the challenge. Participants indicated their attitude toward the *Solight* brand on three 9-point scale anchored by "Unfavorable" (1) and "Favorable" (9). Participants concluded the study by recalling brand nodes and causal linkages of the *Solight* brand.

*Results*

*Manipulations*. Given the hypothesize effect of knowledge structure on participants' brand attitude, only participants who acquired the knowledge structure they had received were included in the analysis. One hundred and sixty two participants

identified a least 3 brand nodes did not inferred causal linkages they were not provided with, or misinterpret the information they read.

*Accessibility of brand information (recall of brand nodes)*. Analysis of covariance[1] supports my expectation that causal structure increases the accessibility of brand information following a competitor challenge. Participants who do not learn of causal linkages between nodes recall on average fewer brand nodes than participants who are presented with causal linkages (M = 3.5 vs. 3.28, F(1, 162), $p < .1$).

I find partial support for the spreading activation theory: participants were able to recall more brand information (nodes and linkages) when "energy efficient" was presented as an "effect" with many linkages than when it was presented as an "effect" with few linkages (M = 4.76 vs. 3.82, F(1, 65), $p <.05$). However, this effect is not observed between the "Low Multiplicity Cause" condition and the "High Multiplicity Cause" condition (M = 3.65 vs. 4.75; F (1, 49), $p >.1$).

*Brand Attitude Change*. $H_1$ predicts that in the presence of causal linkages with challenged brand nodes, participants will change their brand attitude to a lower extent than when such linkages are absent. I find general support for this hypothesis: causal structure of brand knowledge reduces the change in brand attitude when the challenged node is connected to only few other nodes in the brand network. Contrast tests (controlling for prior purchases) suggest the change in brand attitude is lower for the "Low Multiplicity Cause" condition than for the control condition (M = .54 vs. .97, F(1,66) $p <.1$). Results are replicated for the "Low Multiplicity Effect" condition (M = .55 vs. .97, F(1,75), $p < .05$). However, I find that brand attitude change is lower for the control condition than for the "High Multiplicity Effect" condition (M = 0.97 vs. 1.45,

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[1] The following covariates were included in the analysis: prior purchase.

F(1,75), $p < .1$). I find no statistically significant difference between the control condition and the "High Multiplicity Cause" condition.

$H_2$ predicts that a challenge on an "effect" node will lead to lower attitude change than a challenge on a "cause" node. I submitted the data on brand attitude change to a 2 (directionality: inbound or outbound) × 2 (multiplicity: low or high) analysis of variance. I found no statistical difference in how participants respond to a challenge when "energy efficient" is a "cause" or an "effect" ($F(1, 110) = 1.15$, $p > .1$) (Figure 6). This result may however be due to extremely low power observed (observed power = 0.19), much lower than the 0.80 threshold for low power suggested by Cohen (1988). The directionality factor does have a high effect size (eta = 0.35), according to Cohen (1998).

[Insert Figure 6 About Here]

In $H_{3a}$ and $H_{3b}$ I predicted an interaction of directionality and multiplicity of causal linkages. I argued that challenging a highly connected brand node leads to a lower attitude change when the node is an "effect" and higher attitude change when the node is a "cause."

The results support my prediction in $H_{3b}$. Participants in the "Low Multiplicity Cause" condition revised their initial brand attitude to a lesser extent than participants in the "High Multiplicity Cause" condition (M = .54 vs. .96, $F(1, 49)$, $p < .05$). However, respondents in the "Low Multiplicity Effect" condition revised their brand attitude to a greater extent than participants in the "High Multiplicity Effect" condition (M = 1.45 vs. .55, $F(1, 65)$, $p < .01$).

*Summary*

The results of this study provide general support for my hypotheses. I find that the absence of a causal structure of brand knowledge negatively impacts brand attitude change following a competitor challenge. However, knowledge of causal linkages between brand nodes is a double-edged sword: while most causal structures help a brand resist competitor challenges, one structure ("High Multiplicity Effect") increases the brand's vulnerability to competitive challenges.

When a competitor challenges an "effect" node with high multiplicity, participants change their attitude towards the brand to the greatest extent. This result is contrary to my initial expectations: I hypothesized that following a competitor challenge on an "effect" node with many causes, participants would recall the four nodes supporting the challenged node and maintain their belief in the challenged node. This in turn was hypothesized to lead to a lower change in brand attitude.

I advance and test two explanations for this unexpected result: (1) competitor appropriation of brand's nodes and (2) increased relative importance of challenged node.

*COMPETITOR APPROPRIATION*

Research in comparative advertising suggests a superiority claim of a competitor leads it to be perceived as being similar to the challenged brand on the challenged attribute (i.e., "energy efficiency") (Gorn and Weinberg 1984, Walker et al. 1986, Pechmann and Ratneshwar 1991). Moreover, the mere comparison with a brand also associates the competitor with other attributes typically associated with the brand (i.e.,

"does not overheat," "battery recharges quickly," "limited flickering," and "warm shade of light") (Pechmann and Ratneshwar 1991). In other words, consumers infer that "if the advertiser compared these brands, they must be comparable." This is all even more the case if the brand is a market leader or a known brand because consumers expect it to be invariably copied (Ratneshwar and Chaiken 1991; Chaiken 1987). Finally, by challenging a brand on an attribute, a competitor also diminishes the brand's ownership of the challenged attribute (Pechmann and Ratneshwar 1991).

These findings suggest that by challenging a brand node ("energy efficiency"), a competitor "appropriates" the node along with its connected nodes, leading to a lower consumer brand evaluation. I call this the "competitor appropriation effect" and test for it in two follow-on experiments (Study 2 and Study 3).

*RELATIVE IMPORTANCE of the CHALLENGED BRAND NODE*

A second possible explanation for the greater change in attitude when challenged node is an "effect" with many causes is an increased emphasis, or importance, placed by consumers on "energy efficiency." The structural location of a node (i.e., cause or effect, high or low multiplicity) may result in an increased perceived importance of that node at the expense of other brand nodes. This in turn may result in a greater change in attitude when particular node is challenged.

*STUDY 2*

Study 2 was designed to test for competitor appropriation of brand's knowledge when challenged node is believed to be an "effect." In the first test of this effect, I designed manipulations aimed to minimize competitor appropriation, and measured the level of attitude change. If competitor appropriation is indeed causing the greater change in attitude when challenged node is an effect with high multiplicity, I should observe lower brand attitude change in the absence (or at lower levels) of competitor appropriation.

Of interest is the level of attitude change when challenged node is an "effect" with high multiplicity. I compared this condition with a "low multiplicity effect" condition and a control condition (absence of causal linkages). I used the same product category – solar garden lights – to manipulate consumer brand knowledge structure. The same questions were used in this study as in Study 1 to determine participants' change in attitude, attitude confidence, and brand information recall.

*Method*

*Participants and Design*. Fifty-eight undergraduate students at a major U.S. university participated in the study in exchange for a $5 gift certificate. They were randomly assigned to one of the two levels of the multiplicity factor (high vs. low) or to a control condition (absence of causal linkages). The second factor (i.e., directionality) was held constant at the "effect" level.

*Procedure*. I followed the pretest-posttest control group research design of the first study conducted 60 minutes apart. Respondents read the same favorable brand information as presented in Study 1 and stated their favorability towards *Solight*.

In the second session, participants read about the superiority claim of a new solar garden light that was similarly priced. To minimize the competitor appropriation effect, I explicitly provided competitor information on each of the nodes present in Solight's knowledge structure. Participants were informed that a competitor had conducted an internal product testing study, according to which its new product was "at least 20% more energy efficient than *Solight*." Importantly, to minimize competitor appropriation effects, participants were also informed that the competitor acknowledged its product to be "somewhat inferior to *Solight* on other attributes considered by consumers". All participants received this challenge and re-evaluated their attitude towards *Solight*. All other questions were identical to those in Study 1.

*Manipulations*. The undergraduate students were unfamiliar with the solar garden light product category (M = 2.9) and ninety-five percent of participants had never bought a solar garden light.

*Dependent variables*. The scales of Study 1 were replicated in this study.

*Results*

Fifty eight participants acquired the knowledge structure they had received.

*Brand attitude change*. Contrast tests replicate the findings of the first study for the comparison of the "Multiple Linkage Effect" with the no linkage (control) condition (M = 1.24 vs. 0.72, $F(1, 39)$, $p < .05$) (Figure 7). As a validation of the results of Study 1,

I observe a greater attitude change when the challenge targeted an effect node with many causes than an effect node with few causes (M = 1.24 vs. 0.12, F(1, 32), $p < .05$).

[Insert Figure 7 About Here]

*Accessibility of brand information (recall of brand nodes).* Consistent with findings of the first study, I find that brand knowledge increases participants' recall of brand information when "energy efficient" is a low multiplicity "effect" (M = 3.81 vs. 3.29, F(1, 32), $p < .1$). The difference is not statistically significant for "High Multiplicity Effect" condition.

*Summary*

In the second study I provided participants with a competitor challenge that claimed superiority on one brand node ("energy efficiency") and provided slightly negative information on the other nodes. This challenge was designed to minimize competitor appropriation of the brand's positive information. The results of this study indicate that participants in the "High Multiplicity Effect" condition still changed their attitude toward the brand to the greatest extent. This study replicates the findings of Study 1 and suggests that competitor appropriation does not appear to explain the change in attitude of participants in the "High Multiplicity Effect" Condition. However, a direct measure of competitor appropriation is warranted to rule out this alternative explanation.

*STUDY 3*

I conducted a third study to directly test competitor appropriation of a brand's knowledge as a possible explanation for the high attitude change in the "High Multiplicity Effect" condition. I allowed for competitor appropriation by omitting any information on the competitor's brand other than "energy efficiency". I included scales adapted from Pechmann and Ratneshwar (1991) to determine the extent of competitor appropriation of the brand nodes as well as the brand's ownership of its brand nodes following the challenge.

Of interest is again the level of attitude change when the challenged node is an "effect" with many causes. Therefore, I compared brand attitude change in the "High Multiplicity Effect" condition with the "Low Multiplicity Effect" and a control condition (absence of linkages). I used the same product category (solar garden lights) to manipulate consumer brand knowledge structure. I used the same scales as in Study 1 to determine participants' change in attitude.

*Method*

*Participants and Design*. Sixty-eight undergraduate students at a major U.S. university were randomly assigned to one of two levels of the multiplicity factor (high vs. low) or to a control condition (absence of causal linkages). The second factor (i.e., directionality) was held constant at the "effect" level.

*Procedure*. I replicated the pretest-posttest control group research design of the first study and measured the degree of competitor appropriation of the brand's nodes.

In the first session respondents read favorable information about a fictitious solar garden light (*Solight*). In the second session, all participants read a superiority claim of a new solar garden light (i.e., "competitor conducted an internal product testing study, according to which its new product was 20 to 30% more energy efficient than Solight"). In order to assess the degree of competitor appropriation, participants were asked "In your opinion, how likely is it that *Exim*, the competitor, has the following features?" They provided responses on a 9-point scale anchored by "not at all likely" (1) and "very likely" (9). Participants were also asked to rate *Solight* on the same scales. This allowed us to determine the extent of *Solight's* ownership of its brand nodes following the competitor challenge.

*Manipulations*. Ninety-six percent of participants had never bought a solar garden light, indicating low familiarity with the product category.

*Dependent variables*. Participants' brand attitude was measured on a 9-point scale anchored by "unfavorable" (1) and "favorable" (9). Competitor appropriation was measured with the following question: "In your opinion, how likely is it that *Exim*, the competitor, has the following features?" Participants rated the degree of competitor appropriation of *Solight's* five brand nodes on a 9-point scale anchored by "not at all likely" (1) and "very likely" (9). An average rating of competitor's appropriations of the additional four brand nodes (not present in the challenge) was computed. Participants also rated *Solight* on the same scale to determine the extent of *Solight's* ownership of its brand nodes following the competitor challenge.

*Results*

  *Competitor appropriation.* Contrast tests indicate that while competitor appropriation had indeed occurred, it was not causing the greater change in attitude in the "High Multiplicity Effect" condition—I observe no statistically significant difference in the level of appropriation of the additional four brand nodes between the "High Multiplicity Effect" and the "Low Multiplicity Effect" ($M = 4.99$ vs. $5.27$, $F(1,45)$, $p <.01$) (Figure 8). Univariate analysis indicates ratings of competitor appropriation do not affect the change in brand attitude ($F(1.63) = .22$, $p > .1$).

[Insert Figure 8 About Here]

  Interestingly, I also observe an effect of causal structure on competitor appropriation the brand's nodes. Contrast tests indicate when participants do not learn causal linkages, they attribute the brand's knowledge to the competitor to a greater extent ($M = 6.08$ vs. $5.04$, $F(1, 63)$, $p < .1$) than when they learn brand information with causal linkages. Also, participants in the control condition believe the competitor is more likely to be "energy efficient" than participants in the treatment conditions ($M = 7.80$ vs. $6.66$, $F(1,63)$, $p < .01$).

*Summary*

  The third study directly tested competitor appropriation as a predictor of brand attitude change. The results indicate that although competitor appropriates the brand's nodes when challenged node is an "effect" with many causes, it does not cause the change in brand attitude.

The results of Study 2 and Study 3 rule out competitor appropriation as a plausible explanation for the change in brand attitude when challenged node is a "high multiplicity effect."

*NODE IMPORTANCE*

Next, I test for the second plausible explanation for the change in brand attitude when challenged node is an "effect" with many causes (i.e., increased relative importance of challenged node). In Study 1, contrast tests do not reveal a difference in perceived importance of "energy efficiency" in purchase decisions between the two "effect" conditions (M = 8.23 vs. 8.35 $F(1, 65)$, $p > .1$). However, participants do perceive "energy efficiency" differently when compared to the brand's other nodes. I computed perceived relative importance of "energy efficiency" as the importance of "energy efficiency" divided by the sum of nodes' importance. Univariate analysis of variance indicates participants do indeed perceive "energy efficiency" as more important relative to the brand's other nodes when "energy efficiency" is believed to be an "effect" with high versus low multiplicity ($F(1,65) = 5.51$, $p < .05$). This finding is replicated in Study 2 as well ($F(1,32) = 3.42$, $p < .1$).

Further analysis suggests the increased relative importance of "energy efficiency" has an influence on the level of attitude change ($F(1, 95) = 6.31$, $p < .05$). These results indicate the change in brand attitude when challenged node is an "effect" with many causes is due to an increased importance of the challenged node relative to the other brand nodes.

[Insert Figure 9 About Here]

*DISCUSSION*

This paper investigates the effect of the causal structure of consumer brand knowledge on brand attitude change following competitive challenges. I manipulated four different causal structures (Figure 5) and the structural location of one brand node ("energy efficient").  Following a distraction period, I presented a competitor superiority claim on the "energy efficiency" node. I compared the brand attitude change for each of the four brand knowledge structures with the change in attitude observed in the control (no causal structure) condition.

I find that consumer knowledge of causal linkages between a brand's nodes yields lower brand attitude change for most of the structures, but a higher change for one structure. Specifically, I find brand attitude change is the greatest when a competitor challenges a highly linked "effect" node. I advance and test two explanations for this unexpected result: (1) competitor appropriation of brand's knowledge and, (2) increased relative importance of challenged node.

I was able to rule out competitor appropriation as a potential explanation of this result in two additional experiments. The experiments indicate that although competitor challenge results in competitor appropriation of a brand's knowledge, this transfer of knowledge does not explain the greater change in attitude when the challenged node is a high multiplicity "effect." These studies provide further support for the benefits of causal

connections between a brand's nodes. I find that a competitor appropriates a brand's knowledge to a greater extent in absence of causal linkages.

