

The Pleasure and Sin of Darkness:
The Impact of Dark versus Bright Color Cues on Indulgent Consumption

KUANGJIE ZHANG

MONICA WADHWA

AMITAVA CHATTOPADHYAY*

* Kuangjie Zhang (kuangjie.zhang@insead.edu) is a doctoral candidate in marketing, Monica Wadhwa (monica.wadhwa@insead.edu) is an Assistant Professor of Marketing, and Amitava Chattopadhyay (amitava.chattopadhyay@insead.edu) is the INSEAD Chaired Professor of Marketing and Innovation, all at INSEAD, 1 Ayer Rajah Avenue, Singapore 138676. Correspondence should be addressed to Kuangjie Zhang.

Contribution Statement

Departing from previous research on the impact of the metaphoric meanings associated with hues (e.g., red vs. blue) on consumer decision making (e.g., Bagchi and Cheema 2013; Mehta and Zhu 2009), we show that the mere brightness (value dimension of color) of the color cues can differently influence consumers' desire and preference for indulgent consumption. Building upon research on color cognition, we propose that darkness is associated with two conflicting connotations, sin and pleasure. Further, we demonstrate that dark (vs. bright) color cues can either increase or decrease consumers' desire and preference for indulgent products depending on the relative accessibility of the concept of pleasure versus sin. In identifying this dual effect of darkness, our findings not only contribute to the existing literature on indulgent consumption and impulsive consumer behavior, but also add to the emerging research on how ambient and product related sensory cues impact consumer decision making. Finally, our findings have important managerial implications for packaging and advertisement designs.

Abstract

Consumers are influenced by the metaphoric meanings associated with color brightness. Building on prior research on color cognition, we argue that darkness is associated with two conflicting connotations, sin and pleasure. Further, we propose that the relative mental accessibility of these two concepts drives the impact of dark color cues as compared to bright color cues on consumers' likelihood to engage in indulgent consumption. Across four studies, we show that dark (vs. bright) color cues can enhance consumers' desire and preference for indulgent food products when the concept of pleasure is more accessible (e.g., when consumers focus on the pleasurable aspect of indulgent consumption). Conversely, we show that dark (vs. bright) color cues can reduce consumers' desire and preference for indulgent food products when the concept of sin is more accessible (e.g., when consumers focus on the sinful aspect of indulgent consumption).

Metaphors are widely used in language and are fundamental to human cognition (Lakoff and Johnson 1980; Landau, Meier, and Keefer 2010). In literature and popular culture, brightness is often likened to goodness and purity, whereas darkness is often likened to evil and sin. The Bible, for example, refers to Jesus as the “light of the world,” and Satan as the “prince of darkness.” In Asian culture, the Hindu Upanishads use light to depict truth and darkness to depict delusions (Meier, Robinson, and Clore 2004). Similarly, good characters in popular movies are often dressed in white, while evil characters are often dressed in black. Recent research offers empirical evidence for this metaphoric relationship, indicating that brightness is associated with virtue whereas darkness is associated with sin (Meier et al. 2004; Sherman and Clore 2009).

Departing from prior research, we examine the possibility that darkness could carry not just negative connotations, but also positive connotations. This possibility arises from anecdotal evidence, which suggests that darkness is associated with pleasure. For example, the popular movie character Catwoman, dressed in black, straddles the line between good and evil and has been hailed as one of the most entertaining characters by fans (Esposito 2012). Black is also commonly used by designers for party wear. In a similar vein, the dim lights at bars or clubs are associated with pleasurable nightlife, whereas switching on the lights at the end of a party or a movie often indicates the end of such a pleasurable event. Drawing upon the anecdotal evidence, in the current research we examine whether darkness is associated with two conflicting connotations—a negative connotation of sin (in accordance with previous research) and a positive connotation of pleasure. Further, to the extent darkness is associated with both sin and pleasure, we examine how dark color cues, as compared to bright color cues, impact one’s indulgent consumption behavior.

Based on research on the role of knowledge accessibility in consumer behavior (Higgins 1996; Wyer 2008), we propose that the impact of dark versus bright color cues on indulgent consumption depends on the relative mental accessibility of the two concepts, the concept of pleasure and the concept of sin. Specifically, when the concept of pleasure is more accessible (e.g., when consumers focus on the pleasurable aspect of indulgent consumption), dark color cues as compared to bright color cues should enhance consumers' desire and preference for indulgent consumption. However, when the concept of sin is more accessible (e.g., when consumers focus on the sinful aspect of indulgent consumption), dark color cues as compared to bright color cues should reduce consumers' desire and preference for indulgent consumption. We term these effects the dual effect of darkness.

Our research contributes to the existing literature in several ways. First, while the majority of the research on the impact of color on consumer decision making has looked at how color affects consumer decision making through the feelings colors elicit (e.g., Gorn et al. 1997, 2004), our research focuses on color cognition and examines the impact of the metaphoric meanings associated with color on consumption behavior. Second, while the literature has hitherto focused on the associations with the hue dimension (e.g., red vs. blue) of color (Bagchi and Cheema 2013; Chattopadhyay, Gorn, and Darke 2009; Mehta and Zhu 2009), we examine the impact of metaphoric meanings associated with the value dimension (brightness) of color on consumer decision making. Third, by showing how bright versus dark colors impact indulgent consumption behavior, our research also contributes to the growing body of literature examining the role of various ambient or product related sensory cues in consumer behavior.

We organize the rest of this article as follows: In the next section, we review the literature on color cognition and knowledge accessibility to derive our hypotheses related to how dark

versus bright color cues could impact consumers' desire and preference for indulgent consumption and whether this effect is driven by the relative accessibility of the concept of pleasure versus sin. Subsequently, we present four studies that test our aforementioned propositions. Finally, we conclude our paper with a discussion of the implications of our findings and possible future research directions.

CONCEPTUAL BACKGROUND

It has been widely accepted in color research that there are three independent dimensions of color: hue, chroma, and value (Gorn et al. 1997; Thompson, Palacios, and Varela 1992). Hue is the pigment of the color, which is perceived in discrete categories (e.g., red, blue, gray). Chroma is a continuous dimension measuring the saturation (amount of pigmentation) in the color. Likewise, value is also a continuous dimension that indicates the degree of brightness or darkness of the color, ranging from pure black (i.e., the highest level of darkness) to pure white (i.e., the highest level of brightness). To elaborate, low value colors (i.e., dark colors) are more blackish as if the color black was added to the pigment, whereas high value colors (i.e., bright colors) are more whitish as if the color white was added to the pigment (Gorn et al. 1997).

While previous research has examined the effects of color on consumers' feelings of relaxation or excitement (Gorn et al. 1997, 2004), in the present research we focus on color cognition, that is, the meanings associated with color, and we discuss its implications for consumption behavior.

Color Cognition: The Metaphoric Meanings Associated with Color

Much of extant research on color cognition has examined how different meanings associated with varying hues can impact consumption behavior. For example, red is shown to be associated with dangers and mistakes, whereas blue is shown to be associated with openness, peace, and tranquility (Elliot et al. 2007; Mehta and Zhu 2009). Building on this argument, Mehta and Zhu (2009) show that blue (vs. red) screen color can enhance people's performance on creative tasks, whereas red (vs. blue) screen color can enhance people's performance on detail-oriented tasks. More recently, Bagchi and Cheema (2013) show that red (vs. blue) color is associated with aggression, which can differently impact consumers' willingness-to-pay in auctions versus negotiations in the marketplace. Furthermore, particular hues are closely related to certain cultural norms (Chattopadhyay et al. 2009; Jacobs et al. 1991). For example, red is considered a lucky color that is associated with the New Year Festival in Chinese culture, while green is considered a lucky color that is associated with St. Patrick's Day in Irish culture. As a result, consumers are more likely to purchase products with a red (or green) packaging color when the corresponding cultural norm becomes salient.

