

Title: Effects of Lightness-Location Congruency on Consumers' Purchase Decision Making

Running Head: Lightness-Location Congruency Effect

Author 1 (**Contact Author**): Tsutomu Sunaga, Ph. D.

School of Business Administration, Kwansei Gakuin University

1-1-155 Uegahara, Nishinomiya, Hyogo, 662-8501, Japan

Email: sunaga@kwansei.ac.jp Tel: +81-(0)798-54-7483

Author 2: Jaewoo Park, Ph. D.

Faculty of Commerce and Economics, Chiba University of Commerce

1-3-1, Konodai, Ichikawa-shi, Chiba, 272-8512, Japan

Email: park@cuc.ac.jp Tel: +81-(0)47-373-4261

Author 3: Charles Spence, Ph. D.

Department of Experimental Psychology, University of Oxford

South Parks Road OX1 3UD, Oxford, United Kingdom

Email: charles.spence@psy.ox.ac.uk Tel: +44-(0)1865-271364

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ABSTRACT

A considerable body of psychological and neuroscientific research has demonstrated the existence of robust sensory correspondences between various features, attributes, or dimensions of experience in different sensory modalities. Despite findings indicating the importance of sensory correspondences to human information processing, research on purchase decision-making has not to date focused sufficiently on this phenomenon. The present study examines how the lightness of packaging colors, and the location of products on a display shelf interact to affect consumers' purchase decision-making via perceived visual heaviness. As predicted, a display with light (dark) colored products positioned in the upper (lower) shelf positions increases shoppers' perceptual fluency and facilitates their visual search, thus leading to the suggestion that "light" ("heavy") locations are most appropriate for light (dark) colored products. Moreover, the lightness-location congruent display is shown to influence people's choice behavior positively as well. This research also demonstrates that when consumers consider the lightness (in terms of their weight) of the products, they are more likely to choose light (vs. dark) colored products located in the upper shelf positions. These results therefore demonstrate that consumers' purchase decision-making may be promoted by in-store environments designed to be congruent with their sensory correspondences.

Keywords: location effect, visual heaviness, sensory correspondence, perceptual fluency, visual search, purchase decision-making

INTRODUCTION

Among the various sensory features of human experience, there are certain combinations that have mutually strong connections – that somehow “just feel right” together. So, for example, most people feel that bitterness, sourness, and crispness go better with angular shapes than with round shapes. By contrast, sweetness and creaminess are associated with rounder forms instead (see Spence, 2012, for a review).

Over the last quarter century or so, numerous psychological studies have demonstrated the existence of robust sensory correspondences between several features of experience in diverse sensory modalities. A large body of research has also highlighted their importance to human information processing in a variety of laboratory-based tasks (see Spence, 2011, for a review). One suggestion is that the existence of such sensory correspondences helps to reduce noise in the perceptual system by constraining which sensory information obtained from different modalities likely belongs together, thus increasing the speed and accuracy with which an object is detected, and promoting the selection of an appropriate response (e.g., Evans & Treisman, 2010; Klapetek, Ngo, & Spence, 2012). In other words, sensory correspondences may help to solve the binding problem. The prediction that is evaluated here is whether, by matching the various sensory attributes experienced in a store with shoppers’ sensory correspondences, their overall sensory experience can be improved, thus potentially promoting the consumer’s purchase decision-making.

Previous studies of in-store environments have dealt with multiple sensory modalities (e.g., Mattila & Wirtz, 2001). Such studies have demonstrated that consumers report better shopping

experiences when multiple sensory stimuli match in terms of their level of arousal. For example, the scent of lavender combines well with slow-tempo music (both low arousal), while the scent of grapefruit combines well with up-tempo music (both high arousal), than when the level of arousal of the stimuli did not match (see Spence, Puccinelli, Grewal, & Roggeveen, 2014, for a review). However, those studies have not necessarily tended to incorporate the latest insights emerging from research on the sensory correspondences.

The present study was designed to investigate the effect of display shelves on consumers' decision-making from the point of view of the correspondences that humans share implicitly (Spence, 2012). In particular, the present study focuses on the sensory congruency between the lightness of packaging/product colors and its location within a shelf display. The results of the four experiments reported here clearly demonstrate that a lightness-location congruent display affects shoppers' purchase decision-making. Specifically, a display with light (dark) colored products located in the upper (lower) shelf positions increases shoppers' perceptual fluency and, what is more, positively influences people's purchase behavior.

THEORETICAL BACKGROUND

Sensory Correspondences and Marketing

The results of a large number of experiments conducted in the fields of psychology and cognitive neuroscience have demonstrated the existence of numerous of sensory correspondences between diverse attributes of stimuli presented in various sensory modalities in humans (Evans & Treisman, 2010; Koelewijn, Bronkhorst, & Theeuwes, 2010; Li, Moallem, Paller, & Gottfried,

2007; Spence, 2011, 2012). Among them, the tendency to associate a feature in one sensory modality with a seemingly-unrelated sensory feature in another sensory modality is known as a crossmodal correspondence. Examples here include such things as the association between sweet tastes and the sound of the piano, or the association between bitter tastes and the sounds of brass instruments (e.g., Crisinel & Spence, 2010).

According to Spence (2011), crossmodal correspondences can be classified into several distinct types; structural, statistical, semantic, and possibly also affective. The particular sensory correspondence can be represented at various levels of cognitive processing, depending on the task instruction/requirements, the strategy used by the individuals, and their degree of awareness of the sensory correspondence. So, for example, Klapetek, Ngo, and Spence (2012) established that participants could use information about the crossmodal correspondence between auditory pitch and visual brightness (in their experiment, light or dark) in a top-down manner. Their participants found it easier to use such information to search for a visual target in a cluttered display when the crossmodal pairing was congruent (low-frequency tone synchronized with dark target states or high-frequency tone synchronized with bright target states) than when it was incongruent.

Some sensory correspondences are involuntary, and hence are triggered regardless of whether it is advantageous to performance or not (e.g., Parise & Spence, 2012; see Spence & Deroy, 2013, on the automaticity of crossmodal correspondences). According to Knoeferle, Knoeferle, Velasco, and Spence (2014, in press), the facilitation effect on consumers' visual search for, and selection of, products based on the crossmodal correspondences was observed for newly-learned associations between unfamiliar brands and sonic logos, and is stronger (i.e., more

apparent) when searching within complex rather than simple visual displays. Therefore, it is quite possible that consumers could experience some kinds of sensory correspondences during their in-store shopping or else whilst browsing a web site, say, and that experience could then influence their purchase behavior. The findings from research on the sensory correspondences can be utilized in various ways, such as making display shelves which facilitates consumers' visual search for specific products, thus supporting their information processing and making choices, and improving the quality of the in-store purchasing experience.

Spence (2012) has suggested that a consumer's experienced value of a food product or beverage is increased by associating the product/brand name, package design, and label with the taste, smell, flavor, and texture. Meanwhile, Shen and Sengupta (2014) have demonstrated that spatially informative sounds facilitated people's preferences for visually-presented target products (but impaired their performance when given the goal of signal avoidance). Moreover, Knoeferle et al. (2014, in press) provided evidence that the presentation of spatially non-predictive auditory stimuli that happen to be associated with products (e.g., usage sounds or product-related jingles) can crossmodally facilitate consumers' visual search for, and selection of, products.

Meanwhile, elsewhere, Gatti, Bordegoni, and Spence (2014) have demonstrated the relationship between the color of the packaging and the perceived intensity of the fragrance in a liquid body soap. They also documented effects of the perceived weight of the container on the perceived intensity of the fragrance and on the expected efficacy of the product, as well.

Sensory Correspondences between Color and Visual Heaviness

Generally-speaking, an object's appearance influences its apparent weight. Relevant here, Deng and Kahn (2009) reported that color can influence the evaluation of packaging via perceived heaviness. According to Alexander and Shansky (1976), the effect of hue (pigment, such as "red" or "blue") on perceived weight is weak. On the other hand, lightness/value and chroma (intensity, sometimes referred to as "saturation"; see Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004 and Labrecque, Patrick, & Milne, 2013) exert a negative and a positive effect on perceived weight, respectively. In fact, Walker (2012) has shown that objects in a lighter color tend to be perceived as lighter (in weight). Meanwhile, Chijiwa (2001) has argued that the effect of color lightness on the perception of weight is about seven times greater than that of saturation.

These arguments are consistent with the results of an experiment reported by Gatti et al. (2014) in which the color of the bottle (package) had no effect on its perceived weight. Among the three colors (red, pink, and white) which they used in their experiment, the largest difference was in their saturation (100%, 19%, and 1% for red, pink, and white, respectively), while their brightness levels were nearly identical (95%, 99%, and 99%).