I proposed the relative importance of the node challenged in purchase decisions as an alternative explanation for the unexpected finding. Tests across the three experiments support this explanation. Participants judge "energy efficiency" to be more important relative to the other brand nodes when it is an "effect" with many causes as opposed to an "effect" with few causes. Subsequently, the relative importance of the node challenged has a predictive influence on the level of brand attitude change.

These results provide support for the significant implications of causal structures of brand knowledge in brand-related decisions. The study has managerial implication for brand building and brand positioning activities (by showing that causal linkages are a double-edged sword) as well as for targeting competitor's brands (by suggesting that it is better to target an 's "effect" nodes with many causes). The results of the study are informative for established brands operating in emerging industries, in which new competitors and brands are likely to challenge incumbents' positioning.

*CONTRIBUTIONS AND FUTURE RESEARCH*

In this paper, I make a conceptual contribution to the consumer-based brand equity literature by showing causal linkages between a brand's nodes are an important element of consumer brand knowledge. I have identified two structural characteristics of causal linkages–directionality and multiplicity–and tested their influence on the brand attitude change following competitive challenges.

My results suggest causal linkages are a double-edge sword. I find that while some causal structures are beneficial to the brand, other structures seem to increase the brand's vulnerability to competitive challenges. These findings suggest managers should focus not only on the cognitive content of brand knowledge (brand nodes), but also on the underlying structure that relates these nodes to each other. More specifically, brand managers need to actively track and influence, through marketing communications and advertising, the structure of causal linkages in consumers' memory in order to increase their brands' resistance to competitive challenges.

This research also has implications for protecting a brand's most important nodes. I show that when faced with comparative and verifiable claims on a typical attribute, certain network positions within the causal structure (i.e., when challenged node is connected to few nodes) tend to protect the brand from competitive claims.

It is important to mention that I test the effect of causal structure on brand attitude change in the context of a superiority comparative challenge on a typical, verifiable attribute by an unfamiliar competitor. This combination of factors (comparative claim, typical attribute, verifiable claim, and unfamiliar competitor) has been shown to be the most effective at challenging a brand's positioning (Pechmann and Ratneshwar 1991).

More research is needed to establish the impact of causal structure of brand knowledge on brand attitude change. Non-comparative ads are known to be less effective at associating a competitor with a brand, and it is not clear whether the causal linkages in brand knowledge diminish or enhance a competitor's claim. I am also intrigued by the likely effect of causal linkages between non-product related nodes and their effect on

attitude change. New avenue for research include challenges from a familiar (rather than unfamiliar) competitor.

This study examines the impact of only one type of linkages (i.e., causal) among brand nodes on brand attitude resistance. It would be instructive to study other types of linkages, such as co-occurring or semantic linkages and measure their potential contribution to brand attitude change following competitive challenges. Finally, this study investigates only two types of causal networks (common-effect and common-cause). More needs to be learned about the different types of causal networks and their influence on brand attitude change.

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**Table 1 Manipulation Criteria**

|  | Control Condition (absence of linkages) | Low Multiplicity Cause | Low Multiplicity Effect | High Multiplicity Cause | High Multiplicity Effect |
|---|---|---|---|---|---|
| *Manipulations* | | | | | |
| Amount of information | | | | | |
|   No. of lines | 29 | 27 | 30 | 30 | 28 |
|   No. of words | 253 | 258 | 264 | 249 | 252 |
| No. of mentioning | | | | | |
|   Energy efficient | 5 | 5 | 5 | 5 | 5 |
|   Warm shade of light | 5 | 5 | 5 | 5 | 5 |
|   Limited flickering | 3 | 3 | 3 | 3 | 3 |
|   Does not overheat | 5 | 5 | 5 | 5 | 5 |
|   Fast charging battery | 3 | 3 | 3 | 3 | 3 |

**Figure 1**

**A Consumer's Brand Knowledge of Activia (yogurt)**
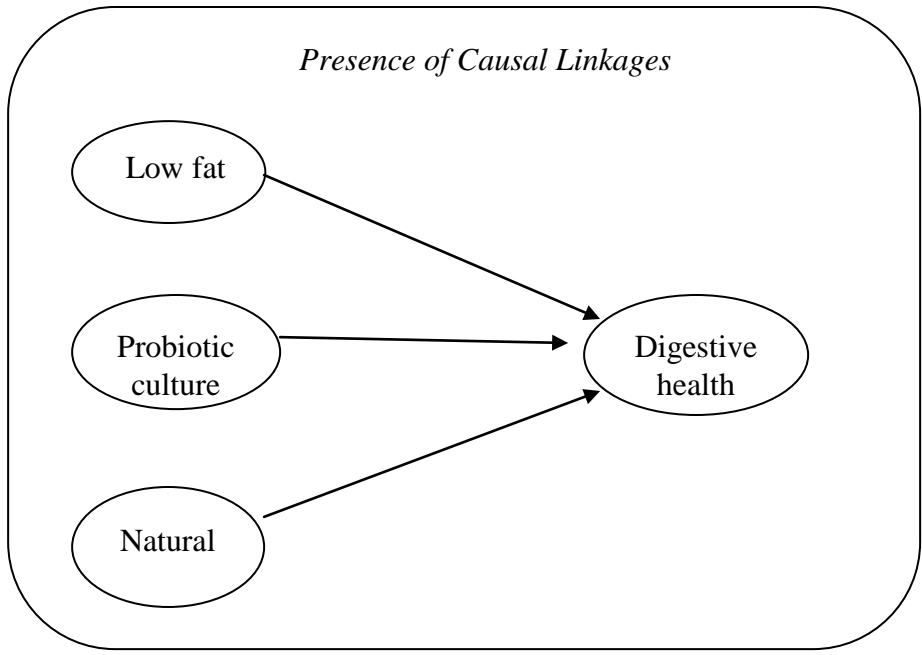


*Source: yahoo.answers.com*

**Figure 2**
**A Consumer's Brand Knowledge of Stoneyfield (yogurt)**
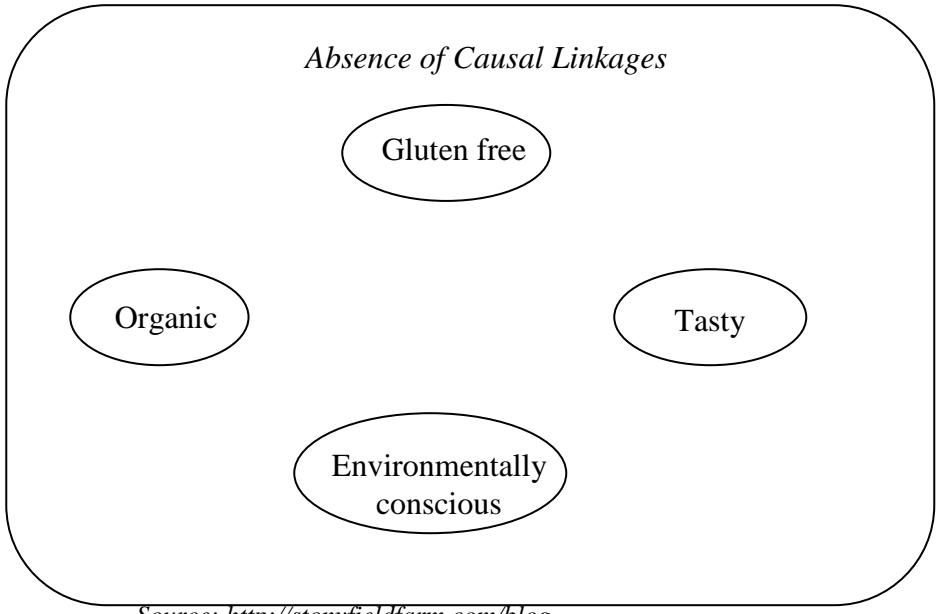


*Source: http://stonyfieldfarm.com/blog*

**Figure 3**
**Types of Causal Structures**



*Common-Effect Structure*

Node 1

Node 2

Node 3

Node 4

Node 5

*Common-Cause Structure*

Node 1

Node 1

Node 2

Node 3

Node 4
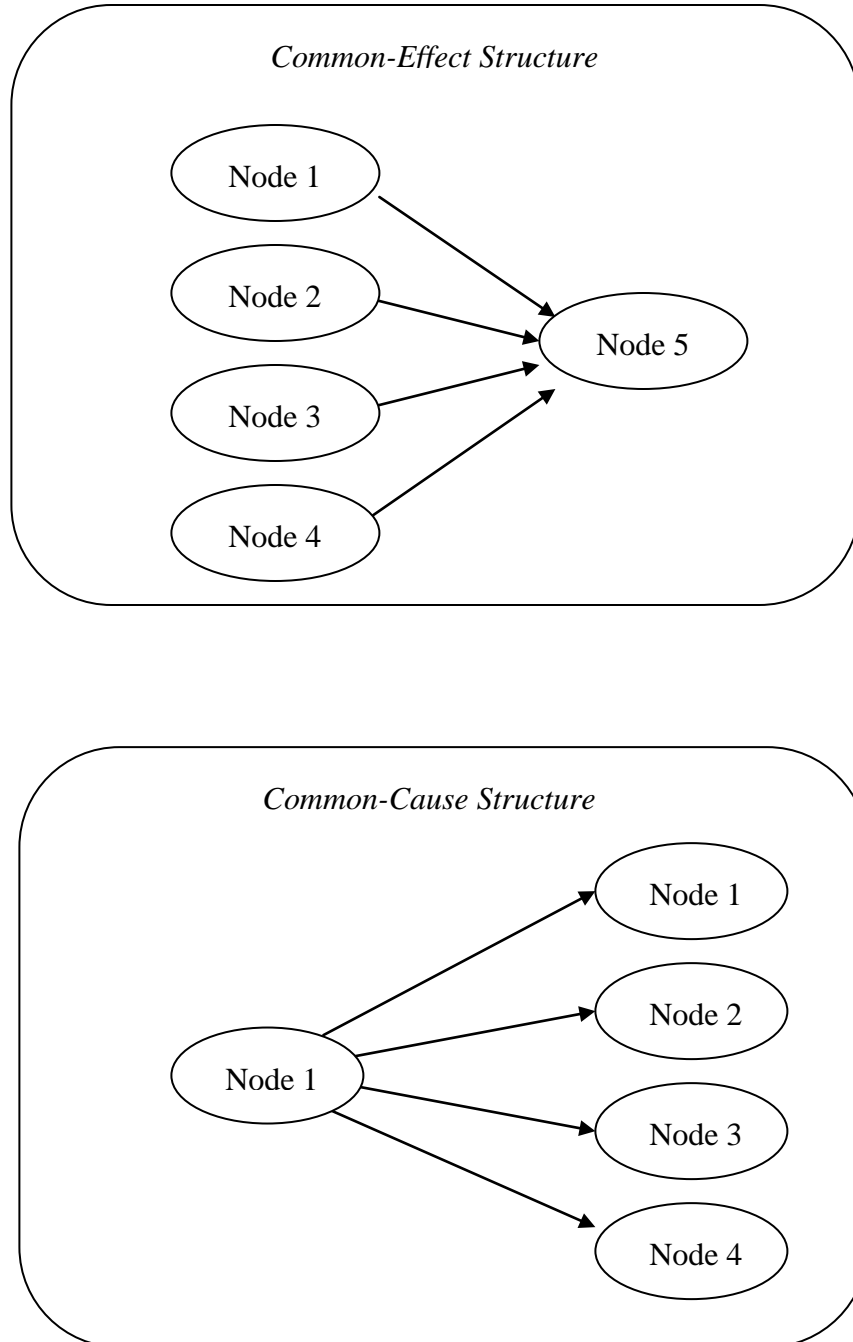
**Figure 4**
**Experimental Design of Study 1**

**Directionality of Causal Linkages**

| | |
|---|---|
| **Cell 1:**<br>Cause (inbound linkage)<br>And<br>Low Multiplicity | **Cell 2:**<br>Effect (outbound linkage)<br>And<br>Low Multiplicity |
| **Cell 3:**<br>Cause (inbound linkage)<br>And<br>High Multiplicity | **Cell 4:**<br>Effect (outbound linkage)<br>And<br>High Multiplicity |

**Multiplicity of Causal Linkages**

**Note**: The levels of the two factors, directionality and multiplicity of causal linkages, describe the structural location of the brand node challenged by the competitor. The node being challenged is always "energy efficient".