Importantly, some research indicates that the value dimension of the color (also referred to as the degree of brightness or darkness) is also associated with metaphoric meanings. In particular, this stream of research suggests that brightness is often associated with positive meanings, such as goodness and purity. In contrast, darkness is often associated with negative meanings, such as evil and sin (Meier et al. 2004; Sherman and Clore 2009). Consistent with this proposition, Stabler and Johnson (1972) found that children tend to assume that black boxes contain negative objects and white boxes contain positive objects. Further research suggests that sports teams wearing black uniforms are judged to be more evil, nasty, and malevolent than the

other teams by lay people as well as professional referees (Frank and Gilovich 1988). More recently, Sherman and Clore (2009) asked participants to evaluate immoral words (e.g., “cheat”) and moral words (e.g., “honesty”) presented on a computer screen in either black or white font. Participants were much faster to evaluate an immoral word (e.g., “cheat”) when it appeared in black font than when it appeared in white font. Conversely, participants were much faster to evaluate a moral word (e.g., “honesty”) when it appeared in white font than when it appeared in black font. These findings provide converging evidence that darkness is associated with the concept of sin, whereas brightness is associated with the concept of goodness.

In the current research, we explore if darkness could also be associated with the concept of pleasure. As alluded to before, anecdotal evidence suggests that black is widely considered a pleasurable and alluring color. Despite the anecdotal evidence, there is no direct empirical support for this association between darkness and the concept of pleasure. Thus, to examine whether people indeed associate darkness with pleasure, we conducted a pilot study, which is described in the following section.

Pilot Study: The Pleasure and Sin of Darkness

In line with the color specifications used in prior research (Meier et al. 2004; Sherman and Clore 2009), we used gray scale as the relevant hue dimension. With gray scale, brightness was manifested in the color white (100% gray scale), and darkness was manifested in the color black (0% gray scale). Therefore, in the pilot study, the color stimulus was presented in either black (darkness) or white (brightness) in the form of a rectangular shape displayed on a light gray background (50% gray scale). Seventy-five US participants (67% female, $M_{\text{age}} = 35$) were

recruited from Amazon's mechanical turk to participate in an online pilot study in exchange for compensation. The pilot study followed a 2 (color brightness: bright vs. dark) \times 2 (evaluation dimension: pleasure dimension vs. sin dimension) between-subjects design. Half of the participants were asked to evaluate the color stimulus on three seven-point items anchored by "not at all fun/a lot of fun", "not at all pleasurable/very pleasurable", and "not at all boring, very boring" (the last item was reverse coded), which measured the pleasure dimension of the color. The other half of the participants were asked to evaluate the color stimulus on three seven-point items anchored by "not at all sinful/very sinful", "not at all vicious/very vicious", and "not at all virtuous/very virtuous" (the last item was reverse coded), which measured the sin dimension of the color. The three items for each dimension were averaged after reverse coding the third item to form a composite index (Cronbach's $\alpha = .85$ for the pleasure dimension, Cronbach's $\alpha = .77$ for the sin dimension).

The results revealed a significant main effect of the color brightness ($F(1, 71) = 37.77, p < .001$), which was qualified by a significant interaction between the evaluation dimension and color brightness conditions ($F(1, 71) = 4.56, p < .04$). First, consistent with prior research, we found that participants rated black (darkness) as more sinful than white (brightness) ($M_{\text{darkness}} = 4.35$ vs. $M_{\text{brightness}} = 1.89, F(1, 71) = 34.77, p < .001$). More importantly, participants also rated black (darkness) as more pleasurable than white (brightness) ($M_{\text{darkness}} = 3.60$ vs. $M_{\text{brightness}} = 2.41, F(1, 71) = 7.93, p < .01$). To summarize, in line with anecdotal evidence, the results from our pilot study show that participants considered darkness not only more sinful but also more pleasurable than brightness.

Building on existing research and the results from our pilot study, we argue that darkness as compared to brightness is associated with two conflicting connotations, the concept of sin and

the concept of pleasure. In the section that follows, we discuss the implications of these associations for consumption behavior.

The Impact of Dark versus Bright Color Cues on Indulgent Consumption

Our pilot study shows that darkness is associated with both the concept of sin and the concept of pleasure. In a similar vein, prior research has also characterized indulgent or vice consumption as both sinful and pleasurable (e.g., Khan and Dhar 2006; Kivetz and Simonson 2002; Lascu 1991; Wertenbroch 1998). While consumers are tempted by the pleasure of indulgent consumption, the sin associated with indulgent consumption elicits the unpleasant feeling of guilt, which inhibits consumers from pursuing indulgence. In the paragraphs that follow, we draw upon these two perspectives to derive our hypotheses with regard to how dark versus bright color cues may impact consumers' indulgent consumption behavior.

A large body of research has suggested that the mental accessibility of a certain concept can influence consumers' likelihood to use this concept to evaluate a target object to which they deem this concept applicable (Higgins, Rholes, and Jones 1977; for a review, see Higgins 1996; Wyer 2008). For example, Higgins and colleagues (1977) show that participants who had been unobtrusively exposed to a trait-related concept (e.g., "adventurous", "reckless") were more likely to use this concept when evaluating a target object in an ostensibly unrelated task. To illustrate, participants who were primed with the concept "adventurous" perceived a target person's behavior "thinking about crossing the Atlantic in a sailboat" as more adventurous and thus evaluated the person more favorably. In contrast, those who were primed with the concept

“reckless” perceived the same behavior as more reckless and thus evaluated the person less favorably.

Drawing on these lines of research, we propose that the impact of dark versus bright color cues on indulgent consumption depends on the relative mental accessibility of the two concepts, pleasure and sin. When the concept of pleasure is more accessible (e.g., when consumers focus on the pleasurable aspect of indulgent consumption), we expect that dark color cues should enhance consumers’ desire and preference for indulgent products, compared with bright color cues. Conversely, when the concept of sin is more accessible (e.g., when consumers focus on the sinful aspect of indulgent consumption), we expect that dark color cues should reduce consumers’ desire and preference for indulgent products, compared with bright color cues. More formally, we hypothesize:

H1A: When the concept of pleasure is more accessible (e.g., when consumers focus on the pleasurable aspect of indulgent consumption), dark (vs. bright) color cues are likely to enhance consumers’ desire and preference for indulgent products.

H1B: When the concept of sin is more accessible (e.g., when consumers focus on the sinful aspect of indulgent consumption), dark (vs. bright) color cues are likely to reduce consumers’ desire and preference for indulgent products.

Prior research further suggests that individuals differ in the degree to which they focus on the pleasurable aspect or the sinful aspect of indulgent consumption. One widely used personality measure that has been used to measure this individual difference is the Restrained Eating Scale developed by Herman and Polivy (1980). Specifically, this scale distinguishes

between restrained eaters (i.e., individuals who are high on dietary restraint) and unrestrained eaters (i.e., individuals who are low on dietary restraint). Restrained eaters are more consciously aware of the health consequence of their eating behavior and thus are more likely to focus on the sinful aspect of indulgent food consumption (Herman and Mack 1975, see also, McFerran et al. 2010; Scott et al. 2008). Therefore, we expect that restrained eaters should exhibit lower desire for indulgent food products paired with dark (vs. bright) color cues. In contrast, unrestrained eaters are less concerned with dieting and instead more likely to focus on the pleasurable aspect of indulgent food consumption (Herman and Mack 1975). Therefore, we expect that unrestrained eaters should exhibit greater desire for indulgent food products paired with dark (vs. bright) color cues. More formally, we hypothesize:

H2A: Unrestrained eaters are likely to exhibit greater desire for indulgent food products paired with dark (vs. bright) color cues.

H2B: Restrained eaters are likely to exhibit lower desire for indulgent food products paired with dark (vs. bright) color cues.

Underscoring the importance of the relative accessibility of pleasure versus sin, we further argue that the impact of dark versus bright color cues on indulgent consumption should be moderated by the relative salience of a health goal versus a pleasure goal. Specifically, consumers are more likely to focus on the sinful aspect of indulgent food consumption and thus the concept of sin is more accessible when they are primed with a health goal (e.g., Fishbach, Friedman, and Kruglanski 2003; Papies and Hamstra 2010). For example, Papies and Hamstra (2010) show that consumers exert more self-control and reduce their indulgent food consumption

when they are primed with a health goal. Therefore, when consumers are primed with a health goal, we expect that dark (vs. bright) color cues should reduce consumers' desire for indulgent food products. On the other hand, consumers are more likely to focus on the pleasurable aspect of indulgent food consumption and thus the concept of pleasure is more accessible when they are primed with a pleasure goal (e.g., Kivetz and Keinan 2006; Poynor and Haws 2009). Therefore, when consumers are primed with a pleasure goal, we expect that dark (vs. bright) color cues should enhance consumers' desire for indulgent food products. More formally, we hypothesize:

H3A: When consumers are primed with a pleasure goal, dark (vs. bright) color cues are likely to enhance consumers' desire for indulgent food products.