Meanwhile, Walker, Francis, and Walker (2010) examined the effect of color on perceived weight by preparing multiple pairs of colors, in which the two colors have different hues but identical surface-lightness (red/blue, green/gray, and lilac/turquoise), while maintaining a fixed level of saturation. The results revealed that even when the hues differed, weight perception did not change when the surface-lightness was kept constant. In other words, hue apparently has no effect on the perception of weight. When it comes to the achromatic colors (white and black), lower surface-lightness appears heavier as well (Walker et al., 2010).

While brightness refers to perceived luminance, lightness strictly refers to perceived

reflectance (Kingdom, 2011). Lightness is the perceived white/grey/black dimension of a surface that runs from dark to light, whereas brightness is the perceptual dimension that runs from dim to bright, meaning the absolute intensity of light that is reflected in the direction of the observer's eye by a surface (Glichrist, 2007).

The Location Effect

People tend to associate height with lightness. Objects appear more or less heavy when they are presented at the bottom of the visual field. Based on this principle, Deng and Kahn (2009) hypothesized, and established experimentally, what they refer to as the “location effect”. This refers to a phenomenon whereby placing product images at certain positions on product packaging makes the product appear heavier than when the same images are placed elsewhere on the packaging. Specifically, the heavier locations were on the bottom, right, and bottom-right of the package, while the lighter locations were on the top, left, and top-left.

The results of Deng and Kahn's (2009) experiment suggest that the “bottom-heavy effect” is a significantly stronger phenomenon than the “right-heavy effect”, as both a within- and between-participants factor, perhaps because eyedness (ocular dominance) moderates the right-heavy perception. Specifically, the left-eyed participants (i.e., those participants whose left eye was dominant) in Deng and Kahn's study perceived the object in the left visual field to be heavier than did the right-eyed participants.

Van Rompay, Fransen, and Borgelink (2014) investigated whether the location of imagery impacts the perception of weight. In line with Deng and Kahn (2009), the results of an experiment using a fictitious brand of washing powder confirmed the effect of location of

packaging imagery on consumer's estimates of the weight of the packaging. Specifically, the participants considered the package to be heavier when the imagery was located in the bottom-right region of the package as opposed to when it was located in the top-left region instead.

HYPOTHESES

Both Deng and Kahn (2009) and van Rompay et al. (2014) have demonstrated that pictorial objects placed at certain “heavy” locations in the visual field appear to be heavier than the same objects when placed at “light” locations, and that the bottom (top) is a heavy (light) location. The present study explores whether and how the location effect can be applied to ways of displaying the products on the shelf.

Given that lighter colored objects tend to be perceived as lighter (in weight), and objects appear lighter when they are presented at the upper part of the visual field, it can be expected there to be a consistent association between lightness in color and location. If so, in the in-store context, locating lighter colored products in the upper shelf positions and darker products in the lower shelf positions would be congruent with the sensory correspondences that so many people share. Although the right-heavy effect is known to matter in color-weight perception (Hirata, 1968), the current study is the first one in this area to focus specifically on the bottom-heavy effect.

If a lightness-location congruent display conforms to consumers' sensory correspondences, perceptual fluency should increase. Perceptual fluency is defined as the ease or difficulty, effort

required, speed, or accuracy of mental processing when a consumer perceives and distinguishes stimuli (Lee & Labroo, 2004; Reber, Wurtz, & Zimmermann, 2004). Previous research has shown that sensory correspondences can increase the speed and accuracy with which an object is detected and promote the selection of an appropriate response (e.g., Evans & Treisman, 2010; Klapetek et al., 2012). Therefore, displays that are designed to match consumers' sensory correspondences should increase their perceptual fluency.

There are several means to increase it, for example, the mere repetition of a stimulus, clarification of figure-ground segregation, and changing the color of letters to make them more visible (Reber, Winkielman, & Schwarz, 1998; Shen, Jiang, & Adaval, 2010). Thus, although it should, of course, be acknowledged that there are many potential factors besides sensory correspondences that may influence a consumer's perceptual fluency in-store, everything else being equal, lightness-location congruency is predicted to increase their perceptual fluency.

Moreover, the perceptual fluency of a target stimulus has been shown to positively influence behavioral intention via increased liking and preference for the stimulus (Reber et al., 1998; Winkielman & Cacioppo, 2001) and increased confidence in the decision (Alter, Oppenheimer, Epley, & Eyre, 2007). For example, Song and Schwarz (2008) have demonstrated that their participants were willing to pay significantly more for a dish when the menu was written in a font that was easy to read as compared to when it is difficult to read. That said, in certain domains, people have been shown to prefer a difficult-to-read stimulus, which gives the feeling of excitement and adventure, or conveys that its preparation requires considerable skill and effort (Song & Schwartz, 2010). Such fluency effects have been obtained in various categories, such as choosing trip destinations (Petrova & Cialdini, 2005), the purchasing of luxury products (Mandel,

Petrova, & Cialdini, 2006), and even amusement park rides (Song & Schwartz, 2010).

Deng and Kahn (2009) treat a package façade as the visual field and the product image as a pictorial object within that field. In this study, a display shelf is treated as the visual field and products located in the upper/lower half of the shelf are treated as pictorial objects within the field. Therefore, a lightness-location congruent display will not, as such, increase shoppers' preference for a particular product, but it may promote their purchase behavior, for example by increasing their willingness to pay (WTP) for a product that can be chosen from the display.

If the lightness-location congruent effect indeed comes from their sensory correspondences, the effect will be expected to occur in the context of a visual search for products in a display. This means that it will be possible for consumers to explore and select products more efficiently on a lightness-location congruent display than on a lightness-location incongruent display. According to theories of visual search, a set of visual features that are registered pre-attentively, such as luminance and color, direct attention towards the most promising parts of the visual field (Müller & Krummenacher, 2006; Treisman & Gelade, 1980). Moreover, Reutskaja, Nagel, Camerer, and Rangel (2011) have suggested that consumers' initial fixations are affected more by the location in the display than the value of items.

It is well-known that consumers exhibit a bias of looking first at items that are placed in the center regions of a display (Reutskaja et al., 2011). However, the current research proposes that there is another systematic bias in consumers' visual attention. Specifically, when consumers search for a light (dark) colored product, their visual attention will be directed toward the upper (lower) region in the visual field. As a result, when a target product is light (dark) colored, consumers' visual search time for the product on a display shelf will be shorter (i.e., they can

detect it rapidly) if the target product is located in the upper (lower) shelf positions.

The results of Deng and Kahn's (2009) experiments indicate that consumers are more likely to prefer those products placed at heavy (light) locations when heaviness is considered to be a positive (negative) attribute. According to Deng and Kahn, the goal of the consumer has a role as a moderator where a salient health goal, as opposed to a neutral goal, weakens the preference for packages using heavy locations. Consequently, if visual heaviness has a mediating role in the lightness-location congruency effect, consumers will be more likely to prefer a light (vs. dark) colored product located in upper shelf positions when lightness in weight is considered as an important attribute.

To summarize, it was expected that a display with light (dark) colored products located in the upper (lower) shelf positions would be more congruent with consumers' sensory correspondences than a display with light (dark) colored products in the lower (upper) shelf positions, and as a result, would positively influence consumers' purchase decision-making. Specifically, the following hypotheses were derived;

H1: A lightness-location congruent display will increase a shopper's perceptual fluency.

H2: A lightness-location congruent display will facilitate a shopper's visual search for a product.

H3: A lightness-location congruent display will positively influence a shopper's choice when the lightness of the products is considered as an important attribute.

H4: A lightness-location congruent display will positively influence a shopper's WTP.

On the other hand, on a lightness-location incongruent display where dark (light) colored products are located in the upper (lower) positions, the effects of lightness in color and location will offset each other even if consumers consider the lightness of the products. As a result, a lightness-location incongruent display will not influence consumers' choice regardless of whether the lightness of the products is considered.

EXPERIMENT 1

The experiments reported here, except for Experiment 2, were all carried out using Yahoo Crowd Sourcing service provided by Yahoo! Japan Corporation, and their questionnaires were written in Japanese. Another survey which was conducted in Japanese using Yahoo Crowd Sourcing in order to investigate the distribution of participants' demographics ($n = 2346$) indicated that 99.8 % of the participants lived in Japan. Besides, the experiments reported here were all conducted in accordance with the ethical guidelines laid down by the first author's university.

