# Monochrome Forests and Colorful Trees: The Effect of Black-and-White versus Color Imagery on Construal Level

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Marketing communications (e.g., advertising, packaging) can be either colorful or black and white. This research investigates how presence or absence of color affects consumer information processing. Drawing from construal-level and visual perception theory, five experiments test the hypothesis that black-and-white (BW) versus color imagery is cognitively associated with high-level versus low-level construal, respectively. Experiment 1 establishes this association via an Implicit Association Test. On the basis of this association, experiments 2 and 3 show that BW (vs. color) imagery promotes high-level (vs. low-level) construal, leading to sorting objects on the basis of high-level (vs. low-level) features, segmenting behaviors into broader (vs. narrower) units, and interpreting actions as ends (vs. means). Extending this effect into consumer decision making, experiments 4 and 5 further show that consumers presented with BW (vs. color) product pictures weight primary and essential (vs. secondary and superficial) product features more and prefer an option that excels on those features.

Color has become mainstream in all forms of media in the twenty-first century, making it rare to observe any content presented in black-and-white (BW) format. Yet, media producers can choose to present visual material in either format, leading marketing and advertising researchers to ask which might be better for various marketing communications (e.g., television and magazine advertising, package design). Research generally suggests that color leads consumers to judge ad content as more attractive, interesting, and powerful (Bohle and Garcia 1986; Click and Stempel 1976; Schindler 1986), attracts viewers' attention (Gronhaug, Kvitastein, and Gronmo 1991; Hornik 1980; Lohse 1997), and promotes favorable attitudes (Berdie 1992; Fernandez and Rosen 2000; Meyers-Levy and Peracchio 1995; Pallak 1983; Percy and Rossiter 1983). Extensive work also suggests that people remember color images more accurately or for a longer time than BW images (Gardner and Cohen 1964; Homa and Viera 1988; Suzuki and Takahashi 1997; Vandermeer 1954; Wichmann, Sharpe, and Gegenfurtner 2002). These findings may explain why color tends to be more common than BW imagery in most media advertisements.

Although past work has focused on which form of imagery, BW versus color, promotes greater attention, memory, favorable attitudes, and so on, the current work adopts a different perspective. That is, we focus on the impact of BW versus color imagery on how people process information and how this change in information processing influences feature evaluation and choice. We propose that BW versus color imagery directs attention to different types of information and product attributes, which in turn systematically affects preferences. One implication of our approach is that there may be conditions under which BW (vs. color) imagery can lead to more favorable consumer responses.

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Drawing from construal-level theory (CLT; Liberman and Trope 2008; Liberman, Trope, and Stephan 2007; Trope and Liberman 2010; Trope, Liberman, and Wakslak 2007), we propose the novel hypothesis that whereas BW imagery promotes high-level construal, color imagery promotes low-level construal. We first present the theoretical argument as to why BW (vs. color) imagery should be associated with high-level (vs. low-level) construal and present empirical evidence for this assertion (experiment 1). We then test to what degree BW (vs. color) imagery evokes high-level (vs. low-level) construal (experiments 2 and 3) and examine the consequences of BW versus color imagery in feature evaluation and choice within consumer behavior contexts (experiments 4 and 5). We end the article with a discussion of how this work contributes to our understanding of color perception, construal, and practices in marketing.

## THEORETICAL BACKGROUND

### Construal-Level Theory

CLT provides a theoretical framework for understanding how people consider objects and events that are removed from direct experience (i.e., those that are psychologically distant). Psychological distance is egocentric and anchored in one's experience of "me" in the "here-and-now." Objects and events that are farther from (vs. nearer to) this reference point are psychologically distant (vs. proximal). For example, an event that is to occur a year from now is psychologically distant relative to one that is to occur tomorrow. Beyond temporal distance, research has identified physical space (here vs. there), social distance (me vs. you, us vs. them), and hypotheticality (likely vs. unlikely, real vs. imagined) as dimensions of psychological distance.

When events are directly experienced (i.e., psychologically proximal), people can use their perceptual systems to construct rich and detailed representations of events. When events extend beyond the scope of direct perception (i.e., psychologically distant), by contrast, people must construct representations from the knowledge that they have. Detailed specifics about distant events, however, are often unavailable and subject to change. In response to this challenge, CLT proposes that people engage in high-level construal—constructing representations that focus on the abstract, essential, and defining features of an event. As events become proximal, people engage in low-level construal—incorporating the incidental details that become increasingly available and reliable to create more concrete and idiosyncratic representations of specific events. This is a functional response to the epistemic challenges of psychological distance because the essential and defining features are less likely to change across different contexts, whereas concrete and incidental details are more variable and depend on the particular situation.

### Association between Black-and-White versus Color Imagery and Construal Level

There are at least three reasons why we might expect BW versus color imagery to be associated with high-level versus low-level construal, respectively. The first reason stems from people's tendency to associate BW versus color media with the distant versus near past, respectively. Given that color in pictures and video is a more recent technological development, people may view color imagery as something temporally proximal and BW imagery as something temporally distant. CLT would suggest that the temporal distance (vs. proximity) of BW (vs. color) imagery in turn should evoke high-level (vs. low-level) construal. Over time, this pairing between BW versus color and construal level might overgeneralize and emerge even when temporal distance is held constant.

A second reason why BW versus color imagery might be associated with high-level versus low-level construal, respectively, stems from people's direct experience of their environments. The human eye is relatively advanced in its perception of color, compared to many other animals (e.g., dogs, cats). The human eye has four types of light receptors; among them are three types of cones, each of which responds to a different range of color (i.e., red, green, and blue), working together to allow perception of the entire rainbow spectrum (Gegenfurtner and Sharpe 2001; Kaplan, Lee, and Shapley 1990; Stockman and Sharpe 2001). Although the fourth type of light receptor, rods, are sensitive only to black, white, and shades of gray, the fact that our environment is mostly colorful rather than BW suggests that our visual experience of the environment is predominately in color. In contrast, the experience of BW imagery is psychologically removed, reflecting an experience that deviates from the colorful experience of "me" in the "here-and-now." So, the perception of BW (vs. color) imagery is different from the reality that is directly experienced, which CLT suggests should therefore promote high-level (vs. low-level) construal (Amit, Algom, and Trope 2009). The repeated pairing of BW versus color with high-level versus low-level construal, respectively, should lead the concepts to become associated.

Finally, a third reason for an association between BW versus color imagery and construal level is that the cognitive operations entailed in the perception of BW versus color imagery are highly similar to those entailed in high-level versus low-level construal, respectively. Relative to color imagery, BW imagery highlights contour and boundary information that facilitates attention to the form or shape of an object yet reduces the contrast between various image components, rendering smaller details less salient and distinctive (Arnheim 1957, 1974; Davidoff 1991; Greenleaf 2010). For example, in a BW image of a chair, the wood color and texture of the chair may not be noticeable, but the shape of the chair is still easily perceived. By contrast, vivid colors accentuate different hues and textures, drawing attention to specific details (Brockmann 1991; Dooley and Harkins 1970; Itti and Koch 2001; Janiszewski 1998). Thus, perception research indicates that whereas BW imagery directs attention to global form and shape, color directs attention to constituent detail.

