COLOUR AND LIGHTING

UNIT 2

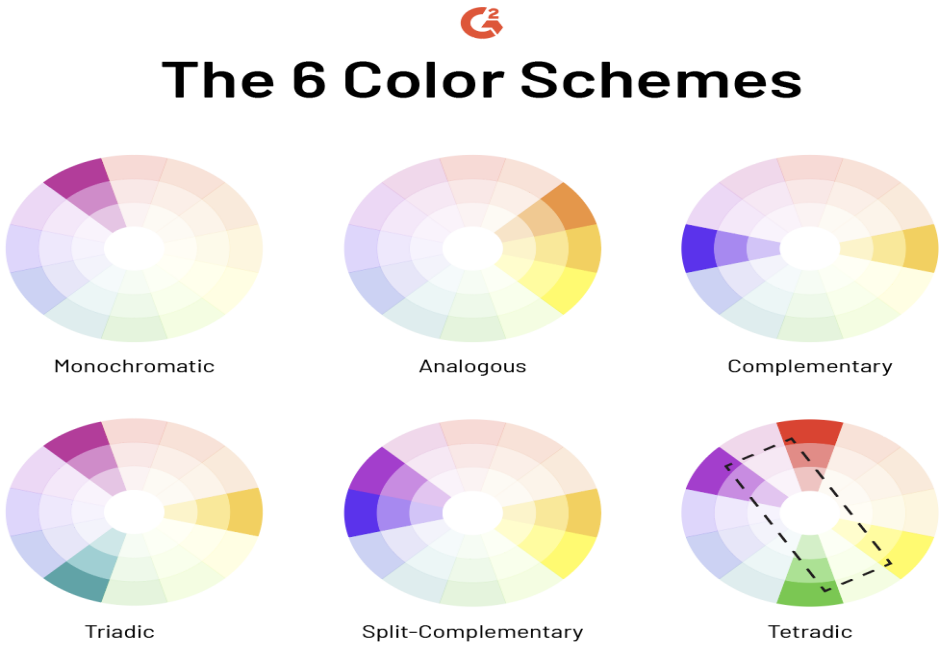
The 6 types of color schemes

It doesn't matter if you're designing an entire website or a disposable print. Designers often have to play around with colors schemes for a long time before finally feeling like they have it right. Before we start learning about how to avoid wasting time doing this, let's learn what a color scheme really is.

What is a color scheme

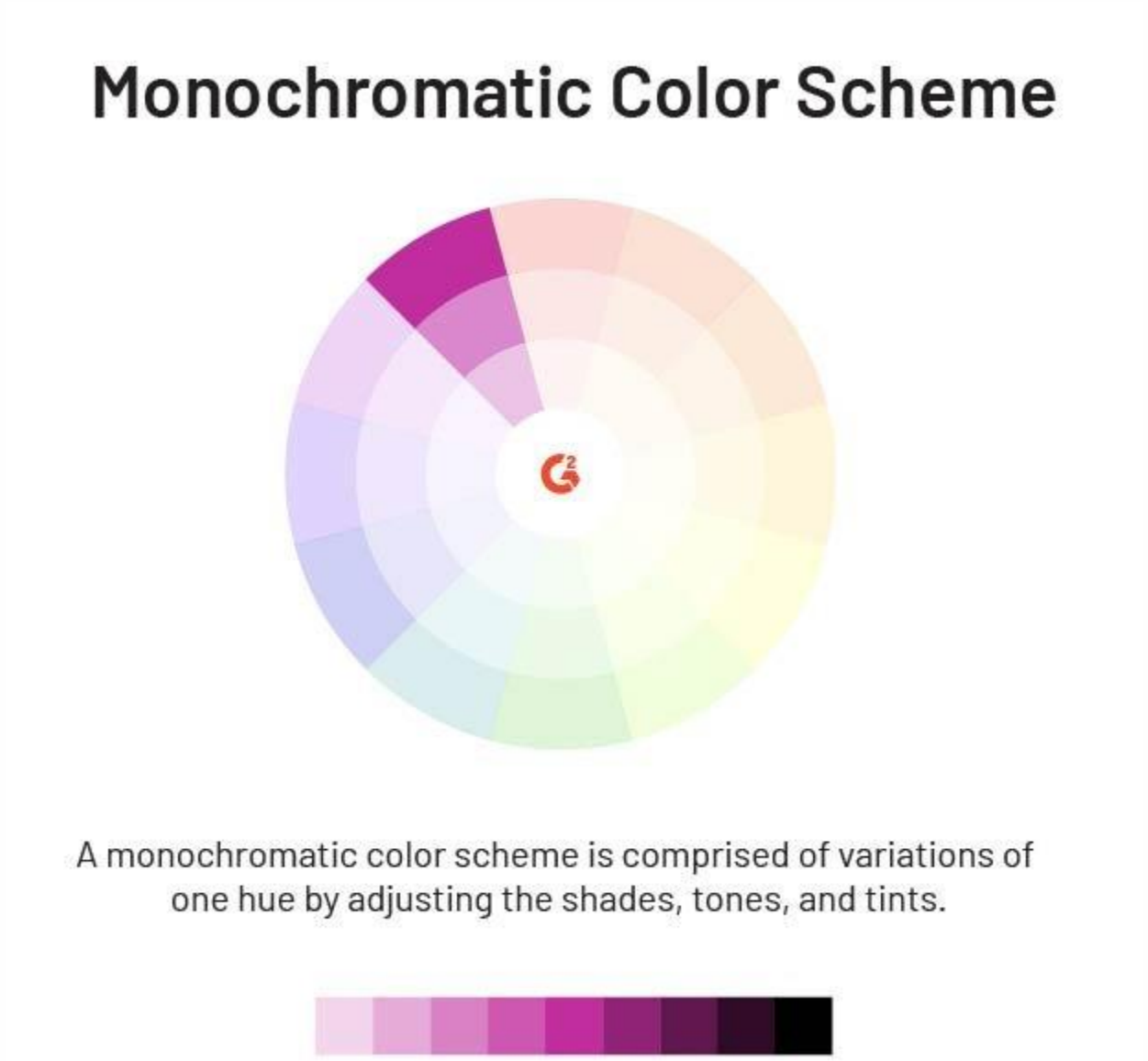
A color scheme is the group of colors chosen by the designer, graphic or otherwise. Ideally, these colors are aesthetically pleasing and should appeal to the viewer.

