A quick guide to quickly learn color language

Achromatic Color — A neutral color (white, gray or black) that has no hue.

Additive Color Mixture — Mixing of the three primary color lights (red, green and blue) to obtain colors. For example, combining green and red creates yellow, red and blue creates magenta, and blue and green create cyan.

Attribute — Distinguishing characteristic of a sensation, perception or mode of appearance.

Black — The color that is produced when an object absorbs all wavelengths from the light source.

Black Point — Definition of a color in an image that the scanner should interpret as black. All colors in the scanned image that are darker than the black point are also set to black. Colors lighter than the black point are adapted as needed. Black point is set, along with white point to achieve optimal highlight and shadow reproduction.

Brightness — Both the saturation and lightness of product color.

Calibration — The process of adjusting the basic setting of a device (e.g. monitor) or for processes (e.g. offset printing) to certain values in order to ensure uniform and consistent results over time. It builds the foundation to achieve stable ICC profile conditions and must be performed before creating a profile.

Chroma — Attribute of color used in the Munsell color system to indicate the degree of departure from a gray of the same value. Correlates with the dimension of saturation.

Chromatic — Having color (hue); not neutral (black, white or gray).

Chromaticity Diagram — In practical terms, a two dimensional graph on which a color may be plotted according to its hue and chroma. The third dimension of this graph is the luminance factor, or lightness, which is independent of hue or chroma. The location of a point on this graph indicates roughly what color it is (red, green, blue, purple, etc) and how saturated it is. A plot of all colors has a characteristic horseshoe shape.

CIE — The abbreviation for the French title of the International Commission on Illumination, Commission Internationale de ÍElairage. The Commission is devoted to standardization in illumination and related areas that include color. The CIE developed mathematical modes to quantify light sources, objects and observers as a function of wavelength. In 1931, the CIE defined a basic concept for the description of color on the basis of the CIE standard colorimetric observer. One common result was the development of the Chromaticity Diagram, a basic color space for plotting colors.

CIELab — (Pronounced "see-l a b". Also referred to as L*a*b* and Lab.) A uniform device independent color space in which colors are located within a three-dimensional rectangular coordinate system. The three dimensions are lightness (L), redness/greenness (a) and yellowness/blueness (b).

CIELCh — (To pronounce, just say the letters.) A uniform device independent color space in which colors are located within a three-dimensional polar coordinate system. The three dimensions are lightness (L), chroma (C), and hue angle (h).

CMY — A color space consisting of the subtractive primaries of cyan, magenta and yellow.

CMYK — A color model used in the printing industry to reproduce color in the printing industry. The addition of black makes up for the practical limitations of trying to reproduce a deep black by using CMY colorants.

Color — The phenomenon of color results from the interaction between a light source, an object and an observer. Standard mathematical models can be used to quantify light source, objects and observers as a function of wavelength. Sources are quantified as illuminants, objects are quantified by spectral data, and observers are quantified by the observer functions. These three elements can then be combined to calculate values that correspond to how the human visual system responds to a given color.

Color Aptitude — The ability to work with and understand color; includes both inherited skills and work experience.

Color Attribute — Three-dimensional characteristic of the appearance of an object. One dimension usually defines the lightness, the other two together define color.

Color Constancy — Perceived object color remains constant under different light sources.

Color Difference, Visual — Visual color difference is the difference between two colors that the human eye sees. It is usually described in qualitative terms such as lighter, darker, redder, greener, bluer, yellower, paler, etc.

Color Difference, Numerical — The difference between color coordinate values for two different samples. Quantifies the difference between two colors.

Color Difference Equations — Mathematical equations that calculate the magnitude of difference between two colors.

Color Management — Method for matching the color of an original image from scanner to monitor to proof to final output.

Color Management Module (CMM) — A color computer that performs the actual conversion of color data from one space to another with the aid of ICC profiles.

Color Order Systems — Method for communicating color based on three-dimensional color space. For a collection of colors to be a color order system, the collection must represent all colors in three-dimensional color space, colors must have a logical visual progression or relationship to one another, any color introduced into the system must fit into the system in a logical sequence, a slight variation to an existing color can easily be described by partial steps, the system should provide values that allow easy communication even when a sample is not provides, and the medium used to represent the system must be consistent and reproducible. One of the most well known color order systems is Munsell.

Color Reproduction — The process to reproduce colors on different devices. Two common methods used for reproducing color are additive color mixtures and subtractive color mixtures.

Color Separation — The process of converting a color or image into CMYK for 4 color process printing. As there are different CMYK combinations that can be made to achieve certain target colors, separation settings must be defined for the specific process.

Color Space — In general, a collection of systematically ordered colors or a system for ordering colors. A color space can be defined by a physical collection of samples (e.g., Munsell), or by a mathematical system (e.g., CIELab).

Color Specification Systems — Method for communicating colors between customers, designers and printers. The most common color specification systems are Pantone and HKS, which are often used as color guides, swatch books or color libraries.

ColorSync — Color management architecture that is built into Macintosh computers.

Color Tolerance — An acceptable color difference between a standard (reference) and a sample.