**Figure 5**
**Treatment Conditions of Study 1**
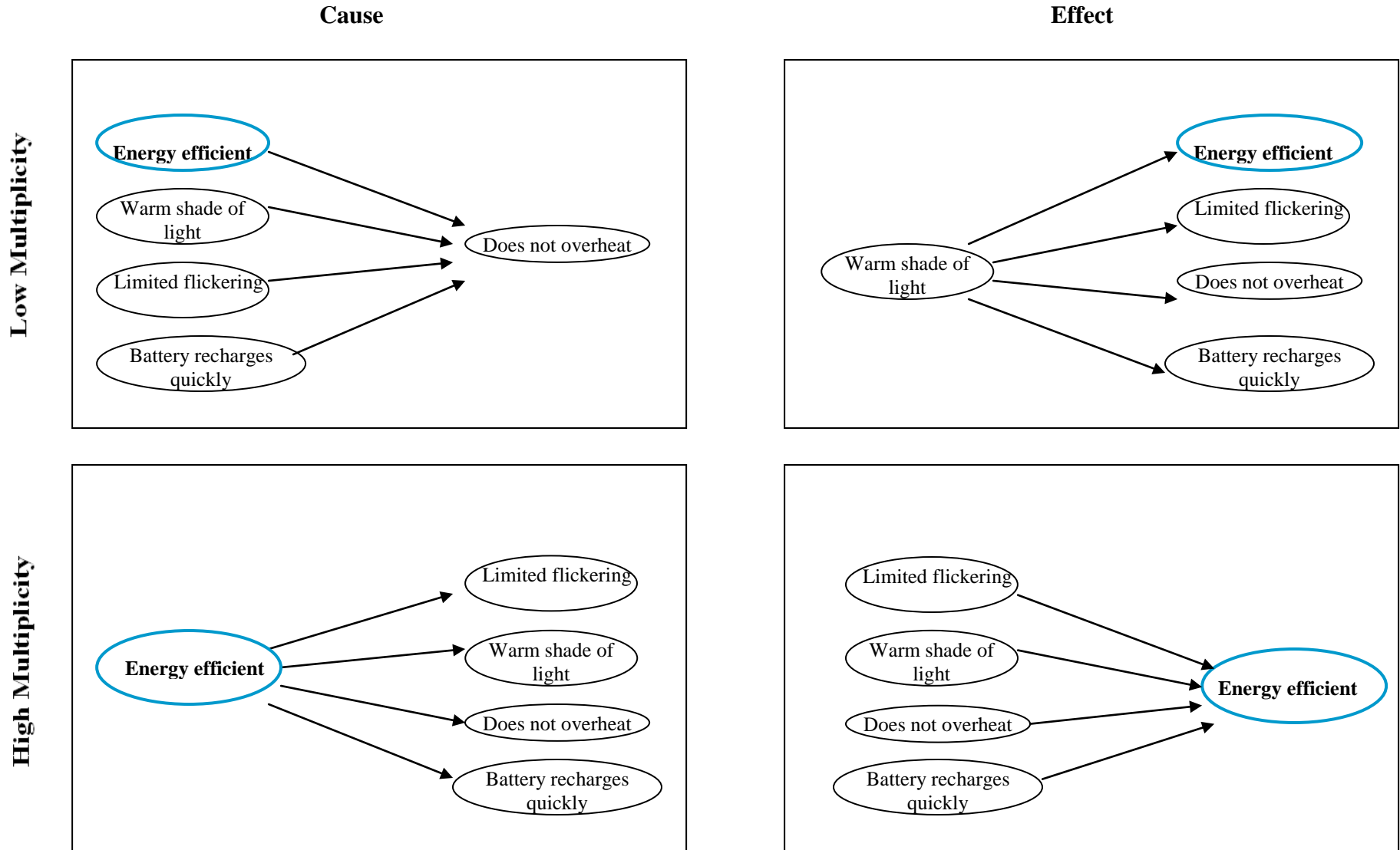
**Figure 6**

**Study 1**
**The Effects of Directionality and Multiplicity of Causal Linkages on**
**Brand Attitude Change**
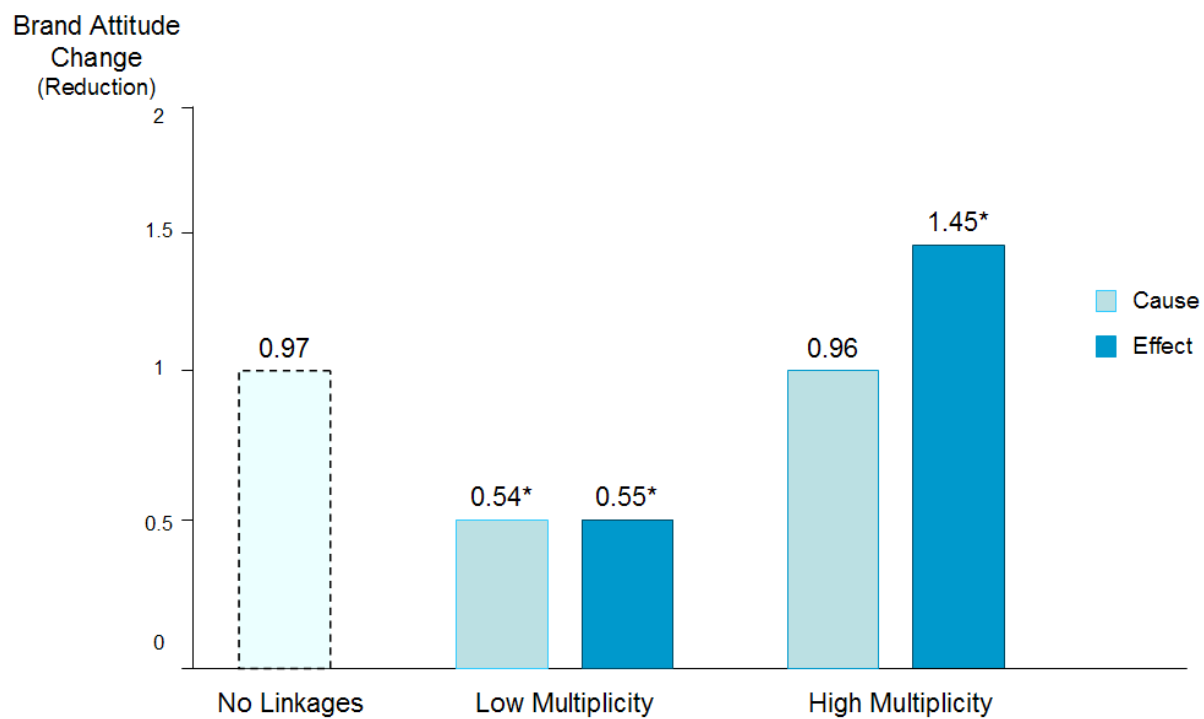


*difference relative to "No Linkages" condition is statistically significant

**Figure 7**

**Study 2**
**The Effects of Multiplicity of Causal Linkages on Brand Attitude Change**
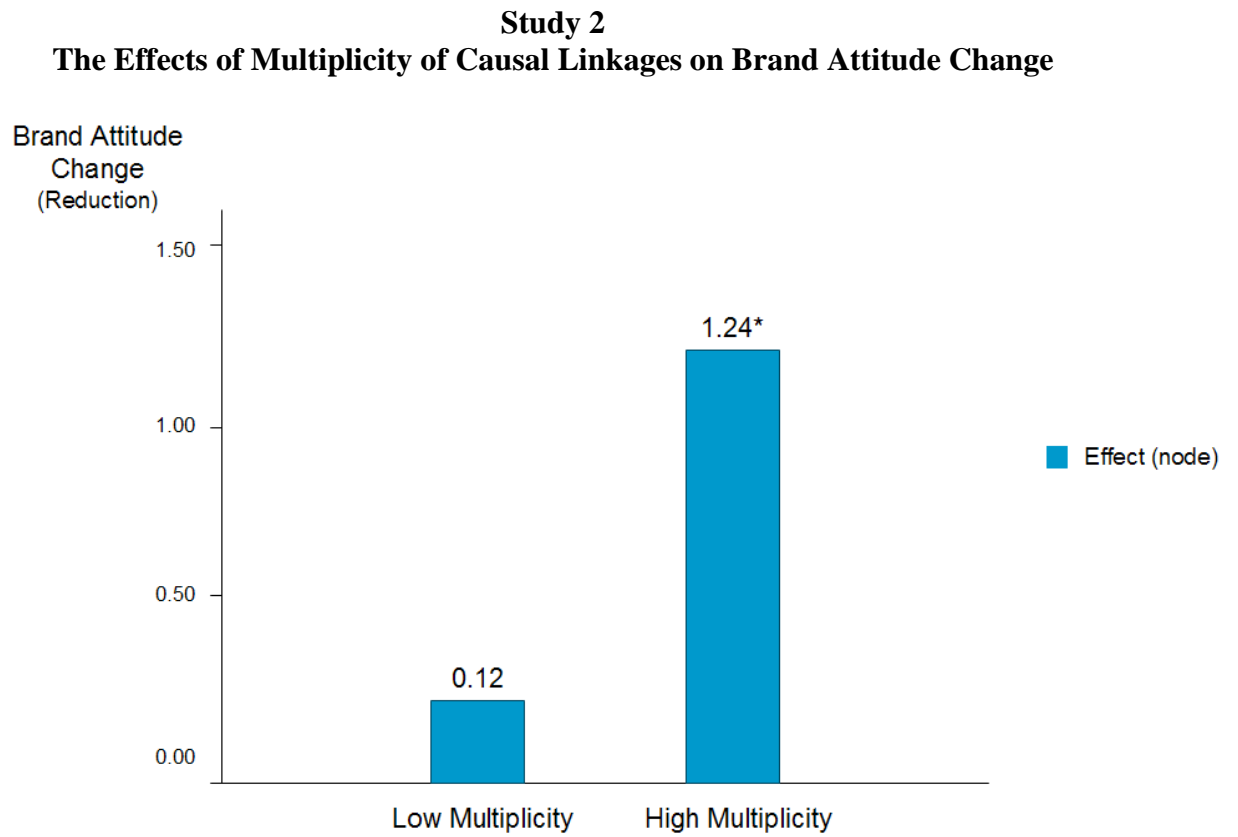


*difference relative to "Low Multiplicity" condition is statistically significant

**Figure 8**

**Study 3**
**The Effects of Multiplicity Competitor Appropriation**



Average Competitor Appropriation of the 4 Add'l Nodes

6.00 — 5.83* (No Linkages)

Difference not statistically significant

5.27 (Low Multiplicity)

4.99 (High Multiplicity)

5.00

4.00

No Linkages — Low Multiplicity — High Multiplicity

■ Effect (node)
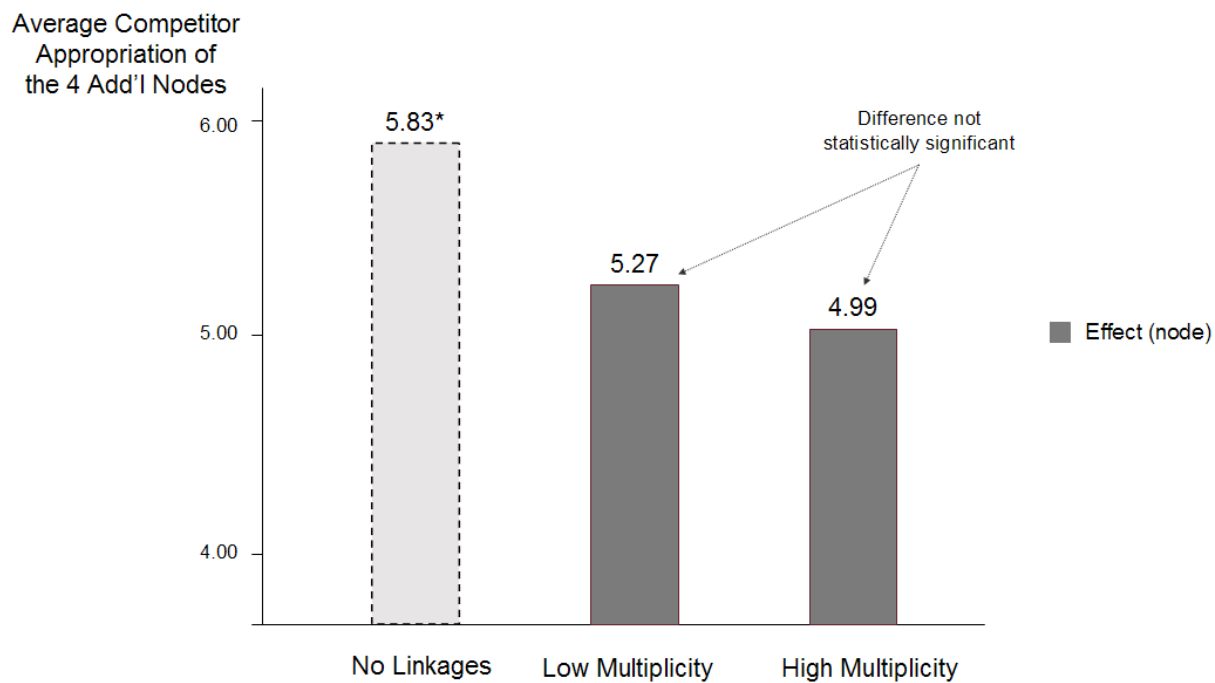
*difference with "High Multiplicity Effect" and "Low Multiplicity Effect" is statistically significant

**Figure 9**

**Study 1 and Study 2**
**Relative Importance of Energy Efficiency**



Relative Importance of
"Energy Efficiency"

0.23 —

0.22* 0.22*

0.22 —

Effect (node)

0.21 —

0.20 0.20

0.20 —

Low Mult. High Mult.     Low Mult. High Mult.

*Experiment 1*          *Experiment 2*
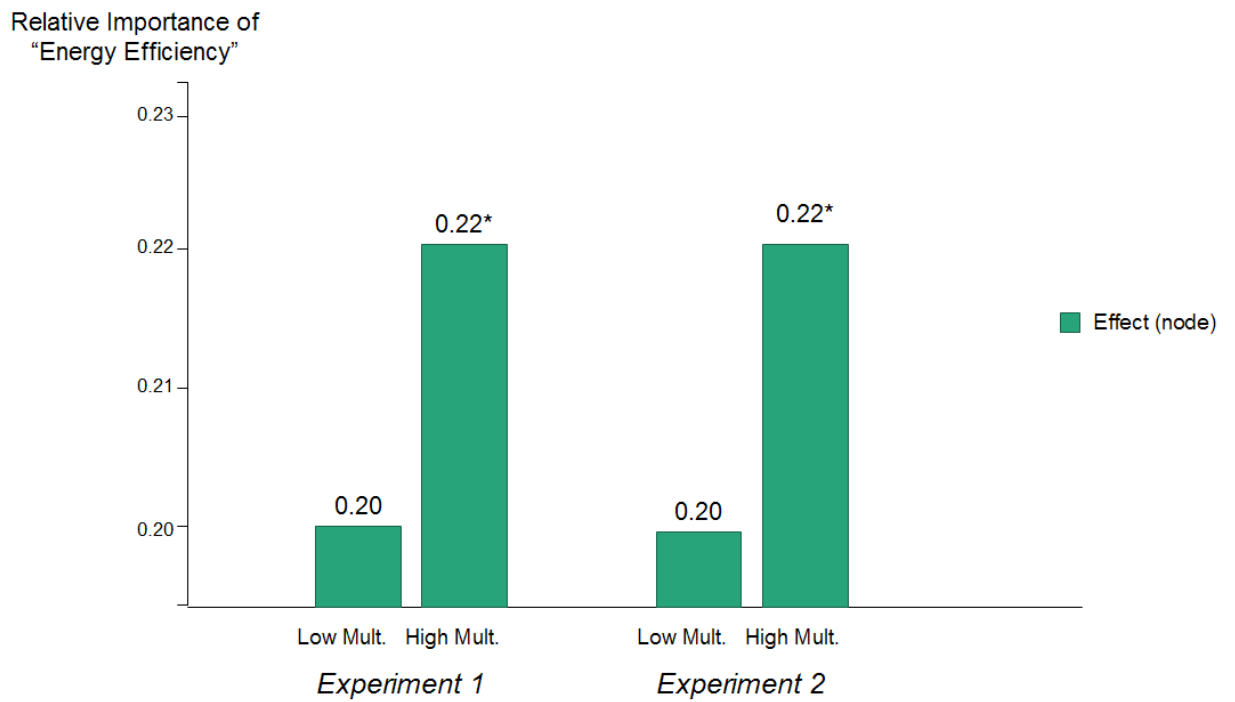
*difference is statistically significant

*APPENDIX A*
*SAMPLE VIGNETTE FOR PARTICIPANTS*

**MARKET RESEARCH STUDY**
*Solar Garden Lights*

**Booklet 1**

One of your friends has just moved into a new house and is looking to buy garden lights. Your friend is very environmentally conscious and would like to purchase solar garden lights, but doesn't know much about them.

You have offered to research and recommend a brand for him.

This booklet provides you with information about solar garden lights and will ask you to respond to a few questions based on this information.

Thank you in advance for your participation!

Participant No.:

# *Solar Lighting Technology*

Solar garden lights have recently become a more viable alternative to outlet-powered lights due to advances in solar energy technology. Unlike outlet-powered lights, solar lights get their energy from the sun. During the day, solar energy is absorbed by a solar panel and converted into electrical energy. This energy is stored in a rechargeable battery, and later used to power the lights at night.

# *Solight*

You have started your research and have come across a solar garden light named *Solight. Solight's* price is comparable to that of other solar lights in the market ($15 per light).

**Please read the information about *Solight* on the next page <u>carefully</u>. You will be asked to make a few decisions based on this information.**

# *Consumer Reviews of Solight*

Consumers describe *Solight* as an <u>energy efficient</u> light. Increasingly, consumers are looking for energy efficient products, and more and more products are being designed with energy efficiency in mind. Consumers also note that *Solight* <u>does not overheat</u> and its <u>battery recharges quickly</u>. Lamps that do not overheat operate at or below recommended temperatures, and most lamps can be rated on the likelihood of their overheating. Also, *Solight* provides a <u>warm shade of light</u> with <u>limited flickering</u>. A warm shade of light refers to the color of a bulb's light; incandescent bulbs, for example, give out a warm shade of light.

In sum, consumers think of *Solight* as shown below:

- Energy efficient
- Does not overheat
- Battery recharges quickly
- Warm shade of light
- Limited flickering

Consumers emphasize that:

- As an energy efficient light, *Solight* loses less of its stored energy to the environment. Also, as an energy efficient product, it consumes less energy to provide light during the night.

- *Solight* does not overheat when it is on at night. It also does not overheat when its battery recharges during the day.

- *Solight's* battery recharges quickly during the day. First, solar energy is transformed into electrical energy, and then stored in its fast charging battery.

