To Contrast Or Not to Contrast? Consumers’ Response to Color Combinations  
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Consumers respond differently to product combinations dependent on the products’ color and the products’ interrelationship. Contrasting (vs. similar) colors are preferred when the paired products are in an additive relationship (vs. belongingness relationship). Moreover, when the relationship between the combined products matches that between the combined colors, willingness-to-pay is higher.

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EXTENDED ABSTRACT

Colors are omnipresent in our daily life (Bagchi & Cheema, 2013). Mehta and Zhu (2009) label color as “a fundamental aspect of human perception” (p. 1226). Every object, person, or environment we daily face contains color information (Elliot & Maier, 2007). Therefore, it should not come as a surprise that, supported by technological advances, various disciplines such as neuroscience, biology, and visual cognition, are to some extent involved in studying the complexities of color perception. In contrast, marketing research about color functioning remains scarce (Labrecque & Milne, 2012) despite color’s pivotal role in consumers’ daily life (Labrecque, Patrick, & Milne, 2013) and color’s potential to impact several consumer behavior outcomes such as perceptions of advertising (Gorn et al., 1997), perceived website loading time (Gorn et al., 2004), brand familiarity (Labrecque & Milne, 2012) and product category membership (Bottomley & Doyle, 2006).

Even when marketing research did study the functioning of color and the role of its attributes (i.e., hue, saturation, and value), the focus was on single colors (Deng, Hui, & Hutchinson, 2010; e.g., Bellizzi & Hite, 2006; Labrecque & Milne, 2012; Westerman et al., 2012), ignoring the fact that, in general, colors are rarely experienced in isolation (Schloss & Palmer, 2011). The visual stimuli we daily observe are almost never unicoloured. So is the case for the objects we encounter as consumers. For instance, in online shopping environments, products are presented on a colored website background (Bagchi & Cheema, 2013). Further, product packages, shopping mall walls, logos (Labrecque & Milne, 2012), and so on, also predominantly consist of multiple colors. Consequently, there is still much to discover about consumers’ response to color combinations.

Unfortunately, the few empirical studies to date offer contradictory findings. On the one hand, consumers seem to prefer color combinations composed of similar (be it closely related or even matching) colors. On the other hand, consumers seem to like combinations of opposing colors as well (e.g., Deng et al., 2010). These findings are in line with the contradictory propositions of existing color models. That is, some models postulate that complementary colors are perceived to be more aesthetically pleasing compared to combinations of colors that violate this principle (e.g., Itten, 1973; Ostwald, 1969). At the same time, other color models suggest that combinations of colors with similar hues are generally preferred (e.g., Chevreul, 1839). The present study clarifies this ambiguity by suggesting and demonstrating that consumers’ preference for color combinations composed of similar versus contrastive colors depends on the type of relationship the colored objects, resulting in those color combinations, symbolize. More specifically, we assume that attractiveness scores of color combinations increase in case there is a match between the type of relationship symbolized by the colored objects and the type of relationship symbolized by the colors making up the color combinations. We distinguish between two types of relationships: a relationship of ‘belongingness’ and one of ‘addition’.

The few previous studies that show a preference for color combinations composed of similar colors mainly presented the colored objects in a figure-ground organization. More specifically, those colored objects are represented by a smaller square depicted against a larger one. We presume that such a spatial organization of those colored objects symbolizes a relationship of belongingness. In other words, the particular figure-ground setup suggests a relationship in which one object is part of a larger object. The smaller square seems to belong to the larger one against which it is shown. We assume that if the colors used in this figure-ground setup also symbolize a relationship of belongingness (which is the case for similar color hues), attractiveness scores of the respective color combination will increase. Stated otherwise, we believe that a match between the type of relationship the colored objects symbolize and the type of relationship the composing colors symbolize, leads to more positive evaluations of the depicted color combinations. We underpin these assumptions by means of conceptual fluency theory.

Generally speaking, conceptual fluency arises when the mental representation of a target is easier to activate because it offers semantic relatedness to the context in which it appears (Whittlesea, 1993). Such conceptual fluency represents a specific form of processing fluency. In general, experiencing processing fluency evokes a positive affective state that people misattribute to the stimuli they are processing rather than to the ease of processing (Winkielman, Schwarz, Fazendeiro, & Reber, 2003). Translated to the context of this study, we could designate the figure-ground organization as prime and the colors making up the color combination as target. Based on conceptual fluency, one might expect that a conceptual match between the spatial organization (i.e., the prime) and the color combination (i.e., the target) results in a positive affective state which, in turn, results in a more positive evaluation of the target (i.e., the color combination).