Delta E — DE or ΔE — This is a generic name for total color difference. It is used to indicate total color difference for all uniform color spaces. Total color difference is a single number that expresses the magnitude of the difference between two colors. The value tells nothing about the nature of the color difference.

Densitometer — A measuring instrument that can determine reflective and/or transmissive density values. GretagMacbeth provides a series of professional densitometers for different applications in the graphic arts industry.

Device-Independent Color Space — A color space that can be used to describe all the colors seen by the human eye, independent of the colorants used to reproduce colors for a specific device.

Device Specific Color Space — A color space that is defined based on how a specific device reproduces color. RGB and CMYK are both device specific color spaces.

Digital Camera Profile — A digital camera profile describes the conversion of the digital camera specific RGB space to the CIELab system. The testchart determines which colors form the original will be converted to which RGB colors of the digital camera. However, since a testchart only covers part of the digital camera's entire gamut, it is the profiling software's job to supply a description of those colors that are in the outer areas of the device gamut.

FOGRA — The FOGRA Graphic Technology Research Association, located in Munich, Germany, is focused on research and development for printing technology. FOGRA's tasks are research, development, transfer of know-how to industry, development of standards, consultancy and technical reports.

Gamut — The range of colors that can be reproduced in a specific color space or on a specific device.

GCR (Gray Component Replacement) — Replaces gray areas with black, but unlike UCR, GCR also affects the progressively more saturated tones. GCR can thus produce a long, broad black.

HKS — A color specification system used in the printing industry. The HKS system contains CMY combinations ordered by increments, and additional samples with different levels of black ink coverage. Due to varying printing inks, papers and printing processes, HKS colors serve only as approximate guides.

Hue — One of the three attributes of color, which distinguishes red from green, blue from yellow, and so forth.

ICC — Abbreviation for International Color Consortium, which was established in 1993 by the major suppliers of operating systems, application programs and peripherals. The ICC initiated the development and standardization of an open architecture for a color management system (CMS) that is independent of suppliers and platforms.

Illuminant — An illuminant is a simulation of a light source. Technically speaking, it is a mathematical representation of a theoretical real light source. The numbers represent the relative power of the theoretical source at each point in the visible spectrum.

Illuminant A — Mathematical representation of tungsten halogen (incandescent). Color temperature: 2856K. Simulates typical home or store accent lighting.

Illuminant CWF-2 (F2) — Mathematical representation of commercial, wide band fluorescent used in the USA (cool white fluorescent). Color temperature: 4150K. Simulates typical office or store lighting in the USA.

Illuminant D50 — Mathematical representation of noon sky daylight.

Color temperature: 5000K. Used for evaluating color uniformity and quality in the graphic arts industry.

Illuminant D55 — Mathematical representation of noon sky daylight. Color temperature: 5500K. Simulates the CIE average noon sky daylight.

Illuminant D65 — Mathematical representation of average north sky daylight. Color temperature: 6500K. Most common daylight illuminant used for general evaluation of color.

Illuminant D75 — Mathematical representation of north sky daylight. Color temperature: 7500K. Used for general evaluation of color, and visual evaluation of opaque materials as outlined by ASTM D1729.

Illuminant TL84 — Mathematical representation of commercial, rare earth phosphor, narrow band fluorescent used in Europe and the Pacific Rim. Simulates typical office or store lighting in Europe and the Pacific Rim.

Light — Electromagnetic radiation that has a wavelength in the range from 380 (violet) to about 770 (red) nanometers (nm), and can be perceived by the normal, unaided human eye.

Lightness — One of the three attributes of color, which distinguishes light from dark.

Light Source — That element in an instrument or in the visual observing situation that furnishes radiant energy in the form of light.

Metameric Pair — A pair of colors that match when viewed under one set of viewing conditions, but no longer match if the viewing conditions are changed.

Metamerism — A phenomenon exhibited by a pair of colors that match under one or more set of conditions, be they real or calculated, but do not match when these conditions are changed.

Metamerism Index (MI) — A special formula that calculates the difference between two colors under two different light sources. An MI of greater than 2.0 usually indicates that the metamerism is visible to the human eye.

Monitor Calibration — To achieve predictable color reproduction on

the monitor, the monitor must be calibrated before generating a monitor profile. This will ensure that the monitor can reproduce the optimal color gamut.

Monitor Profile — A monitor profile describes the RGB corner coordinates, the gradations curves for each color channel, the black point and the white pointl.

Munsell Color Order System — Three-dimensional color order system developed by the artist, Albert H. Munsell in 1905. In the Munsell System, color is identified by the attributes of hue (H), value (V) and chroma.

Nanometer (nm) — Unit of measure equal to one millionth of a millimeter. Wavelengths are measured in nanometers.

Object — One of the three components necessary for the phenomenon of color to occur.

Opaque — Term used to describe complete opacity, i.e. degree to which a specimen obscures the substrate beneath it; opposite of transparent.

Observer Functions — The response of the average normal human eye at each wavelength has been measured through extensive experimentation by the CIE. Since there are three color sensor types, there are three observer functions that comprise what is known as the standard observer.