There are millions of color schemes that you could use in a project, but that doesn't mean they're all good choices. If you want the viewers of your project to feel comfortable, it's best to get an understanding of the relationships that colors have with one another.



1. Monochromatic color scheme

A monochromatic color scheme is somewhat similar to combining typefaces from the same family while font pairing in that monochromatic color schemes are variations of the same hue. The variations are made by adjusting the shades, tones, and tints.

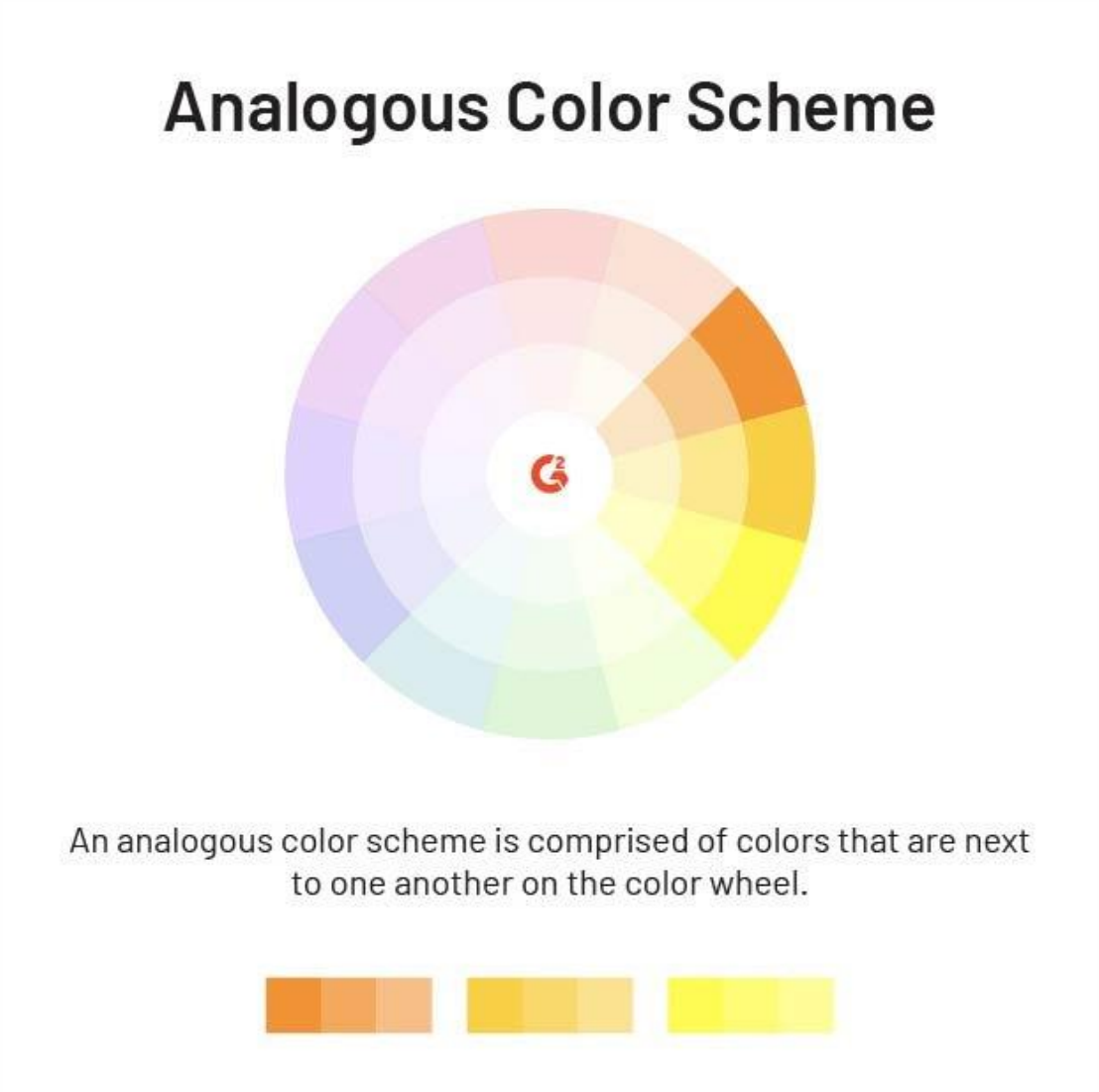


Tints are made by adding white to the hue, while shades and tones are created by adding darker colors to the hue.