Stimuli Development

A pretest was conducted in order to identify the lightness levels that people would perceive as having different weights. For reference, two virtual displays were prepared. Each display had two rows and contained pictures of six different products (product groups A and B). Three products were displayed on each row, and every product had an equal number of facings (two). In order to avoid any confounding due to the effects of brand awareness, consumers' knowledge

and/or familiarity, the reference stimuli consisted of foreign brands sold outside of Japan.

In the pretest, 71 participants, who were over twenty years of age (female = 25.4%, age: $M = 39.3$ years, $SD = 10.65$), were presented with stimuli that differed only in terms of their lightness (10%, 20%, 30%, and 40% darker than the reference). The relative lightness of the images was adjusted using Microsoft PowerPoint. The data from two participants was excluded because they failed to answer all of the questions. The participants were instructed to indicate how heavy each product group as a whole appeared as compared to the reference on a seven-point scale (1 = “much lighter”; 7 = “much heavier”). The results of repeated-measures analyses of variance (ANOVAs) indicated that the darker the image, the heavier the apparent weight (group A: $F(3,204) = 9.764$, $p < .001$, group B: $F(3,204) = 24.609$, $p < .001$). Pairwise comparisons revealed that the participants perceived any two images as having different weights when there were at least 20% points of difference in lightness (Bonferroni-corrected $ps < .019$).

In addition, regarding the comparison with two different product groups, the participants perceived the 30% darker images of A and B as heavier than the 10% darker images of the other product group (30% darker images of A vs. 10% darker images of B: $t(68) = 6.06$, $p < .01$, 30% darker images of B vs. 10% darker images of A: $t(68) = 3.02$, $p < .01$). The results also indicated that, as expected, there was no significant difference between any pairs with the same level of relative lightness of color. On the basis of the above results, 10% darker images were adopted as lighter colored (perceived as lighter in weight) product groups, 30% darker images were adopted as darker colored (perceived as heavier) product groups, respectively, in Experiment 1¹.

¹ Changing saturation affects the perceived lightness of a color. Consequently, it is possible that even if only the lightness of a color is changed using software, another piece of software may

Procedure

102 female participants, who were over twenty years of age ($M = 39.6$ years, $SD = 11.62$), were recruited for Experiment 1 via the Internet. Males were not included because they were not the main buyers/users of the target product. The participants received a point worth 12 JPY (approximately 0.10USD) in return for taking part in the study.

The experiment used a one-factor (display: congruent vs. incongruent vs. control) within-participants design. Each virtual display contained the pictures of twelve different products (see Appendix A). In the congruent displays, the lighter colored product groups were located in the upper two rows, and the darker product groups were located in the third and fourth (i.e., the lower two) rows. On the other hand, in the incongruent displays, darker (lighter) product groups were located in the upper (lower) half. In addition, in the control displays, lighter and darker products were alternated in each row, and as a result, the total number of facings which the lighter/darker products had as a whole was equal to that of the congruent and incongruent display (twelve).

The two product groups displayed on the upper half of the shelves and the lower half were

indicate that the saturation of the color has also changed. In addition, there is another problem that, in fact, different software may have different derivation methods when it comes to judging the saturation of a color. Thus, for information, hue, saturation, and lightness of colors at the same coordinates ($x = 346$ pixel, $y = 398$ pixel) on a lighter and a darker version (image size: width = 817 pixel, height = 1131 pixel) were checked using the Adobe Photoshop Elements 14. The color values of each of the coordinates were as follows; lighter version (hue = 94° , saturation = 46%, lightness = 80%), darker version (hue: 94° , saturation= 61%, lightness = 60%).

counterbalanced across participants in order to avoid any confounding due to the effects of shape, hue, and saturation. Namely, half of the participants were presented with the shelves on which product group A (B) is located in the upper (lower) positions, and vice versa for the remainder of the participants.

The participants were presented with three types of virtual displays, one at a time, and asked to evaluate each display in terms of their perceptual fluency (1 = “very difficult to process”/“not at all eye-catching”/“not at all easy on the eye”; 7 = “very easy to process”/“very eye-catching”/“very easy on the eye”). The same measures of fluency were adopted by Shapiro and Nielsen (2013) as well. Once the participants had completed this task, they were asked a few questions about their demographic attributes.

Results

The three scales measuring perceptual fluency were summed to deliver a single index of perceptual fluency ($\alpha = .833$). First, it was checked whether the difference of product group (A or B) located in the upper (or lower) position exerted any influence over participants’ rating of perceptual fluency. A t-test revealed that there was no significant effect of this factor on the index of perceptual fluency. Therefore, the reported results of the analysis ignore the difference between the shelves on which product group A (B) was located in the upper (lower) positions and the shelves where product group B (A) was located in the upper (lower) ones.

A repeated-measures ANOVA with display as a within-participant factor conducted on the perceptual fluency index revealed a significant main effect of the display ($F(2,202) = 6.607$, $p < .01$, see Figure 1). Pairwise comparisons indicated that the participants’ perceptual fluency

was higher when they were presented with the putatively congruent display ($M_{\text{congruent}} = 12.30$) than when they were presented with the incongruent display ($M_{\text{incongruent}} = 11.78$, $t(102) = 2.50$, $p < .05$) or the control display ($M_{\text{control}} = 11.43$, $t(102) = 3.49$, $p < .01$). These results indicate that the display with light (dark) colored products located in the upper (lower) positions on the shelf increased the perceptual fluency for the participants. Thus, H1 (a lightness-location congruent display will increase a shopper's perceptual fluency) was supported.

The difference between the incongruent and the control display was not significant. It is possible that the visual clarity of the incongruent display compensated for the negative effect of the lightness-location incongruence on perceptual fluency. According to Labroo and Lee (2006), when brand choice is driven by perceptual fluency, as is the case in most supermarket purchases, the visual clarity of the exact image of the brand, the logo, or the packaging at the time of exposure is absolutely critical. Although the positions were opposite, the incongruent display was still organized in terms of surface-lightness as a whole, compared to the control display.

(Insert Figure 1 about here)

Discussion

The results of Experiment 1 support the prediction that a display with light (dark) colored products located in the upper (lower) shelf positions will increase consumers' perceptual fluency (H1). The results indicate that the perceptual fluency of those participants who were presented with the lightness-location congruent displays was higher than that of those participants who were presented with incongruent displays instead. Note that the difference of product group (A or

B) located in the upper (or lower) position did not exert significant influence over the participants' perceptual fluency.

However, perceptual fluency was measured by means of self-report. It would be interesting to test the effect of a lightness-location congruent display on consumers' purchase decision-making by collecting more objective measures. Besides, while in many cases, the quality of online data matches that collected in the lab (Woods, Velasco, Levitan, Wan, & Spence, 2015), online research has some important caveats such as the lack of control over the exact parameters of stimulus presentation (for example, screen resolution and display characteristics). Thus, in the next experiment, lab-based testing was conducted.

EXPERIMENT 2

Setting and Procedure

Experiment 2 was designed to investigate whether a lightness-location congruent display would facilitate the visual search for products in a shelf display. The experiment was conducted in Osaka, Japan.

Twenty participants, who were over twenty and under fifty years of age (female = 50%, age: $M = 34.6$ years, $SD = 8.50$), took part in the study. All of the participants were Japanese, and reported normal or corrected-to-normal vision and no color blindness. The participants received 4000 JPY (approximately 33.33 USD) in return for taking part.

The experiment was conducted in an 8.9×6.0 m room with twenty ceiling-mounted 36-watt (3450 lm) fluorescent tubes. The participants were seated approximately 50 cm from a 21.5 inch

monitor. The screen had a resolution of 1920×1080 pixels, and a screen refresh rate of 60 Hz. The packages and virtual displays were all presented against a full-screen white background.

Adobe Flash was used to create the interactive contents for the experiment. The experiment began with the instructions presented on the screen stating in Japanese that on every trial the participants would first be presented with an image of the target product for 3000 ms followed by a display shelf containing several dish detergents. Their task was to detect the target on the shelf as quickly as possible. The participants were required to point the target and click it on the screen using a computer mouse. A black central fixation cross appeared on a white background for 500 ms between the target and the shelf in order to focus the participant's attention on the center of the screen (see Figure 2). The participants were also informed that an "incorrect" message would appear on the screen when they clicked on an incorrect product, and that they could confirm the target at any time by pressing the "return to the target" button. Reaction times (RTs) were measured in milliseconds.

(Insert Figure 2 about here)

In this experiment, the product images were identical to those used in Experiment 1. The display shelf contained four rows and pictures of twelve different detergents. Three products were displayed on each row, and every product had an equal number of facings (two). The target product was selected randomly from among the displayed products.