This directing of attention to form versus detail is im-

portant to note because, whereas form constitutes a high-level feature, detail constitutes a low-level feature. Two lines of logic support this assertion. First, perception of colors is sensitive to changes in the angle from which a viewer perceives them as well as by the brightness of the environment, whereas perception of form is less affected by such situational variation (Arnheim 1974). Thus, whereas color represents a context-dependent feature, form is relatively more invariant. Second, form more so than detail provides information about the essential nature of depicted objects (Arnheim 1974). People use the global shape of objects to identify and understand their meaning and functionality (Arnheim 1974; Biederman 1987; Biederman and Ju 1988; Lowe 1984; Mapelli and Behrmann 1997). Although there may be times in which color can be critical for identification—such as when the color of a tomato (green vs. red) signals its palatability (less edible vs. more edible, respectively)—generally speaking, color relative to form is less useful in conveying the essential nature of objects (Brockmann 1991; Dooley and Harkins 1970; Rossiter 1982). Thus, research suggests that form is a high-level feature and detail is a low-level feature and that BW versus color imagery may direct attention to these features in a manner akin to high-level versus low-level construal, respectively. This overlap in cognitive procedures should therefore lead the concepts to become associated.

## The Current Research

The current research has three goals. First, on the basis of the three reasons discussed above, we aim at testing the central theoretical assertion of this article: BW versus color imagery is cognitively associated with high-level versus low-level construal, respectively (experiment 1). Second, assuming the two concepts are cognitively associated, we intend to test whether BW versus color imagery promotes high-level versus low-level construal, respectively (experiments 2 and 3). Third, extending this research into consumer decision making, we investigate whether BW versus color imagery affects feature evaluation and choice (experiments 4 and 5).

First, we use the Implicit Association Test (IAT; Greenwald, Nosek, and Banaji 2003) to assess the association between BW versus color imagery and construal level (experiment 1). The IAT is a reaction time measure that gauges the strength of association between different concepts. It has been used in previous research (Bar-Anan, Liberman, and Trope 2006) to document the association between psychological distance dimensions (time, space, social distance, and hypotheticality) and construal level. We adapted this IAT for our critical test.

Second, we test the hypothesis that BW (vs. color) imagery promotes high-level (vs. low-level) construal via three different tasks: a categorization task (experiment 2), as well as behavior segmentation and identification tasks (experiment 3), all derived from the CLT literature. This literature supports the assertion that when thinking about psychologically distant (vs. proximal) events, people engage in high-level (vs. low-level) construal (Liberman and Trope 2008; Liberman et al. 2007; Trope and Liberman 2010; Trope et al. 2007). For example, people are more likely to sort objects associated with the distant versus near future into fewer, broader categories, suggesting more abstract, high-level features rather than concrete, low-level features as the basis for categorization (Liberman, Sagristano, and Trope 2002). People are also more likely to organize and segment continuous streams of behavior associated with psychologically distant versus near events into larger, broader units, suggesting more abstract rather than concrete processing (Henderson et al. 2006; Wakslak et al. 2006). Similarly, people are more likely to identify behaviors in terms of the general ends they achieve ("why" one does something) rather than the specific means by which to achieve them ("how" one does something) when they are situated in the distant rather than near future (Liberman and Trope 1998). In our research, we argue that the perception of BW (vs. color) imagery promotes high-level (vs. low-level) construal, which in turn should increase the tendency to (1) categorize objects on the basis of high-level (vs. low-level) features (experiment 2), (2) segment continuous streams of behavior into fewer, broader (vs. more, narrower) units, and (3) interpret various actions as ends (vs. means; experiment 3).

Finally, applying our key hypotheses (i.e., BW vs. color imagery is associated with and promotes high-level vs. low-level construal, respectively) to consumer decision making, in the last two studies of this article, we test whether consumers exposed to BW (vs. color) product imagery will weigh the primary and essential (vs. secondary and superficial) product features more (experiment 4) and prefer an option that excels on these features (experiment 5), leading those exposed to color imagery to make a suboptimal choice. Research suggests that a high versus low construal level systematically affects evaluation, judgment, and choice. The focus on abstract and essential properties that high-level construal promotes also leads people to prefer decision options that maximize the primary and central aspects of a choice rather than the secondary and superficial features (Eyal et al. 2009; Fujita et al. 2006, 2008; Torelli and Kaikati 2009; Trope and Liberman 2000). In one study, for example, Trope and Liberman (2000) asked participants to select a radio for listening to music in the near versus distant future. One radio had excellent sound (primary feature) but a mediocre clock display (secondary feature), whereas the alternative had mediocre sound but an excellent clock. Those selecting a radio for purchase in the distant future were more likely to pick the radio with superior primary (rather than secondary) features (i.e., the radio with excellent sound but poor clock display). Thus, research highlights the central role of construal level in consumer judgment and decision making. We join this stream of research by assessing the proposed paralleling effects of BW versus color imagery.

We should note that our hypotheses find some support in prior research examining the impact of BW versus color on learning and memory. For example, Katzman and Nyenhuis (1972) found that people were more likely to recall story-

irrelevant information when scenes from a comic book were presented in color rather than BW. Similarly, Dooley and Harkins (1970) presented BW versus color bar charts to participants and found that those exposed to color charts spent more time looking at irrelevant graphic stimuli. Although this past work provides some initial support for our hypotheses, it was not designed to test the construal-level framework specifically and did not explore this research question systematically. The current research extends this past work by examining the effect of BW versus color imagery on construal level and on consumer decision making.

## EXPERIMENT 1: COGNITIVE ASSOCIATION BETWEEN BW (VS. COLOR) AND HIGH-LEVEL (VS. LOW-LEVEL) CONSTRUAL

Experiment 1 adopts the IAT to assess the association between BW versus color imagery and high-level versus low-level construal, respectively. In the IAT paradigm, participants categorize stimuli into one of two categories, which are mapped onto the same response keys. People respond faster when the two categories mapped on to a given key are associated. We predicted that participants would be faster to categorize stimuli when the concepts BW and high-level construal (and color and low-level construal) were paired, as compared to when the concepts BW and low-level construal (and color and high-level construal) were paired.

### Method

One hundred eighty-two undergraduates at the Ohio State University completed this study in a laboratory for partial course credit. Past research indicates that whereas superordinate categories are associated with high-level construal, subordinate exemplars are associated with low-level construal (Bar-Anan et al. 2006; Liberman et al. 2002). Thus, as stimuli for the IAT, we selected 12 stimulus words to represent high-level versus low-level terms: six that referred to general categories (electronics, animal, plant, jewelry, furniture, and vehicle) and six that referred to specific exemplars of those categories (digital camera, poodle, tulip, ring, sofa, and convertible). We also selected six pictures depicting each of the six low-level exemplars and presented them either in BW or in color (see fig. 1).

Instructions regarding the key and item assignments were presented at the beginning of each block (table 1 summarizes these assignments). The first two blocks of the IAT were practice blocks: block 1 required categorizing all of the picture stimuli as either BW or color. Block 2 required categorizing all of the word stimuli (e.g., electronics, digital camera) as either "general category" or "specific exemplar." Blocks 3 and 4 represented critical combined blocks in which the identification of BW pictures and general category words were assigned to the same key, whereas identification of color pictures and specific exemplar words were assigned to the other key (or vice versa, counterbalanced between subjects). Block 5 was another practice block, with the key pairings reversed from block 1. Blocks 6 and 7 represented a second set of critical combined blocks with key assignments reversed from those of blocks 3 and 4. In these blocks, identification of color pictures was paired with general category words and identification of BW pictures was paired with specific exemplar words (or vice versa, counterbalanced between subjects).