- Its warm shade of light resembles that of an incandescent bulb. A warm shade of light is of average intensity.

- The light given out by *Solight* has limited flickering. Besides providing light with limited flickering, *Solight* also has fewer electrical interruptions.

# *Consumer Reviews of Solight*

Consumers describe *Solight* as an <u>energy efficient</u> light that loses less energy to the environment. Increasingly, consumers are increasingly looking for energy efficient products, and more and more products are being designed with energy efficiency in mind. Consumers also note that *Solight* <u>does not overheat</u> and its <u>battery recharges quickly</u>. Most lamps can be rated on the likelihood of their operating at or below recommended temperatures. Also, *Solight* provides a <u>warm shade of light</u> with <u>limited flickering</u>. A warm shade of light refers to the color of a bulb's light; incandescent bulbs, for example, give out a warm shade of light.

More importantly, consumers emphasize that certain features of *Solight* strongly reinforce other features as shown below:

- Limited flickering

- Warm shade of light

- Energy efficient

- Battery recharges quickly
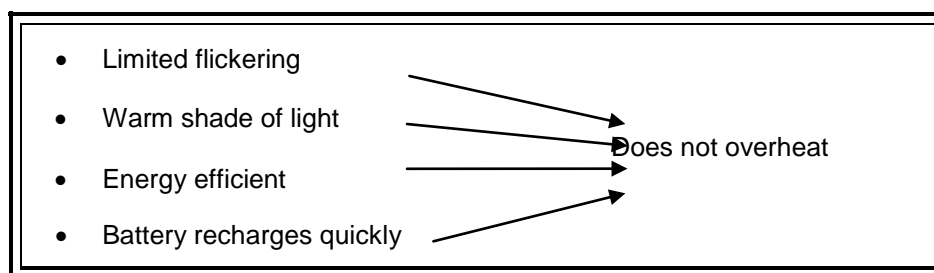
Does not overheat

Specifically, consumers indicate that:

- Because there is limited flickering in its light, *Solight* does not overheat. Limited flickering leads to fewer electrical interruptions, and hence a stable operating temperature.

- *Solight*'s warm shade of light also keeps the lamp from overheating. A warm shade of light is of average intensity, which keeps the bulb (and hence *Solight*) operating at a stable temperature.

- *Solight's* energy efficiency helps it avoid overheating. Being energy efficient, *Solight* draws less charge from the battery during the night, which keeps the lamp at a stable operating temperature.

- *Solight*'s fast charging battery also helps the lamp not overheat. Quick recharging leaves little opportunity for the battery (and hence *Solight*) to exceed the recommended temperature during this process.

# *Consumer Reviews of Solight*

Consumers describe *Solight* as an <u>energy efficient</u> light. Increasingly, consumers are looking for this feature in products, and more and more products are being designed with this in mind. Consumers also note that *Solight* <u>does not overheat</u> and its <u>battery recharges quickly</u>. Lamps that do not overheat operate at or below recommended temperatures, and most lamps can be rated on the likelihood of their overheating. Also, *Solight* provides a <u>warm shade of light</u> with <u>limited flickering</u>. A warm shade of light refers to the color of a bulb's light; incandescent bulbs, for example, give out a warm shade of light.

More importantly, consumers emphasize that certain features of *Solight* strongly reinforce other features as shown below:



Specifically, consumers indicate that:

- *Solight's* energy efficiency helps limit the light's flickering. As *Solight* loses less of its energy while it is on, it results in fewer electrical interruptions and hence limited flickering.

- *Solight's* energy efficiency helps it provide a warm shade of light. This is because lower loss of energy helps *Solight* sustain a warm shade of light of average intensity.

- *Solight's* energy efficiency helps it avoid overheating. Because *Solight* draws less charge from the battery during the night, it keeps the lamp from overheating.

- *Solight's* energy efficiency also helps its battery recharge quickly. Because *Solight* draws less charge from the battery at night, it helps the battery recharge quickly the following day.

# *Consumer Reviews of Solight*

Consumers describe *Solight* as an <u>energy efficient</u> light that loses less energy to the environment. Increasingly, consumers are looking for energy efficient products, and more and more products are being designed with energy efficiency in mind. Consumers also note that *Solight* <u>does not overheat</u> and its <u>battery recharges quickly</u>. Lamps that do not overheat operate at or below recommended temperatures, and most lamps can be rated on the likelihood of their overheating. Also, *Solight* provides a <u>warm shade of light</u> with <u>limited flickering</u>. A shade of light refers to the color of a bulb's light; incandescent bulbs and *Solight* give out a similar shade of light.

More importantly, consumers emphasize that certain features of *Solight* strongly reinforce other features as shown below:
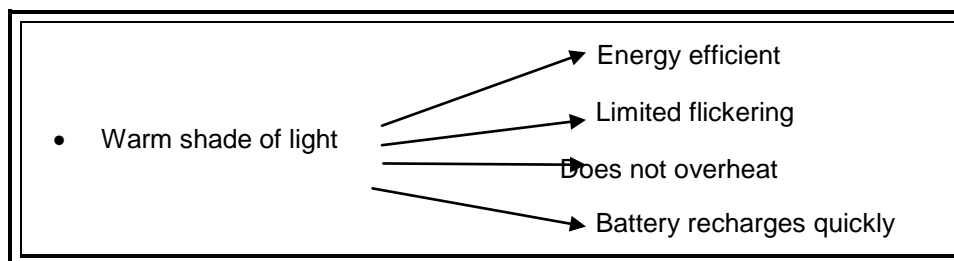


Specifically, consumers indicate that:

- *Solight's* warm shade of light increases its energy efficiency. This is because this type of light is of average intensity that consumes less energy from the battery during the night, making *Solight* more energy efficient.

- *Solight's* warm shade of light also helps limit the light's flickering. This is because this type of light has an average intensity, a characteristic that reduces flickering.

- *Solight's* warm shade of light keeps the lamp from overheating. Being an average intensity light, it keeps the lamp at a stable operating temperature and avoids overheating.

- *Solight's* warm shade of light helps its battery recharge quickly. This is because this shade of light causes fewer electrical interruptions in the battery, which enables it to recharge fast.

# *Consumer Reviews of Solight*

Consumers describe *Solight* as an <u>energy efficient</u> light. Increasingly, consumers are looking for this feature in products, and more and more products are being designed with this in mind. Consumers also note that *Solight* <u>does not overheat</u> and its <u>battery recharges quickly</u>. Lamps that do not overheat operate at or below recommended temperatures, and most lamps can be rated on the likelihood of their overheating. Also, *Solight* provides a <u>warm shade of light</u> with <u>limited flickering</u>. A warm shade of light refers to the color of a bulb's light; incandescent bulbs, for example, give out a warm shade of light.

More importantly, consumers emphasize that certain features of *Solight* strongly reinforce other features as shown below:



Specifically, consumers indicate that:

- Limited flickering increases *Solight's* energy efficiency. This is because limited flickering leads to fewer electrical interruptions, which reduces the amount of energy lost from the battery.

- *Solight's* warm shade of light also increases its energy efficiency. This is because a warm shade of light is of average intensity which consumes less energy to generate light.

- Because *Solight* does not overheat, it is more energy efficient. This is because by not overheating, *Solight* limits its loss of energy to the environment.

- *Solight's* fast recharging battery also helps make the lamp more energy efficient. This is because when a battery recharges quickly, there is lower opportunity for losing energy to the environment.

**Before continuing to Booklet 2,**

**please place this Booklet 1 in Envelope 1.**

**MARKET RESEARCH STUDY**

*Solar Garden Lights*

**Booklet 2**

**Please do not look at this booklet until you have placed Booklet 1 in Envelope 1.**

**When completing this booklet, do not refer back to Booklet 1.**

Participant No.:

## QUESTIONS

1. Please provide an overall assessment of *Solight* based on the information provided to you (circle the appropriate number).

**Unfavorable**                                                                          **Favorable**

       1     2     3     4     5     6     7     8     9

2. How familiar are you with solar garden lights?

**Not at all Familiar**                                                                  **Very Familiar**

       1     2     3     4     5     6     7     8     9

3. Have you ever purchased solar garden lights?
   - ☐ **Yes**
   - ☐ **No**

4. Please check (√ ) only the features associated with *Solight*. (Please leave other boxes blank).

| Features | |
|---|---|
| Adjustable height | ☐ |
| Does not overheat | ☐ |
| Battery recharges quickly | ☐ |
| Warm shade of light | ☐ |
| Copper finish | ☐ |
| Extra brilliance | ☐ |
| Energy efficient | ☐ |
| Illuminates a greater area | ☐ |
| Limited flickering | ☐ |

5. At the time you learned about *Solight*, did you see any connection(s) among its features?

   ☐ No => Go to Question 10

   ☐ Yes => Go to Question 9

6. Please indicate how one or more of *Solight*'s features are connected to each other (you may do so in words or in a diagram).

7. If you were to purchase a solar garden light, how important would the following features be in your purchase decision? (Please circle the appropriate number.)

| Features | Not at all Important | | | | | | | | Very Important |
|---|---|---|---|---|---|---|---|---|---|
| Adjustable height | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Does not overheat | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Battery recharges quickly | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Warm shade of light | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Copper finish | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Extra brilliance | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Energy efficient | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Illuminates a greater area | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Limited flickering | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

**<u>Please place this Booklet 2 in Envelope 2 and</u>**

**<u>return both envelopes to the researcher.</u>**

**Thank you!**

# IMPORTANT!

## Please write down your Participant Number: _____

(Your participant number is on your Participant Card)

## MARKET RESEARCH STUDY

## *Solar Garden Lights*

## Booklet 3

### EXIM: A COMPETING BRAND

Continuing your research, you have just come across a new solar light, named *Exim*, available in the market at a price of $15 (same price as *Solight*).

*Exim's* manufacturer has conducted its own study testing solar garden lights on the market. Based on the results of its study, it claims that *Exim* is 20 to 30% more energy efficient than *Solight*.

**QUESTIONS about SOLIGHT**

**(The first brand)**

**I would now like you to think back to *Solight*, the first brand you were provided information on at the beginning of the class.**

1. Please provide an overall assessment of *Solight* – the first brand for which you received information - in light of the competitor's claim (please circle the appropriate number).

**Unfavorable**                                                                            **Favorable**

      1      2      3      4      5      6      7      8      9

**QUESTIONS about SOLIGHT**

**(The first brand)**

2. Please list everything you know about *Solight* (the first brand) – features and connections among them (bullet form or diagram form is fine; complete sentences are not necessary).

_____

_____

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_____

_____

_____

_____

6a. Do you think you know the study's hypotheses?

      ☐ Yes         ☐ No

6b. If *yes*, please state the hypotheses:

_____

_____

_____

_____

_____

_____

_____

_____

_____

# **<u>Please place this Booklet 3 in Envelope 3</u>.**

**Thank you very much for participating!**

**Essay Two:**
**Asymmetry of Consumer Uncertainty and Its Impact on Brand Decline**

*ABSTRACT*

A brand becomes increasingly weak when consumers expect low levels of brand performance in the future (i.e., point expectation) or considerable variability in the level of these performances (i.e., range expectation) (Rust et al. 1999). I extend this stream of literature and argue a brand's decline, measured as low likelihood of brand repurchase, is also determined by the *distribution* of consumers' range expectation above and below the point expectation of brand performance. Asymmetric distributions arise when consumers' range expectation is not symmetrically distributed around the point expectation–that is, consumers have uneven expectations that a brand will exceed or underperform their expectation for brand performance (i.e., point expectation). I propose that asymmetric distributions of the range expectation (i.e., asymmetric uncertainty) impact the longevity of consumers' relationship with the brand. I argue that elements of temporal sequences of brand experiences, such as the presence of a trend and peak are sources of asymmetric uncertainty. I identify managerial actions, such as the provision of promises by the company that reduce the degree of asymmetric uncertainty.

*INTRODUCTION*

Consumers form expectations about the future performance of brands based on their experiences with the brand, word-of-mouth, or advertisements. Consumers generally develop beliefs about the level of future brand performance (i.e., point expectation) and the degree with which a brand's performance varies over time (i.e., range expectation). Prior studies have shown that a high expected variability in the level of brand performance (i.e., large range expectation), is indicative of consumers' uncertainty regarding the brand's performance (Rust et al, 1999; Chandrasekaran et al. 2007). Thus, a brand's future sales are expected to decline if consumers anticipate low levels of brand performance in the future (i.e., low point expectations) or are uncertain about the brand's future performance (i.e., large range expectation).

In this paper, I argue consumers' brand decisions are not only influenced by their point expectation and the range expectations (the uncertainty with which consumers hold this expectation), but also by the distribution of this range above and below the point expectation. I argue consumers' range expectation may not be symmetrically distributed around their point expectation, which results in inequality of the above and below portion of the range expectation. The inequality of the two components of the range expectation (i.e., above range and below range) stems from consumers' beliefs that the brand may achieve performance levels higher than the point expectation but not achieve symmetrically lower levels (or vice versa). When this inequality occurs, consumers exhibit asymmetric uncertainties for their brand beliefs. Symmetric consumer uncertainty, on the other hand, arises when consumers believe the brand will exceed the

point expectation and underperform it to an equal degree. That is, the range expectation is equally distributed below and above the point expectation.

For example, a consumer has a point expectation of future brand performance of 6 on a scale of 1 to 10 (1 being "Poor," 10 being "Excellent'). This consumer's uncertainty about the brand's future performance is captured by his/her expected variance of brand performance (i.e., range expectation) which stretches from 3 to 7; that is, while the consumer expects a brand performance level of 6, he/she is 90% confident that it could be as low as 3 and as high as 7. The length or range of this interval, (i.e., 7-3 = 4) represents consumer's uncertainty level about the brand's performance, with higher range indicating higher uncertainty.

The relative magnitude of the two components of the range expectation–the above and below range–informs the asymmetry of consumer uncertainty. The above range (the portion of the range expectation above the point expectation–from 6 to 7) is smaller than the below range (the portion of the range expectation below the point expectation–from 3 to 6). I refer to the inequality of the two components of the range expectation as the asymmetry of consumer uncertainty[2].

The point expectation that informs the above and below range expectation captures consumers' expectations of future brand performance. According to prior studies, consumers arrive at these expectations by retrieving either the mean, or the mode, or the median of future brand performances (Engelberg, Williams and Manski 2006; Delawande, Gine and McKenzie 2009). In this essay, I am not concerned with the consumer heterogeneity in forming expectations, but with the effect of stated consumer

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[2] In capturing the asymmetry of uncertainty I however make no assumption of the distribution function of the 95% confidence interval.

expectations on subsequent decisions. In other words, consumers' stated expectations, independent of their underlying process, are predictive of consumers' future choices.

The asymmetry of consumer uncertainty, measured as asymmetry of expectations, has largely been overlooked in prior studies of attitude certainty. Rust et al. (1999) have argued that the distribution of expectations influences consumers' decision making process, but the authors assumed the expectations to be symmetrically distributed around consumers' point expectations. A few studies, however, have found that consumers may not always exhibit symmetric uncertainty. De Bondt (1993), O'Connor, Remus, and Griggs (2001), and Du and Budescu (2007) asked participants to forecast future stock prices from a trended time series and found that participants provided asymmetric intervals around their point estimates.

In this paper I argue that elements of temporal sequences of brand experiences, such as the presence of a trend and peak are sources of consumer asymmetric uncertainty. I argue the asymmetry of uncertainty reveals information about consumers' expectations that is not captured by their point expectation of brand performance or the uncertainty surrounding this expectation (i.e., range expectation). I find that for the same level of point expectation and range expectation, the asymmetry of uncertainty influences consumers' likelihood of severing their relation with the brand. I test firm actions aimed at reducing the negative effects of asymmetric uncertainty and find that advancing promises of better performances reduces the extent of asymmetric uncertainty.

