BASIC COLOR THEORY

Primary Colors

For most of your life you’ve been told that Red, Yellow, and Blue are the Primary Colors and that by mixing them just right you can get just about any other color. Unfortunately, this isn’t entirely true.

Today’s Color Theory says that there are two sets of Primary Colors, and neither of them are Red, Yellow, Blue.

Color is all about light and how it is projected, reflected, and/or absorbed. Outside, during the day, the white light that we see comes from the sun. If you split that light with a prism we see a rainbow, or what is known as the spectrum of visible colors. The Primary Colors of Light are Red, Green, and Blue. By projecting and combining shades of Red, Green, and Blue light we can reproduce any color in nature.

However, until the age of film, television, and computers it was all but impossible to project and/or “paint with light”. Instead we used pigments, dyes, inks, and paints. In the last 100-150 years scientists and artists have discovered that the widest gamut (range) of colors is produced using the colors Cyan (Light Blue), Yellow, and Magenta (a pinkish purply red).
**Color Terminology**

**Hue** (color)

A **Hue** is a color in its purest form as it appears on the spectrum of visible light. A Hue of Red is pure Red.

**Primary Colors**

The base colors, which can be mixed and combined to make other colors.

**Additive Color Theory**

The color of light. Here the Primary colors are **Red, Green, and Blue** (RGB) Different colors are achieved by projecting and blending colored light. This is the most vibrant, accurate, and natural way to see and produce color. Sometimes referred to as **True Color** (when working at 24bits).

**Subtractive Color Theory**

In subtractive color theory colors are made with pigments. This includes **traditional painting** and **modern print or reprographics**

**Traditional Painting Primaries** – Red, Yellow, Blue

**Process Color/Modern Print/Reprographics** – Cyan, Yellow, Magenta, and Black (CMYK) also referred to as **Process Colors.** Process colors are the standard colors of the inks/dyes used in printing. These colors can be used either individually as a pure color, or mixed together during the printing process to produce multiple other colors.
**Why Black in CYMK?**

You were also likely taught, or told that if you mix all of the colors together you get black. This isn't true. What you get, at best, is a dark muddy looking gray/brown. So true black is added to the process color system in order to achieve true blacks as well as more dynamic contrast.

Depending on the printer, and process ink system being used by that printer, other ink colors are frequently added to the standard CYMK in order to increase the range of printable colors. Usually a more true Red, and Blue, 2 kinds of black, one a glossy (shiny) and flat (dull or non-reflective) plus a gray (for tones). An 8-12 color process system is typically what you will find in higher end photo printers.

The range of colors that can be printed accurately by a given system is referred to as the *Color Gamut*.

**Pigment**

Any substance used to chemically make a color.

**Spot Color**

Although the gamut of colors produced by Process Color is good, it is still limited and less accurate, and so the end result often falls short of what is desired, particularly in the area of vibrancy. Occasionally, a Spot color that is out of the normal range of Process color is called for.

A spot color is any color that is generated by using a specific, pre-mixed ink. Spot colors are used when you need to get a exactly the right color or a color *Out of the Gamut* of CYMK. Spot color inks are produced by using a precise chemical formula and are pre-mixed so that the color printed, is the exactly the color you want, and is exactly the same color every time that ink is used. The use of a spot color increases the cost of printing.

**Secondary Colors**

Those Colors made by the combination of two primary colors.

**Complimentary Colors**

The complimentary color of any color is the color that appears directly opposite it on the color wheel. In color theory, the blending of these two colors in the right in equal proportion should result in a neutral color, usually grey.

**Palette/ Color Palette**

The specific range/gamut of colors being used/allowed. A color palette is often intentionally restricted or limited for a number of different reasons.

**Saturation**

Also called *Chroma* this is the intensity or purity of a color. The highest intensity/saturation of given hue/color is the color as it appears naturally in the *spectrum*. *Tones* literally “tone down” the saturation of a color by adding gray or a complimentary color.
Value
The degree of light or dark present in a color. Another way to think of this is how much white or black is present, or mixed into the color. The normal value (0) would be how that color appears on the spectrum, or its Hue. Going up in value + adds white. Going down in value - adds black.

Normal Value
A normal value is equal to the Hue and is the value of a color as it appears naturally in the spectrum.

Tint
Tint is the term used to describe a hue (color) that has been lightened in Value + from its normal value with the addition of white.

Shade
Shade is the term used to describe a hue (color) that has been darkened in Value - from its normal value with the addition of black.

Tone
A hue of reduced intensity/saturation. Tones that have their intensity reduced almost to the point of appearing gray are referred to as a Chromatic Gray. A tone of a hue is created in two ways:
1. By adding a neutral gray, equal in value to the hue. For example, a light gray added to yellow or a medium gray added to red or a dark gray added to violet.
2. By adding its complement.

TINTS - SHADES - TONES

TINTS: When WHITE is added to any color we get TINTS of that color.

SHADES: When BLACK is added to any color we get SHADES of that color.

TONES: When GRAY is added to any color we get TONES of that color.

TONES: When the COMPLIMENTARY color is added we get TONES of both colors.