H3B: When consumers are primed with a health goal, dark (vs. bright) color cues are likely to reduce consumers' desire for indulgent food products.

Overview of the Studies

We report four studies that test our aforementioned hypotheses. In all the studies, we vary only the value dimension (i.e., brightness) of the colors, while holding the hue and chroma dimensions constant. We also use varied products and different color cues (background color or packaging color) to check the robustness of our findings. In study 1, we examine whether dark color cues as compared to bright color cues can enhance consumers' desire and preference for indulgent products in a choice context when the concept of pleasure is more accessible (H1A). In study 2, we manipulate the relative accessibility of the concept of pleasure versus sin and examine whether dark color cues enhance (vs. reduce) consumers' desire for indulgent

consumption when the concept of pleasure (vs. sin) is more accessible (H1A and H1B). In study 3, we examine whether the impact of dark versus bright color on indulgent food consumption is moderated by individual differences in the degree to which consumers focus on the pleasurable aspect or the sinful aspect of the consumption (as measured by the Restrained Eating Scale; H2A and H2B). Finally, in study 4, we employ a goal priming task and examine the role of pleasure versus health goal salience in moderating the impact of dark versus bright color on indulgent consumption (H3A and H3B).

STUDY 1: THE IMPACT OF BACKGROUND COLOR ON FOOD CHOICE

The primary objective of study 1 was to provide support for our hypothesis 1A, which suggests that dark (vs. bright) color cues should enhance consumers' desire and preference for indulgent products in a choice context when the concept of pleasure is more mentally accessible. In this study, therefore, participants were first asked to focus on the pleasurable aspect (i.e., tastiness) of an indulgent food item and a healthy food item, and then they were asked to choose between these two food items. We manipulated the background color of the food items to be either dark or bright. To manipulate the level of brightness in this study, we used gray scale as the relevant hue dimension. The bright color was manifested in the color white (100% gray scale), and the dark color was manifested in a more blackish color (10% gray scale; see Appendix for examples and detailed specifications). A pretest with 53 participants from the same sample population revealed that the product pictures with dark or bright background color did not differ in perceived attractiveness ($F < 1$).

We predicted that participants should exhibit greater preference for the indulgent food option over the healthy food option in a dark (vs. bright) background color when focusing on the pleasurable aspect (i.e., tastiness) of the food consumption. Furthermore, this effect should be mediated by the difference in their desire for the two food options.

Design and Procedure

Sixty-one US participants (36% female; $M_{\text{age}} = 31$) were recruited from an online panel to complete this study. Participants were randomly assigned to one of the two conditions (background color brightness: bright vs. dark). In the first part of the study, participants evaluated an indulgent food option (a beef and cheese burger) and a healthy food option (an organic green salad with chicken) in a sequential order. The order of the presentation for these two food options was counterbalanced. The food options were presented on either a dark (10% gray scale) or a bright (100% gray scale) colored background. Participants were first asked to imagine the tastiness of each food option and report their desire to consume each food option on a nine-point scale (1 = “not at all” to 9 = “very much”). Subsequently, participants proceeded to a choice question, in which they were asked to choose one of the two viewed food options they would like to have for dinner. At the end of the study, participants were asked to indicate the purpose of the study in their own words. None of the participants could accurately guess the hypotheses of the study.

Results

Food Choice. Consistent with our prediction, a logit analysis revealed that the dark background color as compared to the bright background color led to significantly more choices of the indulgent food option (i.e., the beef and cheese burger) among participants (67.7% vs. 36.7%, $\beta = 1.29$, Wald $\chi^2 = 5.70$, $p < .02$).

Desire for Vice over Virtue. Next, we compared participants' reported desire for each food item in the two background color brightness conditions. As expected, participants reported greater desire to consume the indulgent food option (i.e., the beef and cheese burger) when its background color was dark as compared to bright ($M_{\text{dark}} = 7.23$ vs. $M_{\text{bright}} = 5.60$, $F(1, 59) = 12.22$, $p < .001$). In contrast, we found that participants reported lower desire to consume the healthy food option (i.e., the organic green salad with chicken) when its background color was dark as compared to bright ($M_{\text{dark}} = 5.65$ vs. $M_{\text{bright}} = 6.73$, $F(1, 59) = 3.90$, $p < .055$). We then computed a desire for vice over virtue index by subtracting the desire score for the salad from the desire score for the beef burger. This desire for vice over virtue index was significantly different between the two background color brightness conditions ($M_{\text{dark-difference}} = 1.58$ vs. $M_{\text{bright-difference}} = -1.13$, $F(1, 59) = 17.48$, $p < .001$).

Mediation Analysis. We examined if the difference in participants' desire for the two food items mediated the effect of background color brightness on food choice. First of all, the dark background color as compared to the bright background color increased participants' desire for the indulgent food option over the healthy food option ($\beta = 2.71$, $t(59) = 4.18$, $p < .001$). This enhanced desire for the indulgent food option subsequently led to more choices of the indulgent food option ($\beta = 1.18$, Wald $\chi^2 = 14.56$, $p < .001$). Finally, the direct effect of background color brightness on indulgent food choice was no longer significant after controlling for the desire index ($\beta = -0.62$, $p > .46$).

Furthermore, we followed the bootstrapping procedure (Preacher and Hayes 2008; Zhao, Lynch, and Chen 2010) to formally test whether the indirect effect of dark versus bright background color on indulgent food choice (through desire for vice over virtue) was significant. This analysis revealed that the mean indirect effect was positive and significant ($a \times b = 3.21$), with a 95% confidence interval excluding zero (1.37 to 10.68). Thus, we show that desire for vice over virtue mediated the effect of background color brightness on participants' food choice decision (see figure 1).

Insert figure 1 about here

Discussion

Our results from study 1 provide initial support for hypothesis 1A, which predicts that when the concept of pleasure is more accessible, dark color cues as compared to bright color cues can generate increased desire and preference for indulgent products. In line with this prediction, we found that when both food options were presented on a dark (vs. bright) colored background, participants were more likely to choose an indulgent food option over a healthy food option after considering the pleasurable aspect of the food options. Furthermore, we show that this effect was mediated by participants' reported desire for the indulgent food option over the healthy food option.

In this first study, we made the concept of pleasure more mentally accessible by asking participants to imagine the tastiness of food products before making their evaluative judgments and choices. However, this study does not manipulate the relative accessibility of the concept of pleasure versus sin. The next study addresses this limitation.

STUDY 2: MANIPULATE RELATIVE ACCESSIBILITY OF PLEASURE VERSUS SIN

Study 2 has several objectives. First, in study 2, we manipulated the relative accessibility of the concept of pleasure versus sin by directing participants to elaborate on either the tastiness (i.e., pleasurable aspect) or the calorie content (i.e., sinful aspect) of an indulgent food product before making their evaluative judgments. We predicted that when the concept of pleasure was more accessible (i.e., when participants focused on the pleasurable aspect of the consumption), participants should exhibit greater desire for the product with a dark (vs. bright) packaging color. In contrast, when the concept of sin was more accessible (i.e., when participants focused on the sinful aspect of the consumption), participants should exhibit lower desire for the product with a dark (vs. bright) packaging color (H1A and H1B).

A second objective of study 2 was to examine the effect of dark versus bright color cues on indulgent consumption by employing a different color cue, that is, the packaging color of the product. Specifically, we used a box of popcorn as the target product and manipulated the level of brightness of its packaging color. Furthermore, moving beyond the gray scale, we used a different hue, red, as the relevant hue dimension in this study. Holding the hue and chroma dimensions constant, we set the packaging color of the popcorn box to be either bright red (100% brightness) or dark red (60% brightness; see Appendix). In other words, the dark red was more

blackish as if the color black was added to the pigment. A pretest with 36 participants from the same sample population revealed that the popcorn pictures with a dark or a bright packaging color did not differ in perceived attractiveness ($F < 1$).

Design and Procedure

This study consisted of two parts. In the first part of the study, participants were recruited from Amazon's mechanical turk to fill out a brief online questionnaire. In the questionnaire, they answered one binary question concerning their dieting behavior (i.e., "Are you now watching what you eat in order to lose weight?" 1 = "yes"; 2 = "no"). Participants who answered "no" to this question were categorized as unrestrained eaters and those who answered "yes" to this question were categorized as restrained eaters. Considering the fact that restrained eaters may always focus on the sinful aspect of indulgent food consumption and are thus likely to be insensitive to our experimental manipulation, only unrestrained eaters who declared their interests in participating in our follow-up studies received the second part of the study, which was delivered to participants after three days. The purpose of this time delay was to remove the potential concern that participants might be primed with a dieting goal right after answering questions related to their dieting behavior.

