Glossary

absorbed light

Light that enters a material and is trapped (neither reflected nor transmitted).

achromatic

Having no hue; white, gray, or black.

adaptation

Process by which the visual mechanism adjusts to the conditions under which the eyes are exposed to radiant energy. See *chromatic adaptation*.

additive color primaries

Red, green, and blue light that produces white light when mixed together in the proper proportions.

ambient lighting

Environmental lighting condition for a particular location.

attribute

A synonym for tag. See *tag*.

bitmap

A digital representation of an image in which all dots or pixels making up the image are rendered in a rectangular grid and correspond to specifically assigned bits in memory.

brightness

Attribute of a visual sensation according to which an area appears to exhibit more or less light.

bit plane

Level of intensity of each electron gun for each primary color in a CRT, controlled by the depth or number of bits describing a pixel. In a simple one-bit monochromatic display, the pixel is either black or white (on or off). In a three-bit image, eight possible colors can be displayed (2^3). This allows eight gray shades in a monochrome display; in a simple three-bit color CRT, the eight colors are red, green, blue, cyan, magenta, yellow, white, and black.

calibration

Procedure for correcting any deviation from a standard.

characterization

Process that defines what colors are produced by (or, when scanning, ought to produce) a given set of numbers by measuring a sample population of devices. Characterization is a description of a device's color gamut, operation, dynamic range, interaction of colors, color data transfer characteristics, and so forth, which is used as an average operating model for the device.

chroma

Strength of a color, how far it departs from neutral gray.

chromatic

Having a hue; not white, gray, or black.

chromatic adaptation

Adjustment of the visual mechanism in response to the overall color of a stimulus to which the eyes are exposed.

CIE

Commission Internationale de l'Eclairage (International Commission on Illumination), an international organization that establishes and maintains standards of light and color. Its system of describing color is based on standardization of illuminants and observers, not physical samples.

CIEXYZ

Term used when referring to the CIE standard for tristimulus values X, Y, and Z. The system represents all visible colors with positive tristimulus values. Two colors match when their tristimulus values are the same and they are viewed under identical conditions.

CLUT

Color look-up table. An area in computer memory where a set of values is used to index another set of values. Since the table of pixel color information is stored, the information does not have to be recomputed each time it is called up.

CMY/CMYK

Abbreviation for cyan (C), magenta (M), yellow (Y), and black (K) process colors used in printing and other imaging technologies. Cyan, magenta, and yellow are subtractive primaries as well as secondary colors in the additive color system. Black is sometimes added to enhance color and to produce a true black.

CMY/CMYK color space

Color-order model of subtractive primaries cyan (C), magenta (M), yellow (Y), and sometimes black (K), used by printing technologies.

color

Visual sensation that occurs through a combination of physical, physiological, and psychological events involving light, objects, and the visual system.

colorant

A dye, pigment, or ink used in the process of coloring material.

colorimetry

A branch of color science concerned with the measurement and specification of color stimuli.

color laser printer

A printer that uses a laser to xerographically generate the image to be reproduced. Each page is run through the color-application process four times, each time with a different CYMK toner.

color order system

A system used for arranging and describing color, based on physical samples, specific devices, or colorimatric quantities.

color profile

See *device color profile (DCP).*

***c*alibrator**

A physical device that calibrates the monitor attached to a computer.

color management module (CMM)

That component of a color manager that actually processes color data being input and output to the system in addition to the information about the devices stored in the device color profiles (DCPs).

color space

See *color order system*.

color temperature

A measure that defines the color of a light source relative to the spectral distribution of the light radiated by a theoretically perfect radiator, or black body, heated until it emits visible light. See *correlated color temperature*.

color wheel

Circle with primary colors (red, green and blue) and secondary colors (cyan, magenta, and yellow) located equidistant from each other. A color wheel may also show intermediate hues.

complementary colors

Particular wavelengths of light that, when added together, create white light. The subtractive primaries (cyan, magenta, and yellow) are complementary to the additive primaries (red, green, and blue). For example, blue (an additive primary) and its complementary yellow (a subtractive primary), a secondary color on the additive color wheel, can be added together to produce white light. In the visual arts, complementary colors are diametrically opposite one another on any color wheel.

cones

Visual color-receptor cells of the retina. There are three different types of cone-shaped cells, each thought to have a different photosensitive pigment. Under normal and bright lights, cones produce the sensation necessary for color vision. See *rods*.

contrast

Tonal gradation between the highlights, middle tones and shadows of images.

correlated color temperature

Temperature of a black body (Planckian) radiator whose perceived color most closely matches a given stimulus seen at the same brightness and under specified viewing conditions.