My conceptual model informs the occurrence of asymmetric uncertainty when consumers have limited information about a brand's performance and rely on their brand experiences to form expectations. Thus, the findings of this study are relevant for initial

brand encounters, when the level of brand performance and its variability over time are still unknown to consumers. My model is also relevant for consumers' interactions with service brands, both at an early stage and beyond. Due to a human component of the offering of service brands, their performance is likely to fluctuate over time, which persuades consumers to rely on recent past experiences to predict future performances.

*POSITIVE AND NEGATIVE ASYMMETRY OF CONSUMER UNCERTAINTY*

Following my definition of asymmetry of consumer uncertainty, I distinguish between positive and negative asymmetric uncertainty. A consumer holds *negative asymmetric uncertainty* when he/she believes the brand will likely reach levels lower than the point expectation, but not able to reach symmetrically higher levels. In other words, the range below the point expectation is greater than the range above this expectation. In the previous example, my consumer expected a brand performance of 6 on a scale of 1 to 10 (1 being "Poor," 10 being "Excellent"), and also expected the performance to vary between 3 and 7. This is a case of negative asymmetric uncertainty, as the below range of expectation (6-3=3) is greater than the above range of expectation (7-6=1) (see Figure 1).

[Insert Figure 1 About Here]

If however, a consumer believes the brand will likely reach levels of performance higher than the point expectation, but not reach symmetrically lower levels, then the consumer holds a *positive asymmetric uncertainty*. Suppose a consumer expects a performance of 6, but anticipates it to vary from 5 to 9. This distribution of expectation

yields a level of performance variability that is equally high (i.e., 9-5=4) to the one in the example above; however, in this case, the above range of expectation (9-6=3) is higher than the below range of expectation (6-5=1) (see Figure 2).

[Insert Figure 2 About Here]

It is important to understand the process that gives rise to asymmetric uncertainty. Uncertainty, measured as the range of expectations, has two components: (1) an above range of expectation, or the portion of the range expectation that lies above the point expectation, and (2) a below range of expectation, or the portion of the range expectation that lies below the point expectation. Asymmetric uncertainty occurs when consumers see reasons to expect a large above range relative to the below range or vice versa.

*TREND*

Experiences that follow a trend have been found to impact consumers' retrospective evaluation of the series of experiences and influence subsequent related decisions. Consumers rate improving sequences of events more favorably than declining sequences of events (Ross and Simonson 1991; Loewenstein and Prelec 1993) and base their investment decisions on the presence of an increasing or decreasing trend (Johnson, Tellis and MacInnis 2005). Moreover, consumers appear to infer the presence of trends even when they don't exist (i.e., when the sequence is a random walk) (Kahneman and Tversky 1973; Griffin and Tversky 1992). I argue that the type of trend (increasing vs.

decreasing) determines the magnitude of the above range and below range, which in turn leads to the formation of asymmetric uncertainty.

An *increasing trend* depicts a series of experiences of increasing value (e.g., 50, 51, 55, 59, 61, 65, and 69), while a *decreasing trend* depicts a series of experiences of decreasing value (e.g., 69, 65, 61, 59, 55, 51, and 50). On the other hand, a *non-trended sequence* of experiences has identical experiences but lacks the presence of a trend (e.g., 50, 69, 55, 65, 51, 61, and 59) (see Table 1). I argue below that following a series of experiences with an increasing trend, consumers estimate a lower above range as compared to participants exposed to a non-trended sequence of experiences. At the same time, both an increasing trend of experiences and a non-trended sequence will result in a relatively equal below range. Thus, I argue, an increasing trend of experiences will lead to the formation of negative asymmetric uncertainty.

[Insert Table 1 About Here]

According to the well-supported peak-end theory, an increasing trend of experiences will receive a higher retrospective evaluation than a non-trended sequence of experiences. Consumers have been found to average the end experience and the most extreme experience (i.e., peak) to form a retrospective evaluation of the trend (Kahneman et al. 1993; Fredrickson and Kahneman 1993; Montgomery and Unnava 2009). An increasing trend usually has the advantage of displaying a higher end value than a non-trended sequence, which results in a higher average value. Consumers then use this retrospective evaluation to inform their predictions of future brand performances (Ariely

and Zauberman 2003). Thus, following an increasing trend of experiences, consumers are likely to expect a higher future performance (i.e., point expectation) than following a non-trended series.

However, this higher point expectation associated with an increasing trend may be perceived as hard to exceed. In other words, when the point expectation is relatively high, consumers realize the difficulty of experiencing an even higher than expected performance and thus estimate a lower above range of their expectations as compared to the above range following a non-trended experience. There is however no reason for consumers to have expectations of lower below range following an increasing trend of experiences as opposed to a non-trended series of experiences.

Taken together, an increasing trend is hypothesized to be associated with a smaller above range of expectation than a non-trended sequence of experiences but a relatively equal below range. This in turn results in negative asymmetric uncertainty associated with an increasing trend of experiences.

My prediction finds preliminary support in the forecasting literature. Participants in forecasting studies have been found to associate forecasts of increasing time series of stock returns with asymmetric distribution of their expectation intervals (De Bondt 1993; O'Connor, Remus, and Griggs 2001; Du and Budescu 2007). It is not clear however whether consumers develop asymmetric uncertainty following experiences with brands that extend over time. Such experiences differ from forecasting tasks and occur at a certain time interval of each other. Thus, I hypothesize the following in the context of brand experiences:

H$_1$: An *increasing trend* of experiences will be associated with a higher point expectation and a smaller above range of expectation as compared to non-

trended sequences of experiences, resulting in *negative asymmetric uncertainty*.

Following my arguments above, a decreasing trend that contains the same experiences but in a reversed order (e.g., 69, 65, 61, 59, 55, 51, and 50), will be associated with a lower evaluation than a non-trended sequence of experiences (Ariely and Zauberman 2003). This low level of the retrospective evaluation will then be used to forecast a lower future performance (i.e., point expectation) than that associated with a non-trended sequence of experiences. A low level of expected performance, however, reduces the probability that the brand will perform even lower, ceteris paribus. Extremely low levels of performance are expected to be ousted by market efficiency–poorly performing companies are likely to be driven out of the market by competition and consumer dissipation of information. Thus, I expect a decreasing trend to be associated with a low below range of expectation as compared to a non-trended series of experiences. At the same time, I don't expect consumers to predict a different above range following a decreasing series of experiences compared to a non-trended sequence of experiences.

Taken together, I expect a decreasing trend of experiences to be accompanied by a smaller below range of expectation as compared to a non-trended series, which results in positive asymmetric uncertainty.

$H_2$: A *decreasing trend* of experiences will be associated with a lower point expectation and a smaller below range of expectation as compared to non-trended sequences of experiences, resulting in *positive asymmetric uncertainty*.

*PEAK*

The most extreme value of a series of experiences (i.e., peak) is the most positive experience a consumer has with a brand. I argue that while the presence of such an experience in itself has a positive impact on consumer decision making, its location in the sequence of experience also influences decision making.

Peaks are heavily emphasized by consumers when retrospectively evaluating a series of experiences (Frederickson and Kahneman 1993). Montgomery and Unnava (2009) find that peaks are weighted more in retrospective decisions due to their distinctiveness from the other experiences, which makes them more memorable. I suggest that the distinctiveness of a peak may also depend on its location in the sequence relative to the other experiences of the sequence. Namely, the adjacent experiences to a peak experience can accentuate or diminish the peak's distinctiveness. When a peak is preceded and followed by experiences of a much lower level, the resulting discrepancy accentuates the peak's high value and its distinctiveness from the series' other experiences. In Table 2, "High Contrast" example, the peak experience of "69" is surrounded by experiences rated as "50" and "51" yielding a difference between the peak and the surrounding experiences of 37 (i.e., (69-50)+(69-51)=37); in the "Low Contrast" case, the peak is surrounded by experiences rated as "65" and "61", yielding a lower difference of 12 (i.e., (69-65)+(69-61)=12).

[Insert Table 2 About Here]

I argue that this greater perceived distinctiveness of the peak translates into higher recall of the peak experience which leads to a greater availability of the upper end of the series of experiences. Thus, when experiencing a high contrast peak, I expect consumers to be influenced by the easier recall and the perceived positive valence of the peak experience and expect future performances to likely exceed the point estimation (Kahneman and Tversky 1973, Grether 1980). This in turn will result in a larger above range of expectation as compared to a series of experiences with a low contrast peak. At the same time, I don't expect the contrast of the peak to influence the below range of expectation.

Taken together, I argue the presence of a peak with a high contrast will result in greater positive asymmetric uncertainty as compared to a series of experiences with a lower contrast peak. This hypothesis has implications for the timing of "best experiences" and advises managers when to try o exceed prior performance levels.

H$_3$: The higher the *contrast* between a *peak* and its subsequent and preceding experiences, the greater the *positive asymmetric uncertainty* associated with the sequence.

*THE EFFECTS OF ASYMMETRIC UNCERTAINTY ON REPEAT BRAND PURCHASE*

Prior research has shown consumers have a preference for asymmetric distribution of payoffs. Bettors have been found to prefer bets whose returns are positively skewed–that is, have a greater above range of expectation as compared to the below range (Golec and Tamarkin 1998; Garrett and Sobel 1999; Chiu 2005). These studies have shown that bettors trade-off a lower return to enjoy a higher positive asymmetry of return. Moreover, gambles with positive asymmetries are not only most

attractive, but are also associated with highest tolerance for delayed resolution (Lovallo and Kahneman 2000). These findings would suggest consumers are averse to outcomes with negative asymmetry, that is, to outcomes that have a greater probability to fall below consumers' point expectations.

I argue that holding the point expectation and range expectation constant, consumers' asymmetric uncertainty influences their brand choices. When consumers hold negative asymmetric uncertainty, they expect a disproportionately lower level of brand performance (vis-à-vis their point expectation), and discard the possibility of an equally high level of brand performance. Thus, a consumer who holds negative asymmetry of expectations is less likely to continue to purchase the brand. Therefore, I hypothesize:

> $H_4$: All else being equal, *negative asymmetric uncertainty* will be associated with greater *brand decline* (i.e., lower likelihood to continue to purchase the brand).

*ALLEVIATING THE NEGATIVE EFFECTS OF ASYMMETRIC UNCERTAINTY*

I argued above that negative asymmetric uncertainty jeopardizes the longevity of the brand relation (holding the point expectation and the range expectation constant). I am thus interested in identifying ways to reduce negative asymmetry of uncertainty and help consumers continue their relationships with brands.

Negative asymmetry is caused by the presence of a smaller above range of expectations as compared to the below range. Any actions that increase the above range or decrease the below range of expectations can result in a lower negative asymmetry of expectations. Here, I identify a commonly used practice by companies–providing promises of better future performance along with explanations for past performances–and

quantify its effect on the negative asymmetry of uncertainty and the trade-offs inherent with using this strategy.

*Company promises*. Many companies choose to promise their stakeholders higher future performances. I argue that when consumers experience an increasing trend of experiences, advancing company promises of improved future performance result in expectations of even higher levels of performance above the point expectation; that is, I expect to see a larger above range of expectation, even after a potential increase in the point expectation. The now larger above range of expectation reduces the inequality between the above and below ranges, leading to lower negative asymmetry.

Promises are most likely to occur however when the brand's performance deteriorates over time. Companies provide reasons for past poor performance in an attempt to regain consumers' trust and appear optimistic about future brand performances. I argue that when consumers experience a decreasing level of brand performance, a company's promises may result in a trade-off: consumers will expect a higher point expectation (which increases the longevity of the brand relation) but at the same time will lower the positive asymmetry of uncertainty and its benefits. Consumers may interpret the promise and explanation as a desperate attempt to hide a real cause of the decline in performance; consumers may thus become more uncertain about the brand's future performance and estimate a larger below range, even after a potential increase in their point expectation. The now larger above range of expectation reduces the inequality between the above and below ranges, leading to lower positive asymmetry.

I hypothesize therefore an interaction effect between the type of trend (increasing vs. decreasing) and the presence of a company promise on asymmetric uncertainty.

H$_5$: Advancing promises following an increasing trend will result in *lower negative asymmetric uncertainty*, and in *lower positive asymmetric uncertainty* following a decreasing trend.

*STUDY 1*

The two studies of this essay follow a similar procedure. Study 1 investigates whether the presence of a trended series of experiences results in the formation of asymmetric uncertainty (H$_1$ and H$_2$), while Study 2 explores the effect of the perceived distinctiveness of the peak on asymmetric uncertainty (H$_3$). Both studies explore the effect of asymmetry on the likelihood to repurchase the brand (H$_4$). In Study 1 I also test the effect of company promises on asymmetric uncertainty associated with an increasing and decreasing trend of experiences (H$_5$).

*Method*

Study 1 is a 2 (increasing trend vs. decreasing trend) x 2 (presence vs. absence of company promise) between-subject design with a control condition (non-trended sequence). An online panel provided by Amazon Turk participated in the study.

Participants read a scenario comprised of seven visits to a chocolate store which were taking place over several days. The store had recently opened in the neighborhood and gave participants the opportunity to taste the store's truffles. Participants read that during each visit, they sampled a different truffle and based on three objective criteria (freshness, flavorfulness, and texture), they rated the truffles on a scale of 0 to 100 (100 being the highest).

A filler task was presented at the end of each visit. Participants were provided with information about a potential new product the store owner was planning to introduce

in the store. They were then asked to indicate the likelihood with which they would try out the new product, had it become available.

The seven truffles and their ratings were provided to participants in a different order, according to the condition they were assigned to. Participants in the increasing trend condition experienced ratings ordered as 50, 51, 55, 59, 61, 65, and 69, while participants in the decreasing condition were presented with ratings ordered as 69, 65, 61, 59, 55, 51, and 50. The control condition comprised of a non-trended series of experiences ordered as 50, 69, 55, 65, 51, 61, and 59. I chose to present participants with non-extreme ratings (between 50 and 69) to avoid truncation of the expected range of performance at either end which would have confounded my results.

I manipulated the second factor, company promise, by introducing an encounter with the store owner at the end of the seventh (last) experience. The owner explained that he had been experimenting with several techniques while making truffles, and expects to make truffles of higher quality in the future (see Appendix A).

*Measures*. At the end of the seven visits, participants were asked to list their expectations of the next (eighth) rating of the truffle. This answer represented their point expectation.

Subsequently, participants provided an overall 90% confidence interval for their point expectation. I solicited this confidence interval using two separate questions which ask for the minimum and maximum rating the next truffle may score with 95% confidence (Soll and Klayman 2004). I opted for this format because it has been found to provide more accurate confidence intervals (i.e., lower overconfidence) (Block and Harper 1991, Juslin et al. 1999, Soll and Klayman 2004). The range expectation was

calculated as the difference between the two bounds of the confidence interval. The above and below range were then computed as the difference between the maximum expected rating and the point expectation and as the difference between the point expectation and the minimum expected rating, respectively.

Participants were then asked about the likelihood that they will continue buying truffles from the store on a scale of 1 to 7, 1 being "Very Unlikely" and 7 being "Very Likely". Participants were also asked about their chocolate preference and prior purchasing behavior. They indicated their level of agreement on a scale of 1 to 7, 1 being "Strongly Disagree" and 7 being "Strongly Agree") to three statements ("I like chocolate," I know a lot about chocolate truffles," and "I buy several chocolate products per month"). Their responses were averaged into an overall index which represents participants' prior inclination towards chocolate ("prior chocolate inclination"). Several covariates indicated as relevant by prior studies, such as risk aversion (Raju 1980, Bao et al. 2003), disconfirmation sensitivity and perfectionism (Kopale and Lehmann 2001) were also measured.