Three days later, the second part of the study was emailed to 120 participants who were categorized as unrestrained eaters and agreed to participate in a follow-up study. Participants were randomly assigned to a 2 (color brightness: bright vs. dark) \times 2 (focus: pleasure vs. sin) between-subjects design. Of the 120 participants contacted, 79 (55% female, $M_{\text{age}} = 30$; the return rate was 66%) completed the second part of the study. Three participants who took more

than 12 hours to complete the study were removed from further analyses, leaving a final sample size of 76. Final cell sizes ranged between 18 and 20. Upon entering the study, participants were asked to imagine that a local cinema in their city was offering a movie popcorn deal. A popcorn box was displayed on the screen, and we manipulated only the value dimension of its packaging color. In the bright color condition, the packaging color of the popcorn box was manifested in bright red (100% brightness), while in the dark color condition, the packaging color of the popcorn box was manifested in dark red (60% brightness).

We manipulated the focus on pleasure versus sin by directing participants to first take a moment to imagine either the tastiness (pleasure focus) or the calorie content (sin focus) of the movie popcorn. We expected that imagining the tastiness of the movie popcorn should lead participants to focus more on the pleasure of eating the popcorn, whereas imagining the calorie content should lead participants to focus more on the sin of eating the popcorn. Next, all participants were asked to indicate how much they want to consume the popcorn on a nine-point scale (1 = “not at all” to 9 = “very much”) based on the pictorial information.

It is noteworthy that prior research suggests higher-value (i.e., brighter) colors may elicit greater feelings of relaxation as compared to lower-value (i.e., darker) colors (Gorn et al. 2004). To rule out this explanation in the current study, participants subsequently answered on six seven-point items measuring their current feelings of relaxation (1 = “not at all” to 7 = “very much so”: relaxed, calm, peaceful, uneasy, tense, and anxious; adopted from Gorn et al. 2004). After reverse coding the latter three items, responses to all the six items were averaged to form a composite feeling-of-relaxation score (Cronbach’s $\alpha = .90$). At the end of the study, participants were asked to indicate the purpose of the study in their own words. None of the participants could accurately guess the hypotheses of the study.

Results

In line with our prediction, our results revealed a significant interaction between the manipulated focus and packaging color brightness conditions ($F(1, 72) = 8.49, p < .01$). No main effects were significant (F 's $< 1, p$'s $> .48$). As shown in figure 2, in the tastiness focus (i.e., pleasure focus) condition, participants reported greater desire to consume the popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = 5.94$ vs. $M_{\text{bright}} = 4.45, t(72) = 4.30, p < .05$). By contrast, in the calorie content focus (i.e., sin focus) condition, participants reported lower desire to consume the popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = 4.11$ vs. $M_{\text{bright}} = 5.58, t(72) = 4.19, p < .05$).

Insert figure 2 about here

To rule out the explanation that the results were caused by greater feelings of relaxation in the bright color conditions, we conducted the same analysis on the feeling-of-relaxation score with manipulated focus and packaging color as independent factors. Neither main effects nor interaction effects were significant (F 's $< 1.27, p$'s $> .26$). Furthermore, adding the feeling-of-relaxation measure as a covariate did not affect the results reported above. Therefore, an affect-based account cannot explain our findings.

Discussion

Study 2 provides support for the dual effect of darkness. Specifically, we manipulated the relative accessibility of the concept of pleasure versus sin by directing participants to focus on either the tastiness or the calorie content of the target product, a box of movie popcorn. In line with hypotheses 1A and 1B, the results show that when the concept of pleasure was more accessible (i.e., when participants focused on the tastiness of the popcorn), participants reported greater desire to consume the popcorn when its packaging color was dark (vs. bright). Conversely, when the concept of sin was more accessible (i.e., when participants focused on the calorie content of the popcorn), participants reported lower desire to consume the popcorn when its packaging color was dark (vs. bright).

STUDY 3: THE MODERATING ROLE OF DIETARY RESTRAINT

Our results from study 2 suggest that dark color cues as compared to bright color cues can either enhance or reduce consumers' desire for indulgent food consumption depending on the relative accessibility of the concept of pleasure versus sin. In study 3, we examined the role of individual differences related to dietary restraint in moderating the impact of dark versus bright color cues on indulgent food consumption (H2A and H2B). A focus on the role of dietary restraint in consumer research has gained much importance recently (e.g., McFerran et al. 2010; Scott et al. 2008). The widely used Herman and Polivy's (1980) 10-item Restrained Eating Scale defines several characteristics that differentiate restrained and unrestrained eaters, such as a concern with dieting (e.g., "How often do you diet?"), a focus on weight fluctuation (e.g., "In a

typical week how much does your weight fluctuate?”), and a focus on food intake (e.g., “Do you eat sensibly in front of others and splurge alone?”). As mentioned earlier, restrained eaters are more consciously aware of the health consequence of their eating behavior (Herman and Mack 1975). Therefore, restrained eaters are more likely to focus on the sinful aspect of indulgent food consumption, whereas unrestrained eaters are more likely to focus on the pleasurable aspect of indulgent food consumption. Therefore, we predicted that restrained eaters would exhibit lower desire for indulgent food products with a dark (vs. bright) packaging color, whereas unrestrained eaters would exhibit greater desire for indulgent food products with a dark (vs. bright) packaging color.

Design and Procedure

Fifty-five US female participants ($M_{\text{age}} = 36$) were recruited from an online panel to complete this study. Because prior research suggests that female participants are more sensitive to the restrained eating scale than male participants (Fishbach et al. 2003; Herman and Polivy 2010), we restricted our sample to female participants in this study. Participants were randomly assigned to one of the two conditions (packaging color brightness: bright vs. dark). Participants were asked to imagine that a local cinema in their city was offering a movie popcorn deal. The movie popcorn stimuli were the same as the one used in the previous study. In the bright color condition, the packaging color of the popcorn box was manifested in bright red (100% brightness), while in the dark color condition, the packaging color was manifested in dark red (60% brightness). All participants were asked to rate how appetizing they found the popcorn (1 = “not at all appetizing” to 9 = “very appetizing”) and indicate how much they wanted to consume

the popcorn (1 = “not at all” to 9 = “very much”) based on the pictorial information. The answers to these two questions were averaged to form a desire for the popcorn index (Cronbach’s $\alpha = .93$). Furthermore, we also asked participants to report how much they were willing to pay for the box of the movie popcorn (in US dollars).

Subsequently, participants answered on six seven-point items measuring their current feeling-of relaxation used in the previous study (1 = “not at all” to 7 = “very much so”: relaxed, calm, peaceful, uneasy, tense, and anxious). After reverse coding the latter three items, responses to all these six items were averaged to form a composite feeling-of-relaxation score (Cronbach’s $\alpha = .93$). Finally, participants completed the 10-item Restrained Eating Scale (Herman and Polivy 1980; Cronbach’s $\alpha = .75$). At the end of the study, participants were probed for suspicion, debriefed, and thanked. In the debrief, one participant indicated having participated in study 1 and was removed from further analyses.

Results

Desire for the Popcorn. To examine the moderating role of dietary restraint, we performed a linear regression on consumers’ desire for the popcorn index with independent variables (i) mean-centered dietary restraint score, (ii) a dummy variable for the packaging color brightness, and (iii) their interaction. This analysis revealed both a significant main effect of packaging color brightness ($F(1, 50) = 4.37, p < .05$) and a marginally significant main effect of the dietary restraint score ($F(1, 50) = 3.60, p < .07$), which were qualified by a marginally significant color brightness and dietary restraint score interaction ($F(1, 50) = 2.98, p < .10$). A spotlight analysis (Aiken and West 1991; Fitzsimons 2008) at 1.5 standard deviations below the

mean of dietary restraint score revealed that unrestrained eaters indicated greater desire for the box of movie popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = 6.30$ vs. $M_{\text{bright}} = 3.35$, $t(50) = 2.67$, $p < .01$). By contrast, a spotlight analysis at 1.5 standard deviations above the mean of dietary restraint score revealed that restrained eaters indicated directionally, but not significantly lower desire for the box of movie popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = 6.46$ vs. $M_{\text{bright}} = 6.82$, $t(50) = -0.30$, $p > .75$; see figure 3).

