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## Embodied Location Effects: Affecting Consumer Product Attributions Through Location-concept Associations

Kaeun Kim

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**EMBODIED LOCATION EFFECTS: AFFECTING CONSUMER PRODUCT  
ATTRIBUTIONS THROUGH LOCATION-CONCEPT ASSOCIATIONS**

A Dissertation Presented

by

**KAEUN KIM**

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

May 2019

Isenberg School of Management

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Approved as to style and content by:

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Elizabeth G. Miller, Chair

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George R. Milne, Member

---

Easwar S. Iyer, Member

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Lisa A. Keller, Member

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George R. Milne, PhD Program Director  
Isenberg School of Management

## **DEDICATION**

To my loving parents.

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## **ABSTRACT**

### **EMBODIED LOCATION EFFECTS: AFFECTING CONSUMER PRODUCT ATTRIBUTIONS THROUGH LOCATION-CONCEPT ASSOCIATIONS**

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**KAEUN KIM, B.A., YONSEI UNIVERSITY**

**M.A., YONSEI UNIVERSITY**

**Ph.D., UNIVERSITY OF MASSACHUSETTS AMHERST**

**Directed by: Professor Elizabeth G. Miller**

A large number of marketing decisions (e.g., where to place products on a shelf; where to place information on product packages or within advertisements; how to organize product listings on online shopping sites) involve choices related to location. However, because particular locations can convey symbolic and conceptual meanings (e.g., “up” implies power), in order to choose the best location, marketers must understand what meaning is being communicated through a placement. Drawing on embodied cognition theory, which suggests that our thoughts, feelings, and behaviors are shaped through our interactions with the surrounding world and grounded in sensorimotor systems, this dissertation explores conceptual associations with various locations, identifying a new location-concept association (up and chronological newness) and providing insight into how marketers can utilize location effects to better promote product attributes and improve consumer well-being.

Specifically, Essay 1 explores how marketers can use location-number associations to most effectively communicate nutrition information on food packages.

Drawing on the number-location association literature (i.e., small numbers-left, large numbers-right), three experimental studies show that consumers estimate a higher nutrient content when nutrition claims are placed on the right (vs. left) side of the package, which has a subsequent impact on perceived healthfulness of the product. Also, Essay 1 examined the moderating role of product-nutrient associations and nutrient type (negative vs. positive).

Essay 2 examines how marketers can use shelf location combined with a conceptual metaphor between verticality and power to increase consumers' beliefs about green products' effectiveness and consequent purchase. Findings from three experimental studies show that placing green products on a higher (vs. lower) shelf can improve perceived product effectiveness, which in turn increases purchase intention of the target product. Essay 2 also discusses the role of choice criteria (choosing strong and powerful products vs. mild and gentle products) as a moderator.

Finally, Essay 3 identifies a hitherto unexplored conceptual association between up and chronological newness and demonstrates how marketers can utilize this association to better market products. Six studies find support for this association that consumers conceptually associate the chronological newness construct with up and that consumers use this association to infer newness-related information such as product novelty, newspaper credibility, and food freshness.

Together, this dissertation contributes theoretically to the understanding of embodied cognition, particularly location-concept associations, in the marketing domain. Additionally, this dissertation provides managerial and public policy implications.



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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

One of the most essential marketing decisions involves choices related to *location*. For example, marketers must consider where to place products on a shelf, where to place information on product packages or within advertisements, and how to organize product listings on online shopping sites. Such placement decisions are not only about mere design aesthetics, but also about how a product effectively signals its attributes.

Indeed, previous research has suggested that there exists an ideal location to place an object that maximizes perceptions of product attributes and favorability toward the product. For example, Deng and Kahn (2009) showed that products with the product image on the bottom, right, or bottom-right of the package façade are perceived to be heavier than those with the product image on the top, left, and top-left, leading the authors to suggest that marketers display product images on the heavy locations when they want to communicate product heaviness (e.g., richness in taste). Similarly, because consumers represent time as flowing from left to right (i.e., past-left, future-right association), antique products are evaluated more favorably when they are on the left side of an advertisement as opposed to the right side, but technology products are evaluated more favorable when they are on the right side as opposed to the left side (Chae and Hoegg 2013). Another example is Sundar and Noseworthy's (2014) study where they found that displaying a brand logo on the top (vs. bottom) of the package increases perceived power of the brand because consumers typically associate powerfulness with higher vertical positions (Schubert 2005).

A core assumption underlying the above findings is that particular locations can convey symbolic and conceptual meanings (e.g., “up” implies power). Therefore, in order to choose the best location for marketing stimuli, it is important that marketers understand such location-concept associations or what meaning is being communicated through a placement of a stimulus.

The main goal of this dissertation is thus to contribute to the understanding of conceptual associations with various locations and to provide insight into how marketers can utilize these associations to better promote products and improve consumer well-being. Drawing on embodied cognition theory, which suggests that our thoughts, feelings, and behaviors are shaped through our interactions with the surrounding world and grounded in sensorimotor systems, I apply previously established location-concept associations to the food packaging context (Essay 1) and shelf display context (Essay 2), as well as identify a hitherto unexplored location-concept association (up-chronological newness; Essay 3), in order to gain new insights into the effects of these associations.

In the sections that follow, I introduce embodied cognition literature, provide an overview of the three essays, and demonstrate how this dissertation makes theoretical and managerial contributions.

## **1.2 Embodied cognition**

The notion of embodied cognition is that we understand the world, specifically abstract concepts such as love, morality, and time, largely through our bodily sensations (see Krishna and Schwarz 2013 for a review in marketing; also see Meier et al. 2012 for a review in social psychology). This is because from early childhood, our cognition,

feelings, and behaviors have been developed to be grounded in sensorimotor systems. For example, people have used phrases like “a clean record” and “wash away the sin” to represent a state of being moral, and later they develop a conceptual association between morality and cleanliness. In this example, “morality is cleanliness or purity” is a conceptual metaphor that people use to understand the abstract concept “morality” using a concrete concept of “cleanliness.” As such, a large body of research on embodied cognition has examined various conceptual metaphors where abstract concepts (target domain) are explained through concrete concepts (source domain) that are originated from early learning or accumulated perceptual experiences.

Different process models have been proposed to explain mechanisms underlying embodied cognition. Conceptual Metaphor Theory (CMT; Lakoff and Johnson 1980a, 2008) suggests that embodied cognition is largely derived from learning (e.g., figures of speech), and argues that only concrete, sensorimotor processing influences abstract, conceptual processing, but not vice versa. In contrast, proponents of Perceptual Symbol Systems (PSS; Barsalou 1999) posit that embodied cognition is derived from perceptual experiential correlations between abstract concepts and concrete bodily states, and that the effects of concrete, sensorimotor processing and abstract, conceptual processing are bidirectional. Recently, Slepian and Ambady (2014) proposed a new account for embodied cognition, Simulated Sensorimotor Metaphor (SSM), that integrates CMT and PSS. According to SSM, people learn metaphorical associations between abstract concepts and concrete concepts through both language (as in CMT) and perceptual experiences (as in PSS), and both sensorimotor processing and conceptual processing reinforce each other such that concrete processing derived from learned metaphorical



associations is ingrained into neural representation of the abstract concept, where an activation of abstract concepts can influence bodily states or concrete processing.

Even though it is still unclear which of the three models above (CMT, PSS, and SSM) best describes processes underlying embodied cognition, there is no doubt that embodied effects are real, and our cognition is shaped through our interactions with the surrounding world and grounded in sensorimotor systems.

### **1.3 Overview of the essays**

This dissertation focuses on one specific case of embodiment effects: how people understand abstract concepts through *placement* or *locations*. As described above, particular locations convey symbolic and conceptual meanings and consumers have developed various orientational conceptual metaphors (e.g., powerful is up). Therefore, this dissertation is dedicated to advancing our understanding of concept-location associations in the marketing domain. Specifically, this dissertation examines how concept-location associations impact various product perceptions, and provides marketers with practical guidelines for how to utilize concept-location associations in the marketplace to promote product attributes and improve consumer well-being.

To do so, the first two essays examine previously established associations in different marketing contexts. Drawing from the number-location association literature (i.e., small numbers-left and large numbers-right), Essay 1 shows that placing a positive nutrient claim such as fiber or protein on the right (vs. left) side of a package increases perceived healthiness as it signals a greater amount of positive nutrient content, but placing a negative nutrient claim such as sugar or fat on the left (vs. right) side of a

package increases perceived healthiness as it signals a lower amount of negative nutrient content. Also, Essay 1 suggests that this location effect of nutrient claims is moderated by the strength of association between the product and focal nutrient.

In Essay 2, we shift our attention to the conceptual metaphor of verticality and power (i.e., powerful is up) in the shelf display context. Consumers tend to be reluctant to purchase green products because they perceive green products to be less effective than traditional, non-green products. To overcome such biases, Essay 2 suggests vertical shelf layout as an implicit but viable solution that can enhance perceived effectiveness of green products. Because consumers associate up with powerfulness, findings from the three experimental studies show that green products placed at the top rather than at the bottom of a display will be perceived to perform more effectively. These (location-based) associations then, in turn, impact purchase intentions. Also, Essay 2 further shows that choice criteria can moderate the effect of shelf location of green products on purchase intention. When choosing a product with strength-related attributes is important (e.g., powerful and strong laundry detergent), placing a green product at the top shelf is more effective because it signals powerfulness. In contrast, when choosing a product with gentleness-related attributes is important (e.g., gentle and mild baby detergent), placing a green product at the top shelf is not an effective strategy because signaling powerfulness can backfire.

Finally, Essay 3 identifies a new location-concept association (i.e., up-chronological newness) that has not been empirically explored before. Based on linguistic evidence (e.g., “*up-to-date*”) as well as accumulated bodily experiences (e.g., the inbox shows emails in a chronological order from newest-top to oldest-bottom), Essay 3 shows

that consumers associate up with chronological newness or recency. Essay 3 then demonstrates practical implications of this chronological newness association in a variety of consumer contexts ranging from food to product innovation to news articles. For example, placing a tech product image at the top (vs. bottom) of the advertisement can increase consumers' perception of its recency (i.e., how recently this product has been launched), and thus consumers perceive the product as more novel and innovative. Similarly, placing a news article headline at the top of the search results increases recency perceptions, and this has a spillover effect to how credible this news article is.

An overview of these three essays is summarized in table 1.1.

**Table 1.1. Overview of the dissertation essays**

	<b>Research question</b>	<b>Location-concept associations</b>	<b>IV: Locations</b>	<b>DV: Product attributes</b>
<b>Essay 1</b>	Where to place nutrient claims on food package to better communicate the healthfulness of the product?	Left-small numbers, right-large numbers	Left vs. right	Nutrient estimates; Perceived healthiness
<b>Essay 2</b>	Where to place green products on the retail store shelf to most effectively signal product effectiveness?	Up-powerfulness	Top vs. bottom	Perceived product strength
<b>Essay 3</b>	Does a conceptual association between up and chronological newness exist?	Up-chronological newness	Top vs. bottom	Perceived recency

#### **1.4 Intended contribution**

Together, this dissertation sheds light on the theoretical understanding of embodied cognition, particularly location-concept associations, in the marketing domain. Previous research has shown a variety of location-concept associations (e.g., left-past, right-future, Chae and Hoegg 2013; up-rationality, bottom-emotionality, Cian, Krishna, and Schwarz

2015; up-light, bottom-heavy, Deng and Kahn 2009; up-powerful, bottom-powerless, Giessner and Schubert 2007, Schubert 2005; up-good, bottom-bad, Meier and Robinson 2004; left-healthy, right-unhealthy, Romero and Biswas 2016). Following this stream of research, this dissertation extends the applicability of the existing location-concept associations to new domains, namely nutrient claims on the food package (Essay 1) and green product shelf display (Essay 2). Also, a new location-concept association that has not been studied in the past is identified and examined (Essay 3).

Specifically, Essay 1 advances the theoretical understanding of the number-location association (small numbers-left, large numbers-right). Most of the previous research in this area has been done within cognitive psychology (e.g., Dehaene et al. 1993; Nuerk et al. 2005; Wood et al. 2008), but scant research has examined how this number-location association would impact marketing outcome variables. Also, despite the increasing interest in nutrition labeling on product package among companies as well as consumers, little research has examined the best place to display health and nutrition claims on food packages to most effectively signal the product's healthfulness. Essay 1 fills these gaps by showing that the location of a nutrient content claim has a significant impact on consumers' perceptions of how healthy and nutritious the product is, and the rationale here is that consumers estimate higher amount of nutrient content when the nutrient content claim is displayed on the right side of the package rather than on the left side.

Essay 2 contributes to the product placement and shelf layout design literature (e.g., Cai, Shen, and Hui 2012; Chae and Hoegg 2013; Valenzuela et al. 2013) by applying the conceptual metaphor literature linking verticality and power (i.e., up is

powerful, Giessner and Schubert 2007; Lakoff and Johnson 1980; Schubert 2005) to the green and environmentally friendly products context. Essay 2 shows that product strength and effectiveness cues can be communicated through the shelf location, and that placing green products at the top (vs. bottom) shelf can increase consumers' beliefs about green products' effectiveness and thus encourage consequent purchase and usage.

Finally, drawing from embodied cognition literature on how people develop a conceptual metaphor through languages and accumulated behavioral experiences (Barsalou 1999; Lakoff and Johnson 1980a; Meier et al. 2012; Slepian and Ambady 2014) Essay 3 identifies a new location-concept association (i.e., up-chronological newness) by showing that people conceptually associate the chronological newness construct with up (Studies 1-3) and that this up-chronological newness association can be used to infer related product attributes such as fruit freshness (Study 4), product novelty and innovativeness (Study 5), and newspaper credibility (Study 6). Essay 3 also deepens the product newness literature. While most of the previous research has addressed the issue of product novelty, i.e., the degree to which a product is perceived to be discrepant from the typical category elements (Förster, Marguc, and Gillebaart 2010), Essay 3 focuses on another important dimension of product newness, that is, chronological newness (recency), and shows that vertical locations can predict subjective recency perception.

In addition to the theoretical contributions, this dissertation provides managerial and public policy implications. From a business standpoint, where decisions involving locations and placement are crucial such as shelf display, package design, and advertisement, findings from this dissertation will inform marketers where to place

products on a shelf, where to place information on product packages or within advertisements, and how to organize product listings on online shopping sites. From a public policy perspective, this dissertation provides insight into how marketers can nudge consumers' healthy food product choices and encourage the use of green products that may help solve environmental challenges.

The detailed contributions and practical implications of each essay are discussed in the following chapters. Chapter 2 presents how lateral locations of a nutrient content claim on the food package can impact consumers' estimates of nutrient content and perceived healthiness of the product (Essay 1). Chapter 3 presents how vertical locations of a green product on the retail store shelf can impact consumers' perceptions of product strength and effectiveness (Essay 2). Chapter 4 presents a new conceptual association between up and chronological newness (Essay 3). Finally, Chapter 5 concludes this dissertation by highlighting theoretical and managerial implications, and providing directions for future research.

## CHAPTER 2

### ESSAY 1: THE EFFECT OF NUTRITION CLAIM LOCATION ON NUTRIENT CONTENT ESTIMATES AND PERCEIVED HEALTHINESS

#### 2.1 Introduction

As consumers' interests in healthy eating and well-being in life continuously increase, growing attention has been paid to the use of health and nutrient claims on the front of the package as a simple yet effective marketing strategy. For example, about 48.1% of food packages utilize nutrition marketing (Schermel et al. 2013), and 41% of the food advertisements (N=1,320) in print magazines contain health or nutrition-related claims (Parker 2003). Since health and nutrition claims on food packages not only increase consumers' healthiness perceptions of the product (Lähtenmäki 2013), but also influence perceived advantage (Urala, Arvola, and Lähtenmäki 2003) and product information search behaviors (Roe, Levy, and Derby 1999), a substantial body of research has focused on identifying the most effective food labeling system that helps consumers find and choose healthier products (Hawley et al. 2013; van Herpen, Hieke, and van Trijp 2014; Siegrist, Leins-Hess, and Keller 2015).

Although much research on health and nutrition claims has been done on identifying which type of claim (e.g., general vs. specific) is more effective (Andrews, Netemeyer, and Burton 1998), who is interested in health claims (Cavaliere, Ricci, and Banterle 2015), what nutrients should be included in claims (Hawley et al. 2013), or how much information should be stated in claims (Wansink, Sonka, and Hasler 2004), surprisingly little research concerns *where* to place health and nutrition claims on food packages.

In this research, we explore implications of placement of front-of-package health and nutrition claims on perceived product healthfulness. More specifically, drawing from the number-location association literature (i.e., small numbers-left and large numbers-right), we show that placing positive nutrient claims such as fiber and protein on the right (vs. left) side of a package increases perceived healthiness as it signals a greater amount of positive nutrient contents, while placing negative nutrient claims such as sugar and fat on the left (vs. right) side of a package increases perceived healthiness as it signals a lower amount of negative nutrient contents. We also show that this effect is moderated by product-nutrient associations, i.e., the degree to which the product category has a preexisting associative link with the focal nutrient.

In the sections that follow, we first review relevant previous literature on health and nutrition claims and number-location association research. We next present three experiments and one archival study that together support our research findings. Finally, we conclude with theoretical and managerial implications, limitations, and future research directions.

## **2.2 Literature review**

### **2.2.1 Claiming health through food packages**

In response to the growing interest in healthy eating among consumers, companies nowadays seek ways to better convey product healthiness both verbally and non-verbally through food packaging. Non-verbal cues include package shape, color, and typeface. For example, Koo and Suk (2016) show that consumers estimate lower calorie content when



the package shape is taller vs. wider. Also, a package in lighter color (yellow) is perceived to be healthier than one in a heavier color (red), and packages with thicker brand name typeface (**SunSpLash**) are rated as more sugary than those with thinner typeface (AncientScript) because both color and typeface imply a heaviness metaphor that signals product healthiness (Karnal et al. 2016).

Besides non-verbal cues, marketers display health and nutrition-related messages through verbal claims on a package as a direct way to communicate a healthiness cue. Health claims are front-of-package information used to highlight specific health-related functions or health outcomes (e.g., “This product may reduce the risk of heart disease”) whereas nutrition claims describe the level of nutrient content without linking the product with health outcomes (e.g., “Good source of protein”, “10g of fiber”), although consumers do not typically distinguish between these two types of claims (Lähteenmäki 2013).

As shorter claims are known to generate more favorable attitude about the product than longer ones (Wansink et al. 2004), and impactful short claims are likely to grab consumers’ attention through various design elements such as fonts, colors, and shape effects, nutrient claims seem to be more preferred in the marketplace than health claims. Indeed, prior studies by Schermal et al. (2013) and Parker (2003) indicate that nutrient content claims are the most commonly used among food advertisements that utilize health and nutrition related claims, comprising 45.5% - 65.9% of claims.

While consumers generally prefer food products with health and nutrition claims (Aschemann-Witzel and Hamm 2010), the impact of such claims on consumers’ perception of overall healthiness of the food products has been known to be small (van

Herpen et al. 2014; Saba et al. 2010; van Trijp and van der Lans 2007; Urala et al. 2003). For example, one study conducted by Orquin and Scholderer (2015) revealed that adding a nutrition claim to dairy products increased perceived healthfulness only by 0.2 on a 7-point scale compared to the no claim condition, while adding a health claim did not have any significant effect on perceived healthfulness.

Given this small effect combined with growing interest in healthier eating, the practical question is, how might marketers magnify the impact of nutrition claims on perceived healthiness of the product? Previous research suggests that small differences in how these claims are presented (e.g., choice of wording, location, font) may achieve this goal. Sütterlin and Siegrist (2015) showed that merely replacing sugar with fruit sugar displayed on the front of the package increased healthiness perception and nutritional value of the product because the word “fruit” created a health halo. Also, because there exist certain locations associated with heaviness (i.e., bottom, right, and bottom-right), healthful snacks with product images placed on lighter locations were preferred to those with product images in heavier locations (Deng and Kahn 2009). As mentioned earlier, simple changes in typeface and package color can also lead to increased healthiness perceptions (Karnal et al. 2016).

Extending this stream of research, we argue that the location of nutrition claims can also alter the way consumers infer product healthfulness from the claim. Scant research has investigated whether the location of health and nutrition claims has any systematic effect on consumers’ perception of the product. One exception is Bialkova and van Trijp's (2010) research which found that nutrition labels displayed on the top-right of the product package were visually processed faster because they received the most

attention. To the best of our knowledge, however, no research to date has identified the best location to display health and nutrition claims on the package in order to generate greater perceived healthiness of the product.

