Do you see color the way I see color?

The answer may very well be no. Our perception of color is influenced by a wide variety of factors, from viewing conditions to our biological make-up to our culture of origin, creating significant challenges to ensuring accurate color production based on our sight alone. In an increasingly diverse and multicultural marketplace, it is vital that we establish a common color language that is impervious to differences culture, linguistics, and biology. Spectrophotometry offers us a stable, objective method for discussing and evaluating color across cultural, linguistic, and biological lines.

Linguistic Production of Color Perception

Language is utilitarian. Cultures invent words based on their needs and environments, which is why Hawaiians have 65 words for sugarcane and everyone on the internet knows what "selfie", a word that did not exist fifteen years ago, means. But as much as we shape language, language also shapes us. Researcher Jules Davidoff sought to investigate the relationship between language and color perception by traveling to Namibia to studying the Himba tribe.[1] The tribe's language does not include a word for "blue" and makes no linguistic distinction between blue and green. His findings were fascinating:

When shown a circle with 11 green squares and one blue, they could not pick out which one was different from the others — or those who could see a difference took much longer and made more mistakes than would make sense to us, who can clearly spot the blue square.

However, while the Himba tribe members have no word for blue, their language does have many more words for variations of green than English does. When shown a circle of 11 green squares with one square containing a nearly imperceptibly different shade of green, the Himba tribe members could instantly pick out the difference. Distinguishing between green hues was a natural part of their culture, as indicated by the availability of nuanced language to describe green variations. The difference registered immediately because it was culturally legible. At the same time, "without a word for a color, without a way of identifying it as different, it is much harder for us to notice what is unique about it — even though our eyes are physically seeing the [squares] it in the same way." While the Himba tribe may be an extreme example, linguistic differences across cultures can create subtle but meaningful variation in how people from different places perceive color.

The Role of Sex Difference

While environmental factors are a critical part of how we see color, innate sex-based variations in the cerebral cortex may explain differences in color perception between men and women. At team of researchers led by Professor Israel Abramov at the City University of New York showed a large group of students and faculty members from a local college a variety of colors within a highly controlled environment and asked them to describe the colors using only the words "red," "yellow," "green," and "blue," alone or in combination, to establish a common chromatic language.[2] This was important to ensure that the results were not influenced by culturally produced vocabulary differences.

Men had difficulty "mak[ing] find distinctions between colors in the middle of the visual spectrum, such as between grey-blues (or bluey-greens)."[3] They also required a longer wavelength to see the same color women did. In the real world, this means that they would perceive a blue-green sweater as having more blue pigmentation than women, who are more sensitive to yellow hues. While the exact reason for these perceptional differences is not yet known, Dr. Abramov believes that the answer lies in the androgen-sensitive thalamic neurons located in the visual cortex of the brain. "We suggest that, since these neurons are guided by the cortex during embryogenesis, that testosterone plays a major role, somehow leading to different connectivity between males and females."

Universal Spectrophotometry: Quality Instrumentation for Quality and Consistency

As companies from the food, pharmaceutical, plastics, and chemical industries become increasingly international and take advantage of the global marketplace, working with a common understanding of color is more important than ever. Workers from all backgrounds in different countries need to effectively communicate with each other about product color in a way that does not depend on the limits of any given culture's chromatic language, nor the subjective color perception of any individual worker. This takes on particular importance when a single product is produced using components produced in multiple locations around the world, requiring precise color quality control both within a manufacturing plant and between plants. Spectrophotometric instrumentation eliminates human subjectivity by offering exact, numerical valuation of color, ensuring that all workers, even in disparate locations, are able to discuss and create identical hues regardless of individual color perception.

Spectrophotometers work by quantifying spectral data and distilling color to an objective standard. Within highly controlled conditions, these sophisticated instruments remove or account for environmental factors impacting color perception such as light, viewing angle, and texture, allowing for unhindered color measurement. They see color the same way every time, unconfined by human elements of language, culture, and biology. When a color is distilled to hard data, it no longer matters if a male operator sees a turquoise piece of plastic as blue than his female co-worker or if he can pick out minute differences between shades; spectrophotometry is universal and ensures that color is measured consistently against the standard using objective mathematical formulas. By incorporating spectrophotometric color measurement, you can be assured of the highest level of quality control possible to produce predictable, repeatable results.

Full article with photos available here:

https://www.hunterlab.com/blog/color-measurement-2/the-universality-of-spectrophotometry-a-common-language-of-color-measurement/