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Using color–odor correspondences for fragrance packaging design

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ABSTRACT

Fragrance companies may use colors in packaging design to communicate the properties of their fragrances. Packages with matching colors may have an additional advantage: some studies suggest that consumers prefer offerings for which all sensory impressions are congruent. Hence, we investigated whether consumers are more likely to buy fragrances with a matching package.

For five fragrances we created a package, based on a harmonious combination of three colors that obtained high odor–color goodness-of fit ratings in a previous study. Packages were identical in design, except for the colors used. The appropriateness ratings for the five packages were indeed found to be related to the ratings for its major colors.

Subsequently, we assessed the degree to which participants were likely to buy different fragrance–package combinations. However, buying intentions were not affected by the degree of matching between fragrance and packaging. Instead, they were typically dependent on the degree of liking for the fragrance and, to a lesser extent, on the degree of liking for the package.

1. Introduction

Communicating fragrance properties is difficult without directly experiencing the smell of the fragrance. Fortunately, several studies have shown that people show fairly consistent odor–color correspondences. Possibly, fragrance companies can make use of such cross-modal correspondences to create fragrance packages and advertisements that communicate the properties of these fragrances and thus generate consumer expectations that are as aligned as possible with the fragrance perception. Another reason why companies may make use of these correspondences is that consumers may prefer offerings for which all sensory impressions are congruent. If different sensory channels communicate corresponding messages, the product offering is likely to be perceived as more unitary, which could result in a higher degree of liking and appreciation, and higher purchase likelihood.

In the present paper, we create different multi-color fragrance packages based on the goodness-of-fit judgments for a number of specific fragrance–color combinations. We show that packages that are composed of three matching colors also match that particular fragrance when they are presented in the form of a multicolor package. Subsequently, we investigate whether matching packages result in increased buying intentions for the target fragrances.

1.1. Odor–color correspondences

People have difficulty in communicating about smell experiences through words (Engen, 1982), which limits the usefulness of verbal communication in fragrance marketing. As a consequence, fragrance companies who want to inform potential consumers about the experiences their products elicit face a difficult task. An alternative could be to communicate properties of fragrance experiences through the colors of the fragrance fluid, the bottle, the packaging, advertisements, and other promotion materials (Scharf & Volkmer, 2000).

Several authors have reported consistent relationships between perceived odor properties and color properties. In one of the first systematic studies on the topic, Gilbert, Martin, and Kemp (1996) found that color matches for various equi-intense fragrance materials differed on the Munsell dimensions chroma (saturation) and value (brightness). In a follow-up study in which the odorants also varied in intensity, Kemp and Gilbert (1997) found that matching colors generally showed greater variation in hue across than within odors, while perceived intensity was related to brightness. Schifferstein and Tanudjaja (2004) performed an odor–color matching study in which they used complex fine fragrances and color chips from the NCS color system as stimuli. In this study,

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the blackness dimension yielded the largest number of significant differences between fragrances, suggesting that the color brightness dimension may be most salient in distinguishing between fragrances. More recently, Kim (2013) showed that color dimensions can be related to the different types of fragrance families.

The analysis of these matching studies conducted with fragrances and their ingredient materials has revealed relationships between dimensions underlying odor perception (intensity, odor quality) and the dimensions underlying color perception (hue, saturation, brightness). However, these dimensional interrelationships are often very coarse, overly generalizing, and not specific enough to provide the exact fragrance or color properties designers would require for designing a new product. Hence, to obtain more detailed information Schifferstein and Tanudjaja (2004) also asked participants to rate the degree-of-fit between samples of 14 fine fragrances and 17 colors samples. These data showed consistent differences in associated colors between the different fragrances. For example, the fragrance Wish was mainly associated with Red and Orange, while Kouros was associated with Blue, and DKNY with Yellow. Maric and Jacquot (2013) expanded on this research by showing that participants were also able to make subtle discriminations between samples eliciting similar odor percepts (e.g., lime and lemon) by selecting different color matches (more Green and Brown for lime than for lemon). The existence of odor–color associations has not only been shown in self-report studies, but has also been confirmed in implicit association tasks for a number of specific odor–color pairs (Demattè, Sanabria, & Spence, 2006).