Each participant conducted 24 trials and no identical images were presented as the target. In each trial, the target product was presented in one of the three different display types (i.e.,

congruent, incongruent, or control). In the congruent display condition, the target was displayed on a lightness-location congruent display where light (dark) colored products were located in the upper (lower) shelf positions, which means that the target product was always displayed in the first or second (third or fourth) rows when it was light (dark) colored. On the other hand, in the incongruent display condition, the target was presented on a display where dark (light) colored products were located in the upper (lower) shelf positions, which means that the target product was always displayed in the first or second (third or fourth) rows when it was dark (light) colored. In the control display, where light and dark colored products were alternated in each row, the lightness-location congruence/incongruence of the target was counterbalanced. That is, light (dark) colored target products were located in first or second (third or fourth) for half of the trials (i.e., congruent trials), and vice versa for the other half of the trials (i.e., incongruent trials). Each participant was presented with 8 congruent, 8 incongruent, and 8 control displays. In total, in this experiment, there were 160 trials for each display type (8×20 participants), giving rise to 480 trials (160×3 display types).

The order of target products and display types, and the positions of the target product and other 11 products on a display were all randomized both within and between participants. In addition, the number of trials in which the target product was presented was counterbalanced among the four rows.

Results

First, the analysis for effects of the three different displays is presented, then for the effects of lightness-location congruence/incongruence of the target products using data from the control

condition. The RT data from two trials was excluded from the analysis due to extremely poor performance (19375 ms in the congruent condition $> \text{average} + 11.8 \times SD$, and 14071 ms in the control condition (low_light trial) $> \text{average} + 9.5 \times SD$).

A repeated-measures ANOVA with display as a within-participant factor conducted on the RTs revealed a significant main effect of the display ($F(2,314) = 3.774, p < .05$, see Figure 3a). Pairwise comparisons revealed that the participants responded more rapidly on the congruent condition ($M_{\text{congruent}} = 1324$ ms) than on the incongruent condition ($M_{\text{incongruent}} = 1595$ ms, $t(157) = -2.731, p < .01$) or the control condition ($M_{\text{control}} = 1450$ ms, $t(157) = -2.420, p < .05$). No significant difference was found between the incongruent and the control conditions. These results therefore clearly indicate that the lightness-location congruent display resulted in faster visual search by the shoppers.

No significant difference was found on the errors among the three display types (error rates: congruent = 3.75%, incongruent = 1.25%, control = 3.13%). No significant difference was found on the number of times the “return to the target” button was pressed, either (use rates: congruent = 0%, incongruent = 1.25%, control = 1.25%).

2 (lightness: light vs. dark) \times 2 (location: upper vs. lower) repeated-measures ANOVAs on the RTs, the errors, and the number of times that the participants pressed the “return to the target” button in the control condition were conducted. The analysis revealed the marginal main effect of location ($M_{\text{upper}} = 1361$ ms, $M_{\text{lower}} = 1625$ ms, $F(1,38) = 3.446, p < .10$) on the RTs. More importantly, the results also revealed the lightness \times location interaction effect ($F(1,38) = 5.667, p < .05$, see Figure 3b). Planned contrasts revealed that when the target was light colored, the participants responded more rapidly on the upper trials ($M_{\text{light_upper}} = 1315$ ms) than the lower

ones ($M_{\text{light_lower}} = 1864$ ms, $t(38) = -2.311$, $p < .05$). Meanwhile, when the target was located in the lower positions, the participants responded more rapidly on the darker trials ($M_{\text{dark_lower}} = 1385$ ms) than on the lighter ones ($t(38) = 1.972$, $p < .10$).

As for the control condition, the participants made five errors only in the light_lower trials (3.13%). This was marginally higher than in the other trials where no error was made ($F(1,39) = 3.824$, $p < .10$). Although the participants pressed the “return to the target” button only twice in the light_lower trials, no significant difference was found in the numbers. Given these results, H2 (a lightness-location congruent display will facilitate a shopper’s visual search for a product) was also supported.

(Insert Figure 3 about here)

Discussion

Using objective measures, the results of Experiment 2 provide support for the notion that adopting the lightness-location correspondence in a store display facilitates consumers’ visual search (H2). The search task in Experiment 2 mimics a problem often faced by consumers in a supermarket setting where they may not know in advance where the product they planned to buy is located.

The participants responded more rapidly when the virtual display was lightness-location congruent than when it was incongruent or in the control display. Additionally, in the control condition, the participants responded more rapidly when they searched for light (dark) colored products in the upper (lower) shelf positions than in the opposite positions. Note that the faster

responses were not associated with any decrease in accuracy, and hence a speed-accuracy trade-off account of these results seems unlikely.

Experiment 1 showed that a display with light (dark) colored products located in the upper (lower) shelf positions increased shoppers' subjective perceptual fluency. In addition, Experiment 2 demonstrated the effect on their visual search for a product using objective data such as the speed, resource demands, and accuracy of mental processes.

EXPERIMENT 3

Stimulus Development

The aim of Experiment 3 was to assess whether a lightness-location congruent display positively influences a shopper's choice when the lightness of the products is considered. First, a pretest was conducted in order to develop stimuli, which included products among which there was no difference in attractiveness. In the pretest, 33 participants, who were over twenty years of age (female = 45.5%, age: $M = 37.1$ years, $SD = 10.40$), were presented with twenty images of books. In order to avoid any confounding due to the effects of the titles, foreign antique books were used as stimuli.

This target category was selected because the lighter (in weight) a book, the more people will perceive it as being easy to read. However, Schneider, Rutjens, Jostmann, and Lakens (2011) have suggested that the heaviness of a book could positively influence people's judgments of the importance of the book. Thus, the pretest was intended to develop stimuli that did not exhibit significant differences in terms of the preference for cover design or people's desire to read.

The participants were asked to evaluate each book cover in terms of their liking (1 = “extremely dislike”; 7 = “extremely like”). They were also asked to indicate on a seven-point scale (1 = “not at all”; 7 = “very much”) how much they would like to read the book.

From the results of repeated-measures ANOVAs with book cover design as a within-participants factor conducted on liking and desire to read, sixteen images were selected, among which there was no significant difference in any pair with regard to liking ($F(15,480) = 1.120, p = .335$) and desire to read ($F(15,480) = .932, p = .528$). Furthermore, these sixteen images were allocated to the upper and lower half of the shelf display in such a way that there was no significant difference between the upper and lower locations in terms of their liking ($M_{\text{upper}} = 4.50, M_{\text{lower}} = 4.48, t(32) = .184, p = .855$) and desire to read ($M_{\text{upper}} = 3.99, M_{\text{lower}} = 3.95, t(32) = .492, p = .626$).

On the basis of the above procedure, the virtual display was developed, which had four rows and contained pictures of sixteen different books. Four books were displayed in each row, and every book had an equal number of facings (one). All the sixteen books had an identical vertical rectangular shape.

Procedure

217 participants, who were over twenty years of age (female = 53.0%, age: $M = 38.2$ years, $SD = 9.43$), were recruited for Experiment 3 via the Internet. The participants received a point worth 12 JPY (approximately 0.10USD) in return for taking part. The design was a 2 (display: congruent vs. incongruent) \times 2 (time frame: present vs. future) mixed design. The display factor was manipulated between-participants, while the time frame factor was manipulated

within-participants (i.e., each participant made one choice for the present and one choice for the future).

In the congruent condition, the participants were presented with the virtual display, on which light (dark) colored products were located in the top (bottom) two rows, and vice versa in the incongruent condition. The only difference between the stimuli in the two conditions was in terms of their lightness in color. The lightness in color of the images was adjusted using Microsoft PowerPoint. In the congruent condition, the product images located in the lower half of the display were 20% less light-colored as compared to the original, and in the incongruent condition, the product images in the upper half were 20% less light-colored than the original (see Appendix B).

The participants were instructed to indicate which book they would like to buy if they were going to read it starting that day or in a month's time. Each choice could have one of two possible values, indicating whether the book was located in the upper or in the lower shelf positions. Whether the first choice was the present or future was left up to the participants, that is, they could make the decisions in the order they liked. The participants were also asked to indicate their willingness to pay (WTP) for each book which they chose in terms of the absolute monetary value (JPY).

Once the participants had completed this task, they were asked to evaluate each book which they chose using seven-point scales in terms of its ease of reading (1 = "It did not look readable at all"; 7 = "It looked very readable"), and importance (1 = "I did not think I could acquire knowledge from it at all"/"It did not look substantial or profound at all"; 7 = "I thought I could acquire a great deal of knowledge from it"/"It looked very substantial or profound"). Finally, the

participants were asked a few questions about their demographic attributes.