 Insert figure 3 about here

Willingness to Pay (WTP). We performed another linear regression on consumers' WTP for the popcorn with independent variables (i) mean-centered dietary restraint score, (ii) a dummy variable for the packaging color brightness, and (iii) their interaction. Given the open-ended response nature of the WTP measure, we first examined the data for outliers. An observation is defined as an outlier if it is three standard deviations above or below the mean. We used this criterion to identify outliers across all our studies. No outliers were identified and thus all data points in this study were retained for analyses. Consistent with the results on the desire for the popcorn, the regression analysis revealed a significant color brightness by dietary restraint score interaction ($F(1, 50) = 8.11$, $p < .01$). Neither the main effect of packaging color brightness nor the main effect of the dietary restraint score, however, was significant (p 's $> .59$). To explore this crossover interaction, a spotlight analysis at 1.5 standard deviations below the mean of dietary restraint score revealed that unrestrained eater indicated greater WTP for the box of

movie popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = \$3.82$ vs. $M_{\text{bright}} = \$2.33$, $t(50) = 2.17$, $p < .04$). By contrast, a spotlight analysis at 1.5 standard deviations above the mean of dietary restraint score revealed an opposite pattern of results for restrained eaters. As hypothesized, restrained eaters indicated lower WTP for the box of movie popcorn when its packaging color was dark versus bright ($M_{\text{dark}} = \$1.88$ vs. $M_{\text{bright}} = \$3.79$, $t(50) = -2.60$, $p < .02$; see figure 3).

Further, to rule out the feeling-of-relaxation explanation, we also conducted a regression on feeling-of-relaxation score with packaging color brightness and the mean-centered dietary restraint score as independent factors. This analysis only revealed a significant main effect of the dietary restraint score ($F(1, 50) = 8.64$, $p < .01$), with no other effects being significant (F 's < 2.2 , p 's $> .14$). Importantly, including the feeling-of-relaxation measure as a covariate did not affect the results reported above. This suggests that our findings cannot be explained by an affect-based mechanism.

Discussion

Study 3 provides additional support for our conceptualization related to the dual effect of darkness. Specifically, we argue that restrained eaters are more likely to focus on the sinful aspect of indulgent food consumption and thus the concept of sin is more accessible. Conversely, unrestrained eaters are more likely to focus on the pleasurable aspect of indulgent food consumption and thus the concept of pleasure is more accessible. In line with hypotheses 2A and 2B, we found that restrained eaters reported directionally weaker desire and significantly lower WTP for the movie popcorn when the packaging color was dark (vs. bright). By contrast,

unrestrained eaters reported stronger desire and greater WTP for the movie popcorn when the packaging color was dark (vs. bright).

STUDY 4: MANIPULATE PLEASURE VERSUS HEALTH GOAL SALIENCE

Thus far, we have illustrated that the impact of dark versus bright color on indulgent consumption is dependent on the accessibility of the concept of pleasure versus sin. Yet, it remains unclear whether it is mainly the dark color or the bright color that is driving the dual effect of darkness. In study 4, we sought to provide further support that this dual effect of darkness is caused by the fact that darkness is associated with both the concept of sin and the concept of pleasure. Specifically, in this study, we examined the role of pleasure goal versus health goal salience in moderating the impact of dark versus bright color cues on indulgent consumption (H3A and H3B). We also included a control condition to serve as a baseline condition. We argue that when consumers were primed with a pleasure goal, dark (vs. bright) color cues should enhance their desire for indulgent consumption, compared with the baseline condition. However, when consumers were primed with a health goal, dark (vs. bright) color cues should reduce their desire for indulgent consumption, compared with the baseline condition.

Furthermore, to show that our proposed dual effect of darkness is not restricted to hues associated with avoidance motivations (e.g., red color used in studies 2 and 3), in this study we used blue as the relevant hue dimension, which is associated with approach motivations (Elliot et al. 2007; Mehta and Zhu 2009). In particular, we used a cupcake as the target product and manipulated the level of brightness of its wrapper color. We set the color of the cupcake wrapper to be either bright blue or dark blue (the dark blue color was set to be 50% of the brightness of

the bright blue color, which was set at 100% brightness; see Appendix), while holding the hue and chroma dimensions constant. A pretest with 30 participants from the same sample population revealed that the cupcake pictures with a dark or a bright wrapper color did not differ in perceived attractiveness ($F < 1$).

Design and Procedure

Three hundred and ninety-seven US participants (61% female, $M_{\text{age}} = 35$) were recruited from an online panel to complete this study. The study followed a 2 (color brightness: bright vs. dark) \times 3 (prime: pleasure vs. health vs. control) between-subjects design. Participants were randomly assigned across the six conditions. Upon entering the study, participants were asked to participate in a few ostensibly unrelated tasks. In the first part of the study, participants completed an essay writing task, which served as our goal priming manipulation (adapted from Kivetz and Keinan 2006). In the pleasure prime condition, participants were instructed to describe a time when they really regretted that they should have indulged themselves and have fun, but for some reason could not do so. In the health prime condition, participants were instructed to describe a time when they really regretted that they should have engaged in exercising to keep healthy, but for some reason could not do so. In the control condition, participants were simply asked to recall their activities a day ago. All participants engaged in this essay writing exercise for two minutes before they could enter the second part of the study.

Subsequently, all participants moved on to an ostensibly unrelated product evaluation study, in which they were asked to evaluate a cupcake. In the bright color condition, the wrapper color of the cupcake was manifested in bright blue. In the dark color condition, the wrapper color

of the cupcake was manifested in dark blue. Participants were asked to indicate how much they were willing to pay for the cupcake (in US dollars) based on the pictorial information. At the end of the study, participants were probed for suspicion, debriefed, and thanked.

Results

Prior to our analyses, we removed two participants who did not follow the task instruction for the essay writing task and two who indicated that they had participated in a previous study. Further, based on our examination of the remaining data (393 participants) for outliers, we removed eight participants whose WTP were three standard deviations above the mean, leaving a final sample of 385 participants for analyses. The pattern of results and significance of the overall interaction did not change before/after excluding the outliers.

An ANOVA conducted on participants' WTP for the cupcake revealed a significant main effect of the goal prime condition ($F(2, 379) = 3.59, p < .03$), which was qualified by a significant interaction between goal prime and color brightness conditions ($F(2, 379) = 4.53, p < .02$). The main effect of the color brightness condition was not significant ($F < 1, p > .80$). As shown in figure 4, planned contrasts revealed that participants who were primed with a pleasure goal reported greater WTP for the cupcake when its packaging color was dark versus bright ($M_{\text{dark-pleasure prime}} = \1.75 vs. $M_{\text{bright-pleasure prime}} = \$1.33, t(379) = 2.10, p < .04$). Conversely, participants who were primed with a health goal reported lower WTP for the cupcake when its packaging color was dark versus bright ($M_{\text{dark-health prime}} = \0.96 vs. $M_{\text{bright-health prime}} = \$1.38, t(379) = -2.14, p < .04$). The WTP measure did not differ between the control prime conditions ($M_{\text{dark-control prime}} = \1.34 vs. $M_{\text{bright-control prime}} = \$1.31, t(379) = .40, p > .68$).

Next, we conducted planned contrasts within each packaging color brightness condition. Specifically, within the dark color conditions, participants in the pleasure prime condition reported greater WTP for the cupcake than those in the control prime condition ($M_{\text{dark-pleasure prime}} = \1.75 vs. $M_{\text{dark-control prime}} = \1.34 , $t(379) = 2.09$, $p < .04$) as well as those in the health prime condition ($M_{\text{dark-pleasure prime}} = \1.75 vs. $M_{\text{dark-health prime}} = \0.96 , $t(379) = 3.97$, $p < .001$). Furthermore, participants in the health prime condition reported lower WTP for the cupcake than those in the control prime condition ($M_{\text{dark-health prime}} = \0.96 vs. $M_{\text{dark-control prime}} = \1.34 , $t(379) = -1.88$, $p < .06$). However, no significant differences were observed across the bright color conditions (t 's $< .42$, p 's $> .68$).