This is arguably the easiest choice to make when looking for a color scheme, there are almost no danger zones in taking this route for your design. The largest problem one could run into would be overdoing it–a poster made up of only shades of purple is something to be tread on lightly.

2. Analogous color scheme

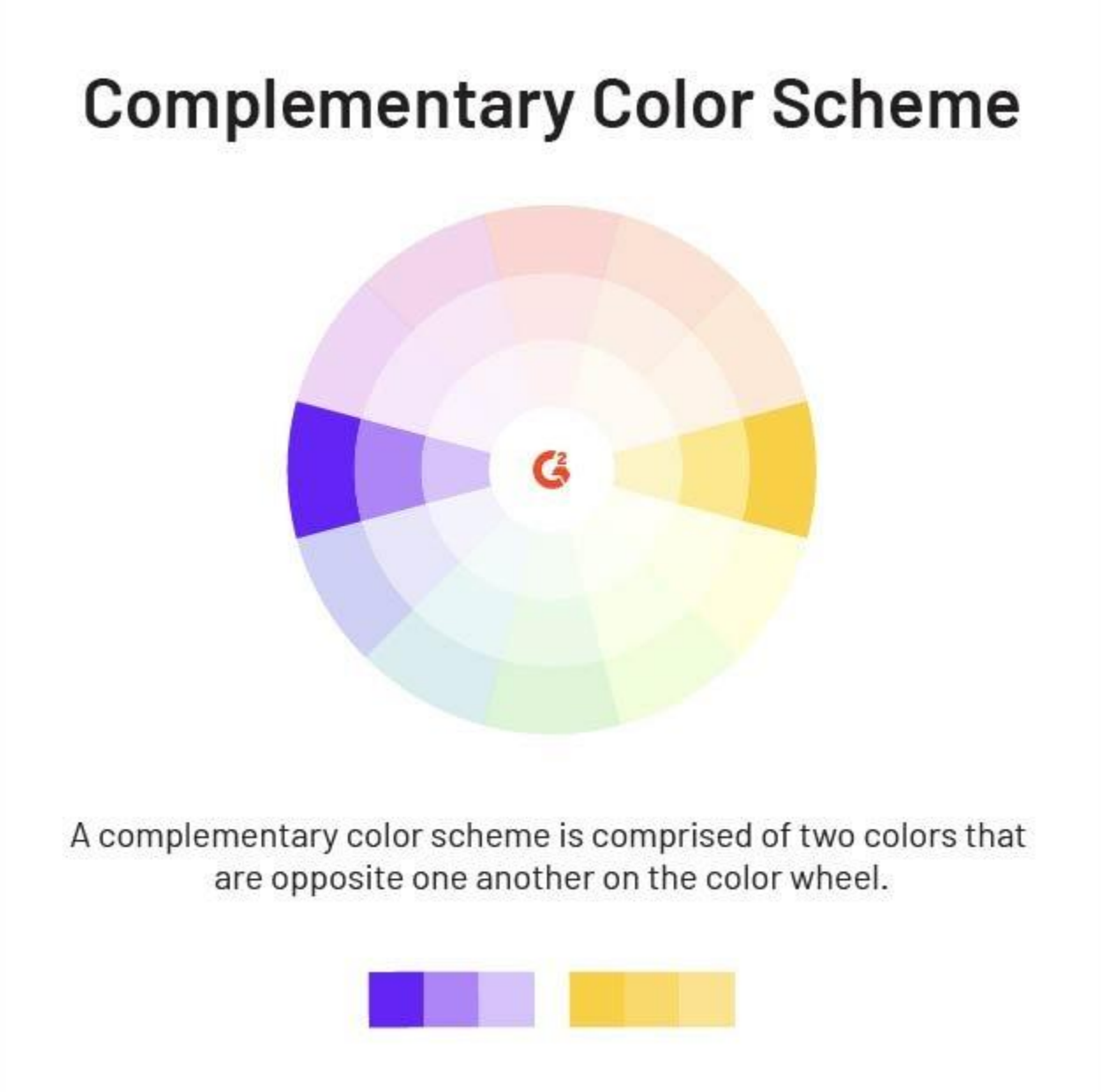
Analogous color schemes are color combinations made up of those that are next to one another one the color wheel. Because of their physical closeness on the color wheel, they often look similar to one another and therefore make a good-looking color scheme.



In design, it’s best to *not* spread these colors out evenly. Instead, choose one color to dominate, while the other two accent it.