The measure of asymmetric uncertainty uses consumers' below and above range expectation and its formula is listed below. Values above 50 indicate positive asymmetry, while values below 50 are indicative of negative asymmetry of uncertainty. Values of 50 indicate symmetric uncertainties.

Asymmetry of Uncertainty = 100*(Maximum Expected Rating – Point Expectation)/Range Expectation

*Results*

Two hundred and five participants participated in the study, out of which 186 provided mathematically-plausible answers to the expectation questions and completed the study in less than an hour, as requested.

Consistent with hypothesis 1, I find that when presented with an increasing trend of experiences and in the absence of a company promise, participants form expectations accompanied by negative asymmetric uncertainty as compared to participants in the control condition (M=41.5 vs. 52.6; $F(1, 88)$, $p < .05$). As anticipated, I find that increasing trends of experiences result in a higher point expectation (M=68.4 vs. 60.4; $F(1, 88)$, $p < .01$), a lower above range of expectation (M=7.2 vs. 9.9; $F(1, 88)$, $p < .05$), and an equal below range (M=11.8 vs. 9.9; $F(1, 88)$, $p > .1$), as compared to the control condition (Figure 3). The difference in expected above range is not due to flooring effscts. Participants in the increasing trend condition expected on average a maximum rating of 75.6 out of 100 (se = 5.4) and could have estimated a higher maximum expectation by as much as 25 points.

[Insert Figure 3 About Here]

Mediation analysis reveals that the level of point expectation fully mediates the effect of the increasing trend on asymmetry of uncertainty. Following the procedure proposed by Baron and Kenny (1986), I find that the presence of an increasing trend predicts the level of asymmetric uncertainty ($\beta = 2.2$, se = 1.0; $t(88) = 2.18$, $p < .05$) as well as the level of point expectation ($\beta = -1.58$, se = 2.77; $t(88) = -5.69$, $p < .01$). In

turn, the level of point expectation predicts the level of asymmetric uncertainty ($\beta$ = -1.14, se = .30; $t(88)$ = -4.65, $p < .01$). The multiple regression analysis reveals that the level of point expectation predicts the level of asymmetric uncertainty ($\beta$ = -1.48, se = .35; $t(87)$ = -3.9, $p < .05$), while the presence of trend does not impact asymmetric uncertainty after accounting for the level of point expectation ($\beta$ = -.48, se = 1.09; $t(87)$ = -.04, $p > .1$).

Also consistent with hypothesis 2, I find that following a decreasing trend of experiences and in the absence of a company promise, participants form expectations accompanied by positive asymmetric uncertainty as compared to participants in the control condition (M=62.9 vs. 52.6; $F(1, 90)$, $p < .05$). As anticipated, I find that decreasing trends of experiences result in a lower point expectation (M=51 vs. 60.4; $F(1, 88)$, $p < .01$), a lower below range of expectation (M=5.4 vs. 9.9; $F(1, 88)$, $p < .01$), and an equal above range (M=9.9 vs. 9.9; $F(1, 88)$, $p > .1$),  as compared to the control condition (Figure 4). The difference in expected below range is not due to flooring effects. Participants in the decreasing trend condition expected on average a minimum rating of 45.8 out of 100 (se = 5.48) and could have estimated a lower minimum by as much as 45 points.


[Insert Figure 4 About Here]


Mediation analysis reveals that the level of point expectation fully mediates the effect of the decreasing trend on asymmetry of uncertainty as well. Multiple regression analysis indicates that the presence of a decreasing trend predicts the level of asymmetric

uncertainty ($\beta$ = -10.33, se = 4.95; $t(90)$ = -2.08, $p < .05$) as well as the level of point

expectation ($\beta$ = 9.42, se = 1.45; $t(90)$ = 6.49, $p < .01$). In turn, the level of point

expectation predicts the level of asymmetric uncertainty ($\beta$ = -1.18, se = .27; $t(90)$ = -

4.25, $p < .01$). The multiple regression analysis reveals that the level of point expectation

predicts the level of asymmetric uncertainty ($\beta$ = -1.22, se = .33; $t(89)$ = -3.6, $p < .01$),

while the presence of trend does not impact asymmetric uncertainty after accounting for

the level of point expectation ($\beta$ = 1.15, se = 5.64; $t(89)$ = .20, $p > .1$).

*The Effect of Asymmetric Uncertainty on Brand Repurchase.* To determine the

effect of positive and negative asymmetric uncertainty on likelihood of brand repurchase,

I examined the likelihood of repurchase listed by participants in one of the four treatment

conditions (increasing or decreasing trend). A regression analysis with repurchase

likelihood as a dependent variable and asymmetry of uncertainty, point expectations,

range and prior chocolate inclination as independent variables was conducted. The results

support hypothesis 4, in that the higher the asymmetric uncertainty (i.e., positive vs.

negative asymmetry), the more likely participants are to continue to purchase truffles at

the chocolate store ($\beta$ = .01, se = .00; $t(116)$ = 2.00, $p < .05$). I also find that the higher

the point expectation, the greater the likelihood to repurchase truffles ($\beta$ = .02, se = .01;

$t(116)$ = 2.01, $p < .05$). I don't find though any effect of the range of expectation on

repurchase likelihood ($\beta$ = -.00, se = .00; $t(116)$ = -.632, $p > .1$).

*Alleviating the negative effect of asymmetric uncertainty.* Consistent with

hypothesis 5, I find an interaction effect between the type of trend and the presence of

company explanaion on asymmetric uncertainty (ANCOVA analysis with prior chocolate

inclination as a covariate,  $F(1, 115)$, $p < .05$) (see Figure 5). The presence of company

promise reduces the degree of negative asymmetry of uncertainty, following an increasing trend, mainly due to an increase in the above range of expectation (M=10.7 vs. 7; $F(1, 58)$, $p < .1$). I observe no effect of a company promise on the level of point expectation (M=68.7 vs. 68.4; $F(1, 59)$, $p > .1$).

[Insert Figure 5 About Here]

The presence of company promise also reduces the magnitude of positive asymmetric uncertainty associated with a decreasing trend, mainly due to an increase in the below range of expectation (M=9.4 vs. 5.5; $F(1, 57)$, $p < .05$). I do observe an increase in most likely performance (i.e. point expectation) due to the presence of company promise (M=56.94 vs. 51.4; $F(1, 58)$, $p < .05$).

*Alternative explanation.* A potential rival explanation to the formation of asymmetry of uncertainty can be found in consumers' reluctance to extrapolate future performances–that is, predict future performances outside the range of past performances.

This would suggest that following an increasing trend of experiences consumers would estimate a high level of point expectation and a lower above range in order for the expectations to remain within the range of past performances. In other words, the highest past performance acts has a ceiling effect on the above range. To test this rival explanation, I compute a new variable, "Extrapolation," which measures the difference between the maximum predicted performance and the highest past performance ("69"). I find that participants who experienced an increasing trend of experiences were more likely to extrapolate their maximum expected performance (by 8.7 points) than

participants who were assigned to the control, non-trended sequence (M=8.7 vs. 1.39; F(1, 124), $p < .01$). Also, participants who experienced a decreasing trend of experiences were more likely to extrapolate their minimum expected performance from a minimum expected performance of 50 than participants who were assigned to the control, non-trended sequence (M=3.23 vs. -.47; F(1, 123), $p < .01$). These findings reject the alternative explanation of extrapolation.

*Summary*

Study 1 investigates the concept of asymmetric uncertainty following trended vs. non-trended series of experiences. I find that participants who are exposed to increasing series of experiences develop negative asymmetric uncertainties. That is, they expect the brand to be underperform their point expectation of brand performance to a greater extent than exceed it. Following a decreasing series of experiences, I find that participants develop positive asymmetric uncertainties. That is, participants expect the brand to exceed their point expectation to a greater extent than underperform it. On the other hand, participants who experience a non-trended sequence of experiences exhibit symmetric uncertainties.

I also find that negative asymmetry of uncertainty lowers the likelihood of brand repurchase, holding constant the level of point expectation. Unlike prior studies (Rust et al. 1999), I don't find an effect of the level of uncertainty, measured as the range of expectation on brand repurchase.

I find that advancing a company promise of better future performance reduces the negative asymmetry of uncertainty following an increasing trend of experiences by increasing consumers' expected above range. If a company promise is provided following

a decreasing trend of experiences, consumers become more skeptical with regards to the degree of variability of future performances and estimate a larger below range. This in turn leads to a reduction of positive asymmetry and its effects on repurchase likelihood.

However, I do find that company promises lead to higher point expectations. This result explains why companies use promises in relation to their shareholders.

*STUDY 2*

In Study 2 I investigate a second element of a temporal pattern–the perceived distinctiveness of the peak–on asymmetric uncertainty ($H_3$). Just like Study 1, Study 2 explores the effect of asymmetry on the likelihood to repurchase the brand ($H_4$).

*Method*

Study 2 uses a one factorial, between-subject design, with level of peak contrast as the manipulated factor. I manipulated this factor by placing relatively similar versus dissimilar experiences around the most extreme experience (i.e., the peak). Participants assigned to the high contrast peak condition were presented with seven experiences ordered as 55, 50, 69, 51, 59, 61, and 65; participants in the low contrast peak condition were presented with experiences ordered as 59, 65, 69, 61, 50, 51, and 55. In both conditions, the peak experience was placed third to eliminate recency or primacy confounding effects.

*Measures*. The procedure followed in Study 2 is similar to the one of Study 1. In addition, I measured participants' perception of a truffle rated as 90. Participants rated

their agreement with the following question "I believe a rating of 90 for a chocolate truffle is hard to achieve" on a scale of 1 to 7, 1 being "Strongly Disagree" and 7 being "Strongly Agree."

*Results*

Ninety participants participated in the study, out of which 83 provided mathematically-plausible answers to the expectation questions and completed the study in less than an hour, as requested.

*Manipulation checks*. My manipulation of the peak's location should emphasize the peak and its value ("69") and make higher ratings of truffles more salient to consumers. I therefore expect participants who were assigned to the high contrast peak condition to perceive a rating of 90 as easier to achieve. I find support for this expectation (M=5.55 vs. 6.15; $F(1, 78)$, $p < .05$).

*Asymmetric Uncertainty*. As predicted in H$_3$, I find that when participants are presented with experiences that emphasize the distinctiveness of the peak (i.e., low contrast condition), they develop positive asymmetric uncertainty as compared to experiences that do not emphasize the distinctiveness of the peak (M=53.7 vs. 44.1; $F(1, 81)$, $p < .05$). The asymmetry is largely due to a greater above range associated with a high contrast peak as opposed to a low contrast peak (M=10.5 vs. 8.2; $F(1, 81)$, $p < .05$) (Figure 6). I observe no statistical difference in the magnitude of the below range (M=9.39 vs. 9; $F(1, 81)$, $p > .1$) or the level of point expectation (M=60.44 vs. 60.80; $F(1, 81)$, $p > .1$).

[Insert Figure 6 About Here]

As in Study 1, the asymmetry of uncertainty I observe is not due to ceiling effects. The maximum expected rating in the high contrast peak condition is 70.97 out of 100. Thus, participants could have estimated a higher maximum rating by as much as 30 points.

Also as predicted, I find that the peak is more salient for participants who experienced a peak surrounded by more contrasting experiences. I find that these participants are able to recall the peak faster (M=14.45 seconds vs. 17.27 seconds; F(1, 74), $p <.1$). This measure captured the number of seconds a participants needed before submitting their answer and the clock was embedded in the web page participants received. However, I find no difference with respect to whether participants recall the highest experience (M=.61 vs. .51; F(1, 81), $p < 0.1$).

*The Effect of Asymmetric Uncertainty on Likelihood to Continue to Purchase.* I don't find support for hypothesis 4 in Study 2 ($\beta$ = -.008, se = .007; $t(78)$ = -.4, $p > .1$). This result is not surprising though, since the degree of asymmetry obtained in Study 2 is low (M=53.7) and very close to the level of symmetry (i.e., 50). I find an effect of prior chocolate inclination on purchase likelihood ($\beta$ = .41, se = .12; $t(78)$ = 3.92, $p < .01$).

*Summary*

In Study 2 I investigate the effect of a sequence's peak and its perceived distinctiveness on asymmetric uncertainty. I find that a high contrast peak leads to the formation of positive asymmetric uncertainty. Unlike in Study 1, I don't find an effect of asymmetric uncertainty on repurchase likelihood. This may be due to the fact that the manipulation of the contrast of peak is subtle, resulting in lower levels asymmetric

uncertainty as compared to Study 1. I used the same experiences as in Study 1 and obtained a lower level of asymmetry (M=53.7 for Study 2 vs. 62.9 for Study 1). These results seem to indicate that a higher peak contrast is needed to yield a higher level of asymmetry and that asymmetry of uncertainty impacts repurchase likelihood only beyond a certain threshold.

*DISCUSSION*

The results of both Study 1 and Study 2 support my expectation that characteristics of temporal sequences of experiences–type of trend (increasing vs. decreasing) and the level of peak contrast (high vs. low)–influence the asymmetry of uncertainty associated with expectations of future brand performances. Specifically, I find that increasing trends of experiences are accompanied by negative asymmetry of uncertainty–i.e., consumers expect a brand to perform at lower levels than the point expectation, but not be able to achieve symmetrically higher levels. Decreasing trends of experiences, on the other hand, are associated with positive asymmetry of uncertainty, where consumers expect a brand to perform at higher levels than the point expectation, but be unlikely to achieve symmetrically lower levels. My results also show that the distinctiveness of the peak experience can be manipulated by changing the level of the experiences surrounding the peak. A higher contrast in value between the peak and its adjacent experiences results in the formation of more positive asymmetry of uncertainty.

I find in Study 1 that negative asymmetry of consumer uncertainty increases a brand decline (i.e., lowers repurchase likelihood), beyond the negative effect of a low

expected performance (i.e., point expectation) and high uncertainty (i.e., expected variance of performance, or range expectation). My findings thus urge brand managers to monitor asymmetry of uncertainty along with their expectations and uncertainty of future brand performance to better understand consumers' decision making process.

My results also reveal a tradeoff inherent in providing increasing levels of performance. Following an increasing trend of brand performances, participants set higher expectations of future performances which encourage them to continue their relationship with the brand. At the same time, these expectations tend to be associated with negative asymmetric uncertainty, which lowers the likelihood of repurchase, holding constant the level of point expectation and uncertainty. Managers thus need to be aware of this trade-off and attempt to alleviate the negative effects of asymmetric uncertainty.

I investigate the effects of one possible action to reduce negative asymmetric uncertainty following an increasing trend of experiences. I find that company promises of future performances increase consumers' above range of expectations, which in turn reduces the inequality of the two ranges and thus the degree of asymmetry of uncertainty. This effect comes however at the expense of a higher range of expectation which is representative of a higher uncertainty. Though I don't find an effect of range expectation on repurchase likelihood, prior studies have empirically established this link (Rust et al. 1999; Chandrashekaran et al. 2007).

I also find that when companies offer promises of improved performance following decreasing trends of experiences, consumers are skeptical or uncertain of the company's future level of performance and estimate a higher below range of expectation. This in turn reduces the degree of positive asymmetry of uncertainty. I find however that

promises increase consumers' point expectations of future brand performances. Thus, the use of company promises involves a tradeoff: consumers increase their point expectations of future brand performances (which increases the likelihood of brand repurchase with a standardized $\beta$ of.21), but reduce the degree of their positive asymmetry (and its positive effect on repurchase likelihood with a standardized $\beta$ of.20), and increase the total range of expectation–i.e., increase their uncertainty (its relationship with repurchase likelihood is not significant).