D50

A CIE designation for a white-light spectrum and its associated colorimetric coordinates. It represents a yellower daylight than D65. This is the "daylight" that is specified by the graphics industry for viewing color prints and transparencies. D indicates "daylight" and 5000, the correlated color temperature in degrees Kelvin.

D65

A CIE designation for a white-light spectrum and its associated colorimetric coordinates. It represents a standard daylight for general use. This "daylight" is commonly used in colorimetry, and it is becoming a "standard" for monitor white point. D indicates "daylight" and 6500 the correlated color temperature in degrees Kelvin.

device color profile (DCP)

Device-specific color information for devices.

display

Representation of a data item in visible form, for example, output to a CRT. Visual representation of the output of an electronic device. See *monitor*.

dithering

The technique of making adjacent pixels different colors to give the illusion of an intermediate color. Dithering can produce the effect of shades of gray on a black-and-white display, or simulate a greater number of colors on a color display than the display is capable of producing.

dither cell

Grouping of pixels into a super pixel for the purpose of creating halftones on the computer. Also called *halftone cell*.

dpi (dots per inch)

Measure of resolution level of raster imaging output devices such as laser printers, monitors and photo or laser typesetters (imagesetters).

dynamic range

Extent of minimum and maximum operational characteristics. For example, the difference between lowest and highest intensity (for a monitor), or the lowest and highest density (for prints and transparencies).

electromagnetic radiation

Combination of electrical and magnetic vibrations called *waves* that constitute the electromagnetic spectrum. The human eye sees only a small range of electromagnetic waveforms, or wavelengths, from approximately 400 nm (violet) to 700 nm (red) in the area designated *visible light.*

gamma

For a CRT device, the slope of the line relating the logarithm of the light output to the logarithm of the applied voltage.

gamut

The limits on a set of colors. Ordinarily the gamut is imposed by the limitations of a physical capture, display, or output device. In a computer screen, colors that cannot be displayed are called *out-of-gamut colors*.

gamut adjustment

Ability to account for device capabilities and limitations by regulating colors through compression or expansion techniques. In *gamut compression*, colors that are beyond the capabilities of a device are mapped into colors that the device can actually produce.

halftone

A color or black-and-white continuous tone image reproduced by changing the image into dots through the use of halftone screens. Because printing presses are not able to print true continuous tone images, a halftone allows tone gradation, in which the dots are perceived as a whole, depending on the halftone screen used, quality of the original image, and so forth. In computers, electronic algorithms can create digital halftone representations.

hue

Attribute of a visual sensation according to which an area appears to be similar to one, or to proportions of two, of the visible colors, red, yellow, green, cyan, blue, and magenta. Hue is part of the HSV (hue, saturation, and value) and HLS (hue, lightness, and saturation) color models.

ICC

International Color Consortium.

illuminant

A light defined by its spectral power distribution. An illuminant may or may not be physically realizable as a source. Several standard illuminants have been defined by the CIE for use in colorimetric computations. See *source*.

ink-jet printer

A printer that uses finely directed sprays of ink to produce the character image. Color printout is achieved in one pass and colors are based on the CMYK or CYM color model. Technologies for this category of color output printers include *drop-on-demand*, which can be subdivided into *bubble jet* (or *thermal ink-jet*) and *piezoelectric; continuous ink-jet;* and *phase-change ink jet.* Phase-change ink jet technique requires solid ink while the others take liquid ink.

light source

See *illuminant* and *source*.

memory colors

Colors seen regularly that people tend to remember best and agree on the appearance of, such as green grass and blue sky.