3. Complementary color scheme

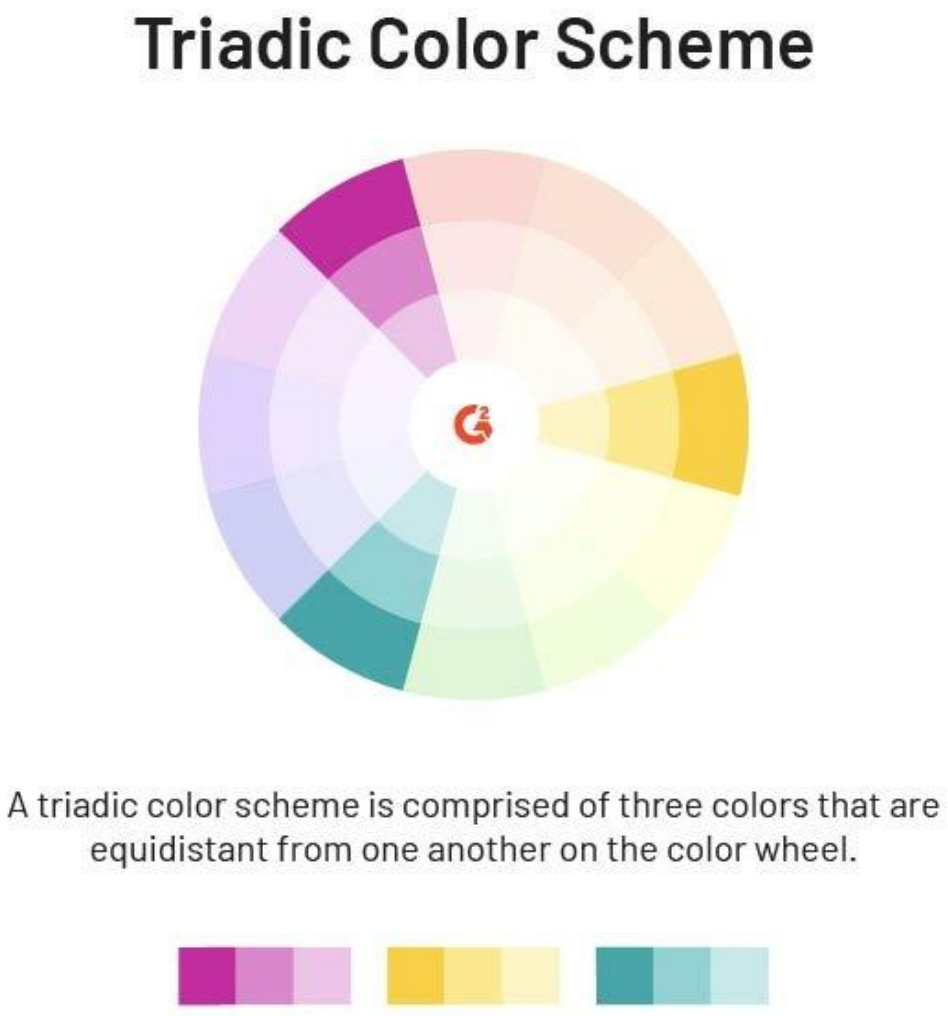
Sometimes, opposites surprise us and really do attract. Complementary colors can be found on the color wheel by choosing one color and the color directly across from it. Opposites really do
attract.



Using this color scheme makes different elements extremely distinct from one another. It translates intensely, so if that's the vibe you're going for, use this color scheme to your own advantage. If the design you're creating isn't meant to be received in that light, avoid it.

4. Triadic color scheme

While not necessarily the easiest, triadic color schemes are the safest bet if you're looking to go outside of one hue. Triadic color schemes are combinations of three colors that are evenly spaced apart on the color wheel.



Triadic color schemes provide viewers with strong contrast, similar to a complementary color scheme. However, triadic color schemes achieve this effect without disturbing the peace.