 Insert figure 4 about here

Discussion

Overall, the results of study 4 provide further support for our conceptualization related to the dual effect of darkness. In line with hypotheses 3A and 3B, we show that the effect of dark versus bright color cues on indulgent consumption was moderated by the relative salience of a pleasure goal versus a health goal. Specifically, we show that when participants were primed with a pleasure goal, dark (vs. bright) packaging color led to higher WTP for the cupcake. However, this effect was reversed when participants were primed with a health goal. Specifically, dark (vs. bright) packaging color led to lower WTP for the cupcake when participants were

primed with a health goal. Importantly, we show that this dual effect of darkness was mainly driven by the differences in the dark color conditions rather than the differences in the bright color conditions.

GENERAL DISCUSSION

Color is one of the most critical components of product packaging and advertisement designs, and color cues are pervasive in everyday shopping environments. Despite the growing body of research on the effect of hue on consumer decision making (Bagchi and Cheema 2013; Bellizzi and Hite 1992; Chattopadhyay et al. 2009; Mehta and Zhu 2009), relatively little is understood about whether and how the metaphoric connotations of the brightness (i.e., value dimension) of color cues could impact one's consumption behavior. This article seeks to fill this gap, and it does so by investigating the effect of the metaphoric meanings associated with color brightness on indulgent food consumption. In the present research, we demonstrate that the mere brightness (or darkness) of the color cues can differently impact consumers' desire for indulgent consumption depending on the mental accessibility of the concept of pleasure versus the concept of sin. To elaborate, we argue that dark color cues as compared to bright color cues increase consumers' desire and preference for indulgent products when the concept of pleasure is more accessible. Conversely, dark color cues as compared to bright color cues decrease consumers' desire and preference for indulgent products when the concept of sin is more accessible.

Across a series of four studies, we used different color cues (e.g., background color or packaging color) and manipulated only the brightness (i.e., value dimension) of these color cues. The results from the studies provide converging support for our conceptualization. First, in study

1 we show that dark color cues as compared to bright color cues could enhance consumers' preference for indulgent food products in a choice context when the concept of pleasure is more accessible. Second, in study 2 we manipulated the relative accessibility of the concept of pleasure versus sin by guiding consumers to focus on either the sinful aspect or the pleasurable aspect of indulgent consumption. We show that, when consumers focused on the pleasurable aspect (i.e., tastiness) of the indulgent food product, dark (vs. bright) color cues enhanced consumers' desire for indulgent consumption. Conversely, when consumers focused on the sinful aspect (i.e., calorie content) of the indulgent food product, dark (vs. bright) color cues reduced their desire for indulgent consumption. Third, we show that the impact of dark versus bright color cues on indulgent food consumption was moderated by individual differences related to dietary restraint (study 3). Specifically, we show that dark color cues enhanced unrestrained eaters' WTP for an indulgent food product but meanwhile reduced restrained eaters' WTP for an indulgent food product. Finally, we show that the dual effect of darkness was moderated by the relative salience of a pleasure goal versus a health goal (study 4). When consumers were primed with a pleasure goal, dark (vs. bright) color cues enhanced consumers' WTP for an indulgent food product. Conversely, when consumers were primed with a health goal, dark (vs. bright) packaging color reduced consumers' WTP for an indulgent food product.

Implications for Marketing and Consumer Welfare

Our research has important implications for marketing and consumer welfare. First, our findings suggest that the mere brightness of product packaging, product display backgrounds or even the ambience of the shopping environment can have substantial consequences for marketers.

Beyond the aesthetic value of colors, we show that marketers can highlight the pleasure of indulgent products by using darker colors in packaging or advertisements. However, our findings also raise the caution that dark color cues can serve as a double-edged sword such that it could backfire when consumers are conscious about the sinful aspect of indulgent consumption. For example, restrained eaters (i.e., consumers who are high on dietary restraint) are more concerned with the health consequences of food consumption. Consequently, dark colors as compared to bright colors in packaging or advertisements may further reduce their likelihood to engage in indulgent food consumption.

Furthermore, recent research has emphasized the critical role of product packaging design in fighting against the worldwide obesity epidemic and in promoting healthy food consumption (e.g., Chandon and Wansink 2011; Wansink and Chandon 2006). For example, recent studies have found that small units, such as 100-calorie packs, may ironically increase consumers' indulgent consumption more than regular size packs especially when consumers have salient health goals (Coelho do Vale, Pieters, and Zeelenberg 2008; Scott et al. 2008). In the present research, we show that the color of the product packaging design can also impact consumers' likelihood to engage in indulgent consumption. In addition, we show that even environmental cues such as background colors can influence consumers' food preference and consumption behavior.

Theoretical Implications and Directions for Future Research

From a theoretical perspective, our research contributes to the growing body of research on how ambient and product related sensory cues can impact consumer behavior (Krishna 2009).

Despite a growing body of research on sensory cues in marketing, relatively little is understood about how ambient and product-specific cues related to brightness interact with consumer decision making. Prior research suggests that the brightness (or value) of colors can affect consumers' attitude toward the ad and product evaluation through its impact on consumers' subjective feelings of relaxation or excitement (Gorn et al. 1997, 2004). Extending this stream of research, we demonstrate that the brightness (or value) of color is associated with metaphoric meanings. We argue that dark colors as compared to bright colors are associated with both the concept of sin and the concept of pleasure. The interplay between these two metaphoric meanings of the color cues drives consumers' desire and preference for indulgent consumption. Specifically, we show that dark color cues as compared to bright color cues can increase (vs. decrease) consumers' desire for indulgent consumption when the concept of pleasure (vs. sin) is more accessible.

Our findings raise promising avenues for further research. First, in the present research, we examined only the effect of the value (i.e., brightness) dimension of colors on indulgent consumption. Future research might explore the effect of the other two dimensions of colors (i.e., hue and chroma) on indulgent consumption behavior. For example, while red is often associated with dangers and mistakes, it is also associated with passion and romantic love (e.g., Elliot and Niesta 2008). Thus, red might also function as a double-edged sword compared with other hues, such that it can highlight either the pleasurable aspect or the sinful aspect of indulgent consumption depending on the specific consumption situations.

Second, while in the present research we focused on the impact of the brightness of color cues on indulgent consumption, it would be interesting to investigate the impact of the brightness of color cues on consumers' likelihood to engage in various other indulgent behaviors beyond

the food consumption domain. For example, if darkness is indeed associated with both the concept of sin and the concept of pleasure, then it is likely that impulsive consumers are more likely to participate in a gamble when the tokens are in a dark (vs. bright) color. However, this effect should be reversed for more prudent consumers.

Third, in the present research we manipulated the background color or the packaging color of the products. Given the ubiquity of color cues in the consumer contexts, it would be interesting to examine whether the mere presence of dark (vs. bright) color cues would also influence consumer decision making in unrelated domains. For example, future research could examine whether priming consumers with dark versus bright color cues in an unrelated task could have a carryover effect on their preferences in subsequent product evaluation and choice settings.

Finally, another interesting avenue for future research pertains to the universality of the dual effect of darkness. Specifically, the present research relies on the assumption that people across culture have the lay belief that dark colors are more pleasurable than bright colors. If people do not have this lay belief, we should not expect the findings that dark color cues enhance consumers' desire and preference for indulgent consumption. Therefore, it would be interesting to examine the impact of people's different lay theories on the dual effect of darkness (e.g., Labroo and Mukhopadhyay 2009; Mukhopadhyay and Johar 2005). For example, while the association between darkness and the concept of sin seems to be universally accepted (Adams and Osgood 1973), it remains unclear whether people across culture also hold the mental association between darkness and the concept of pleasure. Future research examining these issues will provide researchers and marketers with richer insights into the factors that influence the effects of various sensory cues on consumer behavior.

