

# The Evolving Links Between Scent and Color

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Like creative artists in any medium, perfumers stir the soul by appealing to the senses. Perfumers address their appeal primarily to the nose, just as painters primarily address the eye and composers the ear. Yet there is a great artistic tradition of using one sensory mode to speak to another. As part of his *Images pour Orchestre*, Claude Debussy wrote a movement entitled *Les parfums de la nuit*.

Given the elusive nature of scent as an object of aesthetic study, it is not surprising that it has taken longer for the inherently multisensory nature of olfactory creations to be recognized. Discoveries in sensory psychology have confirmed a reliable and quantitative link between scent and color.<sup>3,4</sup>

Now that tests of cross-modal perception are commercially available, consumer goods manufacturers have begun to conduct sensory audits of their product lines and those of their competitors. The result has been a sharpened multisensory focus and a greater emphasis on the impact of scent on the visual attributes of a product.

## Odor Intensity and Color Lightness

A newly published scientific study, which I co-authored with Dr. Sarah Kamp, reveals further systematic links between sensory impressions of odor and color.<sup>5</sup> The new finding has its basis in our earlier work showing that people agree on the color that best represents a given odor. For example, the grape-like scent known as methyl anthranilate is judged to be purple, while the strawberry-like note of aldehyde C16 is matched to red.

In the new experiments, we asked ordinary consumers to match a given smell to one of 1,565 color chips in the Munsell collection.<sup>a</sup> We presented each smell at three different levels of odor intensity. We use "darkness" to refer to the black/white component of color, and "saturation" to refer to a color's intensity.

We found that consumers consistently picked darker

versions of a color to represent stronger-smelling versions of the same scent. For example, as the intensity of the grape-like smell increased, it was matched to progressively darker shades of purple. Therefore, not only do people match smells to colors, they adjust their choices systematically based on odor intensity. This means that color-odor relationships are more than simple pairings or associations. Rather, they consist of lawfully correlated perceptual dimensions. An increase in the olfactory dimension of odor strength corresponds to an increase in the visual dimension of color darkness.

This new discovery puts the odor-visual link on a par with other multisensory research. Psychologists have long known, for example, that people tend to match high-pitched sounds to lighter colors, and low-pitched sounds to darker ones.

I believe the results also speak to a fundamental way the brain integrates sensory information. People often can't verbalize it, but they have strong and detailed expectations regarding the appropriate color for a scent. If a product doesn't meet these expectations, the consumer will sense that something is wrong.

It is important to recognize that these expectations are profound and more enduring than the moment-to-moment preferences induced by marketing. While some color-odor relationships are based on cultural factors, the link between vision and olfaction is largely brain based and deeply biological.<sup>2</sup>

## Marketing Applications

The new link between odor intensity and color lightness already has led to practical innovations in the design of scented consumer products. Product marketers are asking themselves whether the total multisensory experience of their product lives up to the consumer's multisensory expectations.

I believe increased attention should be paid to optimizing the product message on a sense-by-sense basis. If you want to learn about the multisensory dynamics of your

<sup>a</sup>Munsell Color, New Windsor, NY

product, you have to ask consumers about more than just overall liking. At Synesthetics, the focus is on developing methods that relate scent to all the other senses, and we continue to refine our techniques in the color-odor area. Recent experiments using the Pantone<sup>b</sup> color specification system show that it is a user-friendly alternative to the Munsell system.

To get an idea where new fragrance applications might lead, it is worth considering how color-odor phenomena play out in the area of food and flavor. For example, people rate normally colored foods as having stronger and better quality aromas than uncolored or discolored foods.<sup>1</sup> This effect is found only when people can see the food; it is not found when they are blindfolded.

Sensory psychologists have also investigated the influence of color on the perceived intensity of food odor. They concluded that color slightly boosts apparent odor perception, although not in an odor quality-specific way.<sup>7</sup>

Another study investigated the influence of color on the pleasantness (hedonics) and identification of fruit odors.<sup>6</sup> Odors were rated less pleasant in inappropriate color/odor combinations than in appropriate combinations or under blindfolded conditions.

For the perfumer, these results suggest that special care

should be taken in coloring a product in which the scent is meant to convey a perception of high value. Appropriate coloring will add to the perception of odor strength and quality, while inappropriate coloring will detract from the hedonics. As we know now, the definition of "appropriate" involves at least two perceptual dimensions of color vision: hue and lightness.

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<sup>b</sup>Pantone Inc, Carlstadt, NJ