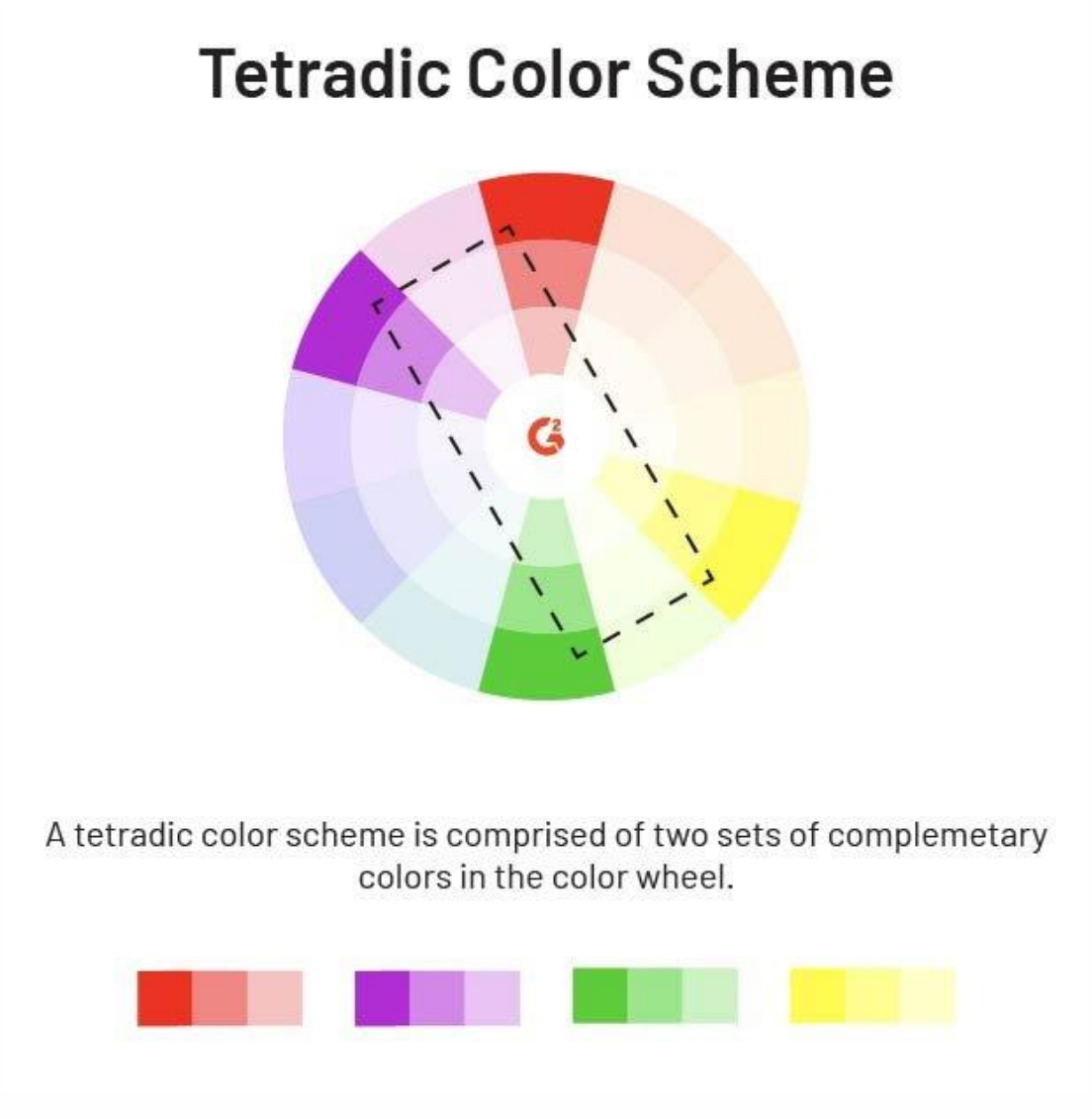
5. Split-complementary color scheme

This color scheme uses two complementary color schemes that land right next to one another on the color wheel. This achieves the same head-turning ability as complementary color schemes but provides designers with a few more color options.

Using this scheme suggests a little more confidence in the color choice than if a designer were to design with just two complementary colors. Split-complementary is still heavily contrasted; it just takes a little bit of the weight off of your eyes.

6. Tetradic color scheme

Also known as the double-complementary color scheme, this scheme is made up of two complementary pairs. Another name for this (yes, this is a lot to remember) is “rectangular colors” because these colors can be found by creating a rectangle on the color wheel.



These colors can be a little alarming to look at, especially if they’re divvied up into equal amounts. To avoid turning heads the wrong way (away from your design),

choose one of these colors to act as your dominant color and let the other three colors act as accents.

PIGMENT THEORY

A Surface has the natural pigmentation of its material. This coloration can be altered with application of paints, stains or dyes which contain Colour pigments. While colored additive in nature, Colour pigments are subtractive. Each pigment absorbs certain Proportion, White light. When pigments are mixed, their absorptions combine to subtract various colures of Spectrum. The colures that remain, determine the dimensions of the mixed pigment.

Object colorants, such as paints and dyes, are the means to modify the colour of illuminati, light, which we interpret to be the colour of the object. In mixing the pigments of paints and dyes each other on the colour wheel produced natural hues. the attributes of colour can be altered. The hue of a colour can be changed by mixing it with other hues.
Analogous hues on the Colour wheel are mixed, harmonious and closely related hues are created, Contrast to this, mixing complementary hues, hues directly opposite of each other on the Colony, Wheel produces neutral hues. The value of a colour can be raised by adding white and lowered by adding black. Lightening, hue's normal value by adding white creates a tint of that hue; darkening the hue’s normal with black creates a shade of the hue. A normally high-value colour, such as yellow, is capable More shades than tints, while a low-value colour, such as red, is able to have more tints than shade the intensity of a colour can be strengthened by adding more of the dominant hue. It can}, lowered by mixing grey with the colour (tones) or by adding to the colour its complementary hues

THE PHYSICIST'S THEORY QF COLOUR

The science of physics deals with colour as a property of light. Within the visible spectrum of colour is determined by wavelength; starting at the longest wavelength with red, we proceed through the spectrum of orange, yellow, green, blue and violet to arrive at the shortest wavelengths. When these coloured lights are present in a light source in approximately quantities, they combine to produce white light—light that is apparently colorless.

The physicist regards the seeing of colour as a psychological sensation which provides a more or less crude and inaccurate indication of the relative intensities of the wave-lengths to which the eye responds. Because the colour sensations which these wavelengths arouse in the eye are only approximately correct, colours in physics are denoted by their intensities and by their wavelength rather than by colour names of all the colours. Red has therefore the longest wave length and voile the shortest. The physicist determines the quality of light radiation by spreading the wavelength present in light into a spectrum, and measures the intensities of the different wavelengths. By this method a clear and physically complete analysis of the quality of light radiation is obtained.

It is found that, in the mixing of coloured lights, all the hues, as well as white, can be secured from three primary colours, but they are not the same three colours the painter must use primaries in pigments to secure all the hues. In coloured lights, red, green and blue-purple are three primaries instead of the red, blue, and yellow of the painter. The three secondary colours, they are seen in light, are yellow, red-purple, and blue. These secondaries are produced as follows yellow light is secured by mixing red and green lights; red-purple results from a mixture of red and blue-purple; and blue light is made by mixing green and blue-purple. The terms "magenta" a! "violet" is often used in this field to indicate red-purple and blue-purple.