APPENDIX: COLOR STIMULI EXAMPLES

Study 1:

Dark Color Condition



Bright Color Condition



Dark Color Specification: Hue = 0, Saturation = 0, Brightness = 24 (10%);

Bright Color Specification: Hue = 0, Saturation = 0, Brightness = 240 (100%);

Studies 2&3:

Dark Color Condition



Bright Color Condition



Dark Color Specification: Hue = 0, Saturation = 216 (90%), Brightness = 144 (60%);

Bright Color Specification: Hue = 0, Saturation = 216 (90%), Brightness = 240 (100%);

Study 4:

Dark Color Condition



Bright Color Condition



Dark Color Specification: Hue = a, Saturation = b, Brightness = 100%*c;

Bright Color Specification: Hue = a, Saturation = b, Brightness = 50%*c;

REFERENCES

- Adams, Francis M. and Charles E. Osgood (1973), "A Cross-Cultural Study of the Affective Meanings of Color," *Journal of Cross-Cultural Psychology*, 4 (2), 135-56.
- Aiken, Leona S. and Stephen G. West (1991), *Multiple Regression: Testing and Interpreting Interactions*, Newbury Park, CA: Sage.
- Bagchi, Rajesh and Amar Cheema (2013), "The Effect of Red Background Color on Willingness-to-Pay: The Moderating Role of Selling Mechanism," *Journal of Consumer Research*, forthcoming.
- Bellizzi, Joseph A. and Robert E. Hite (1992), "Environmental Color, Consumer Feelings, and Purchase Likelihood," *Psychology and Marketing*, 9 (5), 347-63.
- Chandon, Pierre and Brian Wansink (2011), "Is Food Marketing Making Us Fat? A Multi-Disciplinary Review," *Foundations and Trends in Marketing*, 5 (3), 113-96.
- Chattopadhyay, Amitava, Gerald J. Gorn, and Peter R. Darke (2009), "Similarities and Differences in Color Preference and Choice among Chinese and North Americans," in *Sensory Marketing*, ed. Aradhna Krishna, NY: New York: Routledge, 219-40.
- Coelho do Vale, Rita, Rik Pieters, and Marcel Zeelenberg (2008), "Flying under the Radar: Perverse Package Size Effects on Consumption Self-Regulation," *Journal of Consumer Research*, 35 (3), 380-90.
- Elliot, Andrew J., Maier A. Maier, Arlen C. Moller, Ron Friedman, and Jörg Meinhardt (2007), "Color and Psychological Functioning: The Effect of Red on Performance Attainment," *Journal of Experimental Psychology: General*, 136 (1), 154-68.

- Elliot, Andrew J. and Daniela Niesta (2008), "Romantic Red: Red Enhances Men's Attraction to Women," *Journal of Personality and Social Psychology*, 95 (5), 1150-64.
- Esposito, Joey (2012), "Hero Worship: Why I Love Catwoman, "
<http://www.ign.com/articles/2012/05/25/hero-worship-why-i-love-catwoman/>.
- Fishbach, Ayelet, Ronald S. Friedman, and Arie W. Kruglanski (2003), "Leading Us Not Unto Temptation: Momentary Allurements Elicit Overriding Goal Activation," *Journal of Personality and Social Psychology*, 84 (2), 296-309.
- Fitzsimons, Gavan J. (2008), "Death to Dichotomizing," *Journal of Consumer Research*, 35 (1), 5-8.
- Frank, Mark G. and Thomas Gilovich (1988), "The Dark Side of Self- and Social Perception: Black Uniforms and Aggression in Professional Sports," *Journal of Personality and Social Psychology*, 54 (1), 74-85.
- Gorn, Gerald J., Amitava Chattopadhyay, Jaideep Sengupta, and Shashank Tripathi (2004), "Waiting for the Web: How Screen Color Affects Time Perception," *Journal of Marketing Research*, 41 (2), 215-25.
- Gorn, Gerald J., Amitava Chattopadhyay, Tracey Yi, and Darren W. Dahl (1997), "Effects of Color as an Executional Cue in Advertising: They're in the Shade," *Management Science*, 43 (10), 1387-400.
- Herman, C. Peter and Deborah Mack (1975), "Restrained and Unrestrained Eating," *Journal of Personality*, 43 (4), 647-60.
- Herman, C. Peter and Janet Polivy (1980), "Restrained Eating," *Obesity*, 208-25.
- _____ (2010), "Sex and Gender Differences in Eating Behavior," *Handbook of Gender Research in Psychology*, 455-69.

- Higgins, E. Tory, William S. Rholes, and Carl R. Jones (1977), "Category Accessibility and Impression Formation," *Journal of Experimental Social Psychology*, 13, 141-54.
- Higgins, E. Tory (1996), "Knowledge Activation: Accessibility, Applicability, and Salience," in *Social Psychology: Handbook of Basic Principles*, ed. E. Tory Higgins and Arie Kruglanski, NY: Guilford Press, 133-68.
- Jacobs, Laurence, Charles Keown, Reginald Worthley, and Kyung-II Ghymn (1991), "Cross-Cultural Colour Comparisons: Global Marketers Beware!" *International Marketing Review*, 8 (3), 21-30.
- Khan, Uzma and Ravi Dhar (2006), "Licensing Effect in Consumer Choice," *Journal of Marketing Research*, 43 (2), 259-66.
- Kivetz, Ran and Anat Keinan (2006), "Repenting Hyperopia: An Analysis of Self-Control Regrets," *Journal of Consumer Research*, 33 (2), 273-82.
- Kivetz, Ran and Itamar Simonson (2002), "Self-Control for the Righteous: Toward a Theory of Precommitment to Indulgence," *Journal of Consumer Research*, 29 (2), 199-217.
- Krishna, Aradhna (2009), *Sensory Marketing*, NY: New York: Routledge.
- Labroo, Aparna A. and Anirban Mukhopadhyay (2009), "Lay Theories of Emotion Transience and the Search for Happiness: A Fresh Perspective on Affect Regulation," *Journal of Consumer Research*, 36 (2), 242-54.
- Lakoff, George and Mark Johnson (1980), *Metaphors We Live By*, Chicago: University of Chicago Press.
- Landau, Mark J., Brian P. Meier, and Lucas A. Keefer (2010), "A Metaphor-Enriched Social Cognition," *Psychological Bulletin*, 136 (6), 1045-67.

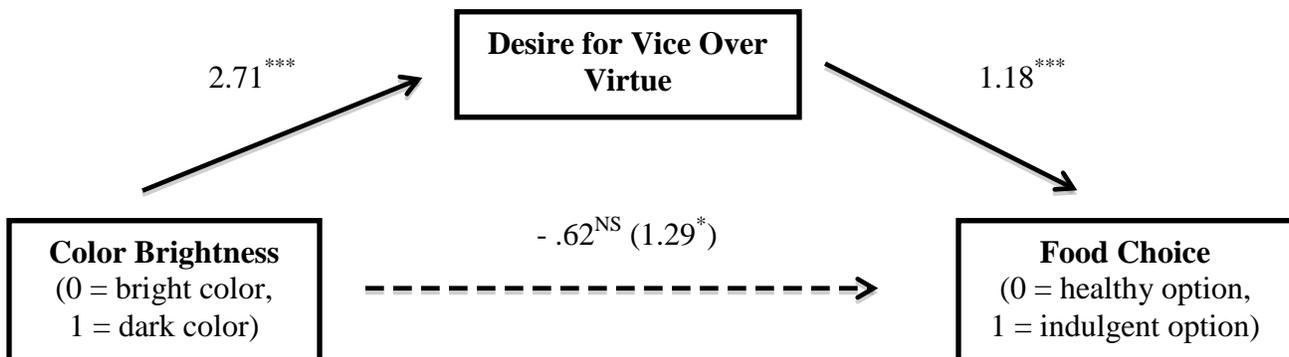
- Lascu, Dana-Nicoleta (1991), "Consumer Guilt: Examining the Potential of a New Marketing Construct," *Advances in Consumer Research*, 18 (1), 290-95.
- McFerran, Brent, Darren W. Dahl, Gavan J. Fitzsimons, and Andrea C. Morales (2010), "I'll Have What She's Having: Effects of Social Influence and Body Type on the Food Choices of Others," *Journal of Consumer Research*, 36 (6), 915-29.
- Mehta, Ravi and Rui (Juliet) Zhu (2009), "Blue or Red? Exploring the Effect of Color on Cognitive Task Performances," *Science*, 323 (5918), 1226-29.
- Meier, Brian P., Michael D. Robinson, and Gerald L. Clore (2004), "Why Good Guys Wear White: Automatic Inferences About Stimulus Valence Based on Brightness," *Psychological Science*, 15 (2), 82-7.
- Mukhopadhyay, Anirban and Gita Venkataramani Johar (2005), "Where There Is a Will, Is There a Way? Effects of Lay Theories of Self-Control on Setting and Keeping Resolutions," *Journal of Consumer Research*, 31 (4), 779-86.
- Papies, Esther K. and Petra Hamstra (2010), "Goal Priming and Eating Behavior: Enhancing Self-Regulation by Environmental Cues," *Health Psychology*, 29 (4), 384-8.
- Poynor, Cait and Kelly Haws (2009), "Lines in the Sand: Implementation Intentions, Categorization, and Choice in Pursuit of Self-Control Goals," *Journal of Consumer Research*, 35 (5), 772-87.
- Preacher, Kristopher J. and Andrew F. Hayes (2008), "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavior Research Methods*, 40 (3), 879-91.