metameric colors

A pair of colors that match visually under some lighting conditions, but not under others.

metamerism

Visual phenomenon where the colors of two spectrally different objects appear to match under a specific set of conditions. The term *observer metamerism* is used when two objects appear to some observers (or instruments) to have the same color, but to other observers the same objects do not match.

moiré

In printing, undesirable patterns caused by misalignment of halftone dots. In imaging devices: visual patterns formed by interference between two sets of regular divisions, such as the combination of a TV raster with a striped object in the scene; can be caused by any beating between frequencies.

monitor

Device for computer generated display; video display terminal.

monitor calibration

Process that measures the performance of a display and compensates for its variations.

monitor RGB

See *RGB color space*.

monitor white point

Color specification of a monitor's white, when all three phosphors are lit to maximum level.

Munsell chroma

The quality that describes the extent to which a color differs from a gray of the same value.

Munsell hue

The quality of color described by the words red, yellow, blue, and so forth. The principal hues of the Munsell system are red, yellow, green, blue and purple.

Munsell system

A color-order system established by A.H. Munsell in 1905. Based on visual perception, this system provides a description of a color, using a collection of samples as well as a color notation system. See *Munsell chroma*, *Munsell hue*, and *Munsell value*.

Munsell value

The quality of a color described by the words light, dark, and so forth, relating the color to a gray of similar lightness.

nanometer

Preferred nomenclature for describing measurement of wavelengths of light. One nanometer equals 1×10^{-6} millimeter. The abbreviation is nm.

observer metamerism

See *metamerism*.

palette

The set of colors (ranging from four to more than 16 million) that a particular computer graphics program is using. Many display adapters have a limited palette. The set of colors may be in a table.

peripherals

The devices that hook up to the desktop computer (color monitor, printer, scanner, and so forth).

phosphor

The phosphorescent coating on the interior of the front surface of a cathode ray tube (CRT) that emits light of one of the three additive primary colors (red, green, or blue) when a carefully controlled beam of electrons strikes the material. Depending on the type of color tube, the pattern of the phosphors can be dot, brick-like, or stripe.

Photo CD

A photographic compact disc (CD) made using a Kodak imaging system. The system scans in photographic images (negatives, slides, and prints), processes the data to optimize its quality for digital imaging, compresses the data, and then writes it on a compact disk.

pigment

Finely ground, natural or synthetic, inorganic or organic, insoluble particles (powder) that, when dispersed in a liquid vehicle, give color to paints, printing inks, and other materials by reflecting and absorbing light.

pixel

P*icture element*. Smallest addressable point of a bitmapped screen that can be independently assigned color and intensity.

pixel depth

Number of bits describing a pixel. Syn. *bit depth.* See *bitplane*.

PMS (Pantone Matching System)

A printing industry standard for specifying spot color.

pre-press

Term used to describe the process or components of the process of preparing information for printing or alternative media output after the writing and design concept stages. In desktop publishing, it is the process of all of the elements on any page to produce the master copy.

primary colors

Three basic colors used to make other colors by mixture, either additive mixture of lights or subtractive mixture of colorants. The additive primaries are red, green, and blue; the subtractive primaries are cyan, magenta, and yellow. See *additive color primaries, subtractive primaries,* and *secondary color.*

printer

Computer-driven device that deposits images on paper or film. See *ink-jet printer, thermal wax printer* and *color laser printer.*

process colors

Cyan, magenta, yellow, and black used in color printing. See *CMY/CMYK*.

profile connection space

The common junction where profiles for different devices are connected together.

reflected light

Light that bounces back from the object that it strikes.

registration

In printing: accuracy with which printing images are positioned or combined so that they align exactly. In multi-color printing each color must be precisely aligned one over the other for accurate reproduction. In color monitors: alignment of the electron guns to produce correct color.

resolution

The degree of sharpness of an image displayed on a computer screen, or quality of printed output from a laser printer or photo or laser typesetter; expressed in dots per inch (dpi). Resolution can also refer to the number of bits per pixel. In printing, resolution refers to the space between dots in a halftone screen; expressed as lines per inch (lpi).