PRANG COLOUR SYSTEM:

The Prang colour system was developed by David Browser based on three primary colors. The fundamental or primary colors such as Red, yellow, and blue which can be mixed so as to form all the other colors, but which cannot themselves be made by mixing any other colors. The secondary colors, orange, green, and purple,

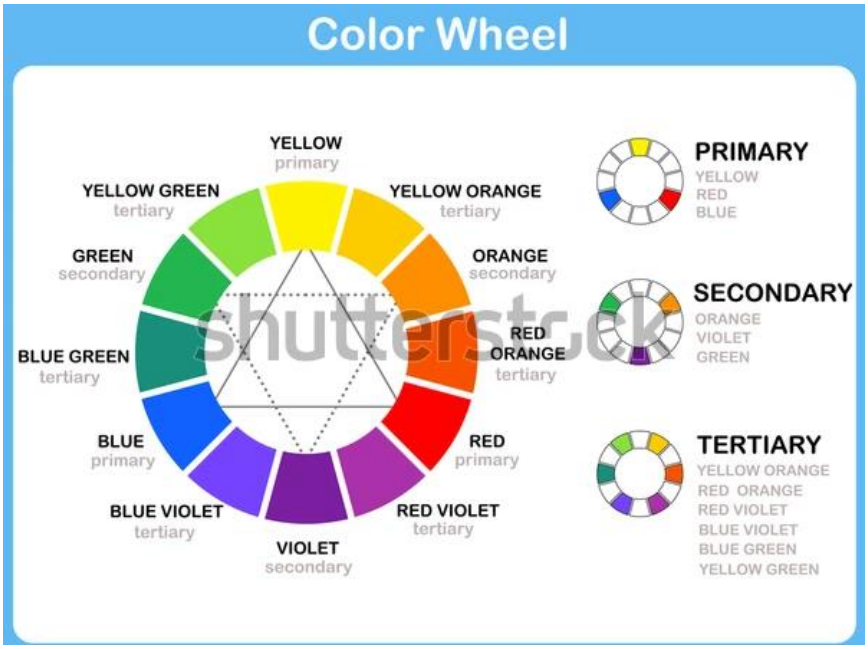
are made by mixing two primary colors; orange is a mixture of red and yellow, green is a mixture of yellow and blue, purple is a mixture of red and blue. A tertiary or intermediate colour is made by mixing primary colour with its adjoining secondary colour. The six colors yellow, green, blue, purple, red, and orange, are called the standard colors. The pigment theory is the simplest basis for mixing paints.

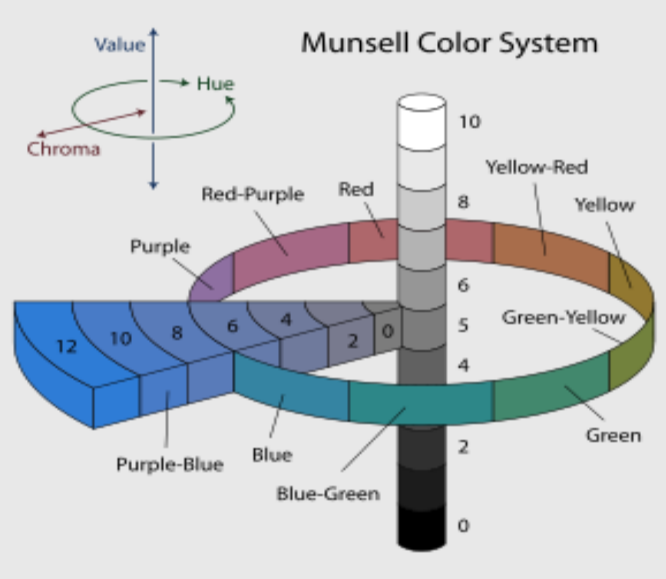
The Prang color system is the basis of the artist's color wheel, and it uses red, blue and yellow as its primaries. This system theorizes that the three primary colors can't be produced by mixing other hues, but can produce all other hues through mixing two of the primaries together.

Developed by Louis Prang, the Prang color system is most often used by artists in determining what paint pigments to mix in order to produce desired colors out of the basic primary colors.

Many other color systems are used. Printers rely on the process color system, which uses cyan, magenta, yellow and black as its primary colors. Televisions, computer monitors and other devices that project light to represent color use the additive system, which mixes red, blue and green primary colors.

Munsell colour system:





Munsell colour system, method of designating colours based on a colour arrangement scheme developed by the American art instructor and painter. It defines colours by measured scales of hue, value, and chroma, which correspond respectively to dominant wavelength, brightness, and strength or purity. The system is used internationally for specifying opaque colours of dyed or pigmented surfaces.

Munsell introduced his system in 1913 with the publication of the *Atlas of the Munsell Color System*, which featured 15 colour charts consisting of several hundred colour chips arranged according to the three characteristics of hue, value, and chroma. After Munsell’s death in 1918, the Munsell Color Company, Inc., carried on his work, publishing a new edition of the *Atlas* under the title. A three-dimensional representation of the Munsell system, sometimes called the Munsell colour tree, is shown in the figure

the **Munsell color system** is a color space that specifies colors based on three properties of color: hue (basic color), chroma (color intensity), and value (lightness). It was created by Professor Albert H. Munsell in the first decade of the 20th century and adopted by the United States Department of Agriculture (USDA) as the official color system for soil research in the 1930s.