### Results and Discussion

IAT responses were analyzed using the D-score algorithm with a 600 millisecond penalty for incorrect responses; we eliminated one participant who responded in less than 300 milliseconds for 10% or more of trials (Greenwald et al. 2003). We identified blocks in which BW pictures and general category words (and color pictures and specific exemplar words) were paired as the compatible blocks. By contrast, we identified those blocks in which BW pictures and specific exemplar words (and color pictures and general category words) were paired as the incompatible blocks. We expected that the response time would be faster for compatible blocks than for incompatible blocks.

We did find the mean response time to be shorter in compatible blocks paring BW with general category and color with specific exemplar (965.75 milliseconds), compared with incompatible blocks paring BW with specific exemplar and color with general category (1,097.52 milliseconds). Following procedures recommended by Greenwald et al. (2003), we converted this difference in response time into D-scores. Consistent with our expectation, we found that the mean D-score significantly differed from zero ($M = .28$, $SD = .45$; $t(180) = 8.19$, $p < .001$). Thus, participants were faster on compatible versus incompatible blocks. That participants were able to respond significantly faster when asked to group BW with high-level and color with low-level concepts suggests that people have a stronger implicit association between BW (vs. color) and high-level (vs. low-level) concepts. Thus, the result from the IAT supports our assertion that there is a cognitive association between BW versus color imagery and high-level versus low-level construal, respectively.

## EXPERIMENT 2: BW (VS. COLOR) LEADS TO CATEGORIZATION BASED ON HIGH-LEVEL (VS. LOW-LEVEL) FEATURES

Experiment 2 intends to demonstrate that BW (vs. color) increases the tendency to categorize objects on the basis of high-level (vs. low-level) features. We test this hypothesis in two steps. First, we confirm that form versus detail is a high-level versus low-level feature of objects, respectively (experiment 2a). Second, we show that BW versus color leads people to sort objects in terms of form versus detail, respectively (experiment 2b).

Experiment 2a consisted of two parts. In part 1, we induced the tendency to construe objects in high-level versus

**FIGURE 1**

EXPERIMENT 1 STIMULI

| Words | | Pictures | |
|---|---|---|---|
| General Category | Specific Exemplar | Black-and-White | Color |
| Electronics | Digital Camera |  |  |
| Animal | Poodle |  |  |
| Plant | Tulip |  |  |
| Jewelry | Ring |  |  |
| Furniture | Sofa |  |  |
| Vehicle | Convertible |  |  |

**TABLE 1**

EXPERIMENT 1: KEY ASSIGNMENTS IN IMPLICIT ASSOCIATION TEST BLOCKS

| | Condition A* | | | Condition B† | | |
|---|---|---|---|---|---|---|
| Block | Function | Item assigned to left key | Item assigned to right key | Function | Item assigned to left key | Item assigned to right key |
| 1 | Practice | BW | Color | Practice | Color | BW |
| 2 | Practice | General | Specific | Practice | General | Specific |
| 3 | Compatible | BW + general | Color + specific | Incompatible | Color + general | BW + specific |
| 4 | Compatible | BW + general | Color + specific | Incompatible | Color + general | BW + specific |
| 5 | Practice | Color | BW | Practice | BW | Color |
| 6 | Incompatible | Color + general | BW + specific | Compatible | BW + general | Color + specific |
| 7 | Incompatible | Color + general | BW + specific | Compatible | BW + general | Color + specific |

NOTE.—BW = black and white.
*Compatible blocks precede incompatible blocks.
†Incompatible blocks precede compatible blocks.

**FIGURE 2**

EXPERIMENT 2 STIMULI


low-level terms, using procedural mind-set procedures validated in previous research (Fujita et al. 2006). In part 2, we presented participants with four consumer products that varied in functional form and aesthetic detail and asked them to categorize these stimuli into groups. To the extent that form represents an essential high-level feature relative to detail, we would expect that those induced to high-level versus low-level construal would sort these products on the basis of form rather than detail.

Experiment 2b subsequently applied this categorization methodology to examine the impact of BW versus color on level of construal. It also consisted of two parts. In part 1, participants completed the same categorization task as in experiment 2a (part 2) but with the stimuli presented in BW or color format. Assuming that form is a high-level feature relative to detail (an assumption tested in experiment 2a), we predicted that those presented with the products in BW (vs. color) format should be more likely to sort the products on the basis of form rather than detail. In part 2, participants completed the Positive and Negative Affect Schedule (PANAS) Short-Form, which was used to assess whether being exposed to BW versus color pictures could have led to any differences in their experience of various types of emotion.

## Method

We recruited 138 and 149 participants for experiments 2a and 2b, respectively, via Amazon Mechanical Turk. They participated in the study in exchange for payment.

*Construal-Level Manipulation* (*Experiment 2a*). The category versus exemplar procedural mind-set manipulation of construal level (Fujita et al. 2006) presented participants with 30 words, such as actor, beer, book, and candy. Those in a high-level construal condition were instructed to generate superordinate category labels for each word by answering the question: an ACTOR is an example of ___. Those in low-level construal condition were instructed to generate subordinate exemplars for each word by answering the question: an example of an ACTOR is ___.

*Main Categorization Task* (*Experiments 2a and 2b*). The categorization task presented participants with six sets of four products each (see fig. 2). In experiment 2a, the prod-

**TABLE 2**

EXPERIMENT 2: BLACK-AND-WHITE (VS. COLOR) INCREASES THE TENDENCY TO CATEGORIZE PRODUCTS ON THE BASIS OF HIGH-LEVEL (VS. LOW-LEVEL) FEATURES

| Groupings based on detail | Groupings based on form | Study 2a: High versus low construal (% grouped by form) | Study 2b: BW versus color imagery (% grouped by form) |
|---|---|---|---|
| Leopard print versus plain (AC vs. BD) | High heels versus sneakers (AB vs. CD) | 88.24% versus 75.41% | 92.75% versus 82.86% |
| Spikes patent versus plain (AB vs. CD) | Flat shoes versus sneakers (AC vs. BD) | 95.59% versus 86.89% | 91.30% versus 84.29% |
| Military print versus plain (AC vs. BD) | High heel boots versus sneakers (AB vs. CD) | 97.06% versus 91.80% | 95.65% versus 92.86% |
| Dot print versus plain (AC vs. BD) | Wedge heels versus rain boots (AB vs. CD) | 95.59% versus 90.16% | 97.10% versus 88.57% |
| Tiger print versus plain (AB vs. CD) | Ankle boots versus slippers (AC vs. BD) | 91.18% versus 83.61% | 97.10% versus 85.71% |
| Check print versus plain (AB vs. CD) | Combat boots versus sneakers (AC vs. BD) | 95.59% versus 90.16% | 97.10% versus 87.14% |

NOTE.—BW = black and white. Each product was labeled with a letter (A, B, C, and D); see fig. 2.

ucts were presented in color. In experiment 2b, the products were presented either in BW or in color. The participants' task was to sort the four products within a given set into two categories of two products each. Each product was labeled with a letter (A, B, C, and D). Participants indicated their groupings by writing down the letter corresponding to each product into one of two boxes, with each box representing a category grouping. The stimuli within each set could be categorized on the basis of either functional form or aesthetic detail. The first set, for example, included four shoes: two high heels and two sneakers. The form of the shoes instantaneously informs their functionality (Arnheim 1974; Biederman 1987; Biederman and Ju 1988; Lowe 1984; Mapelli and Behrmann 1997) and therefore serves as a basis for categorization. The detail of the shoe design can also be used as a basis for differentiation: two shoes (one high heel and one sneaker) were plain whereas the other two had a leopard print. So, the shoes could be categorized by either form (i.e., heels vs. sneakers) or detail (i.e., plain shoes vs. leopard print shoes). Across the six sets of stimuli, whether AB/CD or AC/BD grouping represented form-based (vs. detail-based) categorization was randomly determined across all six sets.

*PANAS* (*Experiment 2b*). After completing the main categorization task, participants in experiment 2b were asked to complete the PANAS Short-Form (Watson and Clark 1994; Watson, Clark, and Tellegen 1988). This was to capture any potential differences in affective states as a function of being exposed to BW versus color stimuli. We added the item "nostalgia" to address the potential possibility that BW imageries evoked a feeling of nostalgia that might account for our results. Participants indicated to what extent they felt, at that moment, each of the affective states listed on the form, using a 7-point Likert-type scale, with 1 = not at all and 7 = extremely.

## Results and Discussion

We coded responses for each set such that categorization based on detail was given the value 0, and categorization based on form was given the value 1. We summed these item scores and created a categorization index ranging from 0 to 6, with higher scores indicating greater tendency to focus on form rather than detail. In our analysis, we excluded 9 participants in experiment 2a and 10 participants in experiment 2b, who did not follow instructions or categorized on the basis of neither form nor detail (i.e., AD and BC grouping).

*Categorization as a Function of Procedural Mind-Sets* (*Experiment 2a*). In general, participants were more likely to categorize products in terms of form, confirming that form represents an essential high-level feature and detail represents a superficial low-level feature. Across all six sets, we found a consistent pattern that a greater percentage of participants categorized products on the basis of their form when induced to a high level of construal (see table 2). Analyses of our categorization index indicated that, as predicted, participants who engaged in high-level construal (via generating superordinate categories) were more likely to categorize products in terms of form than were those who engaged in low-level construal (via generating subordinate exemplars; $M_{high} = 5.63$ vs. $M_{low} = 5.18$; $t(128) = 2.01$, $p < .05$). This result confirms that form relative to detail represents a high-level feature.

*Categorization as a Function of BW versus Color* (*Experiment 2b*). As in experiment 2a, participants were more likely to categorize products in terms of form. Across all six sets, we again found a consistent pattern that a greater percentage of participants categorized products on the basis of their form when presented with BW imagery (see table 2). More importantly, as predicted, analyses of the categorization index revealed that participants who saw products in BW were more likely to categorize products on the basis of form than were those who saw products in color ($M_{BW} = 5.71$ vs. $M_{col} = 5.21$; $t(138) = 2.10, p < .05$). So, findings from experiments 2a and 2b support our argument that BW (vs. color) imagery promotes a focus on high-level features such as the product's form, much like high-level (vs. low-level) construal does.

*PANAS Results.* We analyzed responses to the PANAS scales to test whether there were any differences in (positive or negative) affective states as a function of BW versus color presentation format. Analyses revealed no significant dif-

ference in either positive ($t(138) = .01, p = .99$) or negative ($t(138) = .73, p = .47$) affective state (see table 3), nor did these variables significantly correlate with our categorization index. Moreover, when we included positive and negative mood as a covariate in our analysis, the pattern of results did not change. These data are inconsistent with the possibility that differences in affective states served as an alternative mediator (or confound) for the effect of BW versus color imagery on categorization in experiment 2b.

One might similarly suggest that specific emotions elicited by exposure to BW versus color imagery, such as nostalgia, may underlie the effects. To address this issue, we analyzed responses to each individual item of the PANAS (with the addition of nostalgia). As table 3 shows, there were no significant differences between BW and color condition on any of the items, including how nostalgic participants felt ($t(138) = .11, p = .91$). Although nostalgia was significantly correlated with the categorization index ($r = -.19, p = .02$), including it as a covariate in our analysis did not change the effect of BW versus color imagery on the categorization index ($t(137) = 2.16, p < .05$). These data are inconsistent with the assertion that nostalgia served as an alternative mediator (or confound) for the effect of BW versus color imagery on categorization.

To summarize: experiment 2a showed that when participants were induced to a high level (vs. low level) of construal, they tended to sort objects on the basis of form (vs. detail). Experiment 2b showed that when participants were presented with BW (vs. color) imagery, they demonstrated the same tendency of categorizing objects on the basis of form (vs. detail). Taken together, these results confirmed that form (vs. detail) is a high-level (low-level) feature (experiment 2a) and supported that BW (vs. color) promotes a focus on a high-level (vs. low-level) feature. We also found no systematic differences in the experience of any emotions, including nostalgia, as a function of BW versus color.

**TABLE 3**

EXPERIMENT 2: THE EFFECT OF BLACK-AND-WHITE VERSUS COLOR IMAGERY ON RESPONSES TO THE PANAS ITEMS

| Subscale and item | *p*-value |
|---|---|
| Positive | .9905 |
| Attentive | .9279 |
| Active | .7892 |
| Alert | .4054 |
| Determined | .9762 |
| Enthusiastic | .6321 |
| Excited | .9013 |
| Inspired | .9653 |
| Negative | .4665 |
| Afraid | .4888 |
| Scared | .9458 |
| Determined | .9762 |
| Jittery | .9794 |
| Irritable | .2274 |
| Hostile | .3324 |
| Guilty | .6938 |
| Nostalgia | .9115 |

## EXPERIMENT 3: BW (VS. COLOR) IMAGERY LEADS TO BEHAVIOR SEGMENTATION AND ACTION IDENTIFICATION IN HIGH-LEVEL (VS. LOW-LEVEL) TERMS

Experiment 3 is designed to show that BW (vs. color) increases the tendency to segment continuous streams of behavior into fewer, broader (vs. more, narrower) units, as well as interpret various actions as ends (vs. means). It consists of two parts. In part 1, we used a classic assessment of abstract, schematic processing: how perceivers segment or "chunk" continuous streams of behavior (Newtson 1973; Newtson and Engquist 1976). Past research shows that those who engage in more abstract, high-level information processing tend to ignore incidental details and instead focus on broader patterns of behavior, leading to behavior segmentation that emphasizes fewer, larger units (Henderson et al. 2006; Markus, Smith, and Moreland 1985; Wakslak et al. 2006). Thus, we expect BW (relative to color) imagery to produce parallel effects. Using videos as stimuli, another purpose of this study is to see whether the effects of BW versus color imagery extended beyond pictures to videos. We expect similar effects irrespective of whether BW versus color imagery is presented in picture or video format.

In part 2, we used the classic Behavioral Identification Form (BIF; Vallacher and Wegner 1989) to measure the tendency to construe behaviors in high- versus low-level terms. An important goal of this study is to test the possibility that BW versus color imagery can create high-level versus low-level construal as a procedural mind-set. Past CLT research indicates that inducing participants to construe an event in higher- versus lower-level terms can promote a tendency to construe subsequent unrelated events in a similar fashion (Förster, Friedman, and Liberman 2004; Freitas, Gollwitzer, and Trope 2004; Fujita et al. 2006). To test this, after participants completed the behavior segmentation task in part 1 of the study, we used the BIF to assess their construal of behaviors unrelated to those depicted in the segmentation task. To the extent that BW versus color videos can induce high-level and low-level construal as procedural mind-sets, we might expect that those exposed to BW (vs. color) videos would construe subsequent unrelated behaviors in higher-level (vs. lower-level) terms.