Although the wording of nutrition claims or nutrient content claims is subject to FDA's labeling regulations such that claims containing "high", "rich in" or "excellent source of" may be used only when the food contains 20% or more nutrients of the daily value (DV) per reference amounts customarily consumed (RACC), and "good source of", "contains" or "provides" may be used for nutrients containing 10%-19% of the DV per RACC (Food and Drug Administration 2013), consumers' translation of such nutrition claims as a healthiness signal may not always reflect the absolute nutritional content, especially when they have limited knowledge about the nutrients (Viswanathan 1994). As nutrition claims concern specific nutritional content of a food product, consumers often times estimate the amount of that nutrient from a general claim (e.g., Good source of fiber – What grams of fiber would this product contain?), or subjectively interpret the amount of nutrient from an explicit, quantitative claim (e.g., 10g of fiber – Is 10g of fiber enough?). In either case, consumers' judgment of nutritional content involves numerical estimates or magnitude perception.

Previous research has suggested that numerical judgment of a stimulus depends on *where* the stimulus appears on the visual field (Dehaene, Bossini, and Giraux 1993). If consumers' estimates of, or perception of, nutrient content in nutrition claims can be influenced by the claim location on the product package, it would provide insights as to determining an ideal location to display the nutrition claim on the package.

### **2.2.2 Number-location association**

There has been a considerable body of research suggesting a firm link between numbers and locations (Dehaene et al. 1993). That is, people generally process smaller numbers better when they appear on the left side of the visual field whereas larger numbers are recognized faster when they appear on the right side. For example, when Dehaene et al. (1993) gave participants a parity judgment task (i.e., judging whether a given number is odd or even), they reacted faster with a left-hand key when processing smaller numbers (e.g., 0-4) than with a right-hand key, while the opposite effect was observed when they processed larger numbers (e.g., 5-9).

Dehaene et al. (1993) labeled their novel finding as the Spatial-Numerical Association of the Response Codes (SNARC) effect to describe how numbers are systematically associated with spaces or locations. After the seminal work by Dehaene et al. (1993), over a hundred studies examined the SNARC effect and corroborated its viability (see Gevers and Lammertyn [2005] for a review; also see Wood et al. [2008] for a meta-analysis). For example, the SNARC effect is not just limited to Arabic numbers; almost the same effect was observed when using word numbers or dice dots as stimuli (Nuerk et al. 2005).

Researchers have interpreted the SNARC effect as a consequence of directional reading and writing habits where people from Western culture mostly read and write words and numbers from left to right (Shaki, Fischer, and Petrusic 2009). For instance, people count numbers in an ascending order (e.g., one, two, three, ...); consumers encounter a menu in which serving sizes are displayed as small, medium, and large typically from left to right; and an x-axis on a Cartesian coordinate system represents

smaller numbers on the left-hand side and larger numbers on the right-hand side. Such accumulated habitual experiences of and exposures to the number-location association lead consumers to generate a mental number line in which left is associated with smaller numbers and right is associated with larger numbers. This mental number line would then be readily accessible whenever people process numbers or magnitude. As a practical application of this learned association between numbers and locations, Cai, Shen, and Hui (2012) showed that the location of a product image alters the price consumers would estimate. Participants made a higher price estimate when a product was displayed on the right-hand side (vs. left-hand side) of a computer screen.

We expect to observe similar location effects (i.e., the number-location association) in the food package context in the current research. Because the location of a nutrient content claim on the food package (left or right) is likely to activate a mental number line, consumers would give higher nutrient estimates for the nutrient claim when presented on the right side of the package while lower nutrient estimates would be made for the nutrient claim displayed on the left side of the package. To formally state,

H1: When the nutrient content claim is displayed on the right (vs. left) side of the package, consumers will estimate a higher amount of the nutrient.

### **2.2.3 Moderation by product-nutrient association**

We further expect that H1 depends on the product category. Consumers are aware that certain product categories are rich in particular nutrients. For example, an energy bar is typically acknowledged as a good source of protein and fiber. Because an established link between nutrients and this product category already exists, consumers' estimates of

nutrient content may generate a ceiling effect and its range may be relatively limited. In contrast, for product categories that display unfamiliar nutrient claims (e.g., fiber claims on chocolate cookies), nutrient content estimates will be more strongly affected by the presence of nutrient claims. This expectation can be attributed to the consumers' existing knowledge about product concepts that are accumulated in an associative network structure (Lawson 2002). In the case of chocolate cookies, consumers would be less likely to think that they are healthy or nutritious in the absence of explicit nutrient claims since no established associative nutrient knowledge link exists. Consumers will then be more likely to rely on the nutrient claims on the front of the chocolate cookies package as valid information sources that help them construct a new knowledge structure. For example, Urala, Arvola, and Lähteenmäki (2003) showed that the perceived benefit of a health claim about a familiar, well-known nutrition component was not affected by increasing claim strength, but strengthening a health claim about unfamiliar, novel nutrition component heightened perceived benefits of a product. Therefore, we expect that the nutrient claim location effect will be more pronounced for products whose association with a specific nutrient is weak, because consumers will be more likely to rely on external cues (as opposed to internal knowledge) in estimating nutrient content. To summarize,

H2: The location effect on nutrient content estimates will be more pronounced when the associative link between product and nutrient claims is weak (vs. strong).

#### **2.2.4 Nutrient content estimates and perceived healthiness**

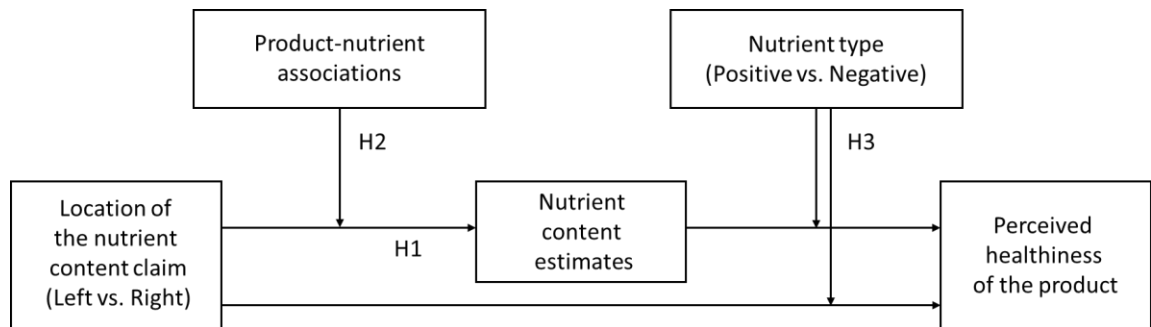
Consumers generally have a lay belief that higher amounts of positive nutrients (e.g., fiber, protein) would increase the product healthiness while higher amounts of negative nutrients (e.g., sugar, fat) would hamper the product healthiness (Bucher, Müller, and Siegrist 2015). Thus, we expect that the degree to which nutrient content estimates as a function of the nutrient claim location (left or right) influences healthiness perception would depend on what type of nutrient claim is shown on the product package. To illustrate, when a fiber claim (i.e., positive nutrient claim) is displayed on the right (vs. left) side of the package, consumers would estimate higher amounts of fiber which leads to increased perception of the product healthiness. On the other hand, when a sugar claim (i.e., negative nutrient claim) is displayed on the right (vs. left) side of the package, consumers would estimate higher amounts of sugar content and thus they would perceive that the product is less healthy. Therefore, we expect a moderated mediation effect of the nutrient type on nutrient content estimates and perceived healthiness and hypothesize:

H3: Nutrient type (positive vs. negative) will moderate the effect of nutrient claim location on perceived healthiness via nutrient content estimates. Specifically,

H3a: When a positive nutrient claim is displayed on the right (vs. left) side, nutrient content estimates will be higher, leading to increased perceived healthiness of the product.

H3b: When a negative nutrient claim is displayed on the right (vs. left) side, nutrient content estimates will be higher, leading to decreased perceived healthiness of the product.

Figure 2.1 presents a conceptual model and hypotheses of the present research.



**Figure 2.1. A conceptual model**

### 2.3 Overview of the studies

We present four studies (1 archival, 3 experimental) to test H1-H3. Preliminary study is a content analysis using a real-world database to investigate whether current practices of the placement of nutrient claims are optimal (i.e., are marketers placing nutrient claims in the optimal location on the package?). Study 1 then provides initial evidence that the location of a nutrient claim influences the estimates for the nutrient content. Study 2 shows that the product type moderates the location effect of a nutrient claim by adopting two contrasting product categories (a granola bar vs. chocolate cookies). Study 3 tests the moderating role of nutrient type (positive vs. negative) on the effect of nutrient claim locations on perceived healthiness. Overall, our findings suggest that placing a nutrient claim on the right (vs. left) side of the package significantly increases consumers' estimates of target nutrient content, which in turn affects perceived healthiness of the product and purchase intention.



## **2.4 Preliminary study: A content analysis**

While our nutrition claim location hypotheses provide new theoretical insights into how consumers process front-of-package nutritional information, the managerial importance of these insights depend on the degree to which marketers and manufacturers are already aware that location of the nutrient claim on the food package matters and the degree to which current practice is sub-optimal (i.e., are positive nutrient claims more likely to be displayed on the right side of the package and negative claims displayed on the left side?). To examine the optimality of current practices in the marketplace regarding the location of the nutrient claim, we conducted a content analysis with the existing products.

### **2.4.1 Method**

We adopted Mintel Global New Products Database (GNPD) as a basis for our content analysis for several reasons. First, it records every new product introduction in the packaged goods each month. More relevant to our research, the database not only shows an exact product picture but also allows filtering based on specific health claims. This feature allowed us to select positive and negative nutrient claims and code where the nutrient claim was displayed on the package. The following criteria were used to define the sampling frame: 1) US food products that were launched during the past three years (i.e., Jan 1, 2015 – Dec 31, 2017), 2) product categories: cookies, crackers, and energy bars, 3) products displaying either positive (fiber, protein) or negative (sugar, fat) claims. These criteria left us with a total of 1,088 products. For each product, horizontal location (left, middle, or right) of a nutrient claim and type of nutrient claim (positive, negative) was coded based on visual inspection of the product image included in the database.

## 2.4.2 Results

First, we ran a frequency analysis to show where nutrient claims are most frequently displayed along the horizontal line on the product package. Nutrient claims are displayed almost equally on the left side (42.2%) and the right side (42.3%) of the package, while only 15.5% are displayed in the middle,  $\chi^2(2)=155.13, p<.001$ . To explore if horizontal locations of a nutrient claim depend on type of nutrient (negative vs. positive), we created a contingency table (see table 2.1).

**Table 2.1. A contingency table: Nutrient claim location by nutrient type**

		Location of nutrient claims			Total
		Left	Middle	Right	
Nutrient Type	Negative	131 (12.0%)	62 (5.7%)	94 (8.6%)	287 (26.4%)
	Positive	328 (30.1%)	107 (9.8%)	366 (33.6%)	801 (73.6%)
Total		459 (42.2%)	169 (15.5%)	460 (42.3%)	1088 (100.0%)

For the negative nutrients (sugar and fat), more nutrient claims were located on the left (131 out of 287, 45.6%) than on the right (94 out of 287, 32.8%) or in the middle (21.6%). On the other hand, positive nutrient claims (fiber and protein) were displayed slightly more on the right (366 out of 801, 45.7%) than on the left (328 out of 801, 40.9%) or in the middle (13.4%). This result supports our theoretical argument that positive (negative) nutrient claims are better off placed on the right (left) side of the package because they can signal more (less) amount of positive (negative) nutrients and thus increased healthfulness of the product.

Finally, product type (energy bar vs. cookies and crackers) was considered (see table 2.2).

**Table 2.2. A contingency table by product categories**

Category=Energy bar					
Nutrient type		<i>Location of nutrient claims</i>			Total
		Left	Middle	Right	
Negative	Count	101	52	58	211
	% within nutrient type	47.90%	24.60%	27.50%	100%
	% of total	10.90%	5.60%	6.30%	22.80%
Positive	Count	313	80	320	713
	% within nutrient type	43.90%	11.20%	44.90%	100%
	% of total	33.90%	8.70%	34.60%	77.20%
Total	Count	414	132	378	924
	% of total	44.80%	14.30%	40.90%	100%

Category=Cookies and crackers					
Nutrient type		<i>Location of nutrient claims</i>			Total
		Left	Middle	Right	
Negative	Count	30	10	36	76
	% within nutrient type	39.50%	13.20%	47.40%	100%
	% of total	18.30%	6.10%	22%	46.30%
Positive	Count	15	27	46	88
	% within nutrient type	17%	30.70%	52.30%	100%
	% of total	9.10%	16.50%	28%	53.70%
Total	Count	45	37	82	164
	% of total	27.40%	22.60%	50%	100%

For the cookies and crackers in which little association between positive nutrients such as fiber and protein exists, more positive nutrient claims are displayed on the right (52.3%) than on the left (17%) or in the middle (30.7%). However, positive nutrient claims on the energy bar products were almost equally displayed either on the left (43.9%) or on the right (44.9%) side of the package. This result suggests that marketing practitioners and manufacturers may be aware of the benefits of placing positive nutrient claims on the right side of the package especially for those products with less association with positive nutrients. Negative nutrient claims are displayed more on the left side (47.9%) than on the right (27.5%) or in the middle (24.6%) for the energy bar products,

which is also consistent with our argument. However, for the cookies and crackers products, negative nutrient claims are displayed more on the right side of the package (47.4%) than on the left (39.5%) or in the middle (13.2%).

### **2.4.3 Discussion**

In summary, the content analysis of the real-world food products in the marketplace and its nutrient claim locations suggests that marketing practitioners and manufacturers may be aware of the benefits of placing positive nutrient claims on the right side of the package especially for those products with less association with positive nutrients. However, the content analysis of the real-world food products in the marketplace and its nutrient claim locations suggests that a majority of the current practice of labeling nutrient claims on the package does not generally seem to follow theory-driven decisions and thus there is room for improving the optimality of the placement of nutrient claims on the food package in a way that it can increase perceived healthiness of the product. In the following three experimental studies, we show that consumers estimate higher amount of nutrient content when the nutrient claim is displayed on the right side of the package than when it is displayed on the left side, and such nutrient content estimates impact perceived healthiness of a product.

### **2.5 Study 1**

Study 1 provides initial evidence that consumers estimate a higher amount of the nutrient when the nutrient content claim is displayed on the right side rather than on the left side of the package (H1). Because when consumers make numerical judgment based on a

mental number line, this mental number line should be accessible however short or long it would be, we presented three food product packages that were different in shape (i.e., a wide rectangular cookie box, tall milk carton, and a squared yogurt cup) to participants. A nutrient claim was displayed on the left or right side of each product package. To minimize potential demand effects, each participant went through only one location condition (i.e., left or right).

### **2.5.1 Method**

Ninety-three participants were recruited from the Amazon Mechanical Turk. They were told that a short survey was being conducted to assess how consumers evaluate food package designs. Three products were presented in a random order: 1) Archway chocolate chip cookies (claim: “contains fiber”), 2) I’m Milk whole milk (claim: “rich in calcium”), and 3) Chobani plain Greek yogurt (claim: “high protein”). Two products were real-world products (Archway and Chobani) and one product was fictitious (I’m Milk) – See Appendix A.1. For each product, participants were asked to estimate using a given range<sup>1</sup> the amount of a focal nutrient that the product per single serving would provide, as well as how many calories the product would provide within a range of 0-300 Cal<sup>2</sup>. Finally, they indicated whether the products they evaluated included any nutrient claims on the package (all of them, some of them, none of them, I don’t know) and those

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<sup>1</sup> The range was constructed around the mean nutrient content that a typical product in that category would provide on average. Chocolate chip cookies provide 1000mg of fiber per serving, so participants estimated the fiber content on a 0-2000mg range. Whole milk provides 200mg of calcium per serving, so a 0-400mg range was given. Finally, plain Greek yogurt provides 20g of protein per serving, so a 0-40g range was given.

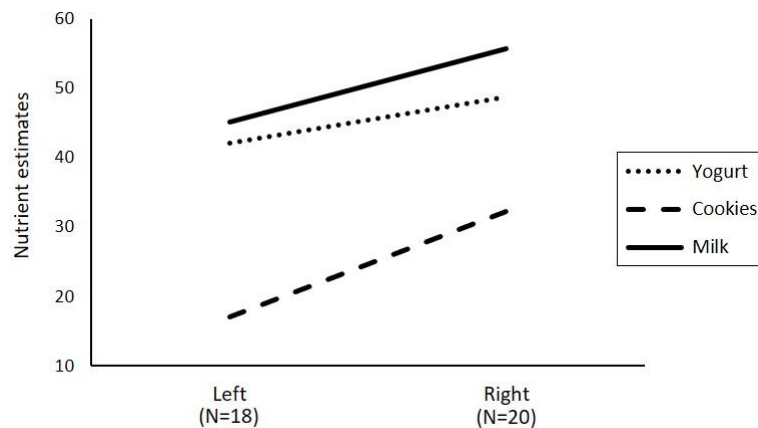
<sup>2</sup> All three products provide about the same amount of calories (150-190 Cal), so the same range was used for all products.

who failed to accurately recall this information were omitted from the analysis, leaving us with 38 participants ( $M_{\text{age}}=37.16$ , 44.7% males)<sup>3</sup>.

### 2.5.2 Results

We ran a 2 (location: left, right) x 3 (product: cookies, milk, yogurt) mixed ANOVA on nutrient estimates with location as a between-subjects factor and product as a within-subjects factor. Because consumers estimated nutrients for each product on scales with different range, we first created a nutrient estimate index for each product. A nutrient estimate index is a percent-based score, calculated by each participant's indicated amount of nutrient / range \* 100. For example, if a participant estimated that the chocolate chip cookies contain 500mg of fiber, the nutrient estimate index for this estimate is 25%.

The mixed ANOVA yields a significant main effect for location ( $M_{\text{left}}=34.74$ ,  $M_{\text{right}}=45.53$ ;  $F(1,36)=5.53$ ,  $p<.05$ ) but not for its interaction with product ( $F(2,72)=.65$ ,  $p=.53$ ). Figure 2.2 shows means for each condition.



**Figure 2.2. The effect of nutrient claim location on nutrient estimates**

<sup>3</sup> The results are substantively the same if the whole sample ( $N=93$ ) is used. A 2 x 3 mixed ANOVA on the nutrient estimate index yielded a marginally significant main effect for location ( $M_{\text{left}}=36.75$ ,  $M_{\text{right}}=41.69$ ,  $F(1,91)=3.04$ ,  $p=.085$ ).

The results indicate that nutrient estimates for the product are higher when the nutrient claim is displayed on the right side rather than on the left side of the package, and that this effect can be observed for all products, supporting H1. The ANOVA also yields a significant main effect for product ( $F(2,72)=27.07, p<.01$ ), reflecting that consumers estimated higher nutrient amounts for the healthier product categories (milk, yogurt).

### **2.5.3 Discussion**

Study 1 showed that the location of nutrient claims affects the numerical estimation of nutrient content such that consumers estimate a higher amount of nutrient when the nutrient claim is displayed on the right (vs. left) side of the package. Lateral display of a nutrient claim activates a mental number line from both relatively long line (wide cookie box) and short line (tall milk carton, yogurt cup) to allow consumers to make numerical judgment. On average, however, consumers estimated a higher amount of nutrient for yogurt and milk than cookies. This is presumably because consumers would expect that yogurt and milk provides high amounts of protein and calcium, respectively, but they may not expect that cookies would typically provide fiber. When consumers do not expect a strong association between a product and its nutrient content, they may need to rely on explicit cues such as nutrient claims in inferring how healthful the product is. Study 2 will further examine this possibility.

### **2.6 Study 2**

The main objective of Study 2 is to replicate the findings from Study 1 (i.e., the location effect of a nutrient claim on nutrient content estimation) and to show that product-

nutrient association moderates the location effect of a nutrient claim on nutrient content estimation, which in turn, impacts perceived healthiness of the product.

## **2.6.1 Method**

### *2.6.1.1 Product stimuli selection*

We use two contrasting product categories, a granola bar and chocolate chip cookies, both with a “contains fiber” claim on the front of the package (See Appendix A.2).

Consumers expect that a granola bar is generally high in fiber content, but not so much for chocolate chip cookies. To empirically test this lay belief, we conducted a pretest (N=69) that asks if respondents believe that energy bars and chocolate chip cookies are generally rich in fiber on a 7-point scale (1=strongly disagree, 7=strongly agree). A paired-sample t-test revealed that consumers believe that energy bars are richer in fiber (M=5.07, SD=1.06) than chocolate chip cookies (M=2.49, SD=1.26),  $t(68)=14.49$ ,  $p<.001$ .

As discussed earlier, when the associative link between product and nutrient content is weak, consumers should be more likely to rely on the explicit nutrient claim information to estimate nutrient content for the product. Therefore, the location effect of a fiber claim on how much fiber consumers estimate should be more pronounced for chocolate chip cookies than a granola bar (H2). Also, increased fiber estimates will lead to greater perceived healthiness of the product because consumers hold a lay belief that the more positive nutrients they consume, the better for their health (H3a). In summary, we expect to find a moderated mediation effect such that the effect of nutrient claim location on perceived healthiness of the product will be mediated by nutrient estimates



and the strength of the effect of location through nutrient estimates will be moderated by product.