RGB

Abbreviation for red, green and blue primaries of the additive color system. Used in reference to color computer graphics and video technology.

RGB color space

A color-order model that may be based on either the light-emitting phosphors (red, green, and blue) of an actual device or on a set of hypothetical RGB primaries.

rods

Photoreceptor cells in the retina that respond to low levels of light. They are not thought to contribute to color vision. See *cones*.

saturation

The amount of hue in a color sample compared to the amount of achromatic light it reflects or transmits.

scanner

An electronic device that digitizes and converts photographs, slides, paper images, or other two-dimensional images into bitmapped images.

scanner calibration

A feature that measures the performance of a scanner and compensates for its variations.

secondary color

Color made by mixing two primary colors. In the additive color system, the secondary colors are cyan, magenta, and yellow; in the subtractive color system, the secondary colors are red, green, and blue.

service bureau

A company that provides pre-press and other computer output in a variety of forms, such as film separations, slides and other transparencies, and color proofs. A service bureau may specialize or can be a full-service operation that offers a wide range of services, including printing.

simulation

Used to represent an image on a display. It is a feature that changes the display colors to match the input or output colors in a way that corresponds to a defined device, medium, viewing environment, and so forth.

source

A physically realizable light, whose spectral power distribution can be experimentally determined. Several standard sources have been defined by the CIE for use in colorimetry. Also a computer term for *origin* of data.

spectral response

Using the example of the human eye, the spectral response curves map the wavelength of light against the fraction of light absorbed by each type of eye cone (red, green, and blue sensitive cones). It is the sensitivity of the eye or a device to different wavelengths of light.

spot color

Color printed in pure color (ink straight out of the container), as opposed to four-color process, where colors are composed of percentages of cyan, magenta, yellow, and black. Spot color separations for printing involve one plate for each color on the page, unlike process color, which requires four separate plates.

standard illuminant

See *illuminant.*

standard observer

The CIE specification for a hypothetical observer whose spectral responsivities represent those of the average human population with normal color vision.

standard source

See *source*.

subtractive primaries

Cyan, magenta, and yellow. The three colors that, when superimposed in register, produce black. Also known as *process colors* because cyan, magenta, and yellow are used in printing. See *CMY/CMYK*.

surround effect

A perceptual phenomenon where the appearance of a color is influenced by the color or colors surrounding it.

system monitor

The monitor that is physically attached to a computer system to be used when displaying images.

tag

Attribute of a color profile that provides information for a CMM to translate color information between the profile connection space and the native device space. Tags are specified by name, value, and status (required or optional).

target

A physical paper target with a reference image used for determining the color response of a scanner.

thermal dye transfer printer

A type of thermal-transfer printer that produces a high resolution continuous tone image. This technology mixes percentages of cyan, magenta, and yellow, and adjusts the density of each printed dot, thereby eliminating the need for halftoning and dithering to produce different colors. Specially coated paper reacts with the dye causing the dye to diffuse into the paper. Also referred to as *dye-diffusion printer, dye-sublimation printer,* and *sublimal-dye printer*.

thermal wax printer

A printer that uses colored wax or plastic, dye, dyed ribbons, or some other material that can be heat-flowed onto paper or transparency film. Other names for this category: *thermal-transfer printer* and *thermal-wax transfer* printer.

transmitted light

Light that passes through an object.

transparency

Image formed on a clear or translucent base by means of a photographic, printing, chemical, or other process, generally viewed by transmitting light through the image.

tristimulus values

Intensities or amounts of each of a set of three primary colors required to match a given color stimulus. See *CIEXYZ*.

value

See *Munsell value.*

visible spectrum

The portion of electromagnetic radiation, from approximately 400 nm to 700 nm, that is seen as visible light. The colors of the spectrum from 400 to 700 nm are violet, blue, green, yellow, orange, and red.

wavelength

Distance between successive corresponding points in electromagnetic and other forms of waves. See *nanometer.*

white point

See *monitor white point*.

XYZ

See *CIEXYZ*.