Cross-modal correspondences may stem from a perceptual, a semantic or an affective mechanism (e.g., Schifferstein & Tanudjaja, 2004; Stevenson, Rich, & Russell, 2012). Perceptual stimulus representations may exhibit similarity, because they result from similar neural patterns, even though these were generated by different sets of sensory receptors. For instance, perceptual magnitude (weak versus strong) may be encoded in similar ways for different sensory modalities. A semantic origin is likely when stimuli have acquired the same meaning through everyday experiences. For instance, when seeing the Brown color of cinnamon has often occurred together with the smell of cinnamon, people are likely to think of a Brown color when they smell cinnamon on a subsequent occasion. Even when people experience difficulty in identifying the smell of a banana, this odor may elicit the association with fruit or, even more general, with food. Thereby, these associations limit the range of colors that seem appropriate. In case of a hedonic origin of correspondences, people will associate stimuli that they like to the same degree. For instance, Schifferstein and Tanudjaja (2004) found that the degree-of-fit between odors and colors increased when stimulus ratings on the pleasure dimension became more similar.

1.2. Possible effects of (in)congruent package colors on odor experience

But what are the effects of a high odor–color congruency? Recently, Zellner (2013) reviewed the literature on odor–color correspondences and their implications for odor–color interactions. An appropriate color usually helps in identifying an odor (Davis, 1981; Zellner, Bartoli, & Eckard, 1991) and increases the probability of detecting the odor in a complex mixture (Arao, Suzuki, Katayama, & Yagi, 2012). As regards perceived odor intensity, colored solutions smelled orthonasally are perceived as smelling stronger than equally concentrated colorless solutions, irrespective of whether the color is appropriate for the odor (Koza, Cilmi, Dolese, & Zellner, 2005; Zellner & Kautz, 1990). This observation suggests that perceiving any color suggests the presence of an active substance, which may increase the intensity of the perceived odor. Surprisingly, colored solutions smelled retronasally do not show any enhancement and may even show a decrease in odor intensity compared to colorless solutions (Koza et al., 2005; Zampini, Sanabria, Phillips, & Spence, 2007; Zellner & Durlach, 2003). Zellner (2013) suggests that the retronasal odor may be judged as less intense, because its perception contrasts with the orthonasal odor perceived just before the stimulus entered the mouth, and whose intensity was enhanced by the color.

Furthermore, appropriately colored odors are usually judged to be more pleasant than inappropriately colored odors (Davis, 1981; Zellner et al., 1991). This increase in hedonic appreciation has been confirmed during brain scanning (Österbauer et al., 2005). If an inappropriate color elicits an olfactory percept that deviates from the percept elicited by the odor itself, the combination of the two may smell odd. In addition, an inappropriate color may interfere with odor identification and, as a consequence, the odor will remain vague and unfamiliar (Zellner, 2013). Whether the pleasantness of congruent odor–color combinations is also higher if the odor and the color are not physically integrated remains to be determined. In the context of the present study, a color profile may be constructed for each fragrance on the basis of odor–color associations found in previous studies. This may form the basis for choosing the color of the fragrance fluid, and for choosing the color palette of the packaging and promotion materials. However, will these correspondences also have a positive effect on the liking or buying intention for the product? Although this way of working is intuitively appealing, its effectiveness has not been demonstrated empirically.

There are some indications that the latter question should be answered affirmatively. For instance, when a color fits a fragrance, their combination communicates a coherent message and is more likely to be regarded as a unitary whole. Perceived unity, in turn, is correlated with ratings of aesthetic appeal and product liking (Bell, Holbrook, & Solomon, 1991; Bone & Jantrania, 1992; Veryzer & Hutchinson, 1998). The colors of packaging are likely to generate expectations with regard to the properties of the packaging's content (Scharf & Volkmer, 2000; Shankar, Levitan, & Spence, 2010). We see this, for instance, in the words that people mention in response to packages with different colors (Ares & Deliza, 2010). And these expectations have consequences for the processing of olfactory information (Schifferstein, 2001). For example, the color of fragrance packaging may affect the perception of fragrance qualities and intensity (Gatti, Bordegoni, & Spence, 2014; Scharf & Volkmer, 2000). In addition, seeing an appropriate packaging color may help in identifying the fragrance category or gender classification (Zellner, McGarry, Mattern-McClory, & Abreu, 2008), identifying the odor's source, or naming the odor (Herz, 2003), which is likely to facilitate the further processing of the fragrance information. However, if the color creates an association with a very unpleasant odor source, the impact on the fragrance liking is likely to be negative (Herz & von Clef, 2001).

1.3. Present study

In the present study, we develop and perform an empirical test to determine whether a fragrance presented in a package with congruent colors generates higher consumer buying intentions than a fragrance in a package with incongruent (or less congruent) colors. We worked with a professional designer to develop fragrance package prototypes, and tested whether matching packages indeed yielded competitive advantage.

First, we tested whether packages composed of congruent colors are perceived as matching better with the fragrance than packages composed of incongruent colors. This test is first performed in a participant sample comparable to the sample that generated the individual odor–color associations (Section 2) and is repeated in a different sample to check for the impact of cultural differences