#### *2.6.1.2 Participants, Stimuli, and Procedure*

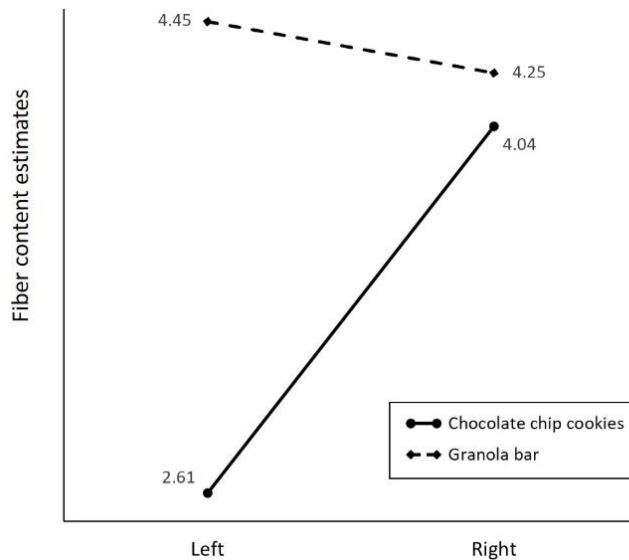
One hundred and nine participants (49.5% males,  $M_{\text{age}}=37.70$  years) were recruited from Amazon Mturk and randomly assigned to one of four conditions of a 2 (product: granola bar vs. chocolate chip cookies) x 2 (location of the nutrient claim: left vs. right) between-subjects factorial design. Participants were told that they were to evaluate a food package design. We created a fictitious package for the granola bar and chocolate chip cookies to minimize possible noise variables such as brand awareness and preference for certain brands, and displayed the nutrient claim “contains fiber” either on the right side of the package or on the left side. Next, participants were asked to estimate how much fiber they thought the product contained using a 0-10 gram scaled slider; this scale provided sufficient range to avoid ceiling effects, as both cookies and granola bars generally contain 1-1.5g of fiber per serving. Participants also indicated how healthy and how nutritious the product is (1=not at all healthy (nutritious), 7=very healthy (nutritious)), averaged to create a perceived healthiness index ( $r=.87$ ). Finally, demographic information was asked, and participants were thanked and debriefed.

### **2.6.2 Results**

#### *2.6.2.1 Hypothesis testing*

We conducted a 2 (product type) x 2 (location) ANOVA on nutrient estimates. There was a significant main effect of product on fiber estimates,  $F(1,105)=8.22$ ,  $p<.01$ ,  $\eta^2=.073$ , such that, consistent with the pretest, participants estimate greater amount of fiber for a

granola bar than chocolate chip cookies ( $M_{\text{granola}}=4.35$ ,  $M_{\text{cookies}}=3.33$ ). There was a marginally significant main effect of location on fiber estimates,  $F(1,105)=2.95$ ,  $p=.089$ ,  $\eta^2=.027$ , supporting H1; participants estimate a greater amount of the nutrient (fiber) when the nutrient claim is displayed on the right (vs. left) side of the package ( $M_{\text{left}}=3.53$ ,  $M_{\text{right}}=4.14$ ). Most importantly, there was a significant interaction effect between product and location,  $F(1,105)=5.19$ ,  $p<.05$ ,  $\eta^2=.047$  (see figure 2.3).

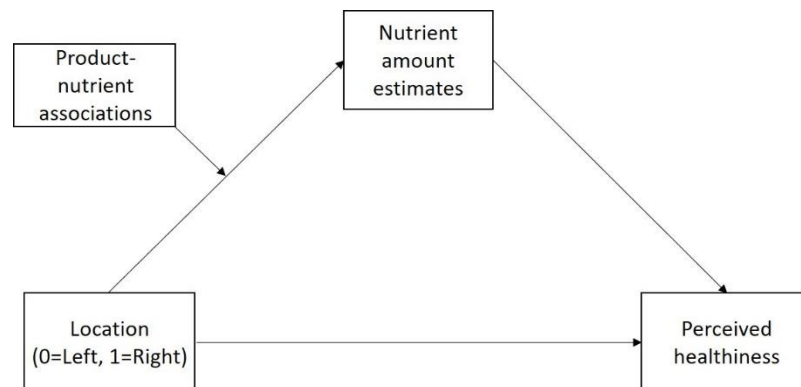


**Figure 2.3. Interaction effect between product types and nutrient claim location**

To decompose the interaction effect, we tested simple effects. For chocolate chip cookies, participants estimated greater amount of fiber when the claim was displayed on the right ( $M=4.03$ ,  $SD=1.98$ ) than on the left ( $M=2.61$ ,  $SD=1.98$ ),  $t(105)=2.84$ ,  $p<.01$ . However, for a granola bar, there was no significant difference between nutrient estimates based on the location of the claim,  $t(105)=-.395$ ,  $p=.694$ . These results support H2; the effect of claim location on nutrient estimates is reduced for categories in which consumers have strong pre-existing beliefs about the product and nutrient content.

### 2.6.2.2 Moderated mediation.

To test the effect of nutrient claim location (left vs. right) on perceived healthiness through increased nutrient content estimates for different product categories (a granola bar vs. chocolate chip cookies), we used the PROCESS macro (Hayes 2013) model 7 (i.e., testing conditional indirect effects; see figure 2.4 for a model specification) with 5,000 bias-corrected bootstrapping samples.



**Figure 2.4. Moderated mediation model (PROCESS model 7)**

The results showed that displaying the nutrient claim on the right (vs. left) side of the package significantly induced greater fiber estimates ( $b=3.05$ ,  $p<.01$ ), which in turn, increased perceived healthiness of the product ( $b=.41$ ,  $p<.001$ ). However, the mediation effect was qualified by a significant interaction effect of the product type ( $b=-1.62$ ,  $p<.05$ ). The conditional indirect effect of the location on perceived healthiness via increased fiber estimates was only significant when the product category was chocolate chip cookies ( $b=.59$ , 95% CI=[.18, 1.05]) but not for a granola bar ( $b=-.08$ , 95% CI=[-.47, .30]). Overall, the analysis revealed a significant moderated mediation index=-.67, SE=.31, 95% CI=[-1.33, -.11], consistent with our hypothesis. Table 2.3 summarizes the results of the moderated mediation analysis.

**Table 2.3. Results of the moderated mediation analysis**

Mediating variable model (Fiber estimates)				
Predictor variables ( $R^2=.14, p<.01$ )	b	SE	t	p
Constant	-2.26	1.77	-1.28	.204
Location of the nutrient claim	3.05	1.12	2.71	.008
Product	3.45	1.13	3.06	.003
Interaction (location x product)	-1.62	.71	-2.28	.025
Outcome variable model (Perceived healthiness)				
Predictor variables ( $R^2=.34, p<.001$ )	b	SE	t	p
Constant	1.85	.38	4.87	.000
Fiber estimates	.41	.06	7.34	.000
Location of the nutrient claim (direct effect)	-.24	.22	-1.09	.278
Conditional indirect effects (Location → Perceived healthiness)				
Mediator	Moderator	b	SE	95% CI
Fiber estimates	Chocolate chip cookies	.59	.23	[.18, 1.05]
Fiber estimates	Granola bar	-.08	.19	[-.47, .30]

### 2.6.3 Discussion

Study 2 showed that the strength of product-nutrient associations can moderate the effect of the nutrient claim location on nutrient estimates. When there is a weaker association between the product and the nutrient (e.g., chocolate chip cookies and fiber as in the present study), consumers are more likely to rely on the explicit nutrient cue that is currently available. Consequently, estimates of the nutrient content are subject to the location of the nutrient claim such that the claim on the right side generates greater nutrient estimates following the number-location association. In the case of a product category in which there is a stronger association with a specific nutrient (e.g., a granola bar and fiber), the location effect on nutrient estimates is mitigated because a nutrient claim alone does not play a significant role in estimating nutrient content. Building on

findings from Study 1 that showed initial evidence that the location of nutrient claims on the package can impact nutrient content estimates, Study 2 showed a moderated mediation effect of the claim location on perceived healthiness via increased nutrient estimates for different product categories. When the nutrient claim is displayed on the right (vs. left) side, consumers' estimates for nutrient content become greater, which in turn, increased perceived healthiness of the product.

### **2.7 Study 3**

The results of Studies 1 and 2 show that the lateral location of a nutrient claim has a systematic impact on nutrient amount estimates and consequent perceived healthiness of the product. Further, this effect is moderated by product-nutrient associations. However, in both studies, the nutrient claims tested always involved positive nutrients (fiber, calcium, protein). Thus, in Study 3, we extend our findings to negative nutrients and test H3, i.e., whether nutrient type (positive vs. negative) moderates the effect of nutrient claim location on perceived healthiness via nutrient content estimates.

Because higher positive nutrient estimates would signal higher perceived healthiness of the product, we expect that when the positive nutrient claim is displayed on the right (vs. left) side of the package, nutrient content estimates will be higher, and thus perceived healthiness of the product will be increased. This prediction was supported in Study 2. However, because higher negative nutrient estimates would signal lower perceived healthiness of the product, we expect to observe the opposite effect. That is, when the negative nutrient claim is displayed on the right (vs. left) side, nutrient content estimates will be higher, and thus perceived healthiness of the product will be decreased. We test this hypothesis (H3b) in Study 3. Also, we include a purchase intention question

as a supplemental measure to examine if perceived healthiness of a product as a function of nutrient claim locations has potential downstream effects on purchase intention.

### **2.7.1 Method**

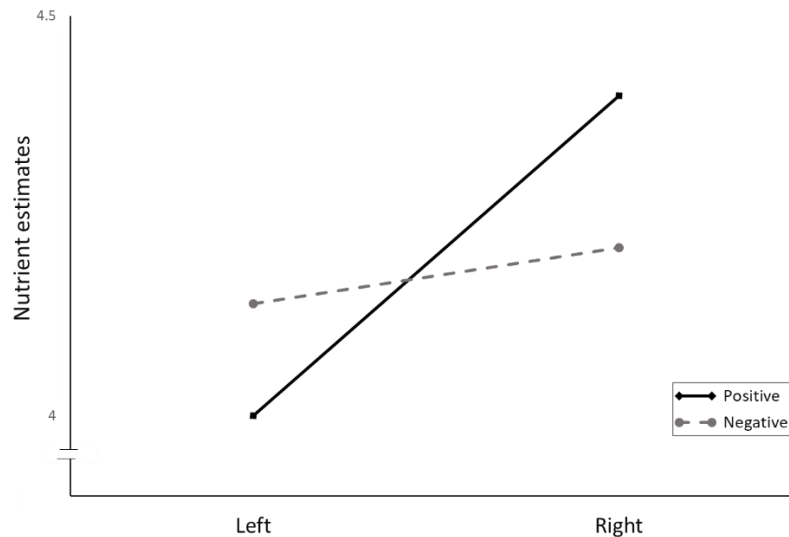
Two hundred and fifty-five participants (45.8% males,  $M_{\text{age}}=36.27$ ) were recruited from Amazon Mturk and randomly assigned to one of four conditions of a 2 (nutrient type: positive vs. negative) x 2 (location of the nutrient claim: left vs. right) between-subjects factorial design. Participants were asked to evaluate the same chocolate chip cookies package as in Study 2. Chocolate chip cookies package displayed a positive nutrient claim “contains fiber” or a negative nutrient claim “contains sugar” either on the right side of the package or on the left side. Next, participants indicated the subjective amount of nutrient content (“I think this package contains \_\_\_\_\_ fiber/sugar than other chocolate chip cookies”) on a 7-point scale (1=much less, 7=much more). They also indicated healthiness and nutritiousness of the cookies on a 7-point scale (1=not at all healthy (nutritious), 7=very healthy (nutritious)), which was averaged to create a perceived healthiness index ( $r=.82$ ). Purchase intention was measured with a single item “How likely are you to purchase the above cookies?” on a 7-point scale (1=not at all likely, 7=very likely).

### **2.7.2 Results**

#### *2.7.2.1 Nutrient claim location on perceived nutrient content*

First, a 2 (nutrient type) x 2 (location of the nutrient claim) ANOVA on perceived nutrient content revealed a marginally significant main effect of claim location,  $F(1,251)=3.42, p=.066$ , suggesting that participants perceived that the package contained

a greater amount of nutrient when the claim was displayed on the right side of the package rather than on the left side (see figure 2.5).

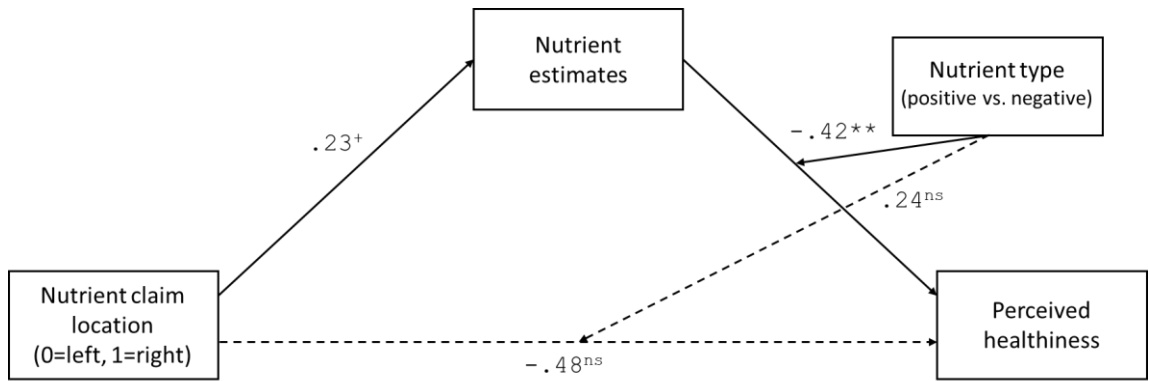


**Figure 2.5. The effect of nutrient claim locations on nutrient estimates**

Although there was no significant interaction effect between nutrient type and claim location ( $F(1,251)=1.70, p=.193$ ), a planned contrast was used to test if there is a significant difference between claim locations for each nutrient type. For a positive nutrient claim, there was a significant difference between claim locations ( $M_{\text{left}}=4.0, M_{\text{right}}=4.4, t(251)=-2.24, p<.05$ ). However, there was no significant difference between claim locations for a negative nutrient claim ( $M_{\text{left}}=4.14, M_{\text{right}}=4.21, t(251)=-.38, p=.70$ ).

#### 2.7.2.2 Moderated mediation analysis

We tested a moderated mediation model (see Figure 2.6) in which we hypothesize that nutrient type (positive vs. negative) moderates the effect of nutrient claim location on perceived healthiness via nutrient content estimates (H3). We used the PROCESS macro (model 15) for bias-corrected bootstrapping with 5,000 resamples (Hayes 2013).



\*Note:  $^{**}p < .01$ .  $^+p < .01$ .  $^{ns}p > .1$

**Figure 2.6. Moderated mediation analysis**

First, the nutrient claim location (left vs. right) marginally significantly predicts nutrient content estimates ( $t=1.86, p=.06$ ). Next, controlling for the claim location, the effect of nutrient content estimates on perceived healthiness is significant ( $t=3.50, p<.001$ ). Within the mediational model, the interaction between nutrient type and nutrient content estimates on perceived healthiness is significant ( $t=-2.93, p<.01$ ) whereas the interaction between the claim location and nutrient type on perceived healthiness is not significant ( $t=.87, p=.39$ ). Finally, the moderated mediation index was  $-.10$ , and the 95% confidence interval  $(-.28, .02)$  included zero, suggesting that the indirect effect of the nutrient claim location on perceived healthiness via nutrient content estimates, moderated by nutrient type, is not significant. Directionally, however, the indirect effect (claim location [right vs. left]  $\rightarrow$  nutrient content estimates  $\rightarrow$  perceived healthiness) was positive ( $.07, 95\% \text{ CI}=[-.0050, .1640]$ ) for positive nutrients, suggesting that placing a positive nutrient claim on the right (vs. left) side of the package increases perceived healthiness of a product via increased positive nutrient content estimates. Also, this indirect effect was negative ( $-.03, 95\% \text{ CI}=[-.15, .06]$ ) for negative nutrients, suggesting



that placing a negative nutrient claim on the right (vs. left) side of the package decreases perceived healthiness of a product due to increased negative nutrient content estimates.

This directionally supports H3.

#### *2.7.2.3 Downstream effects on purchase intention*

A serial mediation analysis using the PROCESS macro for bias-corrected bootstrapping with 5,000 resamples (model 6, Hayes 2013) was conducted to examine the nutrient claim location (right vs. left) → nutrient content estimates → perceived healthiness → purchase intention path. Because the location effect of nutrient claims on nutrient content estimates was only significant for positive nutrient claims in the previous analysis, we examined just positive nutrient claims for this analysis. First, placing a positive nutrient claim on the right (vs. left) side of the package significantly increased nutrient content estimates,  $b=.40, p<.05$ . Next, controlling for the claim location, nutrient content estimates increased perceived healthiness of the product,  $b=.31, p<.001$ . Finally, controlling for claim location and nutrient content estimates, perceived healthiness increased purchase intention,  $b=.42, p<.01$ . Overall, the indirect effect from the nutrient claim location to purchase intention through nutrient content estimates and perceived healthiness was significant with the effect size of .05 (95% CI: .0002, .1334).

#### **2.7.3 Discussion**

Study 3 showed that the location effect of nutrient claims on perceived healthiness of a product is moderated by nutrient type. Placing a nutrient claim on the right (vs. left) side of the package increases consumers' perceptions of nutrient content, and this further increases perceived healthiness of a product as well as purchase intention when the

nutrient type is positive (i.e., fiber). When the nutrient type is negative (i.e., sugar), increased nutrient content perceptions decreases perceived healthiness, although it did not reach statistical significance.

We posit that the reason why our hypothesized location effect of a nutrient claim on nutrient content estimates did not work for negative nutrient claims may be because the way we manipulated the negative nutrient claim in Study 3 (“contains sugar”) is not common in the real world. Common negative nutrient claims on the food product package such as “no fat”, “less sugar”, or “only 1g of sodium” emphasize that there is little or no negative nutrient content in it. Because in the experimental design we had to control for wording across two experimental conditions, we did not use such labels in Study 3 (e.g., “less sugar” vs. “less fiber”). Future study could examine if different wording of a nutrient claim has any impact on nutrient content estimates depending on the location of a nutrient claim.

## **2.8 General discussion**

The present research documents a location effect of nutrient claims on food packages, suggesting that the lateral position of a nutrient claim on the product package can impact nutrient content estimates and subsequent perceived healthiness of the product. Study 1 provides initial evidence with different product categories that displaying a nutrient claim on the right (vs. left) side of the package significantly increases estimates for the nutrient content. Study 2 shows that this effect is more pronounced when the associative link between product types and nutrient claims is weak (e.g., chocolate chip cookies and fiber claims), because consumers are more likely to rely on explicit cues such as a nutrient claim when estimating nutrient content. Also, Study 2 shows that the nutrient content

estimates indeed mediate the effect of claim location on perceived healthiness of the product. Study 3 suggests that nutrient types (positive vs. negative) moderate the link between nutrient content estimates and perceived healthiness, such that when positive nutrient claims are placed on the right (vs. left) side of the package, higher estimates of nutrient content increase perceived healthiness, but in the case of negative nutrient claims, when displayed on the right (vs. left) side, higher nutrient content estimates decrease perceived healthiness.

Drawing from the number-location association literature (i.e., small numbers-left and large numbers-right), findings from the present research suggest that food manufacturers and marketing managers should consider displaying nutrient claims on the right side of the package when signaling higher nutrient content and product healthfulness is important (e.g., protein, fiber). Additionally, displaying nutrition claims for certain product categories works better when consumers have little prior knowledge or expectation of nutrients in that category (e.g., chocolate chip cookies and fiber).

Also, while public policy makers have long emphasized the use of nutrition labels to provide accurate information to consumers, especially to reduce consumption of negative nutrients, our findings suggest that policy makers should also consider placement of a negative nutrient content claim on the package. Because consumers would estimate a greater amount of negative nutrient and thus perceive the product as less healthy when the claim is displayed on the right (vs. left) side of the package, consumption of negative nutrients can be discouraged.