Results

Ease of reading/ Importance. A 2 (display: congruent vs. incongruent) \times 2 (time frame: present vs. future) repeated-measures ANOVA with time frame as a within-participant factor on the ease of reading score was conducted. The results revealed a significant main effect of the time frame; books chosen for the present were evaluated as more readable ($M_{\text{present}} = 4.21$) than books chosen for the future ($M_{\text{future}} = 3.87$, $F(1,215) = 15.054$, $p < .001$). Neither the main effect of the display nor the interaction effect by display \times time frame was significant.

On the other hand, regarding importance, there were no significant main or interaction effects (knowledge acquisition: $F_s < 1.104$, $p_s > .295$, substantial/profound: $F_s < .845$, $p_s > .359$). These results indicate that in this experiment, there was an effect of the time frame manipulation on participants' perception of ease of reading but not on their perception of the importance of the books. It can thus be deduced that the lightness (in weight) is considered more in the present time condition than in the future time condition.

Choice. A McNemar's test revealed that in the congruent display condition, the participants were more likely to choose books in the upper positions for the present (83.3%) than for the future (44.4%; $\chi^2(1) = 30.414$, $p < .001$, see Figure 4). Although another McNemar's test revealed a similar tendency in the incongruent display condition, the difference between the two time frames was small (present: 56.9%, future: 43.1%; $\chi^2(1) = 4.091$, $p < .10$) compared to that in the congruent condition. Moreover, in the present time condition, the choice share of the books in the

upper positions was larger when the participants were presented with the congruent display than when presented with the incongruent one ($\chi^2(1) = 18.092, p < .001$), meaning that the participants were more likely to choose a book in the upper positions when the book was light colored than when it was dark colored. Furthermore, in the incongruent condition, the choice share of the books in the upper positions for the present was not larger than might be expected by chance ($\chi^2(1) = 2.064, p = .151$). Thus, H3 (a lightness-location congruent display will positively influence a shopper's choice when the lightness of the products is considered as an important attribute) was supported.

(Insert Figure 4 about here)

Willingness to Pay (WTP). In order to assess whether the lightness-location congruency on the display shelf positively influenced shoppers' purchase behavior, a repeated-measures ANOVA on the WTP score was conducted. The participants' WTP in the congruent display condition was 243.96 JPY (approximately 2.03 USD) higher than in the incongruent display condition ($M_{\text{congruent}} = 1528.66$ JPY (12.74 USD), $M_{\text{incongruent}} = 1284.70$ JPY (10.71 USD)). However, any main effects and display \times time frame interaction effect were not significant. Thus, H4 (a lightness-location congruent display will positively influence a shopper's WTP) was not supported.

Discussion

The results provide evidence to support the prediction that lightness-location congruency

affects consumer choice (H3). The participants were more likely to choose a product in the upper (lower) rows for the present (future) regardless of lightness (i.e., in both congruent and incongruent conditions). This result implies that the effect of location on the visual heaviness is stronger than that of surface-lightness. However, in the present condition, participants in the congruent display (vs. incongruent display) were more likely to choose a product from the upper rows. Moreover, the participants in the incongruent condition were as likely to choose a book in the upper positions (i.e., a darker product) for the present as might have been expected by chance. These results imply that the lightness-location congruent effect is more powerful than the effect of location alone, and that the lightness-location incongruent display may cause confusion because the effects of lightness in color and location offset one another.

Regarding WTP (H4), it is possible that the association between visual heaviness and the expected price of a book influenced the results. The participants may have expected the price of books that appeared lighter to be lower than that of books that looked heavier. As a result, although lighter books being located in the upper positions increased perceptual fluency, their WTPs may have been inhibited.

Although generalizability was gained by using a realistic product assortment, a confound was also introduced because the different façade designs were intermixed in different locations. That is, one issue with Experiment 3 is that the data do not completely distinguish between two different location effects underlying the results. In other words, it is not clear whether the results reflect a location of the image on package façade or products on the display shelf. Thus, this confound will be removed in the subsequent experiment by keeping package façade design constant.

EXPERIMENT 4

The aims of Experiment 4 were to: (1) test H3 and H4 under more controlled conditions; and (2) to add more validity to the effects by using different methods. First, to eliminate the confounding due to the location effects of package façade design as such, the design elements were hold constant, except for their colors, using product variants of a particular brand as stimuli. Thus, all packages on shelves shared a common design regarding such elements as the logo, image, and their locations as well as the shape of the package. Second, the snack was selected as a target category to explore divergent product categories and increase the generalizability of the results. The snack category was selected because it has been confirmed that the surface-lightness of the products was related to consumer's health goal (Deng & Kahn, 2009). So far, the current study has used the virtual displays which have four rows and has treated the top (bottom) two rows as the upper (lower) position. In Experiment 4, the lightness-location congruency effect was investigated in a simpler shelf context by using a virtual shelf with just two rows.

Pretests

Two pretests were conducted. The first one was designed to develop stimuli. Fifty-three participants, who were over twenty years of age (female = 54.7%, age: $M = 37.4$ years, $SD = 10.33$), were presented with an image which consisted of eight product variants in a row. In order to avoid any confounding due to the effects of the brand awareness, consumers' knowledge and/or familiarity, a foreign brand (TEN ACRE) was used for the stimulus.

The participants were asked to indicate which snack they would like to buy. They were also asked to indicate which snack looked the tastiest and the healthiest. Subsequently, the participants were asked to evaluate each package on a seven-point scale (1 = “not at all”; 7 = “very much”) how much they would like to buy it, and how tasty/healthy the package design looked. Once the participants had answered these questions, they were asked about their recognition of the brand and purchase experience of each variant (yes/no).

The results revealed that choice shares of the eight variants were not significantly different from each other ($\chi^2(7) = 11.755, p = .109$), and none of the participants recognized the brand or had ever purchased any variant. Thus, these eight packages were allocated to the upper and lower row of the shelf in such a way that there were no significant differences between the upper and lower locations in terms of both their choice shares and evaluations on the purchase intention (choice share in the upper position = 56.6%, $\chi^2(1) = .925, p = .336$, evaluation; $M_{\text{upper}} = 4.472$, $M_{\text{lower}} = 4.359$, $t(52) = 1.251, p = .217$), tastiness (choice share in the upper position = 54.7%, $\chi^2(1) = .472, p = .492$, evaluation; $M_{\text{upper}} = 4.538$, $M_{\text{lower}} = 4.462$, $t(52) = .890, p = .378$), and healthiness (choice share in the upper position = 47.2%, $\chi^2(1) = .170, p = .680$, evaluation; $M_{\text{upper}} = 4.264$, $M_{\text{lower}} = 4.250$, $t(52) = .158, p = .875$).

On the basis of the above procedure, the virtual display was developed, which had two rows and contained pictures of eight product variants. Four product variants were displayed on each row, and every variant had one facing.

In the second pretest, questionnaires were developed to prime the participants with particular product attributes in the snack category. Eighty-four participants, who were over twenty years of age (female = 54.8%, age: $M = 37.9$ years, $SD = 8.76$), were first asked to answer

twelve questions about their consciousness of health or indulgence using seven-point scales (1 = “strongly disagree”; 7 = “strongly agree”). Each participant was randomly assigned to one of two primes (health/indulgence). In the health prime condition, the questionnaire asked participants to indicate how conscious they were of health in daily life (e.g., “I habitually take care of my health.”, “I go up/down stairs instead of taking a lift or escalator.”, or “I regularly have a medical examination.”). On the other hand, in the indulgence prime condition, the questionnaire asked participants to indicate how conscious they were of enjoyment in daily life (e.g., “People should enjoy their life.”, “I try not to build up stress as much as possible.”, or “Eating delicious foods makes me so happy.”). Once the participants had completed this task, they were asked to list as many important attributes they considered as possible when purchasing snacks.

Two independent judges, who were blind to the experimental conditions, read and categorized the list of the participants’ salient attributes as health-related, indulgence-related, price-related, and other. After coding the list, the two judges counted how many attributes there were in each category. Inter-rater reliability for these judgments was sufficiently high ($\alpha_{\text{health}} = .877$, $\alpha_{\text{indulgence}} = .916$, $\alpha_{\text{price}} = .984$). In case of disagreements, the two judges decided the numbers through discussions. The results of t-tests revealed that the participants indeed mentioned primed attributes more frequently than unprimed attributes. The participants in the health prime condition listed more health-related attributes than those in the indulgence prime condition ($M_{\text{health}} = 1.03$, $M_{\text{indulgence}} = 0.58$, $t(82) = 2.130$, $p < .05$). On the other hand, the participants in the indulgence prime condition listed more indulgence-related attributes than the participants in the health prime condition ($M_{\text{health}} = 0.45$, $M_{\text{indulgence}} = 0.85$, $t(82) = -2.105$, $p < .05$). There was no significant difference between the two conditions regarding the number of

price-related attributes ($M_{\text{health}} = 0.17$, $M_{\text{indulgence}} = 0.27$). These results indicate that the priming manipulation made the participants focus on the appropriate attribute type in the relevant condition.

Procedure

900 participants, who were over twenty years of age (female = 46.4%, age: $M = 39.2$ years, $SD = 10.08$), were recruited for Experiment 4 via the Internet. The participants received a point worth 12 JPY (approximately 0.10USD) in return for taking part. The design was a 2 (display: congruent vs. incongruent) \times 2 (prime: health vs. indulgence) between-participants experimental design.

In the congruent display condition, the participants were presented with the virtual display with light (dark) colored products located in the upper (lower) row. In the incongruent display condition, the participants were presented with the virtual display with dark (light) color located in the upper (lower) row. The stimuli in the two conditions differed only in terms of their lightness in color. The lightness of the images was adjusted using Microsoft PowerPoint. In the congruent condition, while the packages in the upper position were 10% lighter-colored as compared to the original, the packages in the lower position were 10% less light-colored as compared to the original, and vice versa in the incongruent condition (see Appendix C).

The participants were first instructed to answer the twelve questions for priming. Each participant was assigned to one of the two primes. After answering these questions, half of the participants were instructed to indicate which snack they would like to have if they were to get one in return for taking part in the experiment. On the other hand, the other half of the

participants were instructed to indicate which snack they would like to have if they were to take a break right now and eat it. Each choice could have one of two possible values, indicating whether the snack was located in the upper row or in the lower row. The participants were also asked to indicate their willingness to pay (WTP) for the snack they chose in terms of the absolute monetary value (JPY).

Once the participants had completed this task, they were asked to comment on their decision-making using a seven-point scale (1 = “not at all”; 7 = “very much”), namely how much they considered the effects of the snacks on their health, calories, and content weight. Finally, the participants were asked a few questions about their demographic attributes.

Results

A test of independence was conducted to assess whether the instruction on choice (receiving as a reward/having a break and eating) is related to the choice shares of products in the upper/lower position among the four conditions. The result revealed that the instruction and the choice shares were independent ($\chi^2(3) = 2.497, p = .476$). Therefore, the results of the analysis reported here ignore the instruction that each participant was given.

Manipulation Check. 2 (display: congruent vs. incongruent) \times 2 (prime: health vs. indulgence) ANOVAs on the participants' consideration scores on health, calories, and content weight were conducted. The results revealed main effects of the prime; the participants in the health prime condition considered the effects on their health ($M = 3.02$), calories ($M = 3.08$) and content weight ($M = 3.17$) more than those participants in the indulgence prime condition (health;

$M_{\text{indulgence}} = 2.75$, $F(1,896) = 7.546$, $p < .01$, calories; $M_{\text{indulgence}} = 2.59$, $F(1,896) = 13.672$, $p < .001$, content weight; $M_{\text{indulgence}} = 2.96$, $F(1,896) = 4.135$, $p < .05$). The result indicates that there was an effect of the prime manipulation on the participants' cognitive focus. That is, the lightness (in weight) of the product was more important for the participants in the health prime condition than for those in the indulgence condition. None of the main effects of the display nor the display \times prime interaction effect was significant.

Choice. When the congruent display was presented, the participants in the health prime condition were more likely to choose a snack in the upper position (67.2%) than the participants in the indulgence prime condition (58.0%; $\chi^2(1) = 4.519$, $p < .05$, see Figure 5a). On the other hand, in the incongruent display condition, the difference between the two prime conditions was not significant (health: 57.5%, indulgence: 55.5%; $\chi^2(1) < 1$). Moreover, in the health prime condition, the choice share of the snacks in the upper position was larger when the participants were presented with the congruent display shelf than when they were presented with the incongruent one ($\chi^2(1) = 4.479$, $p < .05$), meaning that the participants were more likely to choose a snack in the upper position when the snack was light colored than when it had a darker color. Thus, H3 (a lightness-location congruent display will positively influence a shopper's choice when the lightness of the products is considered as an important attribute) was supported.

Willingness to Pay (WTP). In order to assess whether lightness-location congruency on the display shelf positively influenced shoppers' purchase decision-making, an ANOVA was conducted on the WTP score. The results revealed a main effect of the display. The participants

in the congruent display condition were willing to pay more for the snack they chose ($M_{\text{congruent}} = 239.00$ JPY; approximately 1.99 USD) than those participants in the incongruent display condition ($M_{\text{incongruent}} = 169.72$ JPY; approximately 1.14 USD, $F(1,892) = 16.435$, $p < .001$, see Figure 5b). Neither the main effect of the prime nor the interaction effect by display \times prime was significant. Therefore, H4 (a lightness-location congruent display will positively influence a shopper's WTP) was also supported.

(Insert Figure 5 about here)

Discussion

The results of Experiment 4 replicate and extend those of Experiment 3 in several important ways. First, using different stimuli and a different manipulation, Experiment 4 demonstrates the robustness of the effects observed in Experiment 3 by showing that consumers were more likely to choose a light (vs. dark) colored product which was located in the upper shelf position when the lightness of the products was considered (i.e., in the health prime condition). Second, when the participants were presented with the incongruent display, the choice share of snacks in the upper position (i.e., a dark product) was almost the same between the two prime conditions. These results are consistent with the finding in Experiment 3 in showing that the effects of lightness in color and location offset each other on the incongruent display as well. Third, Experiment 4 provides systematic evidence in support of the prediction that the lightness-location congruent display would positively influence their purchase decision-making (H3 and H4). The WTP of the participants who were presented with the congruent display was

significantly higher than that of the participants who were presented with the incongruent display. Note that the results of the pretest indicated that the two priming manipulations did not affect the participants' focus on price in a different way. Finally, and most importantly, using the product variants of a certain brand (i.e., same façade design) as stimuli, Experiment 4 removed the confounding that might cause the results of current research reflect the location of the image on package façade, not locations of the products on the display shelf.

GENERAL DISCUSSION

The research reported here has examined how the lightness in color of the product packaging and its location on a display shelf interactively affected consumers' purchase decision-making via perceived visual heaviness. Four experiments were conducted to test the hypothesis that congruence and incongruence with the sensory correspondences on a display would induce differential perception and choice, which were supported by the results.

Converging evidence was presented using different dependent measures (subjective fluency in Experiment 1, visual search in Experiment 2, choice in Experiments 3 and 4, and WTP in Experiment 4), different designs (within-participants in Experiments 1 and 2, mixed in Experiment 3, and between-participants in Experiment 4), and across different product categories (dish detergent in Experiments 1 and 2, books in Experiment 3, and snacks in Experiment 4). The evidence reported here therefore shows that the effect of lightness-location congruency on purchase decision-making is robust.

Specifically, the current research confirms that a display with light (dark) colored products

located in the upper (lower) shelf positions increases shoppers' perceptual fluency (Experiments 1), facilitates their visual search (Experiment 2), and positively influences their purchase behavior, such as increasing the WTP (Experiment 4). The results suggest that in-store environment design which is congruent with shoppers' sensory correspondences has a considerable potential for retailers wishing to grow their sales.

The data also indicated that when the lightness of the products was considered, consumers were more likely to choose products in the "light" location when they are light (vs. dark) colored (Experiments 3 and 4). These results support the notion that lightness in color and location interactively affect visual heaviness, and the sensory congruency between lightness and location is important.

This study provides an additional, important perspective on the consumers' perceptual fluency literature from the viewpoint which has received relatively little attention to date. The concept of perceptual fluency has been applied to a wide range of marketing stimuli, such as the design of brand logos (Janiszewski & Meyvis, 2001; Salgado-Montejo, Velasco, Oliver, Alvarado, & Spence, 2014), advertising (Labroo & Lee, 2006; Lee & Labroo, 2004), and scent in store (Herrmann, Zidansek, Sprott, & Spangenberg, 2013). Schifferstein and Howell (2015) suggested that color-fragrance associations did not necessarily influence consumers' preference for fragrances. However, odors do not only have associations with colors, but also with other sensory features such as shapes or abstract symbols (Hanson-Vaux, Crisinel, & Spence, 2013; Seo et al., 2010). In addition to these findings, the present study provides the evidence that sensory congruent displays resulted in more fluent perception.

Previous research has indicated a crucial role of position in a display. These studies

investigated how consumers choose a product from different types of displays and showed that visual attention plays a critical role in their choice (Chandon, Hutchinson, Bradlow, & Young, 2008; Reutskaja et al., 2011; Russo, 2010). Van der Laan, Hooge, de Ridder, Viergever, & Smeets, (2015) suggested that the location of the first fixation had no down-stream effect on consumer choice. However, in cluttered environments like a supermarket where many products are displayed, consumers tend to spend very little time searching for a product. For example, consumers in the U.S. took an average of 13.16 seconds from the time they entered the aisle to decide which brand of detergent to select (Hoyer, 1984) and consumers in Singapore took 12.18 and 13.80 seconds to decide about detergent and shampoo, respectively (Leong, 1993). In such environments, the effect of lightness-location congruency on shoppers' visual search may be crucial, and rapid detection of a product by shoppers in a store may give a competitive advantage to the manufacturer.

Research on consumers' in-store purchase behavior has shown that eye or hand levels are best and the worst one is the lowest level because top- and middle-shelf positions gain more attention than low-shelf positions (Drèze, Hoch, & Purk, 1994). In fact, the results of Experiment 2 indicated that consumers tended to respond more rapidly to products in the upper positions on the shelf. In addition, the current study demonstrated that there was another systematic bias in consumers' visual attention that meant their perceptual judgment might be positively influenced by in-store environments designed to be congruent with their sensory correspondences.

The experiments reported here imply that the lightness-location relationship can be used strategically to create favorable perceptions of the display and enhance purchase behavior. Marketers may be able to use the operations of these perceptions to improve the ease of shopping

in a store and gain their competitive advantage.

Store managers may wish to adapt their store environments that they control to make shoppers' purchase behavior more efficient and less stressful. Specifically, making a certain type of sensory correspondence active and then framing a decision as having consequences relevant to it may have an influence on shoppers' decision-making. For example, any marketing communications that prime shoppers with heaviness/lightness in the store environment where the lightness in color of display shelves or interior wall is congruent with the height are expected to improve category sale or average spending per customer.

For the manufacturers of less competitive brands, for which it is difficult to display their products at eye or hand level on the shelves, the findings of the current study should also be useful. It would be better to locate the products at the position which is congruent with the lightness of the package/product color or associate the lightness of the package/product color with the allocated locations. For example, if the products are allocated to the "heavy" locations, then a darker package will be beneficial. This is also important in that shoppers can detect their products as quickly as possible. For companies that have multiple product variants or brands within a category, it might be advisable to allocate the appropriate locations to different color products.

In order to minimize potential perceptual confusion, manufacturers could associate the lightness of the package color and the location on a shelf with the current positioning of their brands. For example, a brand which has a healthy image may benefit from light colored packaging and upper shelf positions. On the other hand, a brand of full-bodied wines might communicate the richness effectively by using a dark colored package and locating it at lower

shelf positions.

One limitation with the present study is that the individual product image used in the experiments originally has different levels of lightness, saturation, and hue. Although the lightness in color was relatively controlled, the packages whose original images had different absolute lightness value compared to each other were intermixed in different locations. Future research should address this issue by keeping the absolute lightness value of stimuli constant. It is also not clear whether the results are obtained with saturation and/or hue, not with lightness. However, previous research has implied that both saturation and hue have much less of an impact on visual heaviness than lightness (Chijiwa, 2001; Gatti et al., 2014; Walker et al., 2010). Therefore, the results of the current study do not seem to be obtained with saturation and/or hue.

Many previous studies have suggested that because not only vertical but also horizontal center positions receive more attention, brands located in the horizontal center of a shelf are noted more and chosen more often (Atalay, Bodur, & Rasolofoarison, 2012; Christenfeld, 1995; Shaw, Bergen, Brown, & Gallagher, 2000). Moreover, previous research has shown that people exhibit a “right-heavy” bias in their perception as well (Deng & Kahn, 2009; van Rompay et al., 2014). However, the current research only examined the “bottom-heavy” effect. Investigating the lightness-location effect from the horizontal viewpoint would allow for the generalization and investigation of the boundary conditions of the proposed effects in different in-store environments.

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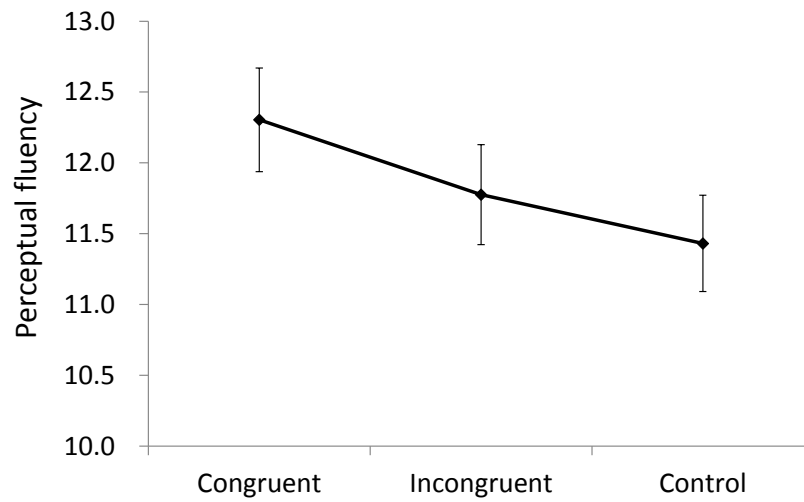
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Figure 1. Lightness-Location Congruency Effect on Perceptual Fluency in Experiment 1.



Note: Perceptual fluency score ranged from 3 to 21, with higher values indicating higher perceptual fluency. Error bars represent the standard errors of the means.

Figure 2. Schematic Representation of a Trial in Experiment 2.

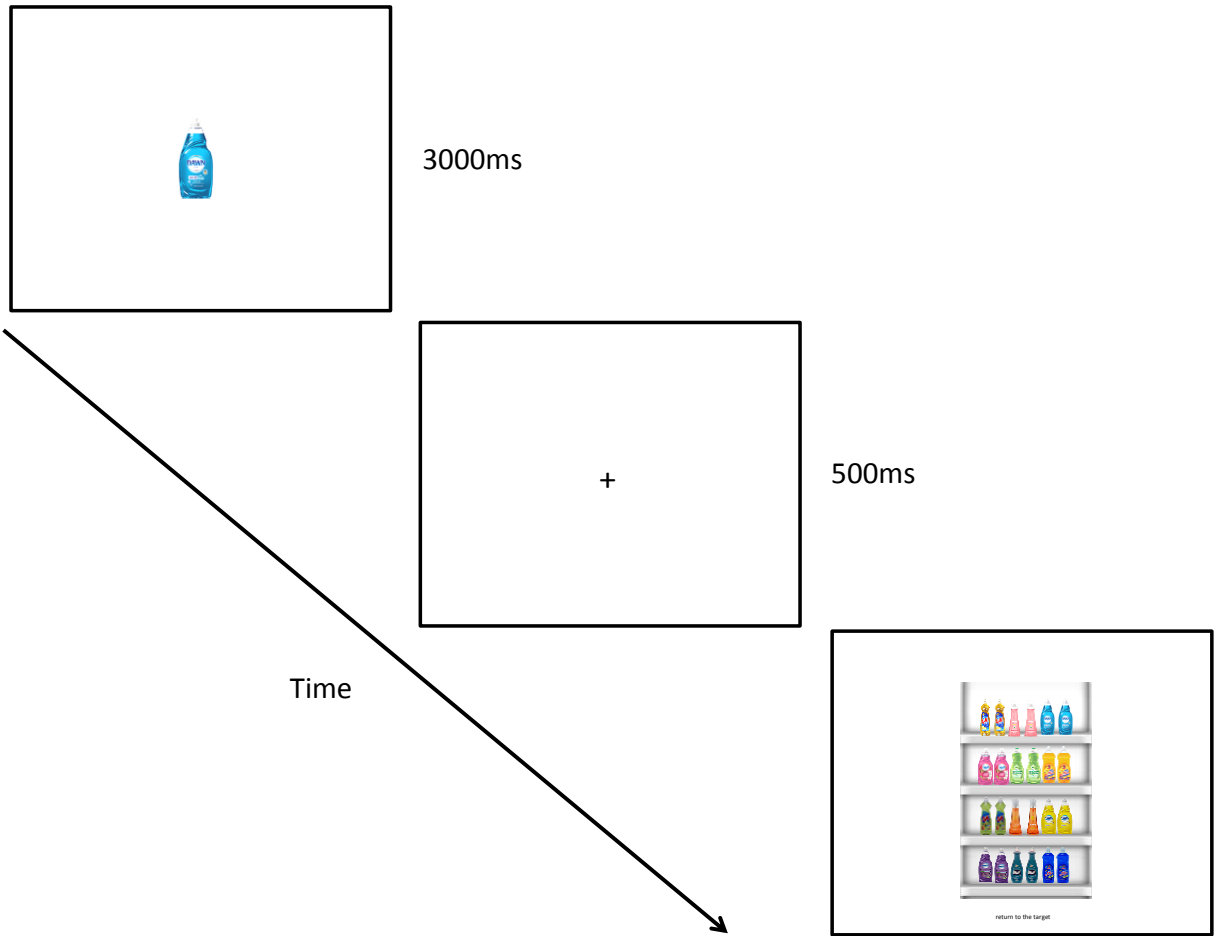
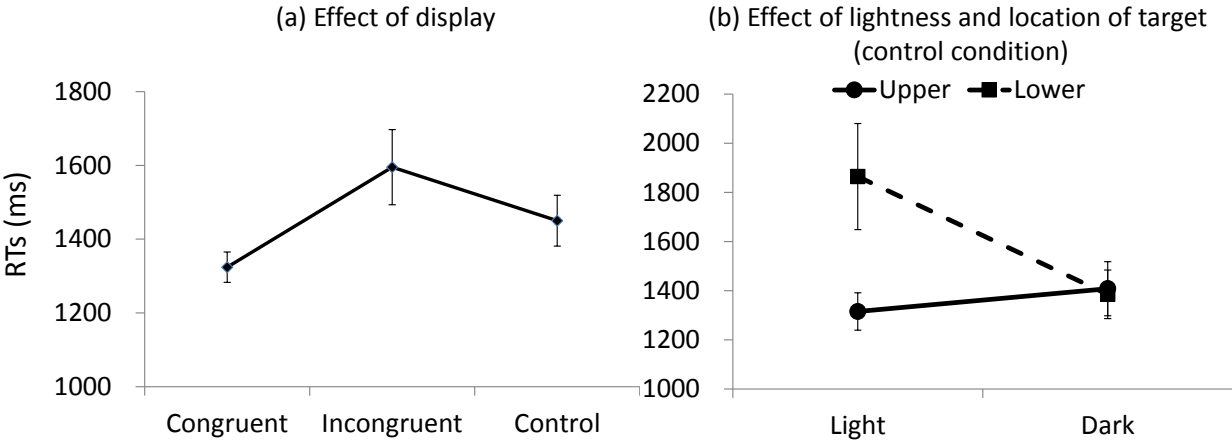


Figure 3. Lightness-Location Congruency Effect on Reaction Times in Experiment 2.



Note: Error bars represent the standard errors of the means.

Figure 4. Lightness-Location Congruency Effect on Choice in Experiment 3.

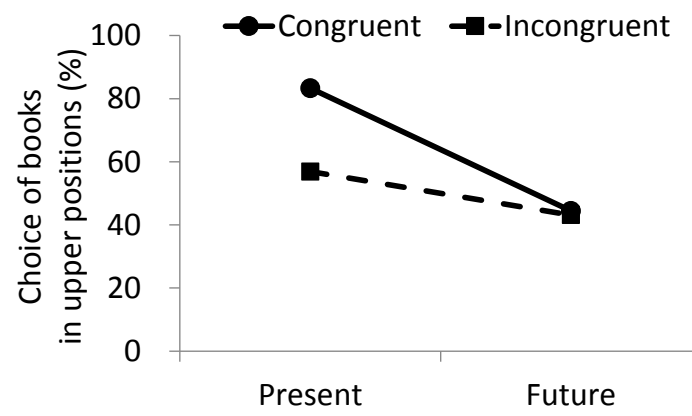
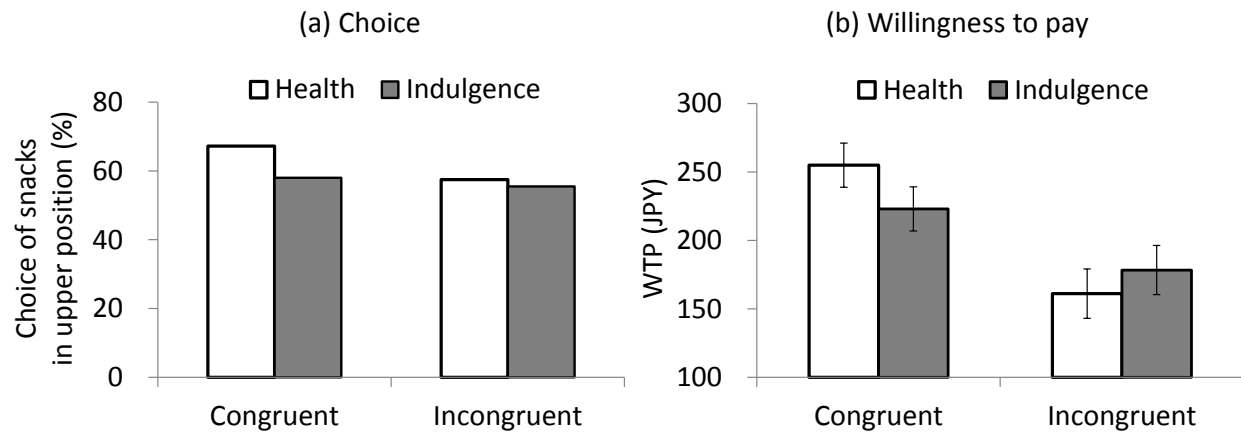
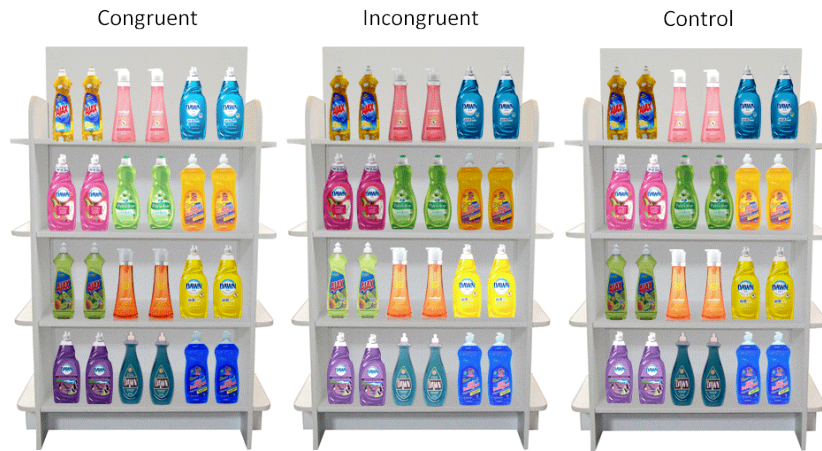


Figure 5. Lightness-Location Congruency Effect on Choice and WTP in Experiment 4.

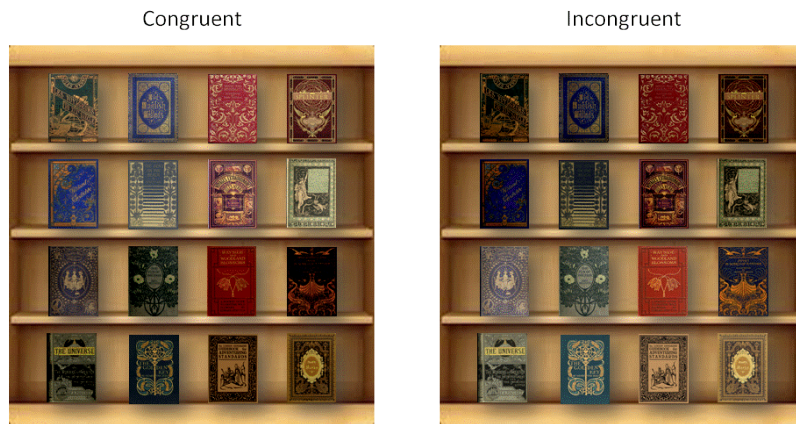


Note: Error bars represent the standard errors of the means.

Appendix A. Stimuli for Experiment 1



Appendix B. Stimuli for Experiment 3



Appendix C. Stimuli for Experiment 4