Taken together, we propose that consumers will evaluate a given color combination more positively if the type of relationship symbolized by the spatial organization of color objects matches the type of relationship symbolized by the composing colors. This general expectation would consequently mean that color combinations composed of complementing or contrastive colors are evaluated more positively in a context also representing this relationship of addition. Such a context is, for instance, present in case the colored stimuli would be organized in a side-by-side rather than a figure-ground setup.

In sum, we assume that consumers give preference to combinations of similar colors when colored objects are characterized by a relationship of ‘belongingness’ (for instance when the colored objects are in a figure-ground organization). When those colored objects are characterized by a relationship of ‘addition’ (for instance when the color objects are in a side-by-side organization), however, consumers prefer combinations composed of contrastive colors. In other words, a match between the type of relationship the depicted colors have and the type of relationship the depicted colored objects have, results in conceptual fluency which, in turn, renders consumers’ evaluation more positive. These assumptions were tested by means of two experimental studies, which are explained in more detail below. Moreover, a third study demonstrates that this finding has implications for consumer behavior.

Study 1

Fifteen undergraduate and graduate students from a large European university participated in this experiment. They engaged in a 40-minute session of experimental studies, comprising this study, for which they received a compensation of six euro. We collected our data in a consumer lab. In this way, we eliminated the potentially confounding influence of differences in color presentation arising due to the use of different computer monitors. Each participant viewed all 64 pairwise combinations that could be composed out of
eight color hues. More specifically, we made use of four approximately unique hues (i.e., red, green, yellow, and blue) and their approximate angle bisectors (i.e., orange, chartreuse, cyan, and purple). Figure 1 displays the eight hues used in this first study. Next to hue (i.e., the pigments of the color; e.g., blue, red), the color attribute of interest in our study, colors can also be differentiated in terms of value (i.e., degree of darkness or lightness of the color) and chroma (i.e., saturation of the color) (Thompson, Palacios, & Varela, 1992). In order to reduce confounds, we only manipulated hue and kept chroma and value constant (cf. Mehta & Zhu, 2009).

Half of the participants viewed the 64 color combinations in a figure-ground organization, while the other half of the participants viewed the combinations in a side-by-side organization. In both words, hue presentation mode varied between-subjects. In the figure-ground organization condition, figure-ground pairs consisted of a small square (100 x 100 pix) centered on a larger square (300 x 300 pix) (cf. Schloss & Palmer, 2011). In the other experimental condition, two colored squares (150 x 300 pix) were presented side by side. In both experimental conditions and for each color pair, two possible combinations were tested: A on/to the left of B, and B on/to the left of A. Participants were asked to indicate the extent to which they liked the pair as whole on a 7-point Likert-scale ranging from ‘1’ very unattractive to ‘7’ very attractive.

First of all, a variable representing color hue difference was calculated. As color hue is a circular dimension (see Figure 1), the difference in color hue can be calculated as the number of hue steps between two colors in the color circle. For example, the distance between red and yellow is two steps, just as the difference between red and blue. Hence, this variable representing color hue difference ranges from 0 to 4.

As the color combination attractiveness ratings are nested within participants, a multilevel model, estimating these attractiveness ratings as a function of hue presentation mode (figure-ground organization versus side-by-side organization), hue distance, and the interaction between those two variables, was run. Most importantly, this analysis yields a significant interaction effect between hue presentation mode and hue distance ($\beta = .33, t(943.71) = 5.96, p < .001$). That is, results show that in case of a side-by-side hue presentation mode, color combination attractiveness is highest when those combinations are composed of contrasting colors (i.e., in case of maximal hue difference) and decreases as those two composing colors become more similar. The opposite pattern is found for the figure-ground organization: color combination attractiveness is highest when color combinations are composed of colors with minimal hue difference and decreases as those composing colors become more contrasting.

In sum, the results of this first study confirm our assumptions. Findings show that the attractiveness of color combinations composed of similar versus contrasting colors depends on the way in which the colored objects resulting in those color combinations are organized (figure-ground organization versus side-by-side organization). More specifically, when colored objects are organized in a figure-ground setup versus side-by-side setup, attractiveness ratings increase as the composing colors become more similar versus more contrasting. So generally stated, an “increasing match” between the type of relationship the composing colors symbolize (one of belongingness versus addition) and the type of relationship the color objects resulting in the respective color combinations symbolize (one of belongingness versus addition) results in increased color combination attractiveness, presumably through an increasing positive affective state due to conceptual fluency.

**Study 2**

The aim of the second experiment is to test our assumptions in a more direct way. More specifically, Study 2 primes participants to interpret each pair of colored objects as either being in a relationship of belongingness or a relationship of addition. Again, the attractiveness of the depicted color combinations is treated as the dependent variable.