In addition to managerial and policy implications, our findings advance the theoretical understanding of the number-location association, and the SNARC effect in

general. Most of the previous research in this area has been done within cognitive psychology (e.g., Dehaene et al. 1993; Nuerk et al. 2005; Wood et al. 2008), but scant research has examined the SNARC effect within the marketing domain. Because consumers frequently make numerical judgments when purchasing a product (e.g., “How much would this product cost?”, “How many years would this product last for?”), it is important to understand the mechanism underlying decisions that involve numbers or quantifiable information. As our findings and prior research on the SNARC effect suggests, consumers relate larger numbers to objects on the right (vs. left) side of the visual field, when the evaluation of stimuli involves numerical judgment. For example, Cai et al. (2012) found that the location of products (left vs. right) affects consumers’ estimation of price, such that the product image displayed on the right side of the advertisement, as opposed to the left side, is perceived to be more expensive. Future research may examine if other marketing variables that involve numerical judgments such as product lifespan expectations or financial products evaluations are impacted by the location of the display.

Also, the present research contributes to the nutrition claim literature. While prior research on health and nutrition claims focused on the types of claim (Andrews, Netemeyer, and Burton 1998), profiles of those who are interested in health claims (Cavaliere et al. 2015), what nutrients should be included in claims (Hawley et al. 2013), or the length of information within claims (Wansink et al. 2004), little research has examined the best place to display health and nutrition claims on food packages to most effectively signal the product’s healthfulness. Previous research has shown that adding a health or nutrition claim may not significantly increase consumers’ perceptions on

healthiness of the product (e.g., Orquin and Scholderer 2015), and such results might be attributable to the suboptimal placement of a claim. We showed that where to place a nutrient content claim had a significant impact on consumers' perceptions of how healthy and nutritious the product is, which implies that investigating the impact of nutrition and health claims on consumers' attitude toward the product or healthiness perceptions should be conducted in conjunction with the location of the claim on the package as well.

It should be noted that the number-location association and the SNARC effect is mostly driven by reading and writing habits (Shaki, Fischer, and Petrusic 2009) and that our findings may be reversed among consumers from cultures where reading and writing direction is different (e.g., from right to left, from top to bottom). For example, Shaki et al. (2009) found that Canadians who read English words and Arabic numbers from left to right associate small numbers with left and large numbers with right while Palestinians who read Arabic words and Arabic numbers from right to left associate small numbers with right and large numbers with left. Although we limit the scope of the study to the U.S. samples who exhibit small numbers-left, large numbers-right associations to explore if nutrient content claim locations have any systematic effects on consumers' nutrient content estimates and perceived healthiness of the product, future research should examine if cultural differences play a significant role in this nutrition claim location effect.

Another fruitful future research avenue is to examine possible moderators such as individual differences in health interests or nutrition involvement (Chandon and Wansink 2007) and nutrition knowledge (Bucher, Müller, and Siegrist 2015) as well as demographic characteristics (Cavaliere, Ricci, and Banterle 2015). Would those with

more knowledge about nutrition be less affected by nutrition claim locations because they do not base their healthiness judgment on a claim itself? Would females, who are known to be more interested in nutrition claims than males (Cavaliere, Ricci, and Banterle 2015), be more impacted by the location of a nutrition claim because they would care more about nutrient content? Such questions remain unanswered and need further investigation.

Also, while we show the nutrition claim location effect in the front-of-package domain only, our findings can be extended to other contexts such as advertisements and restaurant menus. For example, the FDA menu labeling regulations mandate certain retail food stores and restaurants to provide calorie and nutrition information for menu items (Food and Drug Administration 2018), and placement of calorie information (on the left or right side of an item) may serve as a nudge that encourages healthy eating. In most cases, calorie information is currently displayed on the right side of a menu item, but it may be more advantageous to display calorie information on the left side of the healthy item (e.g., salad) because it can signal less calorie content and thus better communicate healthfulness of the item.

## CHAPTER 3

### ESSAY 2: WHERE TO PLACE GREEN PRODUCTS? USING “UP-POWERFUL” METAPHOR TO PROMOTE PERCEIVED GREEN PRODUCT EFFECTIVENESS

#### 3.1 Introduction

Green consumption has been an important corporate goal due to increasing environmental concerns and positive response from consumers (Experian 2012). Yet despite increases in awareness of and concern for environmental issues, actual sales for green products have been decreasing (Packaged Facts 2015). A key reason for consumer hesitation in purchasing green products is a belief that green products are less effective than traditional, non-green products, a barrier that exists separate from concerns about high price and product availability (Luchs et al. 2010; Luchs, Brower, and Chitturi 2012).

In a Mintel (2011) survey on green living, only 26% responded that green household cleaning products clean as effectively as traditional products. Further, the same survey showed that even among affluent consumers with a household income of \$150,000 or more, for whom price is likely a lesser concern, only 21% agreed that green products perform as effectively as traditional counterparts. These findings suggest that one way to increase consumers' purchases of green products is to enhance perceptions of green products' effectiveness.

In this paper, building on prior research that effective shelf space layout can subtly influence consumers' product perceptions (e.g., Inman, McAlister, and Hoyer 1990; Valenzuela and Raghurir 2009; Valenzuela, Raghurir, and Mitakakis 2013) as well as research on conceptual metaphors (Lakoff and Johnson 1980a; 1980b; 2008), we argue that shelf space placement of green products can impact consumers' perception of

product performance. More specifically, building on the conceptual metaphor literature linking verticality and power (i.e., up is powerfulness), we argue that placing green products at the top (vs. bottom) of a retail shelf display will increase perceptions of product effectiveness (e.g., strength, power, functionality), leading to increased likelihood of purchase.

### **3.2 Literature review**

As concerns for environmental issues such as climate change, water and air pollution, and resource depletion have risen over the past decade, firms show their care for the environment through various ways. For example, firms introduce a separate eco-friendly product line in addition to their traditional product lines (e.g., Clorox Green Works), or donate money for environmental causes (e.g., Patagonia has donated over 89M dollars for their social and environmental work since 1985, (Patagonia n.d.)). Consumers also react favorably to the firms adopting such programs, and are willing to purchase more green products. In a national survey conducted by Experian (2012), 73% of the 25,207 U.S. consumers agreed that “Each of us have a personal obligation to do what we can to be environmentally responsible”, and 54% said “I am more likely to purchase a product or service from a company that is environmentally friendly.”

While consumers generally have favorable attitudes toward green products (e.g., Chen and Chai 2010; Hartmann and Apaolaza-Ibáñez 2012; Olsen, Slotegraaf, and Chandukala 2014), gaps exist between consumers’ awareness of the needs for adopting green products and their actual purchases. As direct evidence, actual sales for green products have been continuously decreasing. According to the report on the U.S. green



cleaning and household products by Packaged Facts (2015), retail dollar sales of green household cleaners and laundry detergents dropped from \$655M in 2010 to \$603M in 2014, as well as reduced retail volume sales from 750M in 2010 to 580M in 2014.

Some researchers point out that this disparity may be attributed to the nature of self-report measures of attitude toward green behaviors, as people have a tendency to report their attitude and behaviors in a socially desirable manner (Crowne and Marlowe 1960). For instance, an fMRI study conducted by Vezich, Gunter, and Lieberman (2017) showed that when participants saw control ads (vs. green ads), their brain regions associated with value and reward (ventromedial prefrontal cortex and ventral striatum) were more activated. However, these participants self-rated that they liked green ads more than control ads, hinting at a possibility that deep down inside consumers may prefer conventional, non-green products.

Researchers have identified several barriers to green purchases. In their qualitative study utilizing a critical incident survey, Gleim et al. (2013) found that price was the biggest hurdle for consumers to consider purchasing green products (42.09%), followed by quality (poor experience and unsure of quality, 14.11%), expertise (10.71%), trust (distrust of organization greenness and product greenness, 10.46%), and availability (inconvenience and lack of availability, 9.98%). However, not all green products are actually priced higher than non-green products in some categories (e.g., liquid laundry detergent, dishwasher detergent/additive, and specialty cleaner/polish, Packaged Facts 2015). Also, survey results showing that even those who can afford expensive green products are still highly skeptical about the effectiveness of green products (Intel 2011) suggest that price alone is not attributable to low green purchases. Rather, it is poor

performance and low product effectiveness of green products that consumers are concerned about.

### **3.2.1 Tradeoffs between greenness and product effectiveness**

Consumers generally believe that the more green, sustainable, or environmentally friendly a product is, the less effective it is (Lin and Chang 2012; Luchs et al. 2010; Luchs, Brower, and Chitturi 2012; Newman, Gorlin, and Dhar 2014; Pancer, McShane, and Noseworthy 2017). For example, Pancer et al. (2017) showed that a single environmental cue such as green color and eco-label reduced perceived product efficacy. In a similar vein, Lin and Chang (2012) found that consumers used greater amount of hand sanitizer when the green leaf-shaped label (vs. no label) was displayed on the package, presumably because they believed that a larger amount is needed for green products to achieve the same level of cleaning effect produced by regular products.

Because perception of product effectiveness is paramount in consumers' decision to purchase products, most consumers are likely to prioritize functionality at the expense of sustainability. Luchs et al. (2012), for instance, showed that 62% of participants choose functionally superior yet inferior in sustainability shoes over superior in sustainability but functionally inferior ones. Even those who think that sustainability is highly important are not willing to sacrifice functionality for the sake of sustainability unless the minimum performance is assured. Likewise, consumers are more likely to give up hedonic value, such as product aesthetics, for sustainability, than to forego utilitarian, functional value such as product performance (Luchs and Kumar 2017). In short, perceived effectiveness of green products is discounted, which in turn, impedes consumers' willingness to purchase green products.

### 3.2.2 Overcoming effectiveness discounting effects

If consumers' perception of product performance is a barrier to green purchases, enhancing perceived product effectiveness can be a solution. As Ottman et al. (2006, p. 29) stated, "high performance positioning can broaden green product appeal."

Researchers have suggested several methods to overcome effectiveness discounting effects. One method is to provide explicit information about product performance and effectiveness (Gleim et al. 2013; Luchs et al. 2010). For example, Luchs et al. (2010) asked participants to rate perceived strength of sustainable car tires that differ in description, either "guaranteed strong" or "guaranteed available in your area." They found that merely adding a piece of information about product strength significantly increased perception of how durable and long-lasting the product was. Indeed, manufacturers and marketing practitioners seem to strategize on this matter by adding strength cues to their products (e.g., Seventh Generation: "Free & Clear laundry detergent is free of dyes and artificial brighteners and delivers a *powerful, stain-fighting* clean").

Other researchers have suggested more subtle approaches that can encourage green purchases. For example, Theotokis and Manganari (2015) showed that carefully designed choice architecture can promote green behaviors. Because the opt-out (vs. opt-in) default policy increases consumers' feelings of guilt when they have to explicitly request not to join a green program, it leads consumers to choose more environmentally friendly services such as reusing towels and activating e-statement. In addition, Luchs et al. (2012) found that consumers inferred superior functional performance from highly aesthetic green products compared to unattractive green products, suggesting that product design may serve as a product effectiveness cue.

In the present paper, we argue that the shelf location of green products can communicate product effectiveness cues. Because product placement and shelf layout design can influence consumers' perception of the product and hence purchase decisions (e.g., Cai, Shen, and Hui 2012; Chae and Hoegg 2013; Valenzuela et al. 2013), it is important to understand how specific shelf locations are associated with product perceptions. For example, consumers believe that the most popular items are placed in the middle of the shelf (Valenzuela and Raghurir 2009; Valenzuela, Raghurir, and Mitakakis 2013), discounted items are on the extreme aisles (Inman, McAlister, and Hoyer 1990), and premium products are on the top shelf (Valenzuela, Raghurir, and Mitakakis 2013). The match between consumers' belief about the shelf location and actual product placement should increase purchase intention and choice shares. Despite increasing interests in investigating the retail store shelf structure, surprisingly scant research has concerned where to place green, environmentally friendly products. Drawing from the conceptual metaphor literature on verticality and power, we argue that green products should be placed at the top shelf to signal product power or product effectiveness. Also, we rule out alternative explanations for this shelf placement effect such as perceived premium (cf., Valenzuela et al. 2013).

### **3.2.3 Verticality and power**

From figures of speech such as “you are *under* my control,” “she has a *high* status,” and “he has a *dominating* personality” to an organization chart where employees with higher rank are typically placed at the top, individuals acknowledge that a higher vertical position represents power. Past research on conceptual metaphor theory (Lakoff and Johnson 1980a; 1980b; 2008) also suggests that consumers metaphorically associate

verticality with power (Giessner and Schubert 2007; Huang, Li, and Zhang 2013; Machiels and Orth 2017; Moeller, Robinson, and Zabelina 2008; van Rompay et al. 2012; Schubert 2005; Sundar et al. 2017; Sundar and Noseworthy 2014). For example, Schubert (2005) found that participants completed a task to find the powerful group faster when the target group appeared at the top rather than at the bottom. In the marketing domain, placing a brand logo at the top of the package increased favorable attitudes toward the product when the brand was perceived to be powerful in the market (Sundar and Noseworthy 2014). Similarly, various verticality cues such as pictures taken from an upward camera angle or vertical stripes as a background image of a print ad evoked luxury perception (i.e., feelings of status) which in turn increased purchase intention (van Rompay et al. 2012). When the brand is promoted as a leader-like (vs. friend-like) brand, placing the brand image vertically above the customer image elicited more positive evaluation of the brand than placing it horizontally near the image of the customer (Huang, Li, and Zhang 2013). In summary, marketers may want to utilize this metaphorical relationship between verticality and power, and benefit from placing products at the top when their goal is to signal power.

In psychological research, power is understood as a social construct in which a powerful agent has the potential to influence less powerful others (e.g., McClelland 1975; Rucker, Galinsky, and Dubois 2012). When it comes to product evaluation, consumers understand product powerfulness as how strong, effective, and superior in functionality the product is (Luchs et al. 2010). For example, Seventh Generation uses “powerful clean” as their dish liquid slogan, and all® named their laundry detergent product “powercore pacs” that communicates product effectiveness.

Therefore, we expect that vertical shelf layout will influence perceived strength of the product, such that consumers will evaluate green products to perform more effectively when they are placed at the top rather than at the bottom. Formally stated,

H1: Placing green products at the top (vs. bottom) shelf will increase perceived product strength.

Moreover, we expect that increases in perceived product strength will have a downstream consequence on behavioral intention such as intention to purchase and use. Because product quality perceptions have been theorized as an important antecedent of consumers' intention to purchase (Zeithaml 1988), we predict that the location of the green product (top vs. bottom) will increase behavioral intention via perceived strength.

H2: Location of green product (top vs. bottom) will impact behavioral intention such that consumers will be more likely to use and purchase a green product when it is placed on the top shelf vs. bottom shelf via increased perceived product strength.

Finally, we expect that choice criteria will moderate the effect of product strength perceptions on behavioral intention. When consumers value product strength and power (e.g., detergent, cleaning spray), increased product strength as a function of the verticality=power metaphor is likely to increase intention to purchase and use. In contrast, when consumers value product gentleness and softness more than power and

strength (e.g., baby detergent), increased product strength would not lead to behavioral intention.

H3: Choice criteria (product strength vs. product gentleness) will moderate the effect of perceived product strength on behavioral intention.

### **3.3 Overview of the studies**

We present three experimental studies to test the hypotheses. Study 1 provides initial evidence that green products placed at the top (vs. bottom) shelf are perceived to be stronger and more effective, and that this has a downstream effect on behavioral intention. Study 2 conceptually replicates the results of Study 1 with a few modifications. First, we rule out a possible alternative explanation of the top=expensive heuristic (Valenzuela, Raghurir, and Mitakakis 2013) in which consumers believe that products on the top shelf are expensive and thus have greater quality (i.e., price-quality heuristic, Völckner and Hofmann 2007). Second, Study 2 adopts more realistic shelf stimuli to enhance experimental realism. Third, Study 2 examines if the shelf location effect is observed among non-green products as well. Finally, Study 3 provides further evidence for perceived strength as the underlying process mechanism by using different product categories (strength-related products vs. gentleness-related products) to moderate the effect of shelf location on behavioral intention.

### 3.4 Study 1

The objective of Study 1 was to show the basic effect of the green products' location on perceived strength, and ultimately, purchase intention. Therefore, we randomly assigned participants into two groups, those who evaluate green products placed on the top shelf or on the bottom shelf.

#### 3.4.1 Method

##### 3.4.1.1 Participants, Stimuli, and Procedure

Ninety-three participants (54.8% males,  $M_{\text{age}}=35.33$  years) were recruited from Amazon Mturk. To elicit participants' active involvement with the study, a detailed scenario with images was presented as below:

“Imagine that you're relaxing by yourself at home. While looking out the windows, you realize that you haven't cleaned the windows for ages. You decide to clean up all the dust and dirt on the windows. Since you are almost out of your old cleaner, you head for a nearby supermarket to buy a new one. Upon arrival at the supermarket, you directly walk to the cleaning products section. There are various cleaning products. You find one product that grabs your attention. The product is a multi-purpose cleaning spray, placed on the *top/bottom* shelf.”

Depending on the experimental group participants were assigned to, they were shown a shelf image with the target product (i.e., a green cleaning spray) placed at the top or at the bottom of the retail display (see Appendix B.1). To ensure that participants correctly identified the target stimulus as a green product, we asked participants to rate the statements “The above cleaning spray is an environmentally friendly product” and “The above cleaning spray is a green product” (averaged to create a product greenness index,  $r=.842$ ). Perceived product strength was measured with five items (powerful,



tough, effective, strong, get the job done,  $\alpha=.926$ ) adapted from Luchs et al. (2010).

Purchase intention was asked with a single item “How likely would you be to purchase the above cleaning spray?” All the questions were rated on 7-point scales (1=Strongly disagree, 7=Strongly agree).

### **3.4.2 Results**

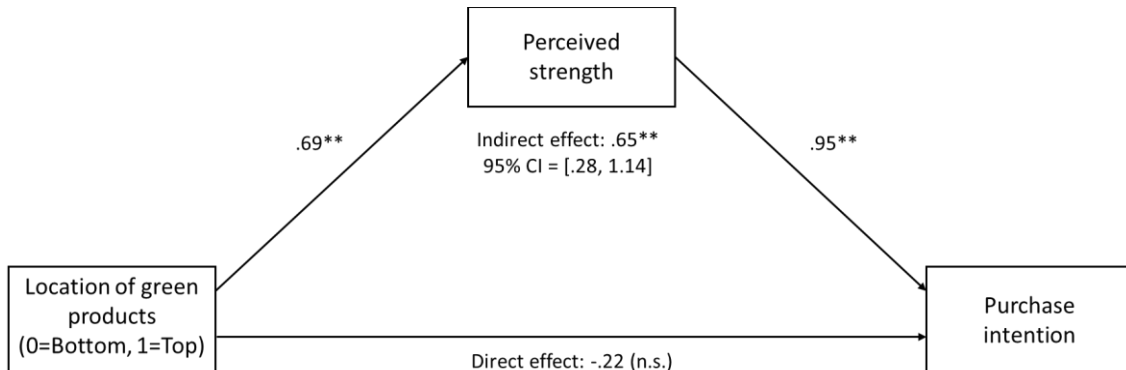
#### *3.4.2.1 Manipulation check*

One-sample t-test confirmed that participants identified the target stimulus as green and environmentally friendly. Mean rating for the product greenness index was 5.23, significantly greater than the midpoint 4,  $t(92)=8.66, p<.001$ . Also, there was no significant difference between two groups in their perception of product greenness,  $t(91)=.28, p=.78$ , suggesting that both groups equally perceived the target product as green.

#### *3.4.2.2 Hypothesis testing*

As predicted in H1, perceived strength was greater when the green product was placed at the top,  $M=5.23, SD=.97$ , compared to when it was at the bottom,  $M=4.54, SD=1.12$ ,  $t(91)=3.16, p<.01$ . To test H2, we conducted a mediation analysis using the PROCESS macro for bias-corrected bootstrapping with 5,000 resamples (model 4, Hayes 2013). First, the location of green products significantly predicted perceived strength,  $b=.69, p<.001$ . Next, when controlling for the location factor, perceived strength significantly predicted purchase intention,  $b=.95, p<.001$ . Although there was no significant direct effect of the

location on purchase intention,  $b=-.22$ ,  $p=.32$ , the mediation analysis revealed a significant indirect effect of the location of green products on purchase intention through the mediator of perceived strength, with the effect size of .65 (95% CI: .28, 1.14), supporting H2. Figure 3.1 shows the mediation analysis results.



**Figure 3.1. Study 1: Mediation analysis**

### 3.4.3 Discussion

Study 1 provides initial evidence that the location of green products on the shelf systematically impacts consumers' perception of the product strength and consequent purchase intention. Because of the verticality=power metaphor, green products placed at the top of the display are perceived to be stronger and more effective compared to when they are placed at the bottom.

Study 1 shows that placing green products on the top shelf leads to higher purchase intention via increased product strength perceptions, but no significant direct effect between location of the green products and purchase intention was observed. We posit that this is because the location of green products may generate two competing

effects – perceived product strength and perceived price – that together impact purchase intention. Consumers have a lay belief that premium, more expensive products are placed on the top shelf (Valenzuela et al. 2013). When products are perceived to be more expensive, consumers show two different reactions. Consumers are either less likely to purchase the product because it is costly, or they are more likely to purchase the product because they signal higher quality (i.e., price-quality heuristic, Völkner and Hofmann 2007). Thus, location of green products may not have directly affected purchase due to these two competing effects – i.e., the price association decreased purchase likelihood, while the quality perception increased purchase likelihood. However, if location impacts price perceptions leading consumers to believe the higher placed product is also costlier, this suggests a potential alternative explanation for the increased product strength ratings, as consumers associate higher priced products with better quality (i.e., greater strength and effectiveness in this context). Study 2 will rule out this alternative explanation.

Also, one might wonder if this location effect can be observed among non-green products as well. Would placing regular detergents at the top (vs. bottom) shelf increase product strength perceptions? We posit that the shelf location effect would not be pronounced for regular products because consumers already believe that regular products are functionally superior, and thus consumers' perceptions of the product strength as a function of the shelf location would elicit a ceiling effect. Study 2 will nevertheless examine this possibility by testing the effects with both green and non-green products.

### **3.5 Study 2**

The goal of Study 2 is to conceptually replicate the results of Study 1 with a few modifications. First, we will rule out a possible alternative explanation of the top=expensive heuristic (Valenzuela et al. 2013) in which consumers believe that products on the top shelf are expensive and thus have greater quality (i.e., price-quality heuristic, Völckner and Hofmann 2007). Second, Study 2 examines if the shelf location effect on product strength perceptions can be observed among non-green products as well. Third, while Study 1 presented participants a shelf image with only the target product being placed at the top or at the bottom, Study 2 adopts more realistic shelf stimuli to enhance experimental realism. That is, remaining shelves are filled with different products<sup>4</sup>. Therefore, the design of Study 2 was a 2 (target product location: top vs. bottom) by 2 (target product: green vs. non-green) between-subjects design.

#### **3.5.1 Method**

##### *3.5.1.1 Participants, Stimuli, and Procedure*

One hundred and ninety-one participants (49.2% males,  $M_{age}=39.90$  years) were randomly assigned to one of the four experimental conditions. The same scenario as in Study 1 was shown to participants in the beginning of the study, and they evaluated the target cleaning spray in the shelf image (see Appendix B.2). To ensure that participants in

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<sup>4</sup> We designed the shelf stimuli such that each shelf is filled with assimilating products (i.e., if the target product is green, remaining shelves are all green products; if the target product is non-green, remaining shelves are all non-green products). Mixed conditions (if the target product is green, remaining shelves are non-green products; if the target product is non-green, remaining shelves are green products) were tested, but product category (green or non-green) became the dominant cue obscuring the ability to understand the effects of shelf location. Thus, mixed conditions are left for future research.

the green products condition and the non-green products condition correctly identified the target stimulus as either green or non-green, we asked the perceived greenness of the product using the same two-item questions as in Study 1 ( $r=.914$ ). Perceived strength of the target product was measured with the same five items as in Study 1 (powerful, tough, effective, strong, get the job one,  $\alpha=.940$ ), behavioral intention was measured with two items “How likely would you be to use the above cleaning spray?” and “How likely would you be to purchase the above cleaning spray?” ( $r=.901$ ), and finally, perceived price of the product was measured with a single bipolar scaled item “This product is cheap/expensive.” All the questions were rated on 7-point scales.

### **3.5.2 Results**

#### *3.5.2.1 Manipulation check*

Participants in the green product condition rated the target cleaning spray as more green ( $M=5.48$ ,  $SD=1.32$ ) than those in the non-green product condition ( $M=3.96$ ,  $SD=1.33$ ),  $t(185)=7.89$ ,  $p<.001$ .

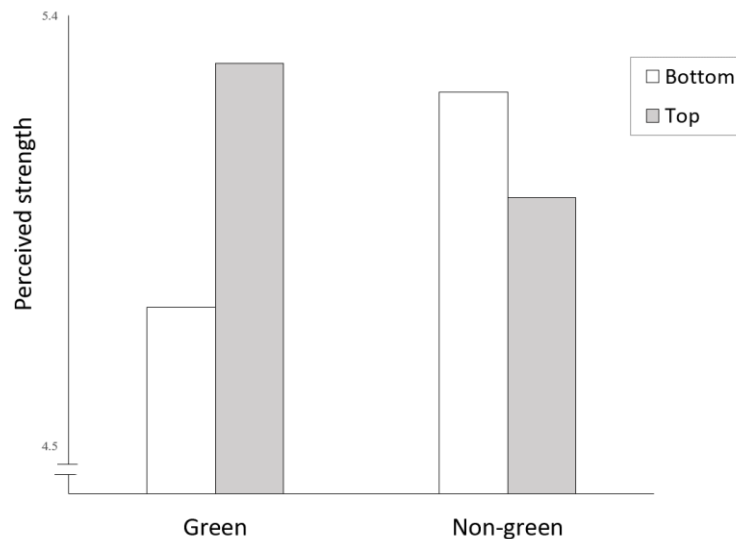
#### *3.5.2.2 Perceived price as an alternative explanation*

We ran a 2 (location) x 2 (target product) ANOVA on perceived price. There was a significant main effect of the target product,  $F(1,185)=6.58$ ,  $p<.05$ , suggesting that consumers perceive green products as more expensive ( $M=4.48$ ) than non-green products ( $M=4.06$ ). However, there was no significant main effect for location or interaction effect between location and target product, suggesting that the perceived price would not be considered as a possible alternative explanation for the shelf location effect on perceived strength of the product. We nevertheless include perceived price as a covariate variable in

our further analysis to account for price expectancy differences between green and non-green products.

### 3.5.2.3 Perceived strength

To test H1, we ran a 2 (location) x 2 (target product) ANCOVA on perceived strength, treating perceived price as a covariate. There was a significant interaction effect between location and target product,  $F(1,184)=5.37, p<.05$  (see figure 3.2). Planned contrasts revealed that perceived strength was higher when placing green products at the top shelf ( $M=5.30$ ) compared to the bottom shelf ( $M=4.79$ ),  $t(187)=2.24, p<.05$ , supporting H1. However, there was no significant difference in perceived strength between the top shelf and the bottom shelf for non-green products,  $t(187)=-.894, p=.373$ . There was no significant main effect of location or target product.



**Figure 3.2. Interaction effect of shelf location and product type on perceived strength**

#### *3.5.2.4 Downstream effect on behavioral intention*

We further tested if increased perceived strength of green products when they are at the top (vs. bottom) shelf affects purchase intention (H2). To test this, we conducted a mediation analysis using PROCESS macro for bias-corrected bootstrapping with 5,000 resamples (Hayes 2013). We used model 4, treating perceived price as a covariate. First, placing green products at the top shelf significantly increased perceived strength,  $b=.51$ ,  $p<.05$ . Next, when controlling for the location factor, perceived strength significantly predicted behavioral intention,  $b=.90$ ,  $p<.001$ , suggesting a significant indirect effect of the location of green products on behavioral intention through the mediator of perceived strength, with the effect size of .45 (95% CI: .07, .86).

### **3.5.3 Discussion**

Replicating Study 1, the results from Study 2 showed that placing green products at the top shelf significantly increases consumers' perceptions of product strength, which in turn increases intention to use and purchase the target green product. Study 2 also ruled out a possible alternative explanation, showing that perceived price was not affected by the shelf location. Most importantly, Study 2 showed that the shelf location effect was not observed among non-green, regular products, presumably because consumers already establish a belief that non-green products are strong and effective such that there is limited room for shelf placement to change consumers' perceptions of product strength. As for green products, on the other hand, consumers' strength perception was significantly dependent on where the product was placed on the shelf, suggesting shelf placement as a viable strategy to enhance consumers' effectiveness perception of green products.

### 3.6 Study 3

In Studies 1 and 2, we explore if placing green products at the top (vs. bottom) shelf increases perceptions of product effectiveness through a conceptual metaphor between up and power. It should be noted that the product stimuli we use in Studies 1 and 2 were cleaning sprays, in which product strength and power are valued. If a product category is one in which gentleness is valued, such as baby detergent, then consumers may avoid strong and powerful products (Luchs et al. 2010). Therefore, we argue that when green products are gentleness-related products, placing such products at the top shelf will increase perceived strength of the product and thus consumers would not intend to purchase or use them. To test a moderating role of choice criteria (i.e., product attributes: strong vs. gentle) for the green products location effect, Study 3 adopts two product categories: regular detergent and baby detergent.

#### 3.6.1 Method

##### 3.6.1.1 Participants, Stimuli, and Procedure

One hundred and forty-seven participants from Mturk (56.5% males, Mage=36.82 years) were randomly assigned to one of the four conditions of a 2 (product type: regular detergent, baby detergent) by 2 (shelf location: top, bottom) between-subjects design.

They were asked to imagine the following scenario:

“Imagine that you plan to do the laundry [*for your baby*] tomorrow. You notice that you are almost out of an old detergent. So you head for a nearby supermarket to buy a new one. Upon arriving at the supermarket, you walk directly to the [*laundry / baby*] products section. There are various detergent products. You notice that they are out of your usual brand, so you will need to buy a new one. You want it to be [*powerful and effective enough to remove all the stains and dirt / gentle and mild enough not to harm your baby’s health*]. You find one product that grabs your attention. They are placed on the [*top / bottom*] shelf.”



Participants were then shown a shelf image with the target green product (either regular detergent or baby detergent) placed at the top or at the bottom of the retail display (see Appendix B.3). To ensure that participants correctly identified the target stimulus as a green product, we asked the same two perceived greenness items as in Studies 1 and 2 ( $r=.904$ ). Also, perceived strength of the product (powerful, tough, strong,  $\alpha=.953$ ), perceived price, and behavioral intention (use and purchase intention,  $r=.941$ ) were measured on 7-point scales.

### **3.6.2 Results**

#### *3.6.2.1 Manipulation check*

One-sample t-test confirmed that participants rated the target product as green and environmentally friendly ( $M=4.56$ ), and it was higher than the midpoint 4,  $t(146)=5.03$ ,  $p<.001$ . Also, there was no significant difference in perceived greenness among four experimental conditions,  $F(3,143)=.454$ ,  $p=.72$ .

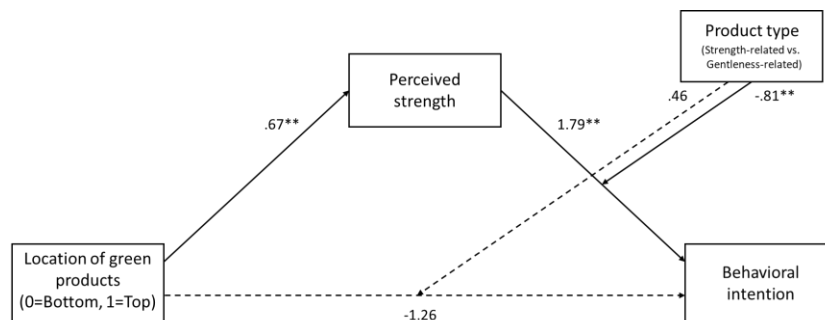
#### *3.6.2.2 Perceived strength*

A 2 (product type) by 2 (shelf location) ANCOVA on perceived strength was performed, treating perceived price as a covariate. As predicted in H1, there was a significant main effect of location,  $F(1,142)=5.35$ ,  $p<.05$ , indicating that the green product placed at the top (vs. bottom) shelf was perceived to be stronger. Also, there was a significant main effect of product type,  $F(1,142)=18.64$ ,  $p<.001$ , indicating that the regular detergent was perceived to be stronger than the baby detergent. There was no interaction effect between the shelf location and product type.

### 3.6.2.3 Moderated mediation analysis

We tested a moderated mediation model (see Figure 3.3) in which we hypothesize that the shelf location of the green product predicts behavioral intention via product strength perceptions (H2) and that choice criteria moderates the effect of shelf location and perceived strength on behavioral intention (H3). We used the PROCESS macro (model 15) for bias-corrected bootstrapping with 5,000 resamples (Hayes 2013).

First, the shelf location of the green product (top vs. bottom) significantly predicts perceived strength ( $t=2.70, p<.001$ ). Next, controlling for the shelf location, the effect of perceived strength on behavioral intention is significant ( $t=6.32, p<.001$ ). Within the mediational model, the interaction between perceived strength and product type on behavioral intention is significant ( $t=-4.80, p<.001$ ) whereas the interaction between the shelf location and product type on behavioral intention is not significant ( $t=1.03, p=.30$ ). Finally, the moderated mediation index of  $-.54$  (95% CI:  $-1.02, -.12$ ) is significant, suggesting that the indirect effect of the shelf location on behavioral intention via perceived strength, moderated by product type, exists. Specifically, for regular detergent (where strength is valued), the indirect effect (shelf location  $\rightarrow$  perceived strength  $\rightarrow$  behavioral intention) was significant (95% CI:  $.17, 1.17$ ), while there was no significant indirect effect observed for baby detergent (95% CI:  $-.06, .36$ ). This supports H3.



**Figure 3.3. Moderated mediation model of the shelf location on behavioral intention**

### **3.6.3 Discussion**

Results from Study 3 suggest that placing green products on the top shelf increases consumers' perceptions of product strength. However, this perception only increases intention to use and purchase the product when strength-related attributes are important choice criteria such as all-purpose (green) laundry detergents. For green products where gentleness is valued, such as baby detergents, increases in strength perceptions do not lead to use or purchase intention.

### **3.7 General discussion**

Previous research has shown that consumers' perception of the product and purchase decisions can be shaped through product placement and shelf layout design (e.g., Cai, Shen, and Hui 2012; Chae and Hoegg 2013; Valenzuela et al. 2013). Drawing on the conceptual metaphor literature linking verticality and power (i.e., up is powerful, Giessner and Schubert 2007; Lakoff and Johnson 1980; Schubert 2005), the present research shows that product strength and effectiveness cues can be communicated through the shelf location, and that placing green products at the top (vs. bottom) shelf can increase consumers' beliefs about green products' effectiveness and encourage consequent purchase and usage. Studies 1 and 2 provided initial evidence that green products placed at the top are perceived to perform better than the ones placed at the bottom, leading to greater purchase intention. Consistent with our argument that this effect is observed due to the conceptual metaphor between up and powerfulness, not due

to perceived expensiveness of the product, no differences between price perceptions were observed due to location. Study 3 then showed that the choice criteria can moderate the effect of shelf location on purchase intention such that only products whose strength-related attributes are valued such as cleaning sprays and (adult) laundry detergents will be more preferred when they are placed at the top shelf than at the bottom shelf.

Findings from this research contribute to the conceptual metaphor literature, specifically the conceptual association between verticality and power. Building on prior research examining the “powerful is up” metaphor in various marketing domains (Huang, Li, and Zhang 2013; Machiels and Orth 2017; van Rompay et al. 2012; Sundar et al. 2017; Sundar and Noseworthy 2014), the present research extends the finding that placing a marketing stimulus at the top of the visual field increases perceived power of the target stimulus with new conceptualization of power to a new context.

Specifically, our research conceptualizes perceived power as functionality of a product, which is a different concept from previous research. *Perceived power* is not a uniform construct but rather a differently conceptualized construct depending on the context. For example, in Sundar and Noseworthy’s (2014) research, congruence between perceived brand power (high vs. low) and actual brand logo location (top vs. bottom) of the product package increases brand preference. In this case, perceived power refers to perceived brand power or consumers’ perceptions of relative brand standing in the market. Another research conceptualized perceived power as how dominant, aggressive, brave, sturdy, daring, and adventurous the target wine bottle is, or how powerful, masculine, dominant, and energy-giving the target energy drink is, and showed that placing a product label higher (vs. lower) on the product package increases perceived

power (Machiels and Orth 2017). As such, while perceived power in previous research is not necessarily translated into product functionality and thus may not be a primary concern for purchase (e.g., consumers do not look for powerful wine all the time), our research conceptualizes power as how strong and effective the product is, which is a primary choice criterion for many product categories.

Another theoretical contribution of the present study is that it extends the scope of the study that examines the “powerful is up” metaphor to the new marketing context, namely shelf display. Previous research examined how various verticality cues such as background vertical lines of a print advertisement (van Rompay et al. 2012), label location of the package (high vs. low) and shelf orientation (horizontal vs. vertical, Machiels and Orth 2017), and brand logo location of the package (high vs. low, Sundar and Noseworthy 2014) influence perceived power of the target marketing stimulus. Adding to the previous research findings, the present research is the first to empirically show that shelf location of the product (top vs. bottom) can also communicate power cues such as product strength and functionality, and thus influences purchase decisions.

From a managerial standpoint, findings from the present research shed light on how marketers can combat consumers’ bias toward green products being less effective. Past research has suggested several methods to reduce such biased perceptions including providing explicit information about product performance and effectiveness (Gleim et al. 2013; Luchs et al. 2010), choice architecture (Theotokis and Manganari 2015), and aesthetic package designs (Luchs et al. 2012). Our findings suggest that shelving green products can also implicitly communicate product power and effectiveness. When strength-related attributes are valued, green products are better off placed at the top shelf

rather than at the bottom shelf in order to increase sales. Also, although we limit our scope to shelf placement in the current research, marketing practitioners may utilize different verticality manipulations as a way of enhancing consumers' perceptions of green product strength and effectiveness. For example, displaying green cleaning products images vertically higher (vs. lower) on an advertisement would signal product strength and thus positively impacts purchase decisions. Also, a product manufacturer may want to draw vertical lines in the background image when designing green product package to signal product strength.

Despite the theoretical and managerial implications discussed above, this research is not without limitations. First, we examined green product categories (cleaning sprays and laundry detergents) in which product power is understood as product efficacy and thus is a primary choice criterion for most purchase decisions. There are numerous other green product categories where product power would mean a different construct (e.g., durability of green furniture) or even defining product power would be meaningless (e.g., eco-friendly toothbrush). Would placing such green products at the top shelf also increase perceived strength of the product which then spills over to functionality perceptions? This question remains unanswered and awaits further investigation.

Second, the present research adopted scenario-based, hypothetical studies. While we provide convergent evidence across three experimental studies that shows placing green products at the top shelf increases strength perceptions and thus leads to higher purchase intention, consumers would not purchase a green product solely based on where the product is placed at a retail store shelf and instead actual purchase decisions in the real world are subject to many different factors such as product price, purchase history,

brand familiarity, or package aesthetics. Despite our effort to control for such noise variables in the three studies by manipulating shelf display images (e.g., blurring a product package image to make it unidentifiable) or treating a price expectancy variable as a covariate in the statistical analysis, future research needs to conduct a field study at an actual retail store to examine if consumers perceive green products as stronger and powerful when they are placed at the top shelf than at the bottom shelf and thus are more willing to purchase the product.

## CHAPTER 4

### ESSAY 3: WHAT'S UP? CONCEPTUAL ASSOCIATION BETWEEN UP AND CHRONOLOGICAL NEWNESS

#### 4.1 Introduction

Consumers use multiple cues available at the moment when they make a decision or evaluate a stimulus. Such cues range from product-relevant cues such as brand logos (Jiang et al. 2016; Sundar and Noseworthy 2014), package color (Huang and Lu 2016), or product images (Deng and Kahn 2009; Elder and Krishna 2011) to product-irrelevant cues such as shelf display (Valenzuela, Raghurir, and Mitakakis 2013), store temperature (Madzharov, Block, and Morrin 2015), or current emotions (Labroo and Patrick 2009).

Among these cues, chronological attributes of the product, or consumers' perception of how long it has existed in the world, play an important role in some categories. On the one hand, consumers prefer things just because they are chronologically newer. For example, consumers like newly introduced technological devices (and they are even willing to queue and spend overnight to purchase a new iPhone series, [Choudhury 2017]); they prefer fresh fruits, vegetables, fish, and meat (Péneau et al. 2006); and they put more credence to more recent news over older ones (Xu 2013). On the other hand, consumers value things such as arts, wines, and antiques as they become chronologically older, because older is believed to be better (Eidelman, Pattershall, and Crandall 2010).

Therefore, it is important for marketers to understand what factors affect chronological perceptions of the product (e.g., Is this product the *latest* one?), how



chronological attributes impact consumers' perceptions of the products, and to develop effective methods to communicate chronological information to consumers.

Drawing on the embodied cognition and conceptual metaphor literature (Cian 2017; Krishna, Cian, and Aydınoğlu 2017; Lakoff and Johnson 1980a, 2008; Meier et al. 2012), we propose that locations of the stimulus will impact consumers' perceptions of chronological attributes and show that these perceptions have downstream consequences in the marketing domain (e.g., purchase intentions). Although explicit and direct cues such as production date and launch date can obviously signal how new or old the product is, the present research suggests location (top vs. bottom) of a stimulus acts as an *implicit* signal for communicating chronological attributes without explicit date labels or a "new" sign. Because consumers tend to develop negative impressions about explicit persuasion attempts (Friestad and Wright 1994), particularly among millennials (Henrie and Taylor 2009), marketers would reap benefits from being able to communicate newness signals implicitly with a simple vertical display. For instance, marketers may display the image of a newly introduced virtual reality headset at the top of the advertisement rather than at the bottom so that consumers would perceive it as a brand-new product.

In addition to the managerial implications, the present research makes several theoretical contributions. First, extending the stream of the conceptual metaphor and embodied cognition literature, particularly locations-concepts association research, our findings discover a new association between vertical locations of a stimulus and chronological newness. Second, we add to the understanding of the chronological newness concept, which has been relatively understudied compared to another dimension of newness, novelty. The present research identifies a new factor (i.e., vertical location)

that affects chronological perception of a stimulus, as well as how such chronological attributes impact consumers' subsequent perceptions such as food freshness, product innovativeness, and newspaper credibility.

## **4.2 Theoretical background**

### **4.2.1 Locations-concepts association**

Previous research on conceptual metaphor theory (Lakoff and Johnson 2008) has shown that the spatial location (e.g., top-bottom, left-right, center-edge) of a stimulus implies conceptual meanings such that they serve as a means to understanding abstract concepts. For example, because people mentally associate powerfulness with up (Schubert 2005), a brand logo placed at the top of the package is perceived to be more powerful than when it is placed at the bottom (Sundar and Noseworthy 2014). Other examples of location-conceptual meaning associations include morality is up (Meier et al. 2007), good is up (Meier and Robinson 2004), and rationality is up (Cian, Krishna, and Schwarz 2015). Accordingly, we review previous research that has found conceptual association between locations and concepts.

#### *4.2.1.1 Up-powerful, down-powerless*

Vertical locations connote the concept of power. From figures of speech (e.g., “under someone’s control”, “having a dominating personality”) to everyday experiences (e.g., employees with higher rank are placed at the top in an organization chart, CEO’s office is typically located on the top floor in the building), we have learned to conceptually associate higher locations with powerfulness. Some of the empirical findings from

previous marketing research that look at the up-powerfulness association include that placing a powerful brand logo at the top of the package or placing a powerless brand logo at the bottom increases brand preferences (Sundar and Noseworthy 2014); product label location (top vs. bottom) on the product package affects perceived power of the product, which in turn influences perceived product quality (Machiels and Orth 2017); and verticality cues in product advertisements such as an upward camera angle and vertical stripes on the background increase perceived luxury of the product, price expectation, and purchase intention (van Rompay et al. 2012).

#### *4.2.1.2 Up-good, down-bad*

There is a conceptual association between vertical locations and valence. We acknowledge that something that is positive is up (e.g., “Two thumbs up”, “I am high”) and something negative is down (e.g., “I am feeling down”). Meier and Robinson (2004) found that positive words were sorted faster when they appeared at the top of the computer screen while negative words were sorted faster when they appeared at the bottom. Similarly, Crawford et al. (2006) showed that affective stimuli influence spatial memory such that positive stimuli were recalled better when they were at the top whereas negative stimuli were recalled better when they were at the bottom.

#### *4.2.1.3 Up-rational, down-emotional*

We have a lay belief that the head (brain) controls rational thinking and the heart is for emotional thinking. As such, figures of speech such as “The discussion fell to the emotional level, but I raised it back up to the rational plane” (Lakoff and Johnson 1980b, p.196) imply that rationality is associated with something that is higher while

emotionality is associated with lower vertical positions. Empirical evidence from Fetterman and Robinson (2013) shows that when participants located themselves in the head, they described themselves as rational and logical, while those who located themselves in the heart described themselves as emotional, apart from sex differences. Likewise, Cian et al. (2015) found that people implicitly associate rationality and up and emotionality and down, and this implicit association further impacts their evaluation of a stimulus such that a rational political slogan (“Intelligence in serving the community”) was more favored when it appeared at the top (vs. bottom) of an advertisement, but an emotional slogan (“Passion in serving the community”) was more favored when it appeared at the bottom (vs. top).

#### *4.2.1.4 Up-moral, down-immoral*

Morality can also be represented by spatial metaphors. For example, a “high-minded” person is someone who has strong moral principles and an “underhanded” person is perceived to be unethical and lack moral standards. Indeed, Meier et al. (2007) found that participants recognized moral words (caring, charity, nurture, truthful, and trustworthy) faster when they appeared at the top of the computer screen while immoral words (adultery, corrupt, dishonest, evil, and molest) were recognized faster when they appeared at the bottom.

#### *4.2.1.5 Up-God, down-Devil*

As we often believe that God lives in heaven and the Devil lives down in hell, the abstract concept of divinity (God and Devil) is associated with verticality. For example, in Meier et al.'s (2007) study, participants not only implicitly associated God with up and

Devil with down (Study 1) but also recognized God-related words faster when they appeared at the top (vs. bottom) of the computer screen and Devil-related words faster when they appeared at the bottom (vs. top) (Study 2).

#### *4.2.1.6 Up-abstract, down-concrete*

Last but not least, verticality is associated with construal level. Because people can see a bigger picture from the high above, a high physical position is associated with global processing and high construal levels but a low physical position is associated with local processing and low construal levels (Aggarwal and Zhao 2015).

As reviewed above, figures of speech and accumulated exposures to conceptual metaphors contribute to the formulation of a specific conceptual association between spatial locations and abstract concepts. Following this rationale, we suggest a hitherto unexplored conceptual association between vertical locations and chronological newness.

#### **4.2.2 Up-chronological newness association**

In our daily language, the concept of chronological newness or recency is frequently expressed with the orientational word “up”. For example, we say “*update* the software to the latest version” or “an *up-to-the-minute* news broadcast”, each of which implies “up” as a newness concept because new things are being piled up against old things. Future time is also described with “up” such as “The new year is coming *up*” and “I’m afraid of what’s *up* ahead of us.” Lakoff and Johnson (2008) explained the physical basis for this metaphor as follows:

*“Normally our eyes look in the direction in which we typically move (ahead, forward). As an object approaches a person (or the person approaches the object), the object appears larger. Since the ground is perceived as being fixed, the top of the object appears to be moving upwards in the person’s field of vision.”* (Lakoff and Johnson 2008, p.16)

In other words, we perceive foreseeable future events (that are chronologically newer) as if they are ahead of us.

In addition, we suggest accumulated bodily experiences as another factor that contributes to the formulation of the conceptual association between chronological newness and up. In our daily experiences, we frequently encounter cases in which chronologically newer things appear at the top of our visual field. For example, the inbox shows emails in a chronological order from newest to oldest; online websites show brand-new, just in products first at the top; and as we refresh the page on social media, latest posts appear at the top. According to the perceptual symbol systems theory (Barsalou 1999), prior perceptual experiences can create embodied metaphor for abstract concepts. Thus, we believe that such accumulated experiences may lead to a learned metaphoric association between up and chronological newness.

Based on the above discussed linguistic evidence and perceptual experiences, we suggest that the concept of chronological newness will be associated with up (i.e., higher vertical placement) and thus hypothesize that a thing that is placed at the top (of a screen, package, advertisement, etc) will be perceived to be chronologically newer compared to when it is placed at the bottom. We find support for this up-chronological newness association in Studies 1-3. Then, in Studies 4-7, we show how chronological newness perceptions have downstream consequences on other perceptions in different contexts

such as food freshness (Study 4), product innovativeness (Study 5), newspaper credibility (Study 6), and trustworthiness toward medical practitioners (Study 7).

### **4.3 Study 1: Ordering task**

To explore if up is associated with chronological newness, Study 1 used an ordering task where participants were asked to organize a list of things in chronological order. We predicted that more participants would order from newest (top) to oldest (bottom).

#### **4.3.1 Method**

Eighty-two participants were recruited from Amazon Mturk (54.9% males). They read a cover story that they were working at a company that publishes monthly magazine articles and that they were assigned a topic “recent smartphone trends” this month. Then they were told that they would like to include a graphic that shows the release dates for the previous Apple iPhone models. We presented eight model names along with their release dates (e.g., Apple iPhone 7S, September 7, 2017) in a randomized, vertical order. Participants were asked to rearrange the order of the iPhones in a way that made sense to them.

#### **4.3.2 Results and discussion**

We expected participants would organize the information either via time or alphabetically. If up and chronological newness are associated as we predict, then participants should be more likely to organize the list with newest items at the top and oldest items at the bottom than vice-versa (old-top, new-bottom). Our data indicated that

all the participants vertically arranged the list based on the release dates, either newest to oldest or oldest to newest. We counted the frequencies of each case. Results showed that significantly more participants (61%) used the newest to oldest order when they vertically rearranged the iPhones,  $\chi^2(1)=3.951, p<.05$ . Thus, Study 1 provides initial evidence for the hypothesized up-chronological newness association.

#### **4.4 Study 2: Word classification task**

In Study 2, we adopted a word classification task in which participants were presented with two boxes and asked to sort a pair of words (e.g., new-old) into either the top box or the bottom box. If up is associated with chronological newness, then participants should be more likely to categorize newness-related words into the top box than into the bottom box.

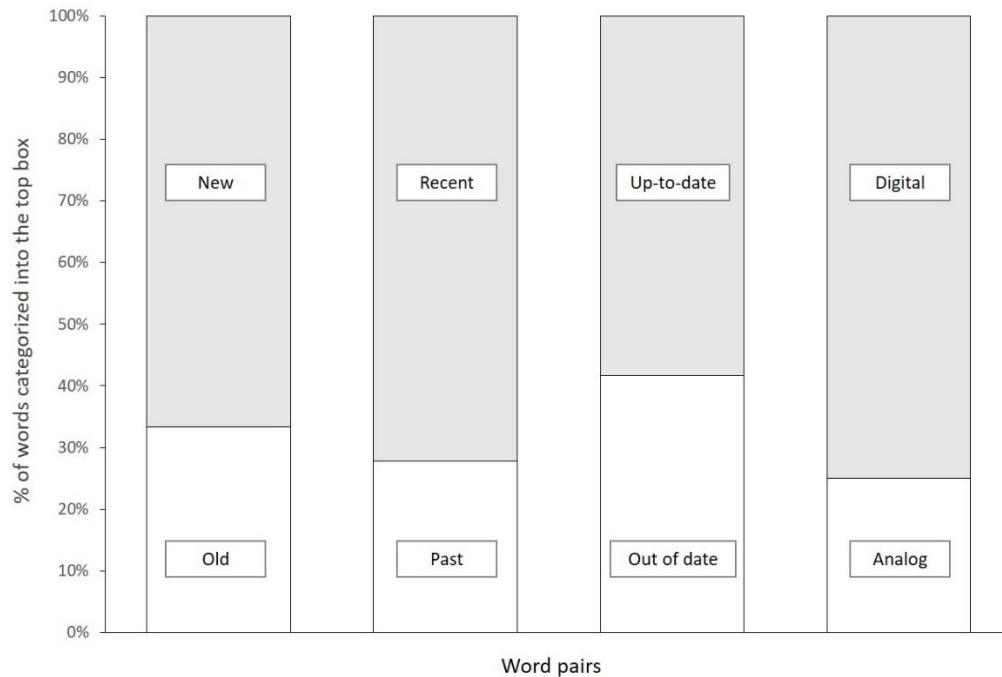
##### **4.4.1 Method**

Thirty-six undergraduate students participated in Study 2 in exchange for extra course credit. They were presented with a pair of words and two vertically displayed boxes. Participants were asked to categorize each word into either the top box or the bottom box so that each box contains one word. There were a total of eight pairs of words, four of which were focal newness-related word pairs (new – old, recent – past, up-to-date – out of date, digital – analog), and the remainder were filler word pairs (eating healthy – indulging, emotion – rationality, salt – pepper, extraverts – introverts) to reduce possible demand effects. The order of the word pairs was randomized.



#### 4.4.2 Results and discussion

Overall, newness-related words (i.e., new, recent, up-to-date, digital) were categorized into the top box more frequently than the bottom box (see figure 4.1), supporting our up-chronological newness hypothesis.



**Figure 4.1. Categorization of word pairs**

Specifically, 66.7% of participants categorized the word *new* (vs. *old*) into the top box,  $\chi^2(1)=4$ ,  $p<.05$ ; 72.2% of participants categorized the word *recent* (vs. *past*) into the top box,  $\chi^2(1)=7.11$ ,  $p<.01$ , 75% of participants categorized the word *digital* (vs. *analog*) into the top box,  $\chi^2(1)=9$ ,  $p<.01$ , and 58.3% of participants categorized the word *up-to-date* (vs. *out of date*) into the top box,  $\chi^2(1)=1$ ,  $p=.317$ . There were no systematic tendencies in terms of how the filler word pairs were sorted (i.e., each word was equally likely to be sorted into the top or bottom box,  $p$ 's  $> .05$ ). Using a different study paradigm, the results

of Study 2 further suggest that consumers may associate chronological newness with up (higher vertical placement).

#### **4.5 Study 3: New brunch menu study**

While findings from Study 1 and 2 support the idea of up-chronological newness association with indirect approaches, Study 3 directly manipulates vertical placement of a stimulus to see if this has any systematic effect on perception of chronological newness.

##### **4.5.1 Method**

Seventy-nine undergraduate students (50.6% males) participated in Study 3 for extra course credit. Participants were told that the study was about a brunch menu evaluation. Two versions of the menu were created. One version had a new brunch item at the very top of the menu and the other showed the same new item at the bottom of the menu. To increase visual salience of the item, a red label “new” was displayed next to the item (See Appendix C.1). Perceived chronological newness (i.e., recency) of the item was measured by asking “How long do you think the new item has been on the menu?” on the following scale: less than a day, less than a week, less than two weeks, less than a month, less than three months, less than six months, less than a year, and more than a year.

##### **4.5.2 Results and discussion**

We analyzed whether the new item location (top vs. bottom) affects perceived recency of the item using the Mann-Whitney U test, because the perceived recency variable was

ordinal<sup>5</sup>. Supporting the up-chronological newness hypothesis, a new item at the top was perceived to be more recently introduced to the menu than when it was displayed at the bottom (Mann-Whitney  $U=563.5$ , rank: top=34.74, bottom=45.67,  $p<.05$ ). Thus, using a direct manipulation of the location, the findings from Study 3 show that when a thing is placed at the top it is perceived to be chronologically newer, compared to when it is at the bottom.

Studies 1-3 provide initial evidence that up is associated with chronological newness. We further predict that such perception of chronological newness as a result of vertical placement (top vs. bottom) will be differentially understood depending on the context and domain. In the food product context, for example, chronologically new food signals its freshness since freshness is defined as how close a product is to its original state regarding the distance, time, and processing (Peneau et al. 2009). Also, newly launched technological products are often perceived to be more innovative and novel compared to the old models. Other examples include latest news being more credible as it contains most up-to-the-minute information and newly graduated medical practitioners being less preferred as patients trust doctors with more years of practical experiences (Bloom 2014). Thus, four studies are conducted in which we explore cases in which chronological newness can be translated in different ways by manipulating vertical placements of a stimulus and examine if placing a thing at the top indeed influences perceptions of freshness (food, Study 4), innovativeness (tech products, Study 5), or credibility (news articles, Study 6) and trustworthiness (dentists, Study 7).

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<sup>5</sup> Treating the variable as an interval measure does not change the results. An independent-samples t-test revealed that a new item at the top was perceived to be more recently introduced to the menu ( $M=3.85$  ('less than 1 month'),  $SD=1.30$ ) than when it was displayed at the bottom ( $M=4.53$  ('less than 3 months'),  $SD=1.31$ ),  $t(77)=2.30$ ,  $p<.05$ .

## 4.6 Study 4

Study 4 examines if placing fruits and vegetables at the top (vs. bottom) of a display increases the freshness perception.

### 4.6.1 Study 4A

Study 4A was a within-subjects design where forty-four participants (38.6% males,  $M_{\text{age}}=41.09$ ) from Amazon Mturk compared and evaluated a stack of tomatoes in a single box. We marked tomatoes at the top of a box “row A” and tomatoes at the bottom of a box “row B” so that participants could compare tomatoes in different rows. Participants rated perceived recency (“From the top row A to the bottom row B, which tomato do you think has been more recently delivered to the supermarket?”), perceived freshness (“Which tomato do you think looks fresher?”), and purchase intention (“Which tomato would you buy?”) on a 7-point scale (1=definitely A, 7=definitely B).

We conducted a one-sample t-test comparing the means for each question with the midpoint 4 because the questions were single items (1=definitely A, 7=definitely B). Consistent with the up-chronological newness hypothesis, participants perceived that tomatoes at the top row were more recently delivered,  $M=3.30$ ,  $t(43)=-2.37$ ,  $p<.05$ , looked fresher,  $M=3.36$ ,  $t(43)=-2.39$ ,  $p<.05$ , and thus they wanted to purchase tomatoes at the top row more than the ones at the bottom row,  $M=2.86$ ,  $t(43)=-3.32$ ,  $p<.01$ .

While Study 4A showed that consumers identified vegetables at the top row as more recently delivered and fresher, this may be because consumers would reasonably believe that supermarkets stack vegetables from the bottom to the top as they are delivered. In reality, however, supermarkets place the least fresh fruits and vegetables in

the most accessible location such as at the top of the pile. To cite Doolin (2016), “*In an effort to sell the older produce before it goes to waste, employees place the fresh stuff at the bottom of the stack and rotate the about-to-perish food to the top.*” In order to address this issue of piling orders as well as whether consumers are aware of the supermarket’s strategy, we conducted a between-subjects design study where we manipulated the actual shelf location of fruits and examined if placing fruits at the top shelf would increase perceptions of how recently fruits have been delivered to the supermarket and how tasty they are.

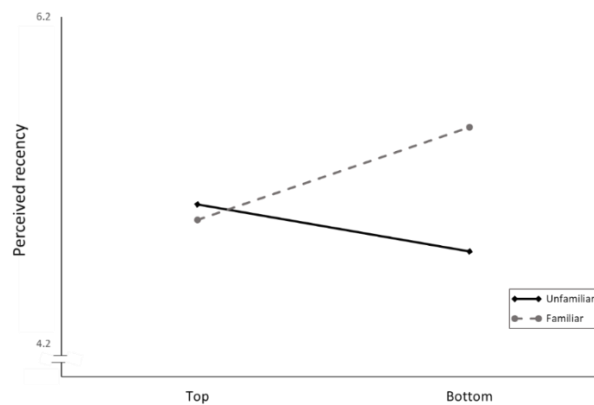
#### **4.6.2 Study 4B**

Seventy-nine participants were recruited from Amazon Mturk (38% males,  $M_{\text{age}}=40.18$ ) and evaluated the image of papayas placed on a grocery shelf. Papayas were placed either at the top shelf or at the bottom shelf (Appendix C.2). Participants rated how recently the papayas have been delivered to the supermarket (1=a long time ago, 7=just now) and how tasty the papayas are (1=not at all tasty, 7=very tasty). They also indicated familiarity with papayas (1=very unfamiliar, 7=very familiar).

Since consumers would be more likely to rely on extrinsic cues when they lack prior knowledge about or familiarity with the target (Park and Lessig 1981; Rao and Monroe 1988), we expected that consumers who are less familiar with papayas would adopt an up-chronological newness as a heuristic cue to infer recency information. Thus, we compared those who indicated that they are familiar with papayas ( $N=43$ , 54.3%) and those who did not ( $N=36$ ).

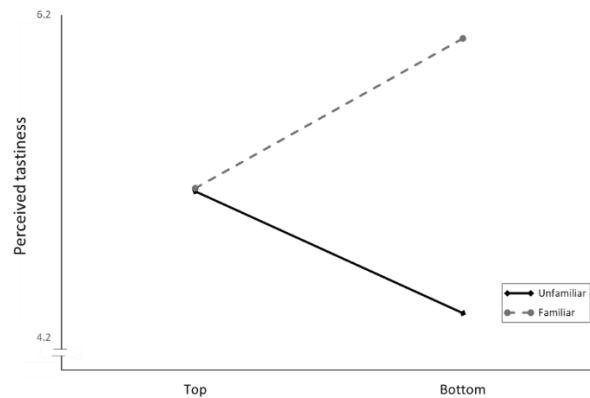
A 2 (location: top, bottom) x 2 (familiarity: high, low) ANOVA on perceived recency revealed a marginally significant interaction effect,  $F(1, 75)=3.83$ ,  $p=.054$  (see

figure 4.2). Directionally, those who are not familiar with papayas perceived that papayas at the top had been more recently delivered to the supermarket ( $M=5.05$ ) than papayas at the bottom ( $M=4.77$ ), supporting the up-chronological newness hypothesis although it was not a statistically significant difference. Those who are familiar with papayas perceived that papayas at the bottom had been more recently delivered ( $M=5.53$ ) than papayas at the top ( $M=4.96$ ), and it was a marginally significant difference,  $t(75)=-1.92$ ,  $p=.059$ .