Several earlier color order systems had placed colors into a three-dimensional color solid of one form or another, but Munsell was the first to separate hue, value, and chroma into perceptually uniform and independent dimensions, and he was the first to illustrate the colors systematically in three-dimensional space.[1] Munsell's system, particularly the later renotations, is based on rigorous measurements of human subjects' visual responses to color, putting it on a firm experimental

scientific basis. Because of this basis in human visual perception, Munsell's system has outlasted its contemporary color models, and though it has been superseded for some uses by models such as CIELAB (*L*a*b**) and CIECAM02, it is still in wide use today.[2]

The system consists of three independent properties of color which can be represented cylindrically in three dimensions as an irregular color solid:

- *hue*, measured by degrees around horizontal circles
- *chroma*, measured radially outward from the neutral (gray) vertical axis
- *value*, measured vertically on the core cylinder from 0 (black) to 10 (white)

Munsell determined the spacing of colors along these dimensions by taking measurements of human visual responses. In each dimension, Munsell colors are as close to perceptually uniform as he could make them, which makes the resulting shape quite irregular. As Munsell explains:

Desire to fit a chosen contour, such as the pyramid, cone, cylinder or cube, coupled with a lack of proper tests, has led to many distorted statements of color relations, and it becomes evident, when physical measurement of pigment values and chromas is studied, that no regular contour will serve.

Hue

Each horizontal circle Munsell divided into five principal *hues*: **R**ed, **Y**ellow, **G**reen, **B**lue, and **P**urple, along with 5 intermediate hues (e.g., **YR**) halfway between adjacent principal hues.[4] Each of these 10 steps, with the named hue given number 5, is then broken into 10 sub-steps, so that 100 hues are given integer values. In practice, color charts conventionally specify 40 hues, in increments of 2.5, progressing as for example 10R to 2.5YR.

Two colors of equal value and chroma, on opposite sides of a hue circle, are complementary colors, and mix additively to the neutral gray of the same value. The diagram below shows 40 evenly spaced Munsell hues, with complements vertically aligned.

Value

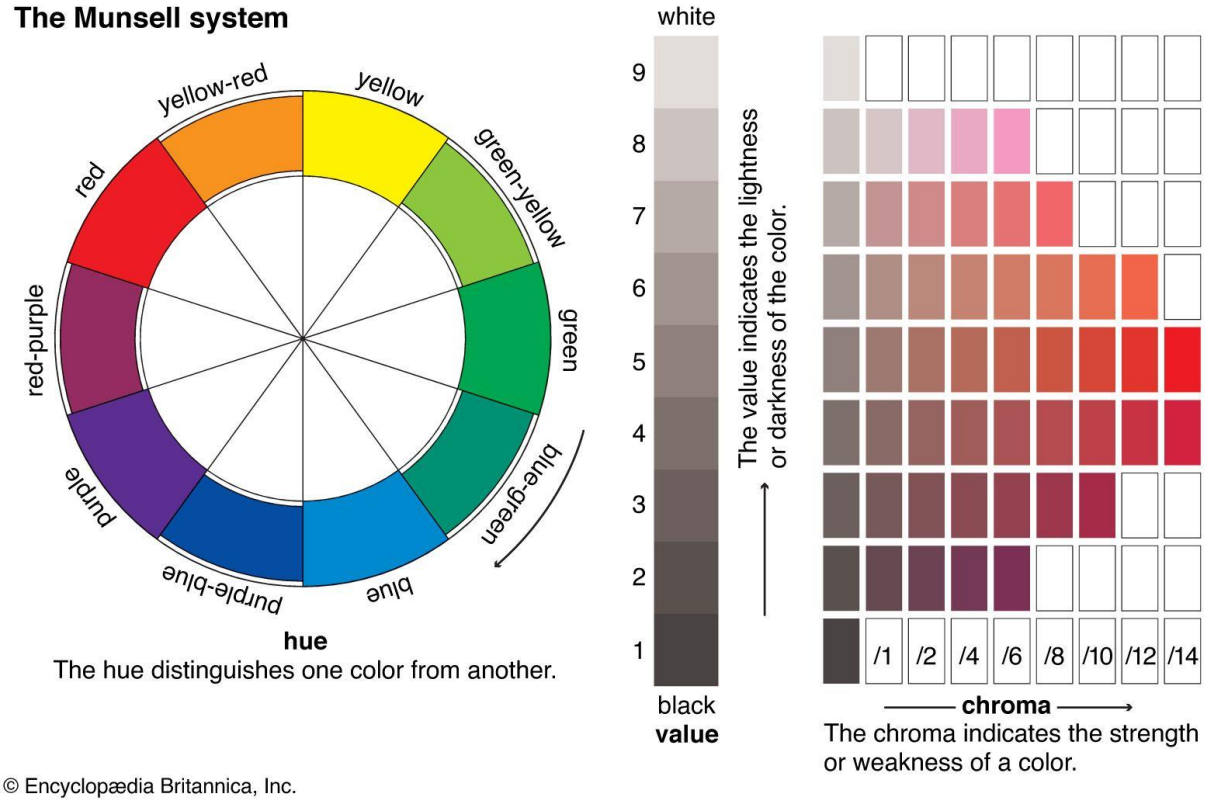
Value, or lightness, varies vertically along the color solid, from black (value 0) at the bottom, to white (value 10) at the top. Neutral grays lie along the vertical axis between black and white.