- Scott, Maura L., Stephen M. Nowlis, Naomi Mandel, and Andrea C. Morales (2008), "The Effects of Reduced Food Size and Package Size on the Consumption Behavior of Restrained and Unrestrained Eaters," *Journal of Consumer Research*, 35 (3), 391-405.
- Sherman, Gary D. and Gerald L. Clore (2009), "The Color of Sin: White and Black Are Perceptual Symbols of Moral Purity and Pollution," *Psychological Science*, 20 (8), 1019-25.
- Stabler, John R. and Edward E. Johnson (1972), "The Meaning of Black and White to Children," *International Journal of Symbolology*, 3 (3), 11-21.
- Thompson, Evan, Adrian Palacios, and Francisco J. Varela (1992), "Ways of Coloring: Comparative Color Vision as a Case Study for Cognitive Science," *Behavioral and Brain Sciences*, 15 (1), 1-26.
- Wansink, Brian and Pierre Chandon (2006), "Can 'Low-Fat' Nutrition Labels Lead to Obesity?" *Journal of Marketing Research*, 43 (4), 605-17.
- Wertenbroch, Klaus (1998), "Consumption Self-Control by Rationing Purchase Quantities of Virtue and Vice," *Marketing Science*, 17 (4), 317-37.
- Wyer, Robert S. (2008), "The Role of Knowledge Accessibility in Cognition and Behavior," in *Handbook of Consumer Psychology*, ed. Curtis Haugtvedt, Frank Kardes, and Paul Herr, Mahwah, NJ: Erlbaum, 31-75.
- Zhao, Xinchu, John G. Lynch, Jr., and Qimei Chen (2010), "Reconsidering Baron and Kenny: Myths and Truths About Mediation Analysis," *Journal of Consumer Research*, 37 (2), 197-206.

FIGURE 1

MEDIATION OF BACKGROUND COLOR BRIGHTNESS ON INDULGENT FOOD

CHOICE VIA CONSUMERS' DESIRE FOR VICE OVER VIRTUE IN STUDY 1



Note. --- one asterisk indicates $p < .05$; three asterisks indicate $p < .001$

FIGURE 2

INFLUENCE OF MANIPULATED FOCUS AND COLOR BRIGHTNESS ON CONSUMERS'

DESIRE TO CONSUME THE POPCORN IN STUDY 2

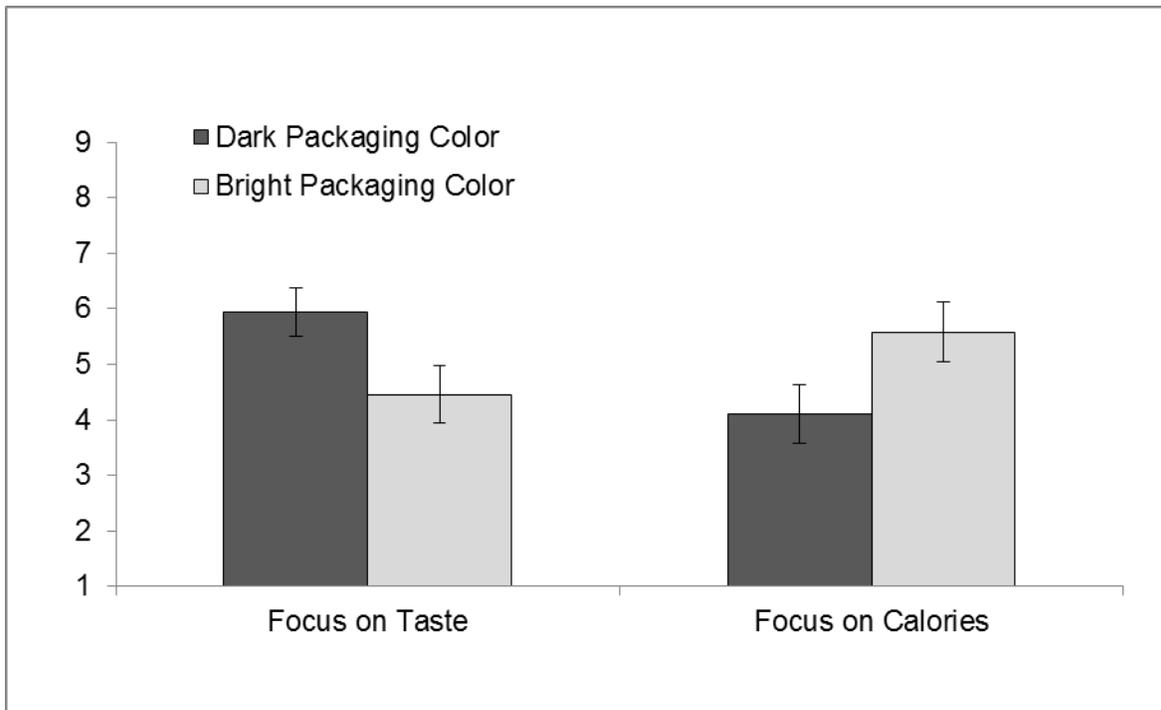


FIGURE 3

INFLUENCE OF DIETARY RESTRAINT AND COLOR BRIGHTNESS ON CONSUMERS'

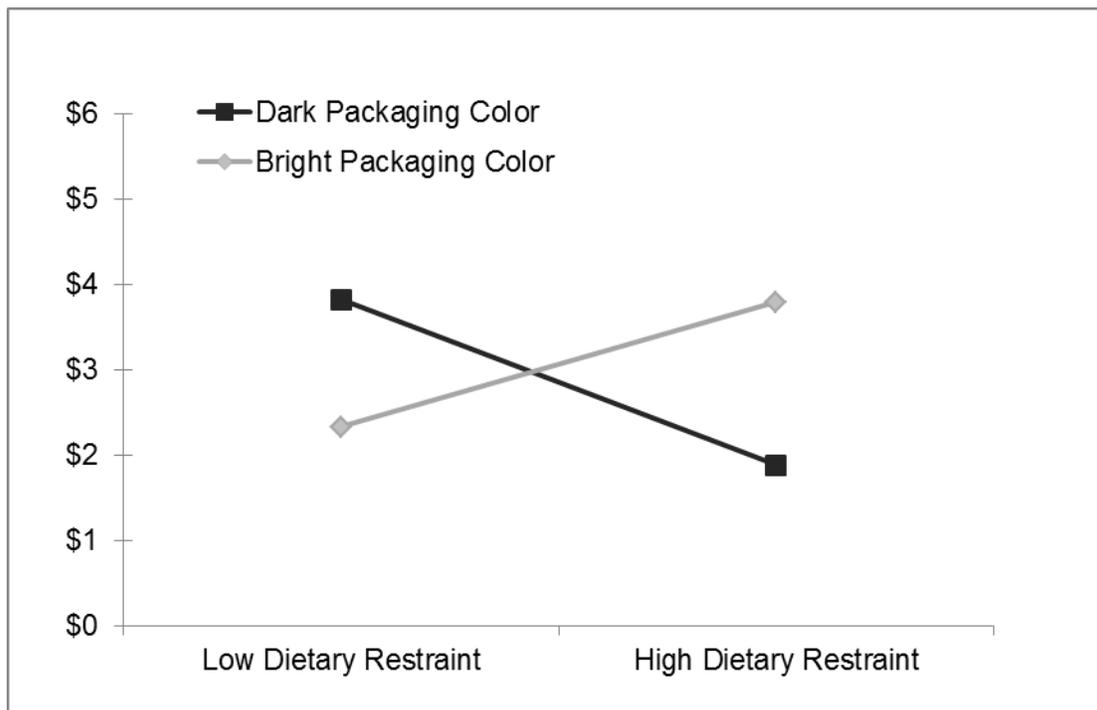
DESIRE (*TOP*) AND WTP (*BOTTOM*) FOR THE POPCORN IN STUDY 3

FIGURE 4

INFLUENCE OF GOAL PRIME AND COLOR BRIGHTNESS ON CONSUMERS' WTP FOR
THE CUPCAKE IN STUDY 4

