# The Little Book of
of
Color Theory
for Scientists

Color Wheel

Color wheels help show the relationships between colors. Using the color wheel can help create effective, harmonious, and contrasting color combinations.

The color wheel has three **primary colors** (red, yellow, blue), and the blending of these colors creates the full color spectrum. Blending primary colors together creates the **secondary colors** (purple, green, orange), as well as other colors.
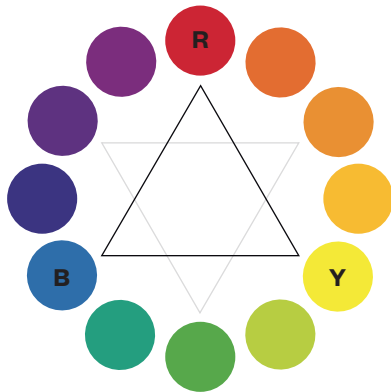
Color Wheel

△ Primary Colors

▽ Secondary Colors

Hue/Value/Saturation

Hue refers to a true color – consider pure red, blue, yellow, etc. Hue does not determine whether a color is dark or light.

Value is the relative lightness or darkness of a color. A color's value is changed by adding white or black to a hue–however, the hue itself is held constant.

Saturation refers to the amount of pigment in a color–a saturated color will look bright, while a desaturated color will appear dull.



Hue

Value

Saturation

Contrast

Contrast refers to an object's difference in color and brightness compared to its surroundings or background. Ensure that your colors have enough contrast to be easily distinguished from one another– colors that originally appear different may be difficult to differentiate depending on their value and saturation.
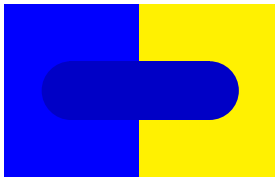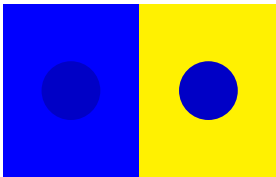
Simultaneous contrast occurs when a single color is perceived to change when seen against different colored backgrounds.
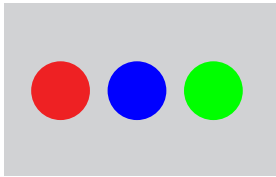
Green has Low Contrast
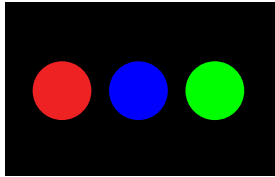
Blue has Low Contrast

The two colors appear different, but are the same.

CMYK & RGB

CMYK and RBG are digital color models.

CMYK refers to the four ink plates used in most color printing: cyan, magenta, yellow, and black. CMYK colors are subtractive, meaning that colors get darker as you blend them together.

RGB refers to red, green and blue lights that are added together to reproduce a wide array of colors on computers, phones, and other electronic devices. RGB colors are additive, meaning that they grow brighter as you blend them together.

Because RGB colors are meant for digital display, the colors of visual designed with this color model might appear significantly different when printed, as they will be converted to CMYK.
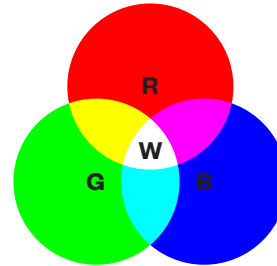

RGB / Screen
Additive Color
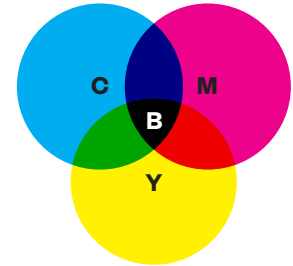
CMYK / Print
Subtractive Color

Color Harmony Rules

Color harmony refers to a set of theoretical properties which certain aesthetically pleasing color combinations have.

Using a color wheel makes it easy to identify and make use of the relationships between colors. Understanding color relationships can help you create effective, harmonious, and contrasting color schemes.

While there are others, some of the basic and most commonly used color schemes are as follows:
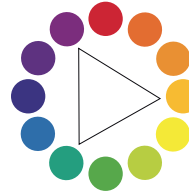
Triadic

Derived from evenly spaced colors around the color wheel

Tetradic

Derived from two sets of complementary colors

Monochromatic

Derived from a single hue and extended

Analogous

Derived from three hues that are next to each other

Complementary

Derived from two opposite colors on the color wheel

Split Complementary

Derived from two colors next to a complementary color

Researcher's Toolkit
for Visual Design
and Critique

Color is one of the most crucial components of a visual composition. Color sets the tone and emotional quality of your work and helps establish what the audience should expect. Too little color can leave your work feeling dry and lifeless, while too much can interfere with the legibility of your content and cause your visual to feel overwhelming.

Use this booklet when considering how to approach and better utilize color in your scientific visuals.