Encyclopedia of Perception

Color Naming

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Color naming in the broad sense is giving a color name such as “red” to an object of a particular color. This task is not as trivial as it sounds. We commonly use only a few color names but can distinguish millions of different colors. The colors of an object such as a banana may differ to some extent in all perceptual color dimensions of hue, saturation, and brightness: Parts of the banana may be darker and less saturated because of shading, parts may be more yellow-greenish or more yellow-orangish. Yet we perceive all these different shades of colors as belonging to the same category “yellow” and speak about the “yellow” banana. Color naming thus involves a partitioning of the continuous color space into distinct color categories, to which we assign a word. In the narrower sense, color naming refers to a method used in psychological experiments where observers have to name the color of the stimuli presented. This entry describes the universality of color names, psychophysical experiments, the Stroop effect, and neural correlates.

Universality of Color Names

Color names in different languages are remarkably consistent. It has been proposed that 11 basic color terms are strikingly similar across different languages and cultures. The English words for these basic color terms are *black, white, red, yellow, green, blue, gray, orange, brown, pink*, and *purple*. These color names may be grouped and ordered to approximately reflect their appearance during child development and cultural development as follows: (black, white) → (red) → (yellow, green) → (blue) → (gray, orange, brown, pink, and purple). An analysis of data from 110 languages of nonindustrialized societies gathered in the World Color Survey confirmed the idea of universal color names. Although there are some small variations of the focal colors (those colors that provide the best example of a basic color term) across languages, the focal color fell on average close to the colors found for English speakers. Despite these similarities, different languages may differ in the number of basic color terms. For example, some languages such as Russian, Polish, and Italian have a basic color term to distinguish between “light blue” and “dark blue”; some languages merge green and blue into a single “grue” category, and members of the Dani of New Guinea have only two basic color terms to distinguish between light-warm and dark-cool colors. Interestingly, when asked to remember colors, the Dani were better across the same color boundaries (e.g., blue-green) than English observers were, even though their language does not have any corresponding color terms. Another New Guinea language, Berinmo, deviates from the universal pattern: Berinmo has a “nol”/“wor” category that goes right across the green category of English speakers. Overall, the issue of the universality of color names and categories is still controversial.

Psychophysical Experiments

Color naming used as a method in psychophysical experiments gives a direct report of the color sensation evoked by the stimulus. Color naming seems to be an inherently coarse method because there are only a few color names but millions of distinguishable colors. One way to overcome this limitation is to use a technique called *hue scaling*, where observers rate the amount of red, green, blue, and yellow in the stimulus. The shapes of the hue scaling curves have been found to be highly similar across observers, and only the amplitude differed. Further, observers almost never rated a color as being both red and green, or both yellow and blue, in agreement with the notion that red-green and blue-yellow are opponent colors. Another way to overcome the limitations of color naming is to let observers name a large number of color samples and to infer the partitioning of color space based on the

naming results of all color samples arranged on the color plane according to the chromaticities of the color samples. This method has been used to investigate color constancy, showing that observers can achieve almost perfect color constancy (the ability to see objects in the same color, independent of the illumination).

The Stroop Effect

The naming of a color interferes with the reading of a word (the so-called Stroop effect): For example, people take longer to name the blue ink color of the printed word *RED* than if the blue ink is used to print the word *BLUE*. In general, the naming of the ink color of a printed word is harder if the word is a color name that is different from the ink color. The Stroop effect occurs even though the observers were instructed to ignore the letters and to pay attention only to the ink. The Stroop effect shows that color naming is tightly coupled to reading, another learned linguistic skill. The Stroop effect occurs also when observers have to name the color of objects with a characteristic object color shown in a “wrong” color. In the reverse Stroop task, observers are instructed to ignore the ink color in which a color word is printed and to respond to the meaning of the color word. Again, reaction times are generally faster with congruent combinations than with incongruent combinations.

Neural Correlates

The neural correlates of the color categories have not yet been found and are a topic of intense research. The present results support the view that in early visual areas V1 to V4 basic color categories do not have a special status. A potential candidate area for the representation of color categories is an area in the inferior temporal (IT) cortex.

- color naming
- color
- ink
- color constancy
- observer
- bananas
- naming

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See also

- Color Perception
- Cultural Effects on Visual Perception Color Perception

Further Readings

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