My study also contributes to the expectation literature. I argue here that expectations should be conceptualized as a range, and not solely as a point in order to understand the consequences of expectations on brand choices. Indeed, I find a significant effect of the asymmetry of the range of expectations on purchase likelihood beyond the effect of the point expectation. Prior studies have questioned the conceptualization of expectation as a single point (Anderson and Sullivan 1993, Rust et al. 1999) and have proposed zones of tolerance, and zones of latitude to describe consumers' expectations (Woodruff, Cadotte, and Jenkins 1983; Boulding et al. 1993; Vargo and Lusch 2004). This study provides support for defining expectations as both a point and a range.

*CONTRIBUTION AND FUTURE RESEARCH*

Future research can extend this study's findings by uncovering new ways to lower the magnitude of negative asymmetric uncertainty. I have proposed that providing company promises following an increasing trend reduces the extent of negative

asymmetry of uncertainty. However, this reduction stems from a larger above range of expectation, which expands the overall range of expectation, and thus increases consumer uncertainty. Future studies can identify ways to reduce the below range of expectations following an increasing trend of experiences, which in turn reduces the total range of expectations and thus consumer uncertainty.

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**Table 1**

**Trend (Increasing and Decreasing) vs. No Trend**

| Increasing Trend | Decreasing Trend | No Trend |
|---|---|---|
| 50, 51, 55, 59, 61, 65, 69 | 69, 65, 61, 59, 55, 51, 50 | 50, 69, 55, 65, 51, 61, 59 |

*Scale of 0 to 100, 0 being the lowest value, 100 being the highest value

**Table 2**

**High Contrast Peak vs. Experiences Low Contrast Peak**

| High Contrast Peak | Low Contrast Peak |
|---|---|
| 55,50, 69, 51, 59, 61, 65 | 59, 65, 69, 61, 50, 51, 55 |

*Scale of 0 to 100, 0 being the lowest value, 100 being the highest value

**Figure 1**
**Negative Asymmetry of Consumer Uncertainty**

*Expectation of future brand performance*

Below Range
Expectation

Above Range
Expectation

1
"*Poor*"

3

6

7

10
"*Excellent*"

Point
Expectation
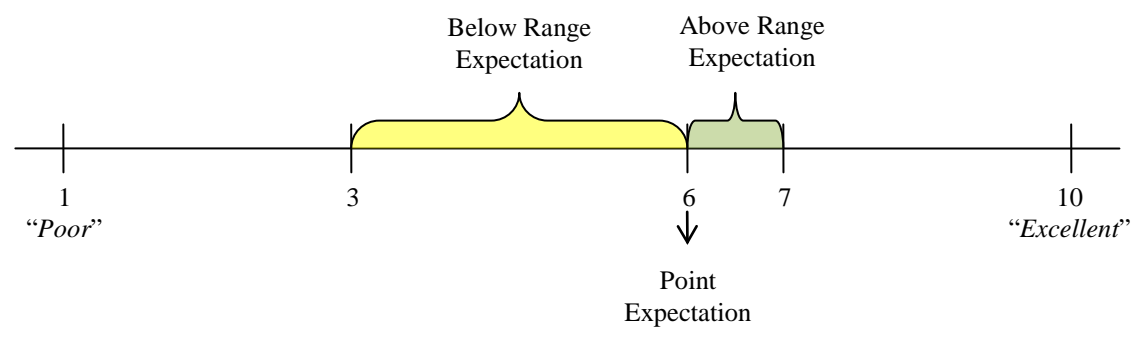
**Figure 2**
**Positive Asymmetry of Consumer Uncertainty**

*Expectation of future brand performance*

Below Range
Expectation

Above Range
Expectation

1
"*Poor*"

5

6

9

10
"*Excellent*"

Point
Expectation
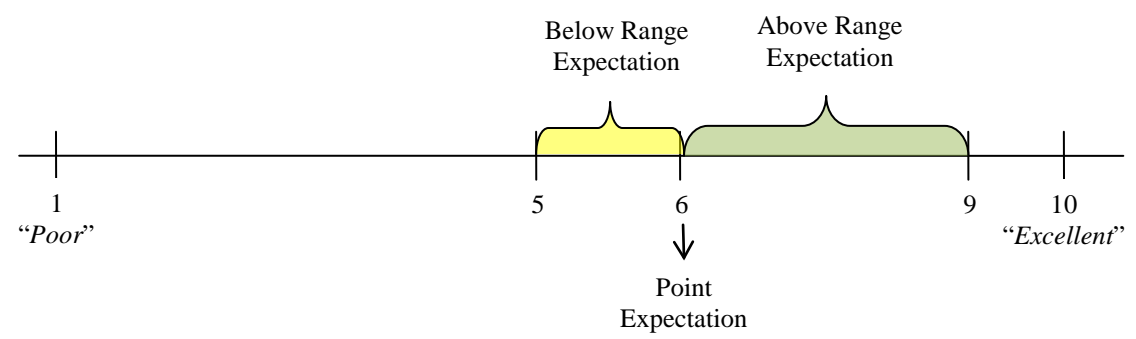
**Figure 3**
**The Effect of Increasing Trend on Above and Below Range of Expectation**
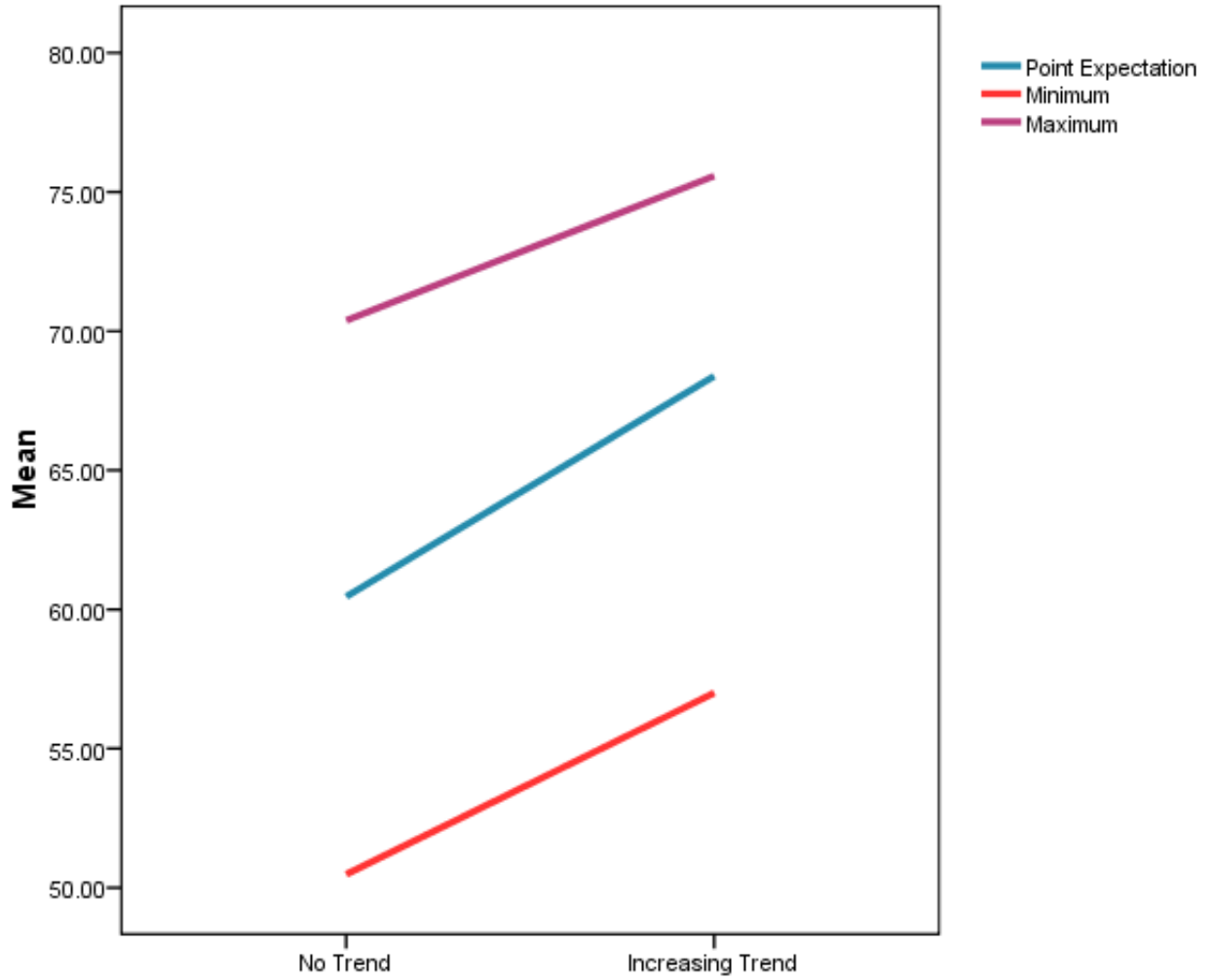
**Figure 4**
**The Effect of Decreasing Trend on Above and Below Range of Expectation**
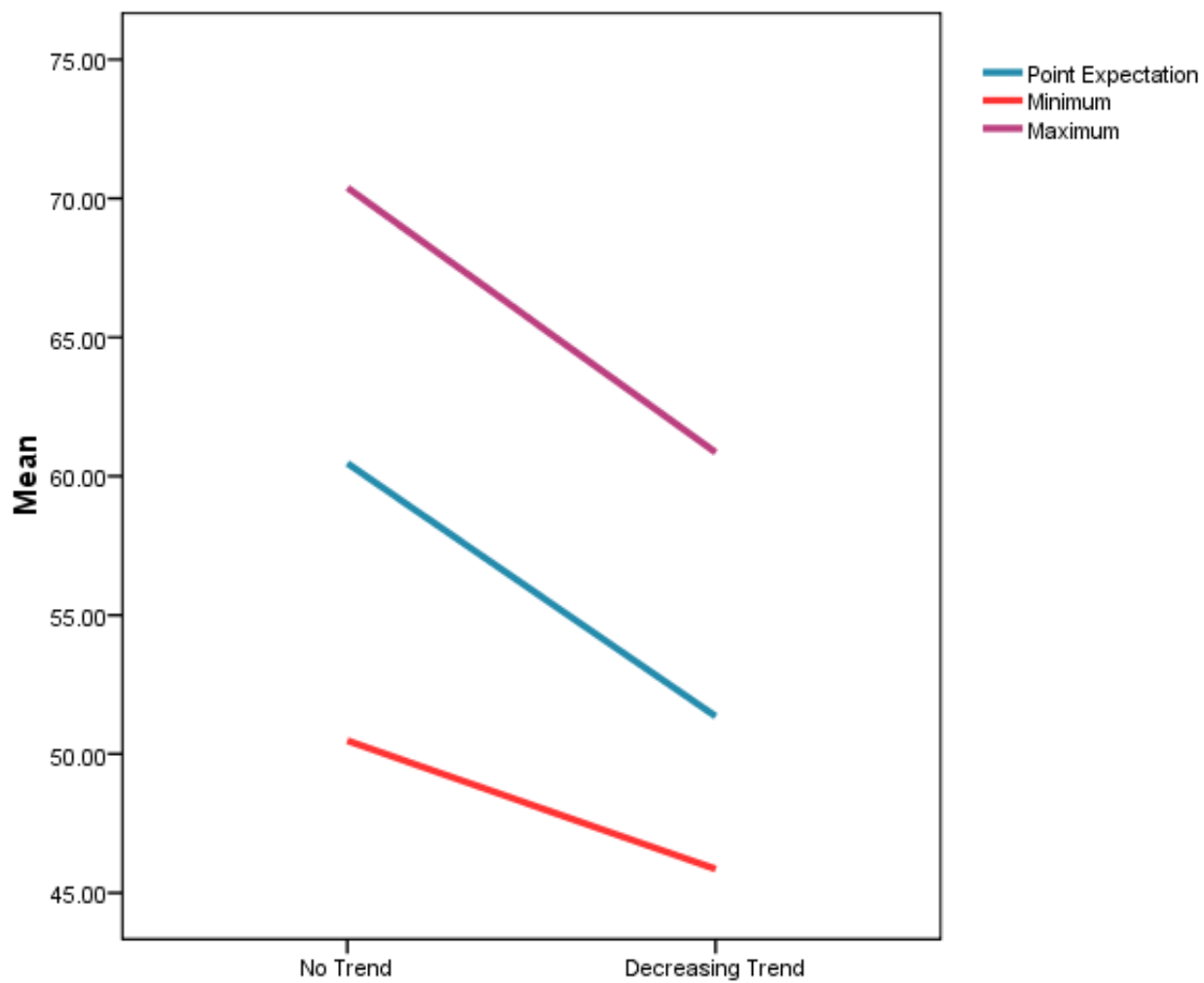
**Figure 5**
**The Effect of Company Promise and Trend on Asymmetric Uncertainty**
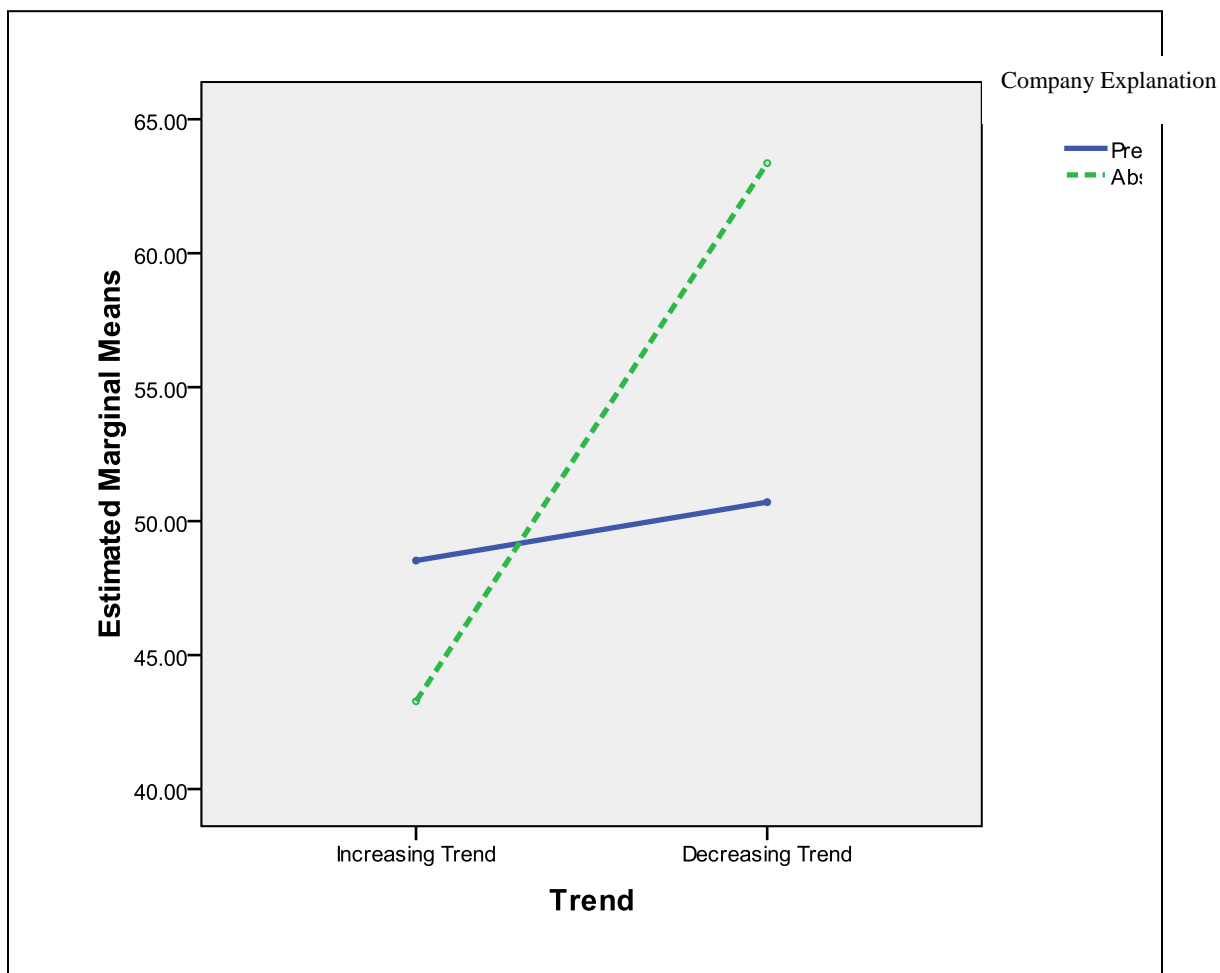
**Figure 6**
**The Effect of Peak Contrast on Above and Below Range of Expectation**
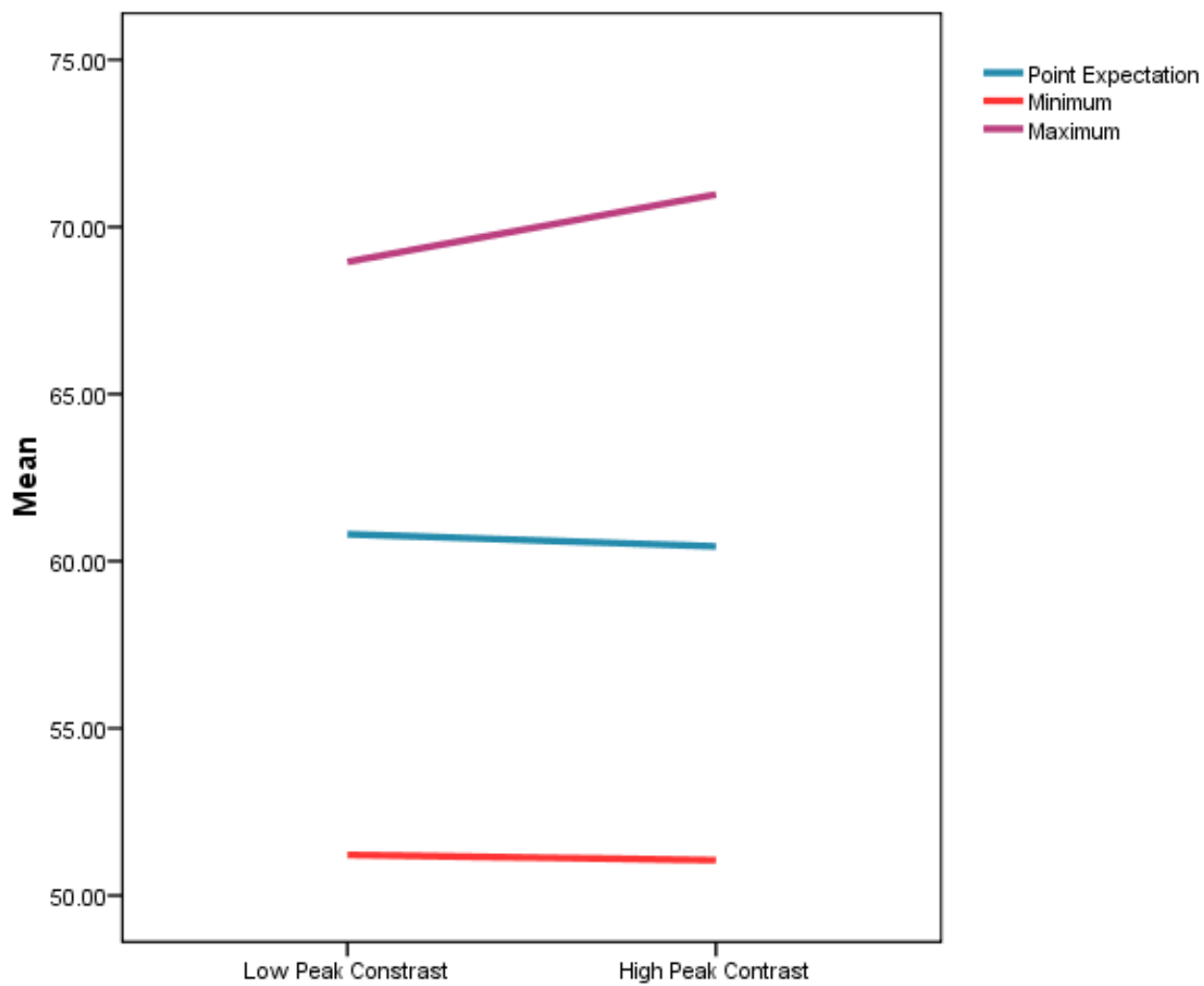
*APPENDIX A*
*SAMPLE VIGNETTE FOR PARTICIPANTS*