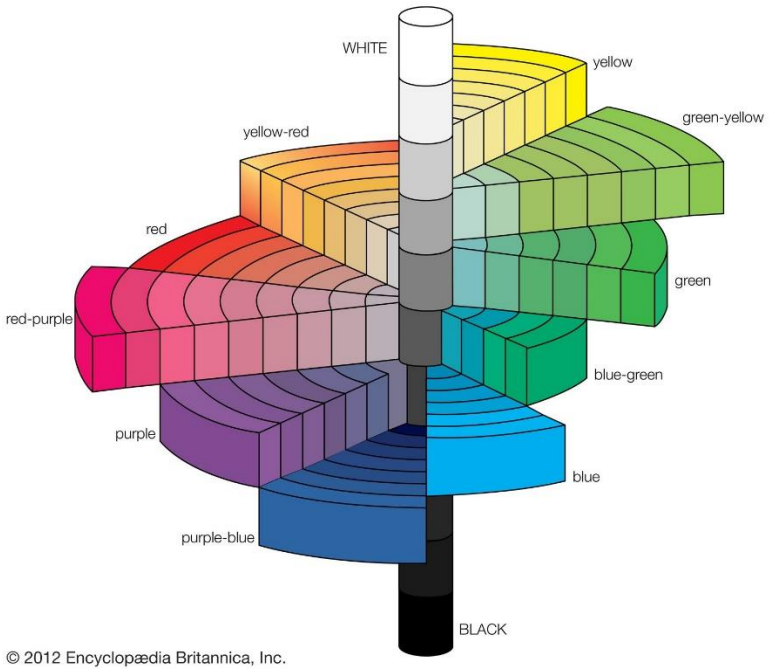
Several color solids before Munsell's plotted luminosity from black on the bottom to white on the top, with a gray gradient between them, but these systems

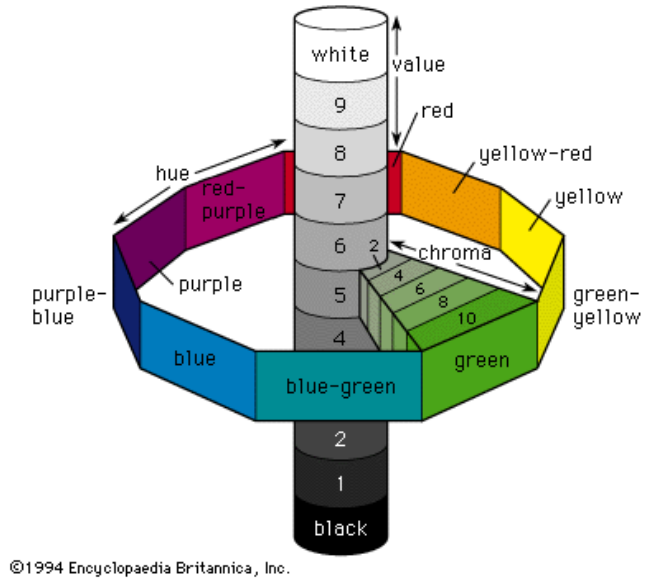
neglected to keep perceptual lightness constant across horizontal slices. Instead, they plotted fully saturated yellow (light), and fully saturated blue and purple (dark) along the equator.

Chroma

Chroma, measured radially from the centre of each slice, represents the "purity" of a color (related to saturation), with lower chroma being less pure (more washed out, as in pastels).[6] Note that there is no intrinsic upper limit to chroma. Different areas of the color space have different maximal chroma coordinates. For instance light yellow colors have considerably more potential chroma than light purples, due to the nature of the eye and the physics of color stimuli. This led to a wide range of possible chroma levels—up to the high 30s for some hue–value combinations (though it is difficult or impossible to make physical objects in colors of such high chromas, and they cannot be reproduced on current computer displays). Vivid solid colors are in the range of approximately







OSTWALD COLOUR SYSTEM:

Ostwald was a German chemist born in Latvia in 1853, who received the Nobel Prize for Chemistry in 1909. Also, a keen amateur painter, he used his knowledge

of chemistry to study pigments and the stability of painting materials. After meeting the American painter Albert H Munsell and seeing his “colour atlas”, Ostwald pursued colour theory and was inspired to develop his own colour classification system, eventually compiling and publishing his theories in Die Farbenfibel (The Colour Primer) in 1916.

According to Ostwald, there were three groups, or classes, of colours. The first consisted of neutral colours – those which do not contain colour and are made only from black and white. The second group were pure “full colours”, containing no black or white. The third group contained mixed colours – combinations of colours with black and/or white. Ostwald identified that all of these groups had at their core four basic hues: yellow, red, blue and sea green. Four further hues – when placed in between the core hues – created orange (between yellow and red), purple (between red and blue), turquoise (between blue and sea green), and leaf green (between sea green and yellow). Finally, two further hues between these colours created a circle of 24 evenly spaced colours.

Ostwald’s ideas about colour standards were enthusiastically received by De Stijl, the group of Dutch artists which included Piet Mondrian and were heavily invested in notions of geometry. De Stijl was a movement which went on to influence the Bauhaus, founded two years later in 1919, and which would become one of the foremost schools of architecture and design