**Figure 4.2. Perceived recency of papayas on the shelf**

Similarly, a 2 (location: top, bottom) x 2 (familiarity: high, low) ANOVA on perceived tastiness revealed a significant interaction effect,  $F(1, 75)=7.39$ ,  $p<.01$  (see figure 4.3).



**Figure 4.3. Perceived tastiness of papayas on the shelf**

Again, directionally, those who are not familiar with papayas perceived that papayas at the top are tastier ( $M=5.11$ ) than papayas at the bottom ( $M=4.35$ ), supporting the up-chronological newness hypothesis although it was not a statistically significant difference. Those who are familiar with papayas perceived that papayas at the bottom are tastier ( $M=6.05$ ) than papayas at the top ( $M=5.13$ ), and it was a significant difference,  $t(75)=-2.22, p<.05$ .

Papayas at the bottom shelf (vs. top shelf) being perceived to be more recently delivered and tastier was an unexpected result, and we could not provide reasonable explanations based on previous theory or intuition. It may be that the study stimulus used in Study 4B was not a proper choice because fruits in a typical U.S. supermarket are not displayed on a layered shelf, or the result is a mere coincidence. Although we showed that fruits and vegetables at the top box are perceived to be more recently delivered and thus fresher in Study 4A, additional work needs to be conducted to test the up-chronological newness hypothesis in this context using different study stimuli in a between-subjects design.

#### **4.7 Study 5**

Study 5 examines if placing a tech product higher (vs. lower) on a print advertisement increases consumers' perceptions of the product recency (i.e., how recently the product has been introduced to the market), perceived innovativeness of the product, and purchase intention.

### 4.7.1 Method

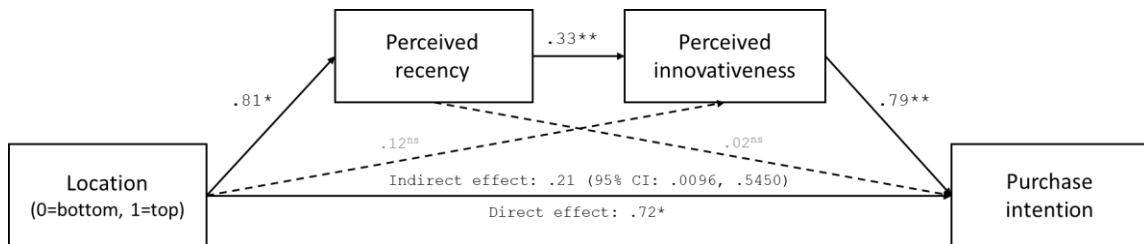
Sixty-nine participants were recruited from Amazon Mturk (36.2% males). They were told that the study was about how consumers evaluate a print advertisement. A virtual reality (VR) headset was used as a study stimulus because of its relative unfamiliarity. Half of the participants were shown a print advertisement with the VR headset image placed at the top of the ad and the other half were shown an ad with the VR headset image placed at the bottom of the ad (see Appendix C.3). Perceived product recency was measured with a single item “Compared to other virtual reality headsets on the market, how recently do you think this VR headset has been introduced to the market?” on a 7-point scale (1=a long time ago, 7=very recently). Perceived innovativeness was measured with three items (new, novel, innovative,  $\alpha=.89$ ), and purchase intention was measured with two items (“This product is something I want to try/purchase”,  $r=.82$ ). All the questions were rated on 7-point Likert scales.

### 4.7.2 Results and discussion

As predicted, participants rated a VR headset as more recently introduced to the market when the VR headset image was placed at the top rather than at the bottom of the print ad ( $M_{\text{top}}=4.35$ ,  $M_{\text{bottom}}=3.54$ ,  $t(67)=2.15$ ,  $p<.05$ ). Also, we ran a serial mediation analysis using the PROCESS macro for bias-corrected bootstrapping with 5,000 resamples (model 6, Hayes 2013) to examine the product location (top vs. bottom) → perceived recency → perceived innovativeness → purchase intention path (see figure 4.4). First, placing a product image vertically higher on the advertisement increased perceived recency of the product,  $b=.81$ ,  $p<.05$ . Next, controlling for the product location, perceived recency increased perceived innovativeness of the product,  $b=.33$ ,  $p<.01$ . Finally, controlling for



product location and perceived recency, perceived innovativeness increased purchase intention,  $b=.79, p<.001$ . The direct effect from the product location to purchase intention remains significant,  $b=.72, p<.05$ , suggesting a partial mediation effect. Overall, the indirect effect from the product location to purchase intention through perceived recency and perceived innovativeness was significant with the effect size of .21 (95% CI: .0096, .5450).



**Figure 4.4. Indirect effect of product location on purchase intention**

Consistent with our up-chronological newness hypothesis, participants perceived the VR headset as being more recently introduced when the product image was displayed at the top rather than at the bottom. Moreover, the results from Study 5 provide supporting evidence that such recency perceptions have a downstream effect on relevant attribute perceptions, namely perceived innovativeness of the tech product, which in turn increases purchase intention.

#### 4.8 Study 6

Study 6 examines if placing a newspaper article at the top (vs. bottom) of the page increases its perceived recency (i.e., how recently the article has been posted to the website) and thus perceived credibility.

### 4.8.1 Method

Because people would want to follow up on most up-to-date information about time-sensitive events such as natural disasters in which the most recent news provide the most accurate and credible information, a recent Alaska earthquake (occurred on November 30, 2018) was chosen as a study stimulus for Study 6. Eighty-nine participants were recruited from Amazon Mturk and they were told to imagine the following situation:

*“While you were browsing websites, you heard about a recent earthquake in Alaska. They said that a severe earthquake, rated 7.0 on the moment-magnitude scale, ripped across the Anchorage area and that buildings wobbled, roads cracked and thousands lost power during the morning commute. Since you have a friend who lives in Alaska, you were worried. You want to find out more up-to-date information about Alaska, so you googled Alaska earthquake.”*

Participants were presented with five vertically displayed article headlines regarding Alaska earthquake, and were asked about a target article that was placed either at the top or at the bottom of the list (see Appendix C.4). Participants evaluated the perceived recency (“How recently do you think this article was written?”) on a 7-point scale (1=a long time ago, 7=just now) and perceived credibility (“How credible do you think this article is?”) on a 7-point scale (1=not at all credible, 7=very credible). Finally, a recall question (“According to the scenario you read earlier, news articles were shown based on your search keyword \_\_\_\_\_”) was asked along with a question that asks if participants were aware of the earthquake before the study.

### 4.8.2 Results and discussion

Out of 89 participants, 30 indicated that they already knew about the earthquake and thus we exclude these participants from the further analysis (final N=59, 54.2% males,

$M_{\text{age}}=32.64$ )<sup>6</sup>. This was to ensure that participants used a news article placement (top vs. bottom) as a single cue to infer recency (i.e., the up-chronological newness association) and credibility information, not other factors such as familiarity and previous knowledge. As predicted, participants perceived that the article was more recently written when the headline was placed at the top ( $M_{\text{top}}=6.04$ ,  $SD_{\text{top}}=.76$ ) rather than at the bottom ( $M_{\text{bottom}}=5.13$ ,  $SD_{\text{bottom}}=.94$ ),  $t(57)=4.04$ ,  $p<.001$ . Also, participants perceived that the article was more credible when it is placed at the top ( $M_{\text{top}}=5.85$ ,  $SD_{\text{top}}=.99$ ) rather than at the bottom ( $M_{\text{bottom}}=5.38$ ,  $SD_{\text{bottom}}=.98$ ),  $t(57)=1.86$ ,  $p=.068$ .

A mediation analysis using the PROCESS macro (model 4, Hayes 2013) revealed that perceived recency mediates the effect of news article location on the credibility rating. Placing a news article at the top increased perceived recency,  $b=.91$ ,  $p<.001$ , which in turn increased perceived credibility,  $b=.60$ ,  $p<.001$ . There was no direct effect of the article location on perceived credibility ( $b=.07$ ,  $p=.77$ ) when controlling for perceived recency, suggesting that perceived recency fully mediates the relationship between the article location and perceived credibility. The indirect effect was significant with the effect size of .55, and the 95% confidence interval (.25, .89) did not include zero.

Corroborating findings in Studies 4 and 5, the results from Study 6 are in support of the up-chronological newness association and show how recency perceptions as a function of a vertical placement can have a downstream effect on credibility perceptions in the news article context.

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<sup>6</sup> When the total sample ( $N=89$ ) was included in the analysis, the finding was still consistent with our original hypothesis. Participants perceived that the article at the top was more recently written ( $M=5.77$ ) than the article at the bottom ( $M=5.18$ ),  $t(87)=2.75$ ,  $p<.01$ .

## 4.9 Study 7

Finally, Study 7 examines if placing a dentist's information at the top (vs. bottom) of a list impacts perceived recency (i.e., how many years of practical experiences a dentist has) and subsequent trustworthiness perceptions. If consumers use the up-chronological newness association to infer how recently a dentist has started working as a dentist, we expect that a dentist displayed at the top of the list will be perceived to have least practical experiences and thus the least trustworthy while a dentist at the bottom will be perceived to have most practical experiences and thus be the most trustworthy.

### 4.9.1 Method

Study 7 adopted a 3 (location of a dentist in the list: top, middle, bottom) x 2 (presentation order: middle-top-bottom, middle-bottom-top) mixed design where the location was a within-subjects factor and the presentation order was a between-subjects factor. Ninety participants (45.6% males,  $M_{\text{age}}=36.43$ ) were recruited from Amazon Mturk. They read a cover story to imagine the following scenario:

*“You're traveling abroad for a vacation. You have lunch at a fancy restaurant but then you suddenly notice that a piece of your tooth broke after you bite something. You feel pain in your tooth, so you want to see a dentist immediately for this dental emergency. You google “dentists near me” and you find a list of seven local dentists on the screen. You want to navigate each dentist.”*

Participants were shown an image of vertically listed seven dentists' names (see Appendix C.5) in which the middle person's name was highlighted. Participants then rated perceived recency (“How recently do you think this person has started working as a dentist?”) on a 7-point scale (1=a long time ago, 7=very recently) and perceived trustworthiness toward a dentist (“How trustworthy do you think this dentist is?”) on a 7-point scale (1=not at all trustworthy, 7=very trustworthy). Next, half of participants

evaluated the first person and the last person with the same recency and trustworthiness items and the other half evaluated the recency and trustworthiness of the last person then the first person last. This was to ensure that the question/evaluation order did not affect the results.

#### 4.9.2 Results and discussion

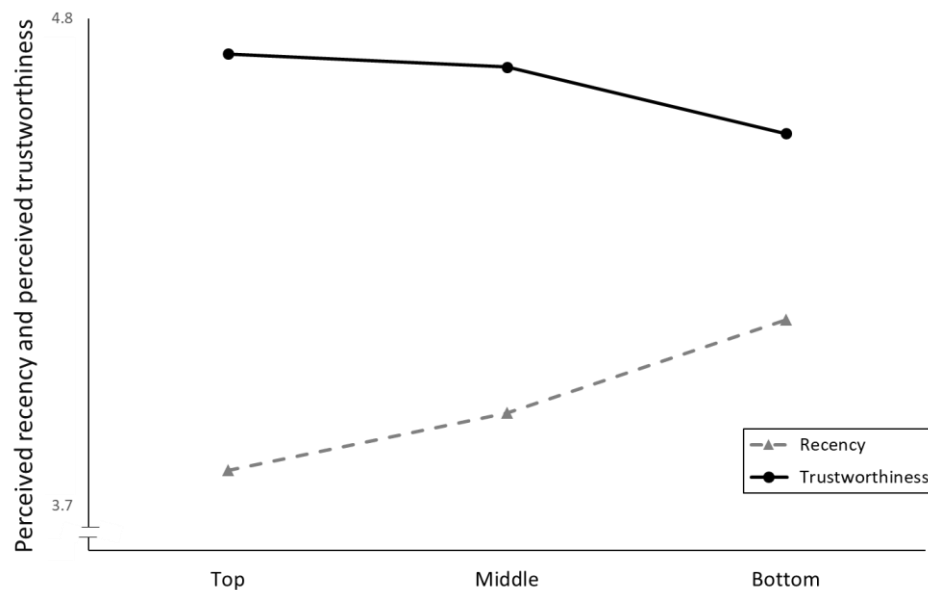
A 3 (location) x 2 (order) mixed ANOVA on perceived recency of the dentist was conducted. There was neither significant interaction effect between location and order nor significant main effect of location on perceived recency, suggesting that participants did not infer dentists' working experiences based on where they are appeared on the list (see table 4.1 for descriptive statistics).

**Table 4.1. Means (standard error) for perceived recency and perceived trustworthiness for dentist locations**

<b>Order</b>		
	Middle-top-bottom	Middle-bottom-top
<b>Location</b>	<b>Perceived recency</b>	
Top	3.70 (.21)	3.86 (.22)
Middle	3.80 (.12)	4.02 (.12)
Bottom	4.20 (.19)	4.05 (.20)
<b>Location</b>	<b>Perceived trustworthiness</b>	
Top	4.72 (.17)	4.82 (.18)
Middle	4.70 (.15)	4.68 (.15)
Bottom	4.46 (.17)	4.62 (.17)

However, descriptive statistics indicated that the perceived recency rating was the lowest for a dentist displayed at the top list, and the highest for a dentist displayed at the bottom list (see figure 4.5, dashed line). This was in the opposite direction from the up-chronological newness hypothesis.

Also, results from a 3 (location) x 2 (order) mixed ANOVA on perceived trustworthiness toward the dentist revealed no significant interaction effect but a marginally significant main effect of location,  $F(2,176)=2.45, p=.089$ , suggesting that a dentist at the top list was perceived to be the most trustworthy followed by a dentist in the middle, and at the bottom of the list (see figure 4.5, solid line). This was also counter to our original prediction.



**Figure 4.5. Perceived recency and perceived trustworthiness as a function of the placement of a dentist**

We posit that these unexpected results were observed because the nature of evaluating and choosing a dentist is distinct from the contexts that were used in Studies 4-6. When evaluating and choosing fruits and vegetables, tech products, and news

articles, the recency or chronological newness dimension would be a primary concern. Consumers care that if tech products are new and if fruits and vegetables are fresh. Thus, as shown in Studies 4-6, placement of a target stimulus was used as a heuristic to infer recency-related information. In contrast, recency is not a primary concern when choosing a dentist. Consumers would rather care more about a dentist's quality and reputation over how long this person has worked as a dentist. In such case, the up-good association (Meier and Robinson 2004) might become more salient than the up-chronological newness association, in which consumers would think that something at the top is good (trustworthy in this study).

#### **4.10 General discussion**

Findings from the current research show a conceptual association between vertical locations and chronological newness. The first three studies demonstrated that the concept of chronological newness can be mapped onto higher locations. Participants vertically organized a list of products (iPhone series) from newest to oldest (Study 1); they put newness-related words at the top more often than at the bottom (Study 2); and they believed that the new item listed at the top of a menu was more recently introduced than when it was listed at the bottom of the menu (Study 3). Also, the additional three studies showed that perceptions of chronological newness then have subsequent impacts on attribute perceptions differently depending on the context, and that manipulating vertical locations of a stimulus can affect newness-related perceptions such as food freshness (Study 4), product innovativeness (Study 5), and credibility of a newspaper (Study 6).

The present research contributes to the conceptual metaphor and embodied cognition literature by identifying a new conceptual metaphor. Specifically, adding to the previously identified orientational metaphors such as control is up (Schubert 2005; Sundar and Noseworthy 2014), good is up (Meier and Robinson 2004), rationality is up (Cian, Krishna, and Schwarz 2015), and morality is up (Meier et al. 2007), we show that chronological newness is also represented by up. Because people understand the world and abstract concepts through languages as well as perceptual experiences that have been accumulated in the sensorimotor systems (Barsalou 1999; Lakoff and Johnson 1980a, 2008), we argue that the frequent usage of “up” in daily conversations to communicate the concept of recency or chronological newness (e.g., *up-to-date*, *coming up*) and accumulated perceptual experiences that chronologically newer things are presented at the top of the visual field develop a learned metaphorical association between up and chronological newness.

Among many orientational metaphors that have been previously identified, little research has addressed the issue of when a specific metaphor becomes more accessible over other metaphors. As discussed above, various concepts such as goodness, power, rationality, divinity, and morality are associated with vertically higher locations. Because such orientational metaphors are rather automatically processed on an unconscious level, it is hard to test multiple metaphors simultaneously and seek boundary conditions in which one metaphor is more salient than another. Findings from our studies hint at a possibility that a primary goal or motivations for choice may activate different orientational metaphors. As shown in Studies 4-6, consumers seek new (fresh) fruits and vegetables; consumers like latest tech products; consumers want most recent news. In



such cases, the up-chronological newness association is the most salient over other conceptual metaphors and thus consumers would perceive that a target displayed at the top would be new. When consumers choose a dentist (Study 7), chronological newness is not likely a primary criterion. Rather, quality or how good a dentist is would be more important, and thus the up-goodness association becomes more accessible. The reason why an up-chronological newness association was not supported in Study 7 may be due to the different nature of such choice goals. Future research should provide more context-dependent explanations and suggest theory-based boundary conditions as to when a specific conceptual metaphor is activated and when it is not.

In addition, we deepen the product newness literature. While product newness is a multidimensional concept, most prior research has focused on the novelty dimension, i.e., the degree to which a product is perceived to be discrepant from the typical category elements (Förster et al. 2010). For example, previous research investigated antecedents of perceived novelty (Kim and Lakshmanan 2015; Sung et al. 2016) and its impact on product adoption or technology adoption (Wells et al. 2010). However, another equally important dimension of product newness is a chronological aspect of newness or recency, the length of time elapsed since the product has been launched on the market (Blake, Perloff, and Heslin 1970). Both recency and novelty predict perceived newness of a target as a whole (Hart and Jacoby 1973); they are different dimensions and thus need to be examined separately. For example, consumers may perceive a previously launched product as different from what they already know and thus novel. Also, consumers may perceive a newly launched product as having the same appearances, features, and functions, and thus not novel. For some product categories such as tech products, fruits

and vegetables, and news articles, chronological newness or recency is a primary concern for choice and purchase regardless of how novel or different the product is. Also, there are avid consumers who look forward to the launch of latest products just because they are (chronologically) new. Despite the importance of this chronological aspect of newness, little empirical research has looked at the role of recency, or what factors affect subjective recency perceptions. The present research focuses on this understudied chronological newness concept, and identifies vertical location as a predictor of subjective recency perception.

Relatedly, our findings provide marketing practitioners with managerial implications such that chronological attributes of a target product (how new or old it is) can be effectively communicated without an explicit verbal cue such as product launch date or even the word “new.” Using different display platforms such as advertisements, product stands, restaurant menus, and webpages, we suggest that a vertical display of a target *implicitly* affects consumers’ perception of product recency and its relevant attributes as well. Therefore, when marketers want to communicate newness to consumers, they may reap benefits from placing a target product at the top rather than at the bottom of consumers’ visual field.

Also, our findings suggest that there is a correct placement for explicit newness cues such as the word “new” in a print advertisement or a product package. A recent study by Sung et al. (2016) showed that simply adding the word “NEW” in an advertisement increased viewing duration and evoked interest, as well as subjective novelty perceptions toward the product. While the authors did not address where the word “new” should be placed, we posit that consumers’ perception of product novelty

would be more pronounced if the word was displayed at the top of the advertisement compared to the bottom. Previous studies found that a match between a physical placement of a stimulus and its attributes associated with a corresponding placement (e.g., up and powerfulness) increases positive evaluations of the target (e.g., Chae and Hoegg 2013; Deng and Kahn 2009) because a match (vs. mismatch) increases processing fluency or how easily information can be processed (Schwarz 2004). As shown in Study 5, a VR headset was more favorably evaluated (higher purchase intention) when it is displayed at the top of the ad rather than at the bottom. Thus, retailers and marketers may want to place items with the “new” label at the top of the visual field whether it is an online shopping website, an advertisement, a store shelf, or a product package not only to signal chronological newness of the product but also to boost consumers’ positive evaluations of the product.

It is also possible that placing a target at the bottom (vs. top) of the visual field would be more advantageous to communicating its oldness. Because in the real world, signaling newness is a more important goal for companies and marketers than signaling oldness, and consumers prefer newer things in general, the present research did not explicitly test cases in which placing a product at vertically lower locations is better. For example, artwork, wine, or antique furniture are said to get better as they age, and future research could examine more various product categories that possess time-related value.