Upon arrival in the consumer lab, participants were led to believe that the goal of the study was to examine the effects of interference on people’s long-term memory. They were told that they would get to see several objects they needed to remember, and that an interfering task would be inserted before they would be asked to recall the objects they had just seen. The slideshow depicting the objects participants needed to remember served as our experimental manipulation. More specifically, the slideshow either comprised a prime of object interrelationship based on belongingness versus addition. To prime object interrelationships, we used a task described by Higgins and Chaire’s (2000). All participants were shown the same series of slides depicting 15 objects. Of the 15 objects, five were filler objects that would normally be designated by a single word (e.g., football, banana, scissors) and 10 were objects that would normally be designated by two words linked together by a linking word. In the ‘additive relationship’ condition, these two objects were linked together by the linking word ‘and’ (e.g., a bowl and cereal). In the ‘belongingness relationship’ condition, these two objects were linked together by the word ‘of’ (e.g., a bowl of cereal). After the participants saw the slides, they completed a task in which they indicated the attractiveness of the depicted color combinations. Colors were presented by means of two rectangles that were equal in size (150 x 300 pix). In order to avoid that either a dependency or additive interpretation of the relationship would be favored, the two rectangles were partially overlapping when presented to participants. A presentation thus holding the middle between a figure-ground organization and a side-by-side organization.

Analogous to the first experiment, we ran a multilevel model. That is, a multilevel regression analyses, estimating color combination attractiveness as a function of object interrelationship condition (belongingness versus addition), hue distance, and the interaction between those two variables, was conducted. As in Study 1, a significant interaction effect resulted ($\beta = .23, t(2713.75) = 5.53, p < .001$). More specifically, when participants were primed with an additive relationship, color combinations composed of colors with a large hue distance were preferred over color combinations composed of more similar color hues. When participants were primed with a relationship of belongingness, color combinations composed of contrastive colors were more likely to be preferred compared to color combinations composed of similar colors.

The results of Study 2 are thus in line with those of Study 1. Generally speaking, color combinations receive higher attractiveness scores in case there is a match between the type of relationship symbolized by the colored objects and the type of relationship symbolized by the colors making up these colored objects.

**Study 3**

A third study then was designed to illustrate the importance of this finding in a consumer behavior context. Specifically, in this experiment we vary the mode in which a product bundle is presented to the participants, as well as the color in which the combined products are presented, and we assess participants willingness-to-pay for the product bundle.

The third study was the final study in a 50-minute experimental session for which participants were paid 7 euro. After being paid,
participants were presented with a product bundle, in this case a set of two bottles of Vitamin Water, and participants were given the opportunity to purchase this set of products at a price they could freely determine. A first factor that was manipulated was how this product bundle was presented to the participants: products were either presented as being part of one package (i.e., bundled with a plastic wrapper and referred to as a ‘one set of bottles’), or they were presented in an additive manner (i.e., bottle A + bottle B). A second factor that was manipulated was the color of the presented bottles. Two color pairs of similar colors were selected (i.e., red and orange, and green and cyan), and two color pairs of contrastive colors were selected (i.e., red and green, and orange and cyan).

The results point to a significant interaction effect (F(1,76) = 16.55, p < .001). We find that when products are presented as a ‘one-package deal’, the willingness to pay is higher when colors are similar (M = 1.73) rather than contrasting (M = 1.18) in hue (p = .013), whereas when products are presented in an additive relationship (e.g., buy one, get another one on top), the willingness to pay is higher when colors are contrasting (M = 1.90) rather than similar (M = 1.20) in hue (p = .002). The results of this third study are in line with those of studies 1 and 2 and demonstrate that how colored objects are presented in a product bundle may have important implications.

General Discussion

although colors play an important role in affecting consumer behavior (Bagchi & Cheema, 2013), marketing research on color remains scarce. Even if studies are conducted about the impact of color on several consumer outcomes, single colors rather than the interaction between colors have been studied (Deng et al., 2010). Even if color combinations were to be studied, resulting findings are mixed. Some studies indicated that consumers prefer combinations composed of similar or even matching colors, while other studies indicate that consumers prefer combinations composed of contrastive colors (e.g., Deng et al., 2010). The present study clarifies this ambiguity by suggesting and demonstrating that whether consumers’ show a preference for color combinations either consisting of similar colors or contrastive colors, depends on how the colored objects, resulting in those color combinations, are related to each other. More specifically, by means of three experimental studies and based on conceptual fluency theory, we show that consumers give preference to combinations of similar colors when colored objects are characterized by a relationship of ‘belongingness’. When those colored stimuli are characterized by a relationship of ‘addition’, however, consumers prefer combinations composed of contrastive colors. In other words, a match between the type of relationship the depicted colors have and the type of relationship the depicted colored objects have, renders consumers’ evaluation of the color combinations more positive. The third study exemplifies that this finding has important implications and suggest that marketers should take the color of their products into account when deciding on how to bundle the products.