### Method

We recruited 40 undergraduate students taking summer courses at the Ohio State University to participate in this computer-based study in exchange for course credit. The critical manipulation was whether the videos shown in part 1 of the study were BW or color. Participants were randomly assigned to one of the two conditions. We asked them to imagine that they had secured a new position in a film production company and had been asked to view three short

**TABLE 4**

EXPERIMENT 3: BLACK-AND-WHITE (VS. COLOR) INCREASES THE TENDENCY TO INTERPRET BEHAVIORS IN HIGH-LEVEL (VS. LOW-LEVEL) TERMS

| Behavior | Two interpretations of behavior | % Chose high-level BW versus color |
|---|---|---|
| Common: | | 85% versus 60% |
| Making a list | **Getting organized** versus Writing things down | |
| Reading | **Gaining knowledge** versus Following lines of print | 95% versus 70% |
| Washing clothes | **Removing odors from clothes** versus Putting clothes into the machines | 75% versus 45% |
| Eating | **Getting nutrition** versus Chewing and swallowing | 75% versus 65% |
| Uncommon: | | |
| Painting a room | **Making the rooms look nice** versus Applying brush strokes | 95% versus 75% |
| Chopping down a tree | **Getting firewood** versus Wielding an axe | 65% versus 30% |
| Caring for houseplants | **Making the room look nice** versus Watering plants | 25% versus 10% |
| Measuring a room for carpeting | **Getting ready to remodel** versus Using a yardstick | 90% versus 75% |

NOTE.—Bold type indicates high-level interpretation. BW = black and white.

videos that were currently in production, with the following instructions (Henderson et al. 2006; Wakslak et al. 2006): The assignment your boss gave you is to watch three videos and to segment what you see into actions that seem natural and meaningful to you. While watching these videos, you will be asked to click a button when, in your judgment, one meaningful action ends and another begins. There is no right or wrong way to do this; it's up to you to decide whether or not an action seems natural and meaningful to you."

We then presented three videos in the same sequence to all participants. They first watched Heider and Simmel's (1944) classic animated film of shapes moving around a rectangular object (90 seconds long). Henderson and colleagues (2006) used this video in a behavior segmentation task to assess changes in construal level. Following their lead, we told participants that the moving shapes in the video symbolically represented an event that took place during a camping trip for young teenagers. Participants then watched a stop-motion animation video (103 seconds long) that presented a sequence of what appear to be unrelated actions (e.g., washing a knife, measuring and sawing a board, using a screwdriver, cooking a lobster and vegetables). Finally, they watched an animated film (216 seconds long) depicting an elderly man selling noodles on a street for his living, despite his shaking hands (e.g., receiving order, cooking noodles, serving noodles, changing a light bulb). We selected these three videos to vary in content and format. While watching each video, participants were instructed to press a key each time they perceived that a meaningful action had ended and another had begun. The number of meaningful behavioral segments served as the measure of construal level, with fewer segments suggesting enhanced high-level construal.

In part 2 of the study, to examine whether any change in construal level induced by the videos would "carry over" to subsequent unrelated contexts as a procedural mind-set, we asked participants to complete a second task adapted from the BIF (Vallacher and Wegner 1989). The BIF presents participants with target behaviors (e.g., making a list) and asks them to choose which of two redescriptions of this behavior they prefer. One description emphasizes the abstract ends achieved by the behavior ("why" one engages in the behavior: e.g., getting organized), whereas the other emphasizes the concrete means by which to achieve the behavior ("how" one engages in the behavior: e.g., writing things down). We presented only eight of the original BIF items, for the sake of time. To ensure that any effect was not dependent on the frequency or commonality of a given behavior, we selected four items that reflected what we intuited would be more common for undergraduate students and four items that were less common (see table 4). We coded responses such that preferences for the concrete, low-level identification were given the value 0 and preferences for the abstract, high-level identification were given the value 1. We summed these item scores and created an abstraction index ranging from 0 to 4 for both common and uncommon behaviors, with higher scores indicating greater high-level construal.

## Results and Discussion

We analyzed the data from the behavior segmentation task using a 2 (presentation format: BW vs. color) × 3 (video clip: video 1 vs. video 2 vs. video 3) repeated-measure ANOVA with presentation format as a between-subjects factor and video as a within-subjects factor. Because the distribution of behavioral segments was positively skewed, we transformed the data using a logarithmic function and conducted our analysis on this transformed variable (for ease of interpretation, though, we present the raw means in table 5). As predicted, our analysis revealed a significant main effect of presentation format ($F(1, 38) = 6.36$, $p < .05$). More specifically, participants who watched BW videos segmented the behaviors into fewer units ($M_{BW} = 2.21$) than did those who watched color videos ($M_{col} = 2.67$). Neither the main effect of video ($F(2, 76) = 1.03$, $p = .36$) nor the interaction between presentation format and video ($F(2, 76) = 2.00$, $p = .14$) was statistically significant. These data suggest that watching BW (vs. color) videos promotes high-level (vs. low-level) construal. Not only do they con-

**TABLE 5**

EXPERIMENT 3: BLACK-AND-WHITE (VS. COLOR) INCREASES THE TENDENCY TO SEGMENT BEHAVIORS IN FEWER, BROADER (VS. MORE, NARROWER) UNITS

| | Mean number of segments (SD) | |
|---|---|---|
| | Black and white | Color |
| Video 1 | 12.75 (6.96) | 15.85 (8.61) |
| Video 2 | 12.05 (8.34) | 15.40 (14.53) |
| Video 3 | 10.95 (6.64) | 18.55 (6.06) |
| Mean | 11.92 (5.48) | 16.60 (8.81) |

NOTE.—Raw mean and standard deviation (non-log-transformed) are presented.

ceptually replicate experiments 1 and 2, they also suggest that the effect of BW (vs. color) imagery on construal level is not limited to pictures but may also extend to videos.

We next analyzed the abstraction index calculated from participants' responses to eight BIF items using a 2 (presentation format: BW vs. color) × 2 (commonality: high vs. low) repeated-measure ANOVA with presentation format as a between-subjects factor and commonality as a within-subjects factor. The interaction between presentation format and commonality was not statistically significant ($F(1, 38) = .03$, $p = .87$), but the main effect of commonality was significant ($F(1, 38) = 11.65$, $p < .01$). The latter revealed that participants generally preferred to describe common relative to uncommon behaviors ($M_{common} = 2.85$ vs. $M_{uncommon} = 2.33$) in more abstract, high-level terms. More importantly, however, as predicted, participants who watched the BW videos tended to prefer more abstract redescriptions of behaviors ($M_{BW} = 3.03$) than those who watched color videos ($M_{col} = 2.15$; $F(1, 38) = 13.67$, $p < .001$). Table 4 describes the choice probability for each of the eight items as a function of condition. Thus, these findings suggest that not only can BW versus color imagery affect construal of the focal objects and events, it can also affect people's construal of subsequent unrelated stimuli by inducing construal-level mind-sets.

To summarize, experiment 3 showed that the perception of BW (vs. color) imagery promotes high-level (vs. low-level) construal in the sense that it led people to segment continuous streams of behavior into fewer, broader units (vs. more, narrower units; in part 1) and interpret various actions as ends (vs. means; in part 2). We also found that the effect of BW versus color imagery extended beyond pictures to videos and carried from one task (i.e., behavior segmentation task in part 1) to another unrelated one (i.e., action identification task in part 2).

# EXPERIMENT 4: PRODUCT ATTRIBUTE EVALUATION

Experiments 1–3 support our main propositions that BW (vs. color) imagery is associated with and promotes high-level (vs. low-level) construal. Experiments 4 and 5 are designed to investigate the implications of these findings for common consumer decisions. As noted earlier, CLT research indicates that high-level relative to low-level construal enhances sensitivity to the primary and essential features rather than the secondary and incidental features of objects and events, leading people to weight these attributes differently in evaluation and choice (Eyal et al. 2009; Fujita et al. 2006, 2008; Torelli and Kaikati 2009; Trope and Liberman 2000). Drawing from these findings, we reason that to the extent that BW (vs. color) imagery evokes high-level (vs. low-level) construal, it should lead people to become more sensitive to the primary and essential (vs. secondary and incidental) features of consumer products. Thus, we predict that BW versus color presentation of products should increase the perceived importance of the primary, goal-related attributes of the product relative to the secondary, goal-irrelevant attributes. We tested this hypothesis in experiment 4.

## Method

Experiment 4 implemented a 2 (presentation format: BW vs. color) × 2 (attribute: primary vs. secondary) mixed factorial design, with imagery as a between-subjects factor and attribute as a within-subjects factor. We recruited 125 undergraduate students from an introductory marketing class at the Ohio State University, who participated in this computer-mediated study in exchange for course credit. We introduced our study to participants as an experiment designed to develop advertising tag lines for a camping radio. Participants read the following information: "This radio is targeted at people who go on camping trips. Many camp locations in the U.S. have poor reception and most radios don't work as well. A recent study showed that over 80% of the popular camping sites in the U.S. received an acceptable signal from only one radio station nearby. Yet, many people like to take a radio on their camping trips because it makes them feel like they are still part of the 'civilization' even though they are away from people. This radio puts out nice sound and is rugged enough to be used for camping trips. Many campers rent this type of a radio from camp offices across the country."

We reasoned that informing participants that the radio is to be used on camping trips would lead them to understand that physical attributes such as size and weight are goal-relevant and primary features, as the radio would have to be carried and transported. At the same time, since camping sites can tune to one radio station only, station-related features, such as "multistation presets" (a feature that allows users to quickly tune to their favorite radio stations) and "high precision tuner" (which allows the radio to distinguish two stations that share similar radio frequencies), are less useful and thus secondary. To provide empirical support for these assumptions, we conducted a pilot study ($N = 55$). Participants were presented with the scenario above and asked to rate how important each of the four attributes was, using a 9-point Likert scale (1 = not at all important, 9 = very important). Results confirmed that participants considered the two physical attributes to be more important and primary ($M_{size} = 6.33$, $M_{weight} = 6.35$) than the two station-

**FIGURE 3**

EXPERIMENT 4 STIMULUS


related attributes ($M_{presets}$ = 5.53, $M_{tuner}$ = 5.13). Specifically, the average of the two primary attributes ($M_{pri}$ = 6.34) was significantly higher than the average of the two secondary attributes ($M_{sec}$ = 5.33; $F(1, 54) = 21.41$, $p < .001$).

Consistent with the cover story, participants in experiment 4 generated taglines for the target product. Afterward, they rated the importance of four attributes of the radio (primary attributes: size and weight; secondary attributes: multistation presets and high-precision tuner) on a 9-point scale (1 = not at all important, 9 = very important). Critically, we presented the picture of the radio in either BW or color when participants read the scenario and rated the importance of attributes (see fig. 3). Our interest was whether BW versus color presentations of the radio would influence the relative weighting of these primary and secondary attributes. If BW (vs. color) presentation enhances high-level (vs. low-level) construal, we would expect that participants would perceive the physical attributes to be more important relative to the station-related attributes in the BW condition relative to the color condition.

## Results and Discussion

Ratings within attribute type (primary vs. secondary) were averaged to create a single index for each attribute type. We then analyzed these data using a 2 (presentation format: BW vs. color) × 2 (attribute: primary vs. secondary) repeated-measure ANOVA with presentation format as a between-subjects factor and attribute as a within-subjects factor. Results revealed a significant main effect of attribute ($F(1, 123) = 28.58$, $p < .0001$). This effect replicates our pilot data and supports our assumption that the physical attributes of the radio ($M_{pri}$ = 6.47) were more goal relevant and primary compared to the station-related attributes ($M_{sec}$ = 5.58), based on the scenario presented to participants. Results also indicated a significant main effect of presentation format. Color ($M_{col}$ = 6.28) relative to BW ($M_{BW}$ = 5.77) pictures increased the perceived importance of all radio attributes ($F(1, 123) = 7.07$, $p < .01$). Critically, as predicted, the interaction between attribute and presentation format was marginally significant ($F(1, 123) = 3.58$, $p = .06$). More specifically, as depicted in figure 4, participants tended to weight the primary over secondary attributes to a greater extent when exposed to BW ($M_{pri}$ = 6.38 vs. $M_{sec}$ = 5.16; $F(1, 55) = 21.68$, $p < .0001$) as compared to color imagery ($M_{pri}$ = 6.57 vs. $M_{sec}$ = 5.99; $F(1, 68) = 7.21$, $p = .01$). Looked at another way, whereas presentation format did not affect the consideration of primary features ($M_{BW}$ = 6.38 vs. $M_{col}$ = 6.57; $F(1, 123) = .59$, $p = .44$), those presented with BW imagery were significantly less likely to give consideration to secondary features as compared to those exposed to color imagery ($M_{BW}$ = 5.16 vs. $M_{col}$ = 5.99; $F(1, 123) = 10.55$, $p < .01$). These results support our prediction that BW (vs. color) imagery increases the perceived importance of the primary, goal-related attributes of the product relative to the secondary, goal-irrelevant attributes.

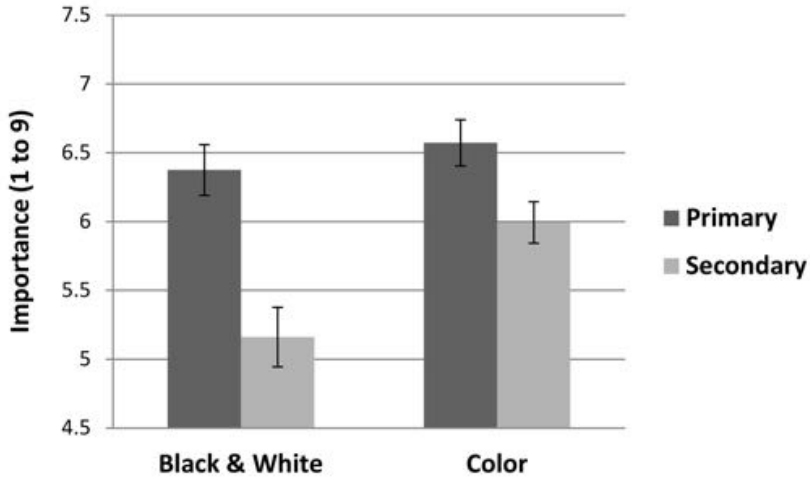
Some might interpret the lack of a crossover interaction as inconsistent with predictions. That is, both BW and color imagery appear to have led to similar weighting of primary features. Generally speaking, one should expect to find that primary features receive more weight in general in a consumer evaluation and decision-making context than do secondary features. As such, consistent with other CLT research, we emphasize the relative rather than absolute weighting of primary and secondary features. We note that the absence of condition effects on the absolute weighting of primary features is common in the literature (Fujita et al. 2008; Trope and Liberman 2000). Thus, the absence of a crossover interaction does not undermine our theoretical assertions.

# EXPERIMENT 5: PRODUCT CHOICE

In experiment 4, we showed that BW (vs. color) imagery can influence how people weight primary versus secondary features in the consideration of consumer products. Experiment 5 examines the implications of these changes in feature weighting for consumer choice. That is, can BW (vs. color) imagery enhance preferences for consumer products that are superior on primary (vs. secondary) features?

**FIGURE 4**

EXPERIMENT 4: BLACK-AND-WHITE (VS. COLOR) IMAGERY INCREASES THE PERCEIVED IMPORTANCE OF THE PRIMARY (VS. SECONDARY) ATTRIBUTES OF THE PRODUCT




## Method

Experiment 5 implemented a one-factor (BW vs. color) between-subjects design. We recruited 94 undergraduate students from an introductory marketing class at the Ohio State University, who participated in this computer-mediated study in exchange for course credit. To facilitate introduction of consumer products that differ in superiority of primary versus secondary features, we presented participants with a scenario similar to the one used in experiment 4: "Imagine you went camping with your close friends. There would be no electricity in the camping site. But you and your friends are hoping to enjoy some music while camping. You don't have a portable radio with you, and are looking for something that can play music and give decent sound. Fortunately, the campsite manager is able to rent a radio that operates without electricity. The manager told you that because the camp location is remote, you can play only one station."

Given this camping scenario, we assumed that participants would understand that rental price in addition to physical characteristics (e.g., size and weight) represent primary attributes for evaluation and choice. By contrast, we assumed that participants would understand that aesthetic design (e.g., a nice display) and station-related features (e.g., multiple station presets and high-precision tuner) represent secondary attributes. To provide empirical support for these assumptions, we conducted a pilot study ($N = 84$) in which participants read the scenario and rated how important each of the four attributes was using a 9-point Likert scale (1 = not at all important, 9 = very important). Results confirmed that participants considered the two primary attributes to be more important ($M_{price} = 6.17$, $M_{physical} = 4.44$) than the two secondary attributes ($M_{stat\text{-}rel} = 3.24$, $M_{display} = 3.57$). Specifically, the average of the two primary attributes ($M_{pri} = 5.30$) was significantly higher than the average of the two secondary attributes ($M_{sec} = 3.40$; $F(1, 83) = 62.16$, $p < .0001$).

Drawing from these pilot data, we presented participants in experiment 5 with information and pictures of two radios (see fig. 5) and asked them which one they preferred. One radio (option A) was superior on the basis of the primary attributes, whereas the other (option B) was superior on the basis of the secondary attributes. Specifically, both radios were described as having equally good sound quality, as indicated by their star ratings. However, Option A had a lower rental price ($10 per day) and appeared smaller and lighter. By contrast, Option B featured a more attractive display design along with multistation presets and high-precision tuner buttons but had a higher rental price ($18 per day) and appeared larger and heavier. If BW (vs. color) presentation enhances high-level (vs. low-level) construal, we would expect that participants prefer option A over option B in the BW relative to color condition.

## Results and Discussion

Among the 94 participants, 58 chose option A and 36 chose option B. That participants were generally more likely to choose option A over option B, together with our pilot data, supports our assumption that the former was viewed as the choice option with superior primary (relative to secondary) features. More critically, as expected, a chi-square test revealed that those presented with BW pictures of the two radios were significantly more likely to choose option A over option B (73.91%), compared to those presented with color pictures (50.00%; $\chi^2(1, N = 94) = 5.68$, $p < .05$). These results support our prediction that BW (vs. color)

**FIGURE 5**

EXPERIMENT 5 STIMULI


presentations of products can increase the choice probability of the option with superior primary, but inferior secondary, attributes. In other words, in this particular study, participants in the color condition showed a greater willingness to spend more money for the choice option that contained unnecessary secondary features. This suggests that at times, by emphasizing secondary features, color relative to BW imagery may lead to suboptimal consumer decisions.

## GENERAL DISCUSSION

In this research, we focus on studying the relationship between BW (vs. color) imagery and high-level (vs. low-level) construal. Using an IAT, experiment 1 provided the important evidence that people associate BW versus color pictures with high-level versus low-level construal, respectively. On the basis of this association, the next two studies tested the novel hypothesis that perception of BW (vs. color) imagery promotes high-level (vs. low-level) construal. Experiments 2a and 2b adopted a categorization task and confirmed that form relative to detail is an essential, high-level feature and that BW (vs. color) imagery leads people to focus on form (vs. detail) in a manner similar to high-level (vs. low-level) construal. Experiment 3 demonstrated that BW versus color imagery not only influences the construal of the focal objects (as assessed by a behavior segmentation task) but may also induce procedural mind-sets that affect the construal of subsequent unrelated material (as assessed by a subsequent action identification task). This study also showed that the effect of BW versus color can extend beyond pictures to videos. Experiments 4 and 5 explored the implications of this effect for consumer behavior, examining the impact of BW versus color imagery on consumer product feature evaluation (experiment 4) and product choice (experiment 5). Specifically, BW versus color imagery enhances the perceived importance of primary versus secondary product features and leads consumers to prefer products with superior primary relative to secondary features. Collectively, these findings support our assertion that BW versus color imagery is associated with and promotes high-level versus low-level construal, respectively.

### On Emotionality as a Potential Confound

Some (Elliot and Maier 2014; Labrecque, Patrick, and Milne 2013; Singh 2006) may argue that color imagery is more emotional than BW imagery and that it is the emotionality of the stimuli (and not the presence or absence of color per se) that leads the former to promote low-level construal relative to the latter. This suggestion, however, would appear inconsistent with the intuitions of artists, who strategically use BW imagery to convey a wide variety of emotional content (Schindler 1986; Zettl 2014). Moreover, empirical research on the impact of BW versus color imagery on emotions appears mixed (Detenber, Simons, and Reiss 2000; Perse, Pavitt, and Burggraf 1991). Research by Detenber and colleagues (2000), for example, suggests that while participants self-report stronger emotional reactions to color rather than BW imagery, there are no detectable differences in physiological assessments of these emotions. We might add that our own data in experiment 2b find no differences in emotional experience as a function of exposure to BW versus color imagery. Thus, it is unclear whether color images are indeed more emotional than BW images.

There are also reasons to question the assertion that low-level construal is more emotional than high-level construal. CLT proposes that emotionality and construal level are conceptually distinct. Rather than suggesting that one level of construal is more emotional than the other, CLT instead suggests that people experience different types of emotions at each level of construal. Some emotions represent acute responses to specific, unique features of the here-and-now, whereas other emotions result from a broader understanding. Research suggests, for example, that whereas low-level con-

strual promotes the experience of lust, high-level construal promotes the experience of love (Epstude and Förster 2011). Research also suggests that low-level construal is associated with the experience of primary emotions such as happiness, and high-level construal is associated with the experience of self-conscious emotions such as pride (Eyal and Fishbach 2010; Fishbach, Eyal, and Finkelstein 2010; Katzir et al. 2010). Thus, it is not that high-level and low-level construals differ on emotionality; rather, they may differ on the type of emotions experienced. Thus, assuming that low-level construal is more emotional than the high-level construal is conceptually problematic.

## Implications for CLT

The current findings extend the existing CLT literature in a number of ways. Theoretically, this work is the first that we are aware of to demonstrate that a basic component of visual imagery (presence or absence of color) can be an important antecedent variable that determines level of construal. It adds to a growing literature examining factors that lead people to construe events in higher- versus lower-level terms beyond psychological distance, such as temperature (Ijzerman and Semin 2010), darkness (Steidle, Werth, and Hanke 2011), visual perspective (Libby, Shaeffer, and Eibach 2009), novelty (Förster, Liberman, and Shapira 2009), fluency (Alter and Oppenheimer 2008), confidence (Wan and Rucker 2013), measurement unit size (Maglio and Trope 2011), regulatory resource depletion (Agrawal and Wan 2009; Bruyneel and Dewitte 2012; Schmeichel and Vohs 2009; Wan and Agrawal 2011), and mood (Beukeboom and Semin 2006; Gasper and Clore 2002; Labroo and Patrick 2009). Such factors are important to understand given the central role of construal level in consumer information processing, evaluation, and decision making (Trope et al. 2007). Understanding the antecedents to construal level may facilitate our understanding of how people represent and interpret objects and events, which may in turn help us understand and potentially influence their subsequent judgments and decisions.

The current work may also lead to the development of new experimental methodologies with which to manipulate level of construal. Researchers looking to manipulating construal level could capitalize on the tendency for BW versus color imagery to promote high-level and low-level construal, respectively. Results from experiment 3 suggest that exposure to BW versus color videos led people to construe subsequent unrelated materials in higher-level versus lower-level terms. This indicates the possibility of developing materials that use BW versus color stimulus to induce differences in construal level as procedural mind-sets. We encourage future research to pursue this possibility to expand the "toolbox" of procedures with which researchers can use to investigate further the role of construal level in consumer judgment and decision making.

The current findings may, in addition, have implications for understanding how people visualize various events in their "mind's eye." To the degree that the processing of BW versus color imagery and construal level are associated, we should not only expect that BW (vs. color) imagery promotes high-level (vs. low-level) construal, but we might also expect the reverse. That is, whereas high-level construal may promote visualization of objects and events in BW, low-level construal may promote visualization of objects and events in color. To the extent that this is true, we might also predict that people will use BW to visualize psychologically distant events and use color to visualize psychologically proximal events. This suggests, for example, that people may picture the distant future in BW and the near future in color. These possibilities may provide insight into the subjective experience of high-level and low-level construal, an insight largely lacking in the current CLT literature. We are currently conducting experiments in the lab testing these possibilities.

## Implications for Marketing and Consumer Behavior

Marketing research on the effects of BW versus color imagery has generally focused on whether the high cost of using color in marketing can be justified by any positive effects (e.g., Which attracts greater attention? Which is remembered better? Which promotes positive evaluations of products?). Fewer studies have examined more nuanced predictions, such as the possibility that BW versus color imagery directs attention to distinct aspects of ads and products. Research that has addressed this issue has largely been conducted in isolation and has lacked an integrative theoretical framework (Bohle and Garcia 1986; Katzman and Nyenhuis 1972; Kumata 1960). In the current work, we have attempted to present a theoretical framework that not only accounts for these past findings but also generates new predictions. Not only do these studies explore how BW versus color imagery affects representation or construal of consumer products, but they are also among the first to explore directly the consumer behavior implications of such differences in attention and information processing.

Future research might explore the implications of the effect of BW versus color imagery for consumer judgment and decision making beyond those that we have examined in the current work. Research has demonstrated, for example, that high-level (vs. low-level) construal can enhance self-control (Fujita 2008; Fujita and Carnevale 2012). Other work has suggested that high-level (vs. low-level) construal can enhance the likelihood of finding more integrative win-win agreements in negotiation (Henderson and Trope 2009; Henderson, Trope, and Carnevale 2006), promote use of base rates (Henderson et al. 2006; Ledgerwood, Wakslak, and Wang 2010), and facilitate decision making under information overload (Fukukura, Ferguson, and Fujita 2013), among many other judgment and decision-making phenomena (Trope et al. 2007). In all these cases, we should expect BW versus color imagery to have similar effects. Marketers seeking to leverage these effects may thus consider using

BW versus color imagery as a psychological "nudge" (Thaler and Sunstein 2008).

One key implication of our theoretical perspective is that it questions the assertion that color is always superior to BW in advertisement. Although color may have positive effects, such as promoting attention, memory, and general positive evaluations (Fernandez and Rosen 2000; Gardner and Cohen 1964; Gronhaug et al. 1991; Hornik 1980; Lohse 1997; Pallak 1983; Percy and Rossiter 1983), the current findings also suggest that by highlighting secondary and incidental aspects, color ads may also distract consumers from attending to the more essential and primary features of the advertisement and advertised product. For marketers, the current work provides profitable opportunities by suggesting the need to consider carefully whether to use BW versus color imagery in advertisements. If a product is superior on a primary feature, for example, marketers should consider using BW imagery to draw attention to these positive features. By contrast, if a product is superior on a secondary feature, marketers should consider using color imagery. Thus, the decision to use BW versus color imagery may be an important one when tailoring messages to consumers. Our findings also ring the alarm to consumers and guide wiser consumption. As suggested in experiment 5, color can redirect our attention from primary to secondary attributes of consumer products, leading to a greater willingness to pay premiums for products with unnecessary and superfluous features.

Knowing that BW versus color imagery affects construal level may also have important implications for matching effects in persuasive advertisements. Research suggests that a match in construal level between consumer and advertisement enhances persuasion (Fujita et al. 2008; Kim, Rao, and Lee 2009; Tsai and Thomas 2011). Similar effects should emerge with a match between BW versus color and whether consumers are engaged in high-level versus low-level construal. Thus, a persuasive appeal concerning a temporally distant versus near event (which should evoke high-level vs. low-level construal among consumers, respectively; Trope et al. 2007) should be more persuasive if accompanied by a BW versus color image, respectively. Matching, however, may also be important to consider within aspects of the persuasive appeal itself. A persuasive appeal that highlights high-level "why" arguments versus low-level "how" arguments should be more persuasive when accompanied by BW versus color imagery, respectively. Ongoing work in our lab is currently testing these predictions.

### Coda

Artists have anecdotally noted that BW relative to color imagery conveys messages that are timeless and enduring, revealing the deeper meaning of the depicted content (Bray 2011; Rowse 2007; Zettl 2014). Such intuitions are supported empirically by the current research. By evoking high-level (rather than low-level) construal, BW imagery may allow people to transcend the particulars of the moment and focus on bigger and broader generalities. We find the notion both intriguing and exciting that such a simple change in the visual presentation of a stimulus has such a fundamental effect on people's psychology. We encourage and look forward to further scientific inquiry addressing this issue.

## DATA COLLECTION INFORMATION

The data for experiments 2a and 2b were collected during summer 2014 via Amazon Mechanical Turk by the first author. The first author, a lab manager, and several lab assistants collected the rest of the data in the Fisher Behavior Lab at the Ohio State University. The data for experiment 1 were collected during spring 2014. The data for experiment 3 were collected during summer 2013. The data for experiments 4 and 5 were collected during spring 2012. All data were analyzed by the first author under the guidance of the second, third, and fourth authors.

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