## **CHAPTER 5**

### **GENERAL DISCUSSION**

#### **5.1 Theoretical contributions and managerial implications**

A large number of marketing decisions involve choices related to location. In order to inform marketers to choose the “best location” that effectively communicates symbolic and conceptual meanings underlying a particular location, this dissertation is dedicated to exploring conceptual associations with various locations in the marketing domain. This dissertation sheds light on the theoretical understanding of embodied cognition, particularly location-concept associations, in the marketing domain as well as provides managerial implications with implementable guidelines as to where to place a marketing stimulus.

Drawing from the number-location association literature (i.e., small numbers-left and large numbers-right), Essay 1 documents a location effect of nutrient claims on food packages. Findings from Essay 1 suggest that the lateral position of a nutrient claim on the product package can impact nutrient content estimates and subsequent perceived healthiness of the product. Specifically, placing a positive nutrient claim on the right (vs. left) side of a package increases perceived healthiness as it signals more amount of positive nutrient contents, but placing a negative nutrient claim on the left (vs. right) side of a package increases perceived healthiness as it signals less amount of negative nutrient contents. Essay 1 not only advances the theoretical understanding of the number-location association and the SNARC effect in general, as well as nutrition claim literature, but also provides insightful managerial implications as to how marketers should consider the placement of nutrient claims on the food package. To better communicate product

healthfulness through nutrient claims, marketing practitioners need to consider not only what type of nutrient (positive or negative) the claim displays depending on whether they want to signal greater or less amount of nutrient content, but also product categories (“In general, do consumers think of our products as rich in this nutrient?”), in deciding where to place nutrient claims on the product package.

Essay 2 examines how marketers can use shelf locations combined with a conceptual metaphor between verticality and power to increase consumers’ beliefs about green products’ effectiveness and consequent purchase. Because consumers associate up with powerfulness, they evaluate green products to perform more effectively when products are placed at the top rather than at the bottom. This finding provides insight into how marketers can encourage green purchase. While consumers tend to be reluctant to purchase green products because they perceive green products to be less effective than traditional, non-green products, enhancing perceptions of product effectiveness with a shelf placement can be a less costly but viable strategy. Also, the findings from Essay 2 make theoretical contributions by applying a “powerful is up” conceptual metaphor into the shelf display context, which has not been examined in previous research. Therefore, Essay 2 expands the shelf display literature and green products literature.

Finally, Essay 3 identifies a hitherto unexplored conceptual association between up and chronological newness and demonstrates how marketers can utilize this association to better market products. As embodiment processes stem from learning about a metaphoric link between abstract concepts and perceptual experiences, Essay 3 examines if our daily language use (e.g., “*update* the software to the latest version”, “an *up-to-the-minute* news broadcast”) and accumulated experiences (e.g., many inboxes

show emails in a chronological order from newest to oldest; many online websites show brand-new, just in products first at the top) contribute to the formulation of a conceptual association between chronological newness and up. Across six empirical studies, Essay 3 finds support for this conceptual association as well as shows that chronological newness perceptions have downstream consequences on other attribute perceptions in different contexts ranging from food freshness to product innovation to newspaper credibility. Essay 3 advances our theoretical understanding of orientational conceptual metaphors (e.g., power is up, morality is up, rationality is up, good is up, etc.) by identifying another important metaphor.

Essay 3 also deepens the product newness literature. While product newness is a multidimensional concept, most prior research has focused on the novelty dimension, i.e., the degree to which a product is perceived to be discrepant from the typical category elements (Förster et al. 2010). As a result, little has been investigated on a chronological aspect of newness or recency, the length of time elapsed since the product has been launched on the market (Blake et al. 1970). Because chronological attributes of the product play an important role in certain product categories (e.g., the newer a tech product, the better; the older wine, the better), it is important to understand what factors other than explicit chronological cues such as product launch dates and the label “new” affect consumers’ perceptions of product recency. Essay 3 thus contributes to the product recency literature by identifying a new factor (i.e., vertical location) that affects chronological perceptions of a stimulus, as well as how such chronological attributes impact consumers’ subsequent perceptions such as food freshness, product innovativeness, and newspaper credibility.

Additionally, findings from Essay 3 provide marketing practitioners with managerial guidelines that can be used to effectively communicate chronological attributes of a target product with a vertical display. For example, displaying a tech product image at the top (vs. bottom) of an advertisement can increase consumers' perception of how recently this product has been launched on the market, and thus perceived product novelty and innovativeness can be increased.

Together, this dissertation contributes to a greater understanding of embodied cognition effects, specifically location-concept associations, across three essays. Not only does each essay in the dissertation examine and identify specific embodied location effects and its implications in marketing, but also the dissertation as a whole yields important insight into when and how such embodied location effects are most likely to occur. For example, a particular location-concept association becomes more active than other location-concept associations when the choice criterion and the target concept match (e.g., choosing a new tech product → up-chronological newness; choosing a good dentist → up-goodness). Also, findings from several studies suggest that embodied location effects work better for ambiguous or unfamiliar stimuli and situations. Under such circumstances, a location-concept association serves as a heuristic cue to infer product attributes because consumers have limited available information on hand such as product knowledge. Future research could examine more specifically when and how certain location-concept associations get activated as well as possible boundary conditions that moderate the strength of embodied location effects. More detailed future research directions are discussed in the following section.

## 5.2 Future research directions

This dissertation suggests promising avenues for future research in the field of location-concept associations research. First, as Essays 1 and 2 did, future researchers may empirically test effects of many other conceptual metaphors in the marketing domain. Some orientational conceptual metaphors (e.g., powerful is up) have been applied more frequently to the marketing context (e.g., Machiels and Orth 2017; van Rompay et al. 2012; Sundar et al. 2017; Sundar and Noseworthy 2014) than other metaphors (e.g., rationality is up, Cian et al. 2015). Because understanding what conceptual meaning is being communicated through locations is important to marketers in choosing the best location to place products, images, advertising slogans, and product information, there is room for investigating how other conceptual metaphors can be utilized in affecting consumers' perceptions of product attributes. For example, if morality is associated with up (Meier et al. 2007), then would consumers perceive a corporate transgression as more immoral when the media report the news at the bottom (vs. top) of the page? Also, if rationality is up (Cian et al. 2015), would consumers make more rational decisions when they look up (vs. down) but make more emotional decisions when they look down (vs. up)? Such questions remain unanswered.

Equally important future research directions are to investigate the processes and boundary conditions of how and when particular conceptual metaphors are activated. As reviewed in the previous chapter, there may be cases in which multiple target domains (e.g., power, morality, valence, divinity, rationality, chronological newness) are mapped onto a single source domain (verticality, in this example). While previous research has looked at one conceptual metaphor at a time, it is uncertain which of multiple metaphors



will be activated when there is no explicit cue available to rely on. Krishna and Schwarz (2013, p. 164) stated that this issue depends on “*its relative accessibility and applicability to the task at hand, consistent with general principles of the context-sensitive construal of meaning.*” Indeed, findings from Essay 3 hint at a possibility that a primary goal or motivation for choice may activate different orientational metaphors. When choosing something chronologically new is a primary goal (e.g., choosing fruits and vegetables, tech products, or news articles, Studies 4-6), the up-chronological newness association is the most salient over other conceptual metaphors and thus consumers would perceive that a target displayed at the top would be new. However, when choosing something good is a primary goal (e.g., choosing a dentist for a dental emergency, Study 7), the up-good association (Meier and Robinson 2004) becomes more salient and thus consumers perceive a target at the top as the best. Relatedly, future research could examine how and when different conceptual metaphors get activated. In this dissertation, Essay 1 examined the product-nutrient association that moderates the effect of nutrient claim location on nutrient content estimates, and Essay 2 examined the choice criteria (i.e., choosing strong and powerful products vs. gentle and mild products) that moderates the effect of shelf locations of green products on perceived powerfulness.

Other than contextual moderators and boundary conditions that this dissertation examined, individual and cultural differences also play an important role in affecting the intensity or even the directions of location-concept associations. For example, the number-location association (Essay 1) depends on reading and writing habits. Shaki et al. (2009) found that Canadians, who read English words and Arabic numbers from left to right exhibit small numbers-left and large numbers-right association; Palestinians who

read Arabic words and Arabic numbers from right to left exhibit small numbers-right and large numbers-left; and Israelis who read Hebrew words from right to left but Arabic numbers from left to right do not exhibit any systematic number-location associations. Therefore, location-concept association research should be conducted in conjunction with cross-cultural investigations.

Another interesting idea is to examine from when location-concept associations or specific conceptual metaphors start to be developed and exert their influences on consumers' cognition and behaviors. Compared to embodied cognition research findings among adults, little is known about developmental processes of embodied cognition among young children. Since embodiment research among children has received attention recently among developmental psychologists (Wellsby and Pexman 2014), and attention is growing among consumer psychologists with respect to children as independent consumers (e.g., Chaplin and Roedder John 2005; Peracchio 1992; Wright, Friestad, and Boush 2005), it is worthwhile to study if young children utilize location-concept associations to identify product attributes, and if so, when such associations start to develop.

### **5.3 Conclusion**

To conclude, this dissertation explores conceptual associations with various locations (left-right, up-down) across different marketing domains including product packages, advertisements, menu display, shelf display, and web search results lists. As elaborated in this chapter, this dissertation contributes broadly to the relevant theory and provides practical and implementable guidelines to marketing practitioners as to *where* to place a

marketing stimulus – be it a product itself, image, or information. Indeed, consumers can see what is unsaid through locations and thus it is researchers' role to figure out how specific locations can convey symbolic and conceptual meanings. I believe that much more exciting future research opportunities in this field of location-concept associations await.

APPENDIX A

PRODUCT STIMULI IN ESSAY 1

A.1 Study 1

---

Nutrient claim on the *left* side of the package

---

Nutrient claim on the *right* side of the package

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## A.2 Study 2

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### Granola bar

---



---

### Chocolate chip cookies

---



### A.3 Study 3

---

Positive nutrient (Fiber)

---



---

Negative nutrient (Sugar)

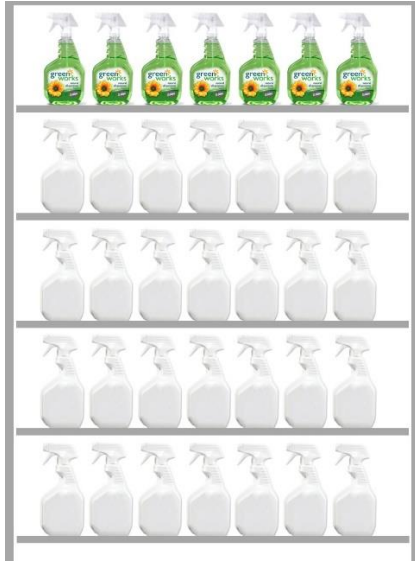
---



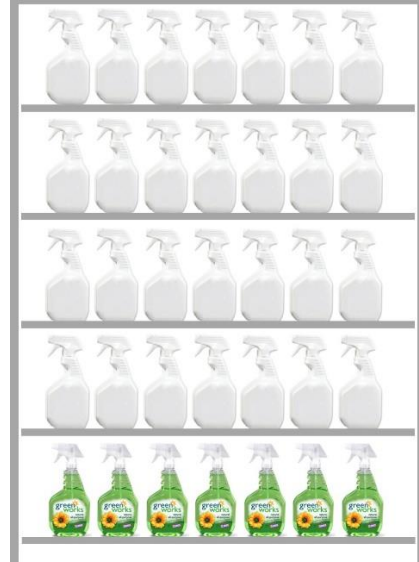
## APPENDIX B

### PRODUCT STIMULI IN ESSAY 2

#### B.1 Study 1



Green products placed on the *top* shelf



Green products placed on the *bottom* shelf

## B.2 Study 2

<Target product location>

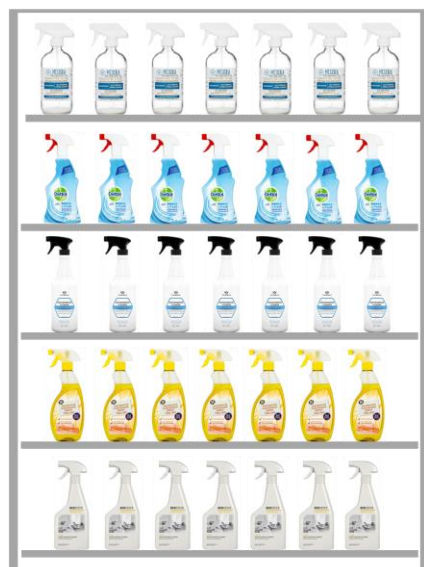
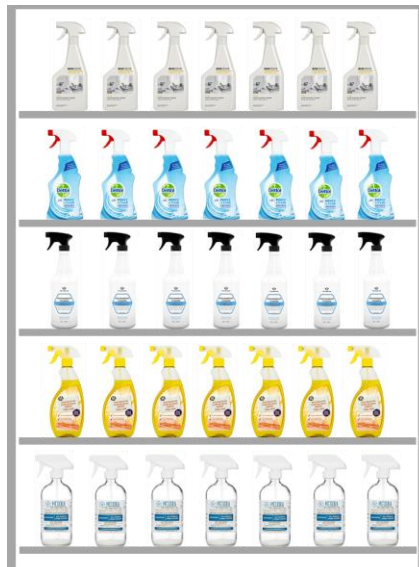
Top

Bottom

Green



Non-green





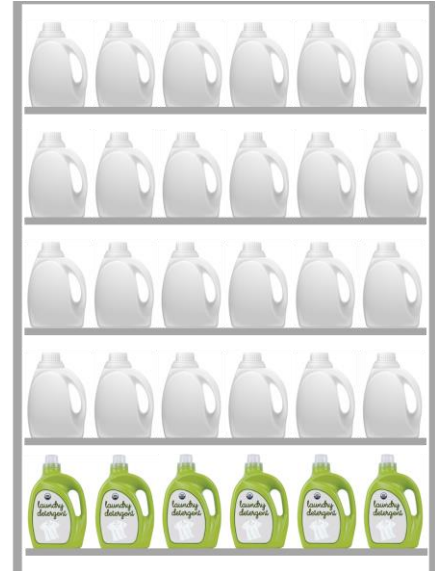
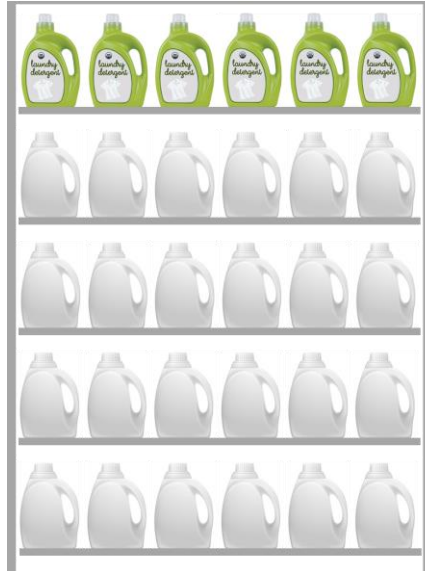
### B.3 Study 3

<Target product location>

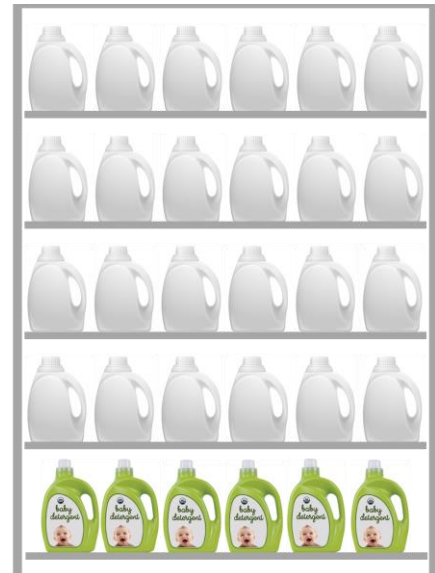
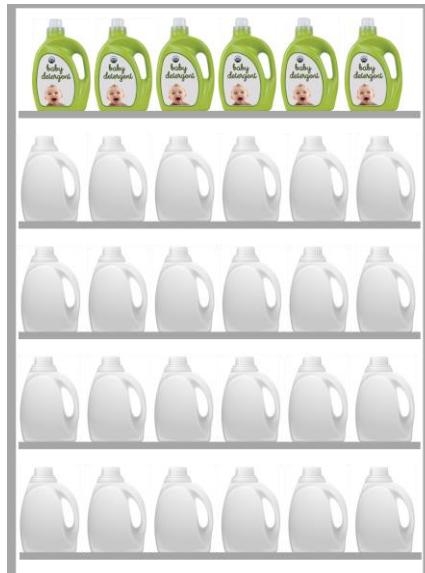
Top

Bottom

Regular  
detergent



Baby  
detergent



## APPENDIX C

### PRODUCT STIMULI IN ESSAY 3

#### C.1 Study 3

<i>Menu</i>	
Brunch	
<i>All items served with a complimentary coffee, tea, or Mimosa</i>	
Crab and Eggs Benedict 	\$12
Polenta cakes, pile of crab, spinach, poached eggs	
Buttermilk Pancakes	\$10
Served with Canadian maple syrup	
Cinnamon Swirl French Toast	\$10
Rich egg bread with choice of ham, bacon, or sausage	
Vermont Scrambled Eggs	\$10
With bacon and cheddar	
Eggs Benedict	\$10
With toasted ciabatta bread, spinach, poached eggs	
Parisien Three Eggs Omelet	\$12
Any 2: mushrooms, bacon, ham, cheese, onion, jalapeno	
Irish Breakfast	\$10
Two eggs, Irish sausage, bacon, pudding, home fries, toast & grilled tomatoes	

A new item placed at the *top* of the menu

<i>Menu</i>	
Brunch	
<i>All items served with a complimentary coffee, tea, or Mimosa</i>	
Buttermilk Pancakes	\$10
Served with Canadian maple syrup	
Cinnamon Swirl French Toast	\$10
Rich egg bread with choice of ham, bacon, or sausage	
Vermont Scrambled Eggs	\$10
With bacon and cheddar	
Eggs Benedict	\$10
With toasted ciabatta bread, spinach, poached eggs	
Parisien Three Eggs Omelet	\$12
Any 2: mushrooms, bacon, ham, cheese, onion, jalapeno	
Irish Breakfast	\$10
Two eggs, Irish sausage, bacon, pudding, home fries, toast & grilled tomatoes	
Crab and Eggs Benedict 	\$12
Polenta cakes, pile of crab, spinach, poached eggs	

A new item placed at the *bottom* of the menu

## C.2 Study 4B



Papayas at the *top* shelf



Papayas at the *bottom* shelf

### C.3 Study 5



VR headset image at the *top* of the ad



VR headset image at the *bottom* of the ad

## C.4 Study 6

The screenshot shows the Google News interface for a search on "alaska earthquake". On the left is a navigation sidebar with categories like "Top stories", "For you", "Favorites", "Saved searches", and regional filters like "U.S.", "World", "Local", "Business", "Technology", "Entertainment", "Sports", "Science", and "Health". The main content area is titled "TOP COVERAGE" and lists five articles. The first article, "Aftershocks rock Alaska as more earthquakes hit near Anchorage", is highlighted with a light blue background and a mouse cursor pointing to it. The other articles are "More Than 100 Buildings Found Unsafe After Alaska Quake", "New maps and data show widespread Anchorage earthquake damage and more than 100 unsafe buildings", "Understanding the 7.0 earthquake, aftershocks, and how it compares to 1964", and "More and more aftershocks recorded after the 7.0 earthquake".

Article headline at the *top* of the list

This screenshot is identical to the one above, showing the same Google News search results for "alaska earthquake". However, the article "Aftershocks rock Alaska as more earthquakes hit near Anchorage" is now at the bottom of the list, and the article "More and more aftershocks recorded after the 7.0 earthquake" is at the top. The mouse cursor is still pointing to the article at the bottom of the list.

Article headline at the *bottom* of the list

## C.5 Study 7

<b>Dr. Guo Xuefeng</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Yu Tai</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Han Chen</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Dong Chun</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Kang Zhou</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Gong Kang</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Wan Qiu</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY

Dentist list (full)

<b>Dr. Guo Xuefeng</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Yu Tai</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Han Chen</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Dong Chun</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Kang Zhou</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Gong Kang</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Wan Qiu</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY

Dentist in the *middle*

<b>Dr. Guo Xuefeng</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Yu Tai</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Han Chen</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Dong Chun</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Kang Zhou</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Gong Kang</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Wan Qiu</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY

Dentist at the *top*

<b>Dr. Guo Xuefeng</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Yu Tai</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Han Chen</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Dong Chun</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Kang Zhou</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Gong Kang</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY
<b>Dr. Wan Qiu</b>	Distance from ZIP Entered 0 Miles Dentist Type: GENERAL DENTISTRY

Dentist at the *bottom*

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