This study contributes to previous research in several ways. First, despite the ubiquity of color in our daily live, color psychology remains an underdeveloped area characterized by low scientific rigor, among others, due to methodological weaknesses by ignoring some basic principles of experimental research (e.g., not controlling for the effect of other color attributes; Elliot & Maier, 2007). Further, research questions are often practical and pragmatic in nature (Elliot & Maier, 2007). So is the case for the marketing domain (Aslam, 2006; Labrecque & Milne, 2012; Singh, 2006). By conducting a theory driven and solid experiment in the domain of color psychology, this study addresses these issues. Second, most of the few studies on color in the marketing domain examine the effects of specific dimensions of colors (i.e., hue, saturation, and lightness) on consumer responses (e.g., Bellizzi & Hite, 1992; Gorn, Chattopadhyay, Yi, & Dahl, 1997) thereby focusing on single colors and not color combinations (Deng, Hui, & Hutchinson, 2010). By studying consumers’ response to color combinations, this study fills this gap. Third, the few studies investigating people’s preference for color combinations call for more studies considering the role of different spatial arrangements of the respective colored stimuli (e.g., Schloss & Palmer, 2011). This study addresses this issue by comparing color combination preferences between figure-ground and side-by-side organizations of colored stimuli. Fourth, by demonstrating that the effects of color combinations depend on the context in which these color combinations are shown (i.e., a context of belongingness versus addition), this study complies with the demand for more research on the contextual effect of colors (e.g., Elliot & Maier, 2007). Finally, we add to fluency research studying the impact of color (e.g., De Bock, Pandelare, & Van Kenhove, 2013) by identifying a source of processing, and more particularly conceptual, fluency that has largely been overlooked, namely, fluency stemming from a match between the type of relationship colors have and the type of relationship the colored objects have.

Our findings are highly relevant for practitioners who, up until now, often make color choices based on trial and error or the recommendations of consultants whose judgments rely on their own past experience rather than scientific rigor (Labrecque & Milne, 2012). Almost all creative directors interviewed by Gorn et al. (1997) told they were not familiar with color theory and relied mainly on personal preferences and intuition when making color choices. Nevertheless, color is an essential part of marketing communications. It is an integral element of the aesthetics of products, packages, logos, displays, and so on. As colors can meaningful influence consumers’ mood states, perceptions, and behaviors (Aslam, 2006), marketers should thoroughly consider this marketing cue, certainly since inappropriate color choices might end up in strategic failure (Ricks, 1983). There is also an economic benefit to the study of color functioning. For manufacturers, changing the color of products to please consumers’ individual aesthetic preferences comes at much lower costs compared to, for instance, having to change a product’s shape (Deng, Hui, & Hutchinson, 2010). Color is the least expensive way of changing a product (Parmar, 2004).

Although this research meaningfully contributes to the limited literature on consumers’ reactions to color combinations (e.g., Deng et al., 2010), several limitations can be discerned which may give rise to future research. First of all, our experimental studies investigate consumers’ preferences for two-color combinations. However, marketing communications in general might be chromatically more complex. Consequently, it would be worthwhile to explore the effect of such complex color compositions on consumer preferences as well. Although preliminary results of Schloss and Palmer (2011) incite them to suggest that once pairwise color preferences are known and understood, enough relational information is available to account for preferences in higher-order combinations, we still believe this to be an important point for further investigation. Second, we attribute the effects we obtain to conceptual fluency, but offer no direct evidence to support this. Future research should aim to test this underlying process. In general, research on color should fully explore the psychological processes through which color operates (Elliot & Maier, 2007). Testing whether conceptual fluency is at play could be done in several ways, for instance by manipulating cognitive load or by including measures of ease of processing or response time during judgment. Third, by relying on conceptual fluency, the current study
focuses on how color effects can depend on the context. However, consumer behavior in general can be influenced by personality, and the interaction between context and personality, as well. Therefore, it might be valuable to enrich the present study by examining whether the current results would hold for every person. Fourth, marketing stimuli such as product packages influence consumer perceptions in several ways, and not only by means of their color. Other design elements, such as size and shape, as well as non-design elements, such as price, affect consumer perceptions as well. Nevertheless, this study focuses on one design factor, color, and more specifically, one color dimension (i.e., hue). Nevertheless, colors can be differentiated based on value (i.e., degree of darkness or lightness of the color) and chroma (i.e., saturation of the color) as well (Thompson et al., 1992). Although we rule out the possibly confounding effects of value and chroma by keeping them constant (cfr. Mehta & Zhu, 2009), it might be worthwhile to examine interaction effects among these color-dimensions as well.

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