Opponent Color Theory — Opponent Color Theory explains conceptually how the human visual system perceives color. To the human visual system, red and green are opposites and yellow and blue are opposites. This means that if something is red, it has no green in it (but it may also be blue or yellow) and if something is yellow, it has no blue in it (but it may also be red or green). This theory is the basis for most uniform color spaces, such as CIELab and CIELCh.

PANTONE® System — One of the best known color specification systems used by designers and printers to communicate color. Available in Coated, Uncoated, and Matte, each swatch book contains a series of colors that can be referenced based on the assigned PANTONE notation.

Profile — A color profile describes how a device reproduces color. Also

used a verb to describe the process of creating a profile for a specific device.

Rendering Intents — Methods established by the ICC to define the objective for a color conversion. For example, when reproducing a logo color, the goal is to achieve the closest match possible, yet when reproducing an image, the goal is accurately reproduce the overall tonal range.

Reference — In evaluating color difference, the reference is the color against which all measurements are compared. Also referred to as Standard.

RGB — the three primary colors (Red, Green and Blue) for additive color mixing. Color televisions, computer monitors and stage lighting use these additive primaries to reproduce colors.

Sample — In evaluating color difference, the sample is the target color to be measured and compared to the reference.

Saturation — One of the three attributes of color, which indicates the purity of a color. The more gray a color contains, the less saturated it is. We often distinguish the purity of a color by describing it as stronger or weaker.

Scanner Profile — A scanner profile describes the conversion of the scanner specific RGB space to the CIELab system. The testchart determines which colors form the original will be converted to which RGB colors of the scanner. However, since a testchart only covers part of the scanner's entire gamut, it is the profiling software's job to supply a description of those colors that are in the outer areas of the device gamut.

Simultaneous Contrast — The phenomenon that occurs when the surrounding color influences how a color is perceived.

Spectral Data — Method for uniquely identifying an object based on each wavelength of light is reflected from it.

Spectral Reflectance Curve — The spectral reflectance curve graphically depicts the color composition of an object. The x-axis shows the wavelengths, starting with 380nm and ending with 700nm, and the y-axis shows the relative reflectance (the amount of light reflected from the object in %).

Spectrophotometer — A photometric device for the measurement of spectral reflectance, transmittance or emission (monitors). The measured values are reported graphically (the spectral curve of the measured object) and numerically (at intervals across the visible spectrum).

Standard — In evaluating color difference, the standard is the color against which all measurements are compared. Also referred to as Reference.

Standard Observer — The CIE conducted experiments to quantify to standard observer. Two separate sets of experiments were done. In 1931, the experiments were done using a 2° field of view (much like looking at one's thumbnail at arm's length). This resulted in the establishment of the 2° observer. In 1974, a second set of experiments was done using a 10° filed of view (which correlated better to how most colors are viewed). This resulted in the establishment of the 10° observer.

Subtractive Color Mixture — Produced by combining color pigments or dyes, using the primaries of cyan, magenta and yellow. By combining all three primary colors, the resulting image appears black (since all light is absorbed).

Testchart — Collection of color patches that are used to generate ICC profiles for input and output devices. Testcharts are provided on paper or transparent materials, and also as files.

UCA (Under Color Addition) — Minor portions of C, M and Y are inserted under the neutral and dark areas to enhance brilliance and contrast.

UCR (Under Color Removal) — A method by which a portion of gray shades composed of cyan, yellow and magenta is replaced with black. UCR has the greatest impact in neutral and dark tones close to the gray axis. Repro professionals refer to this as a short, narrow black.

Ultraviolet — Radiant energy below just below the visible spectrum.

Uniform Color Space — A color space in which equivalent numerical differences represent equivalent visual differences, regardless of location within the color space. A truly uniform color space has been the goal of color scientists for many years. Most color spaces, though

not perfectly uniform, are referred to as uniform color spaces, since they are more nearly uniform when compared to the chromaticity diagram.

Value — An attribute of color used in the Munsell System to indicate the lightness of an object viewed in daylight, on a scale from 0 for the ideal black to 10 for the ideal white, in steps that are visually equal.

Visual Spectrum — That portion of the electromagnetic spectrum between 380 nm and 700 nm that can be seen by the human eye.

Viewing Booth — A special, enclosed light box used for evaluating color samples, proofs, and printed material under controlled lighting conditions.

Viewing Conditions — When performing visual color evaluation, it is critical to control the conditions associated with viewing geometry (the angle at which the object is viewed and the direction from which light strikes the object) and sample surround.

Wavelength — The distance between the crests of two adjacent waves.

White Point — The lightest color that can be reproduced. On monitors, the lightest color that can be reproduced, ideally with 100%RGB. If you compare 100% RGB on two monitors side-by-side, one may look distinctly blue compared to the other. On scanners, the definition of the color that the scanner should interpret as white. This is used to control highlight and shadow reproduction. In printing, the white point depends on the whiteness of the paper. In colorimetric terms, the white point is defined as the chromaticity of a white light source or other emissive object. The white point may be expressed in terms of correlated color temperature or chromaticity coordinates.