**Chocolat: A New Chocolate Store**

A new independently owned chocolate store, Chocolat, has recently opened in your neighborhood. It sells a variety of hand-made truffles, chocolate bars as well as filled chocolates.

You have recently become interested in chocolate truffles, which are primarily made of ganache, chocolate and cocoa. You are fascinated by the variety of chocolate truffles, and have decided to try out the new store's truffles.

You decide to visit Chocolat at least 8 to 10 times over the next several weeks, and order a different type of chocolate truffle each time.

**Evaluating Chocolate Quality**

Chocolat encourages its customers to rate its products' quality based on a set of **<u>objective criteria</u>**.

These criteria are industry standards, and used by food critics to rate chocolate products. Because these criteria are objective, people give the same quality rating to a given truffle **<u>regardless of the truffle's ingredients or the type of truffle they personally like</u>**.

For example, a truffle's quality is rated based on the objective criteria of freshness, flavorfulness and texture. A high quality truffle is always fresh, full of flavor and has a velvety texture. This is true regardless of whether it is made of dark or light chocolate, and whether it has a cream or liquor filling.

**Evaluating Chocolate Quality, cont'd.**

It is standard to rate a truffle's quality on a 0 to 100 scale (where 100 is the highest rating).

**<u>[This rating is known to be very strict though, and on average gourmet truffles sold in chocolate stores like Chocolat are rated around 80</u>**. There are though stores that receive a higher rating and stores that receive a lower rating than this.]

Truffles receive higher ratings if they are made with high quality ingredients (such as fresh cream, real flavorings and pure chocolate) and if the chocolate maker uses a proper technique.

**Your Task**

On the following pages you will read about your seven visits to Chocolat, one at a time. Each visit's description will include (1) your overall rating of the truffle you try that visit, and (2) information about a new product Chocolat plans to introduce in the store.

Following this, you will be asked questions related to the ratings you give truffles on your visits. Please pay attention to information provided during your visits.

Please think of yourself trying out truffles offered by Chocolat as you read the following screens.

**First visit: Dark Chocolate Truffles**

On your first visit to the chocolate store you order a couple of dark chocolate truffles. They are made with dark chocolate ganache and almond toffee.

You try them out, and based on the three objective criteria (freshness, flavorfulness, and texture), you arrive at an **overall rating of 50**.

**Chocolat's New Product:**

**Milk Chocolate with Almonds Bars**

The store owner is thinking of introducing several new products, and would like to know its customers' opinions about them. Each time you visit the store you read the description of a new product and indicate your interest in trying it out.

*"This is a fine expression of the chocolate bar and very decadent. The bars have the richness and smoothness of chocolate and the crunchy feeling of almonds.*

*These bars are an excellent source of calcium, contain folic acid, vitamins B6, B12 and antioxidant vitamins C and E and are a nutritionally responsible 140 calories per serving."* *Chocolat*

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Second visit: Milk Chocolate Truffles**

On your second visit to the chocolate store, you order few milk chocolate truffles. They are made with milk chocolate, cream and chocolate liquor.

Based on the three objective criteria (freshness, flavorfulness, and texture) you arrive at an **overall rating of 51**.

**Chocolat's New Product:**
**Hazelnut Praline Biscuit**

*"These are fine hazelnut praline biscuits which combine a smooth chocolate hazelnut cream between two crunchy biscuits, bottomed and edged in rich milk chocolate.*

*We use gluten free hazelnuts and tasty pralines. This is a perfect balance of cookie and chocolate. You will enjoy the crispier side of decadence, as a snack or as a desert." Chocolat*

How interested are you in trying out this product?

| **Very Interested** | **Interested** | **Somewhat Interested** | **Neutral** | **Somewhat Disinterested** | **Disinterested** | **Very Disinterested** |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Third visit: Raspberry Truffles**

On your third visit to the chocolate store you order few Raspberry truffles. They are made with white chocolate, milk chocolate, butter and cream raspberry preserve.

You sample the truffles based on the three objective criteria (freshness, flavorfulness, and texture), and arrive at an **overall rating of 55**.

**Chocolat's New Product:**
**Milk Chocolate with Almonds Bars**

*"This is a fine expression of the chocolate bar and very decadent. The bars have the richness and smoothness of chocolate and the crunchy feeling of almonds.*

*These bars are an excellent source of calcium, contain folic acid, vitamins B6, B12 and antioxidant vitamins C and E and are a nutritionally responsible 140 calories per serving." Chocolat*

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Fourth visit: Coffee Truffles**

On your fourth visit to the chocolate store, you order a couple of coffee truffles. They are made with dark chocolate, coffee ganache and dusted with cocoa powder.

Keeping in mind the three objective criteria (freshness, flavorfulness, and texture), you arrive at an **overall rating of 59**.

**Chocolat's New Product:**
**Chocolate Mousse Gift Box**

*"The Chocolate Mousse Box contains rich shells of chocolate surrounding exquisite mousse centers. Though all of different flavors, they are light and airy in texture. Each shell of chocolate is gluten-free and comes with a chocolate covered coffee bean on the top.*

*The box includes Milk Chocolate, Hazelnut, Coffee, Strawberry, Tropical, and Dark Chocolate mousse pieces, a total of 18 pcs. (7.9 oz.)."* Chocolat

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Fifth visit: Praline Truffles**

On your fifth visit to the chocolate store, you order several praline truffles. They are made with milk chocolate, praline and almond pieces.

You sample the truffles and rate their quality based on the three objective criteria (freshness, flavorfulness, and texture). You arrive at an **overall rating of 61**.

**Chocolat's New Product:**
**Chocolate Covered Almonds**

*"These chocolate covered almonds are made with roasted almonds smothered in smooth chocolate. They make a great snack for an afternoon break.*

*They are also healthy, as they provide 1.1 grams of plant sterols and 100 mg of cocoa flavanols per serving. These chocolate covered almonds are also an excellent source of calcium and also provide folic acid, vitamins B6, B12 and antioxidant vitamins C and E." Chocolat*

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Sixth visit: Coconut Truffles**

On your sixth visit to the chocolate store you order few coconut truffles. They are made with white chocolate, milk chocolate, butter and toasted coconut.

You sample the truffles and based on the three objective criteria (freshness, flavorfulness, and texture) you arrive at an **overall rating of 65**.

**Chocolat's New Product:**
**Assorted Chocolates**

*"These assorted chocolates provide a range of chocolate sensations, from creamy caramels and scrumptious pralines, to luscious ganaches, and refined fruits and nuts.*

*They come in a fine and elegant gift box designed with a luxurious, matte silver finish. Most noteworthy are the gray and smoked salt caramels, a harmonious blend of complex flavors (rich smooth chocolate, soft buttery caramel and the unexpected boldness of the gray and smoked salt)." Chocolat*

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Seventh visit: Mint Truffles**

On your seventh visit to the chocolate store, you order a few mint truffles. They are made with milk and dark chocolate, and cream with mint essence.

Based on the three objective criteria (freshness, flavorfulness, and texture), you arrive at an **overall rating of 69**.

**Chocolat's New Product:**
**Orange Peel**

*"This is a European favorite! The most flavorful part of select orange peels are blanched, simmered for two days in a sugar syrup, rolled in confectioner's sugar, then dipped in the finest Swiss dark chocolate, sealed in a cellophane bag and tied with a silver bow.*

*You and your family will enjoy this unusual chocolate desert! Net weight is 8 oz."*
*Chocolat*

How interested are you in trying out this product?

| Very Interested | Interested | Somewhat Interested | Neutral | Somewhat Disinterested | Disinterested | Very Disinterested |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Meeting the Owner of Chocolat**

At the end of your seventh visit to the store, you meet the owner of Chocolat, who is also the chocolate chef.

He tells you that he has been **experimenting with several techniques** while making the truffles. He has learned a lot from carrying out these tests and expects to offer truffles of higher quality in the future.

He thanks you for your patronage and urges you to come back and try more truffles.

**RATING of the NEXT TRUFFLE: Instructions**

The next set of questions focus on the quality of truffles you expect on your next visit to Chocolat.

Please answer the following questions **based on your experiences you've had so far** at Chocolat.

**RATING of the NEXT TRUFFLE: Questions**

Based on your experiences so far at Chocolat, what is your **expectation** of the **rating** you will give to the next truffle:

_____ out of 100

    Please keep in mind this rating in order to answer later questions in the study.

**MINIMUM and MAXIMUM Rating: Instructions**

Next, I would like you to estimate the **minimum and maximum rating** you think the next truffle may receive.

I would like you to consider minimum and maximum ratings so that you are **95% confident** that the rating of the next truffle will fall within the range you specify.

Here is an example that illustrates the minimum and maximum concept: upon meeting a person, you might guess that he/she is 30 years old, but you are 95% confident that he/she is no more than [Maximum Age] and no less than [Minimum Age].

## MINIMUM Rating

You are 95% confident that the **<u>minimum</u>** rating of the next truffle will be:

\_\_\_\_\_ out of 100

## MAXIMUM Rating

You are 95% confident that the **<u>maximum</u>** rating of the next truffle will be:

\_\_\_\_\_ out of 100

Next I would like to ask you for your overall opinion of the new chocolate store, Chocolat.

How likely are you to continue to buy truffles at Chocolat?

| Very Likely | Likely | Somewhat Likely | Undecided | Somewhat Unlikely | Unlikely | Very Unlikely |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Now I would like to ask you few more questions about your visits at Chocolat.

Please list the highest rating you gave a truffle during your 7 visits at Chocolat.

_____

Please list as many ratings of the truffles you sampled at Chocolat as you can remember.

_____

Please list all the ratings you gave to the truffles you sampled during your 7 visits at Chocolat.

_____

Please indicate the extent you agree or disagree with the following statements.

I believe a rating of 90 for a chocolate truffle is hard to achieve.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Now I want to ask you a few questions about yourself. Please answer openly and honestly as this will enhance the quality of the study.

Please indicate the extent you agree or disagree with the following statements.
I like chocolate.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I buy several chocolate products per month.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I know a lot about truffles.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I get mad at myself when I make mistakes.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

It is very important for me to be right.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Little errors bother me a lot.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I notice when product performance does not match the quality I expect from the product.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I am not at all satisfied when products perform worse than I expect.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I am very satisfied when products perform better than I expect.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I am cautious in trying new or different products.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I would rather stick with a brand I usually buy than try something I am not very sure of.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

I never buy something I don't know about at the risk of making a mistake.

| Strongly Agree | Agree | Somewhat Agree | Neither Agree nor Disagree | Somewhat Disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | |