

Color Theory

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Computer Graphics & Design 1

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Color Basics

A color is a particular wavelength of light, and it arrives at our eyes by taking one of three main routes. It is transmitted directly from an energy source, such as the sun, candle or a lightbulb. It is reflected from a "colored" object, when some of the wavelengths of transmitted light hitting the object will have been absorbed and what we see are the wavelengths that survive.

Colors of Light (Transmitted Color)

Pigment Colors

Color Terminologies

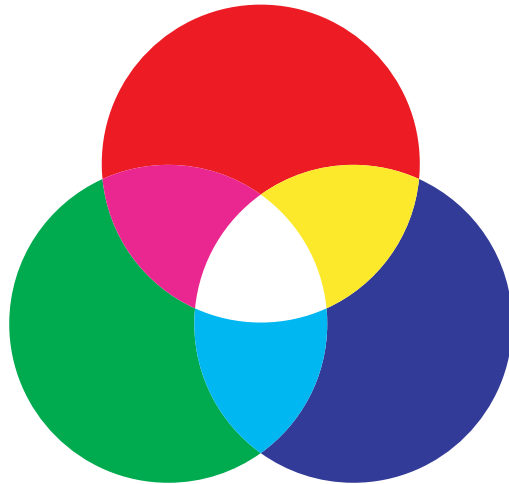
Color Wheel

Tint, Shade and Tone

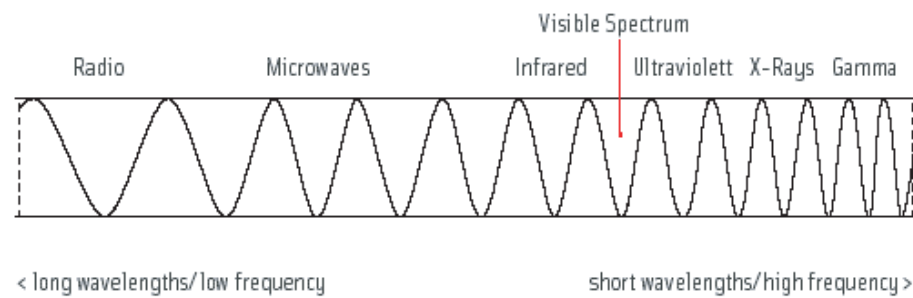
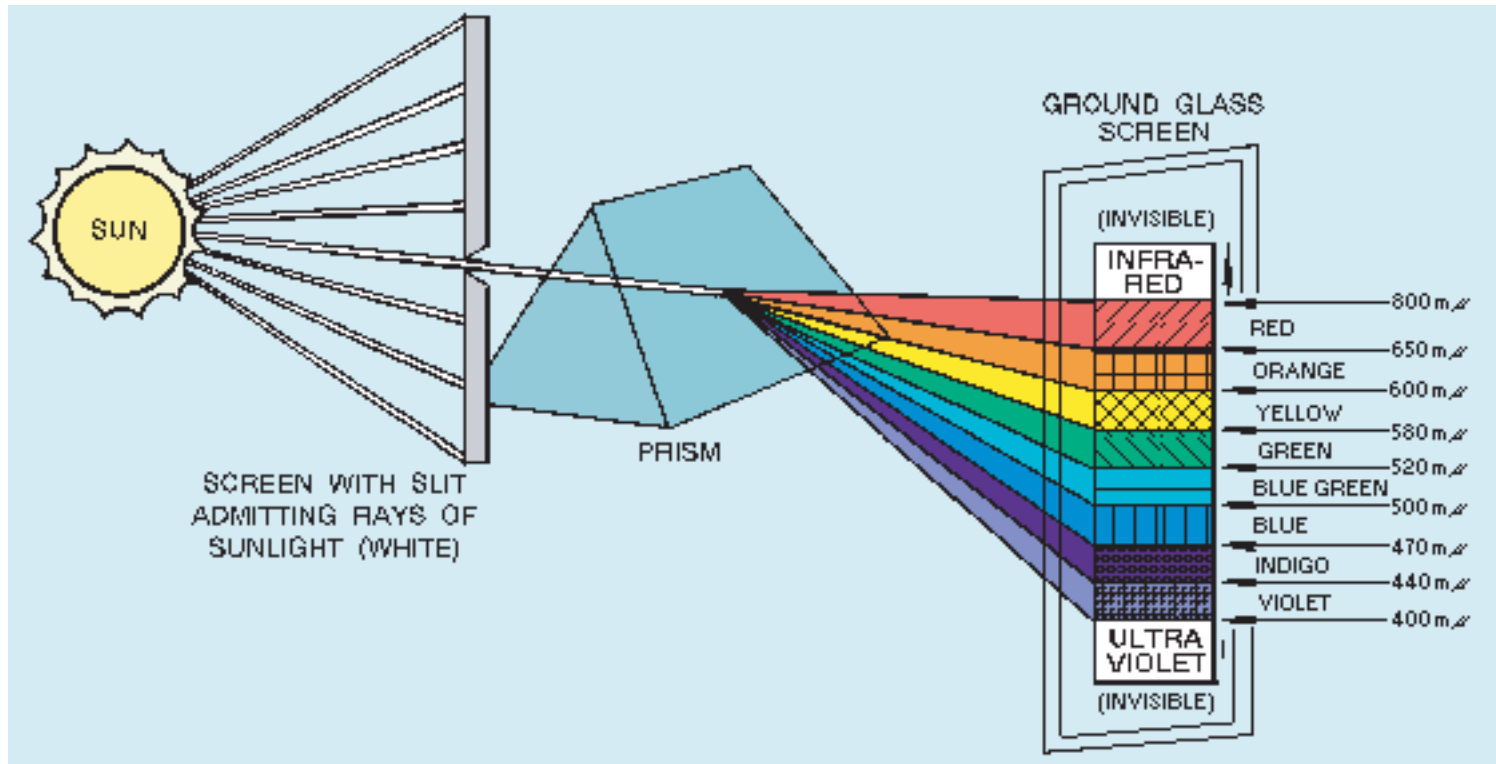
Chromatic/ Achromatic

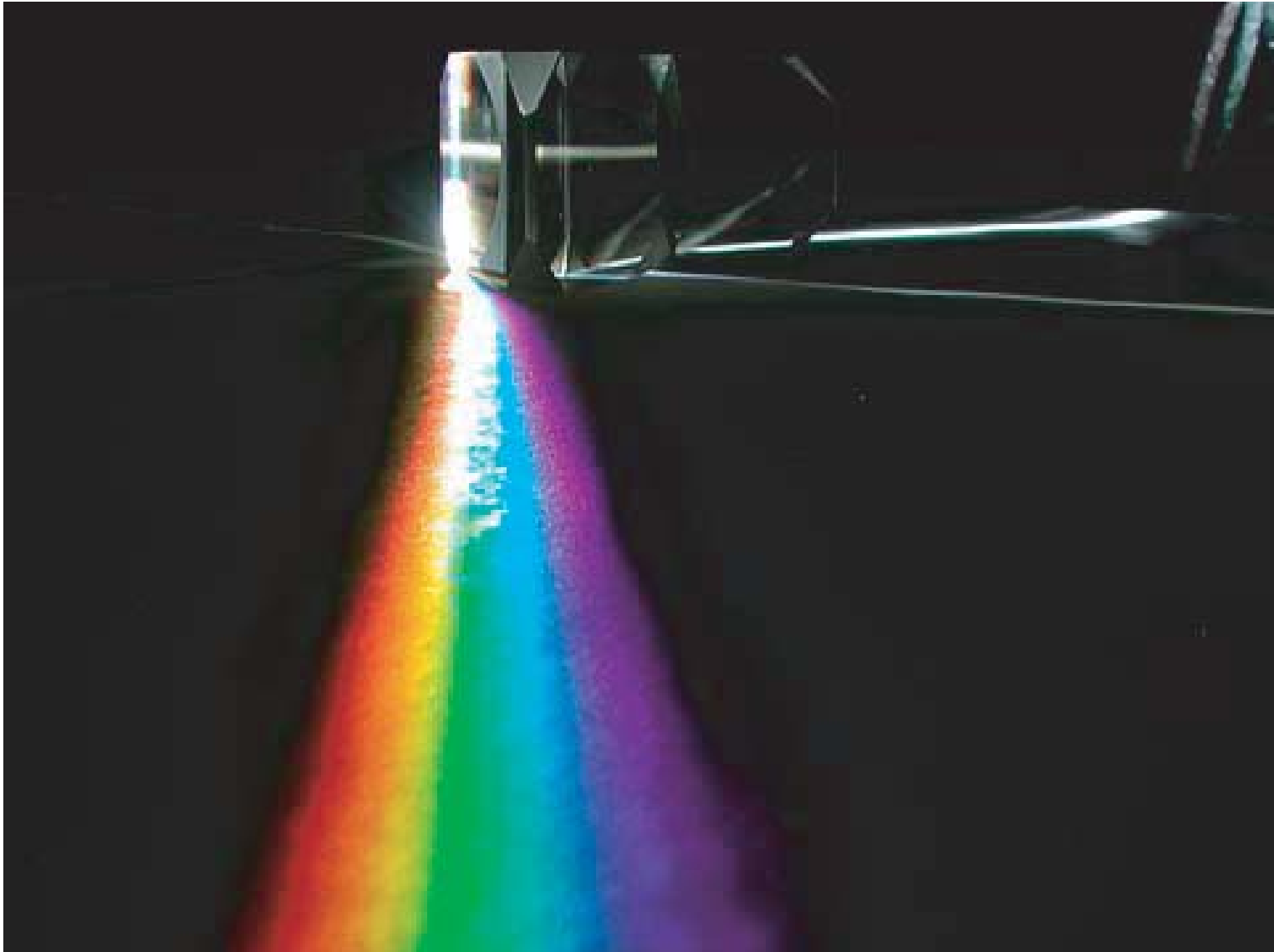
Polychrome/ Monochrome

Colors of Light (Transmitted Color)

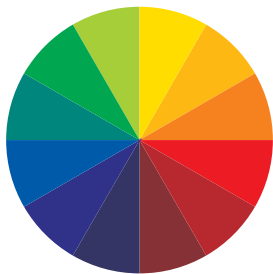
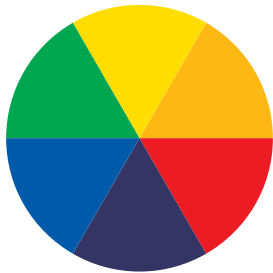


- Color is a property of light (physics)
- Color is determined by visible wavelengths
- Red (longest), Orange, Yellow, Green, Blue, Indigo, Violet (shortest)
- Computer Graphics, Photography, and Television work with light sources (colored lights) and add colors to get other colors
- This is called the 'Additive color system'
- Its primary colors are Red, Green and Blue
- No colors added together is black
- Red + Green = Yellow
- Green + Blue = Cyan
- Blue + Red = Magenta
- Red + Green + Blue (in sufficient quantity) = White (or in lower quantities, gray)





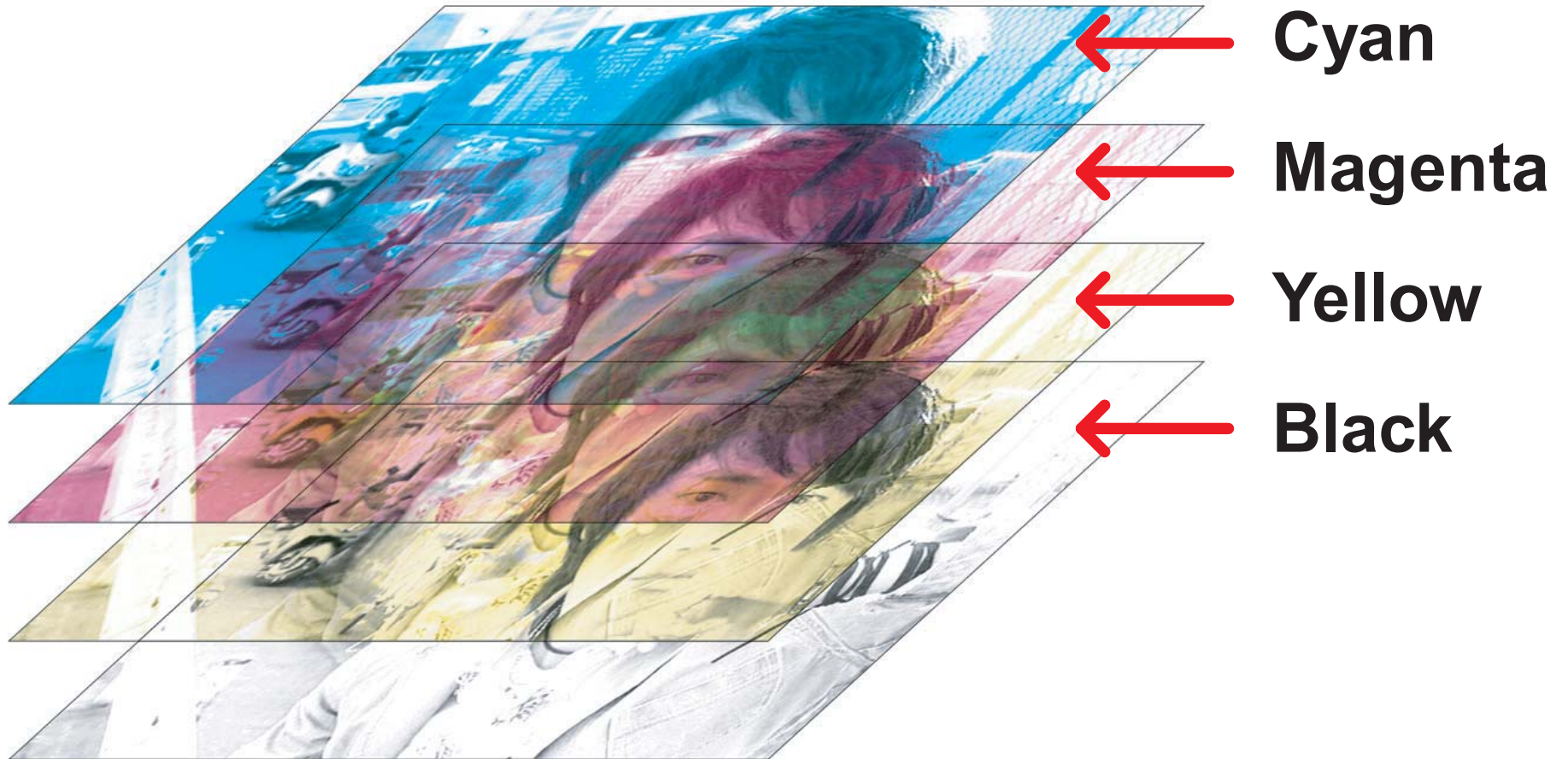
Pigment Colors



- Color as a visual phenomenon (perception)
- Looking at pigments (dyes or paints) under a white light
- Pigment colors absorb and reflect light energy
- Red pigment absorbs Green and Blue, reflecting Red
- The better a pigment is at absorbing light, the darker the pigment looks and vice versa
- This system of color mixing is called the 'Subtractive Color System' (colors are made by 'subtracting' other colors from white light)
- Primary Colors (Subtractive Primary)
Yellow, Red, Blue
- Secondary Colors (Primary + Primary)
Orange, Purple, Green
- Tertiary Colors (Primary + Secondary)
Yellow-Red, Green-Yellow,
Blue-Green, Purple-Blue, Red-Purple









Color Terminologies

Color has three dimensions

- Hue (Color): attribute by which we recognize and describe a color, used to describe any pure color, with the exception of Black or White.
- Value (Brightness): degree of lightness or darkness of a color in relation to white and black
- Intensity (Saturation): degree of purity or saturation of a color when compared to a gray of the same value

Hue



Value /Brightness



Intensity / Saturation





HYPERFESTA

STABLOU SI SI KONTOURNOI
DIAI SIAI ANI ANI SIAI SIAI

RESTAURANTEI MANIKORAKO
MOKOSIAI



Saturation:



Saturation:



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ITALIANO 2019
DALLA SPINA AL TAVOLO

RESTAURANTE MANAGERIA
MONTECARLO



Brightness:



Brightness:

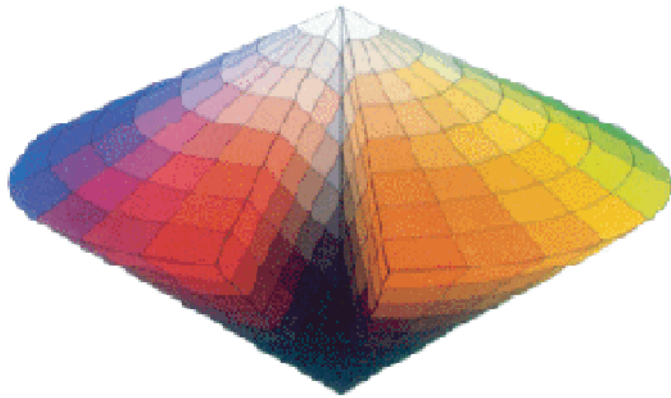
Color Wheel

Color has three dimensions

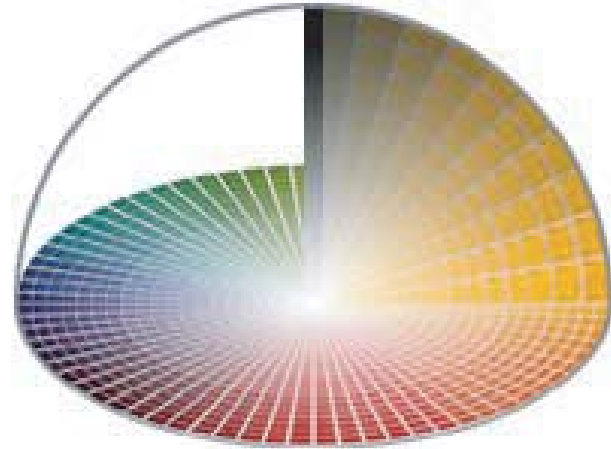
- Invented through the basic theory of bending the spectral range of light into a circle containing seven different colors
- Color Wheel Systems
Munsell, Moses, Goethe, Runge, Chevreul, Rood, Ostwald, etc.
- Brewster or Prang Color Wheel
- Consists of 12 basic hues
3 Primary Colors
3 Secondary Colors
6 Tertiary Colors



Color Wheel

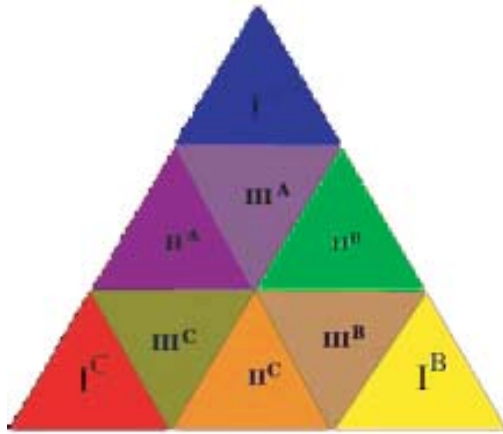


Ostwald

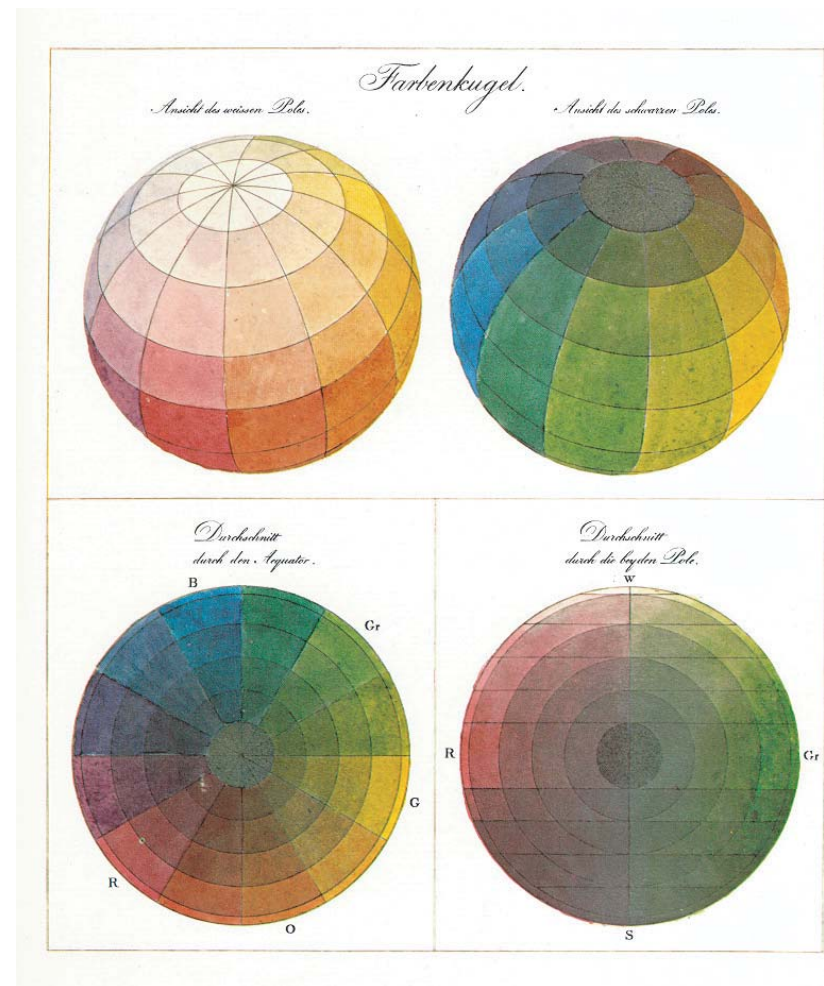


Chevreul

Color Wheel

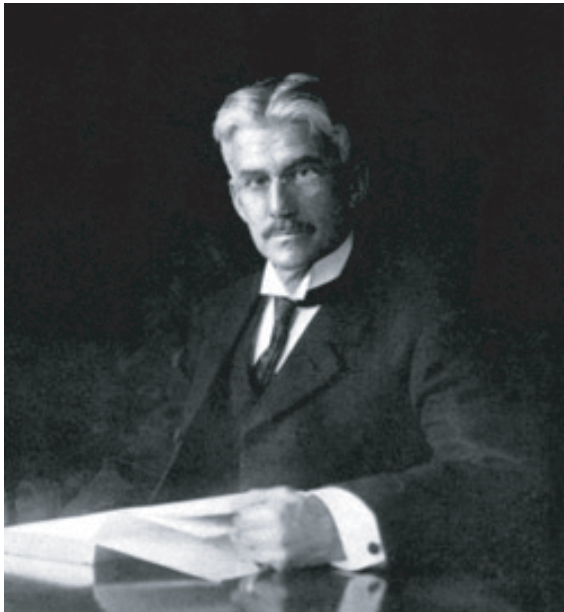


Goethe

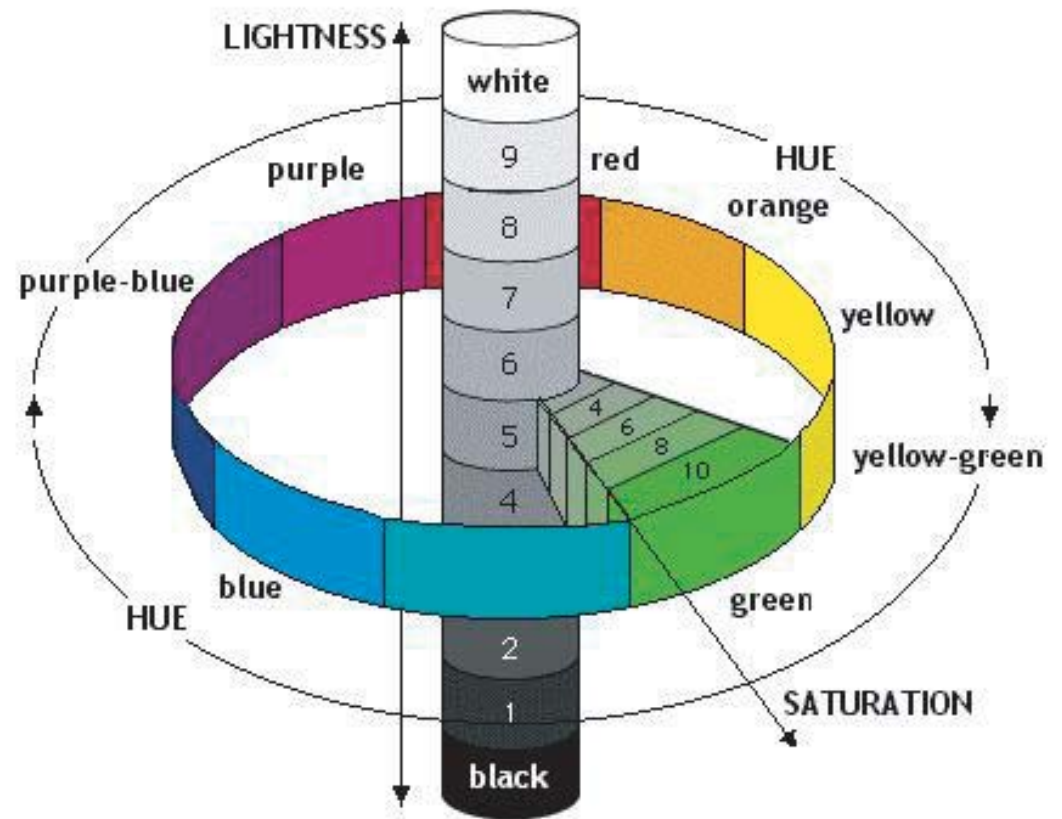


Rouge Kugel

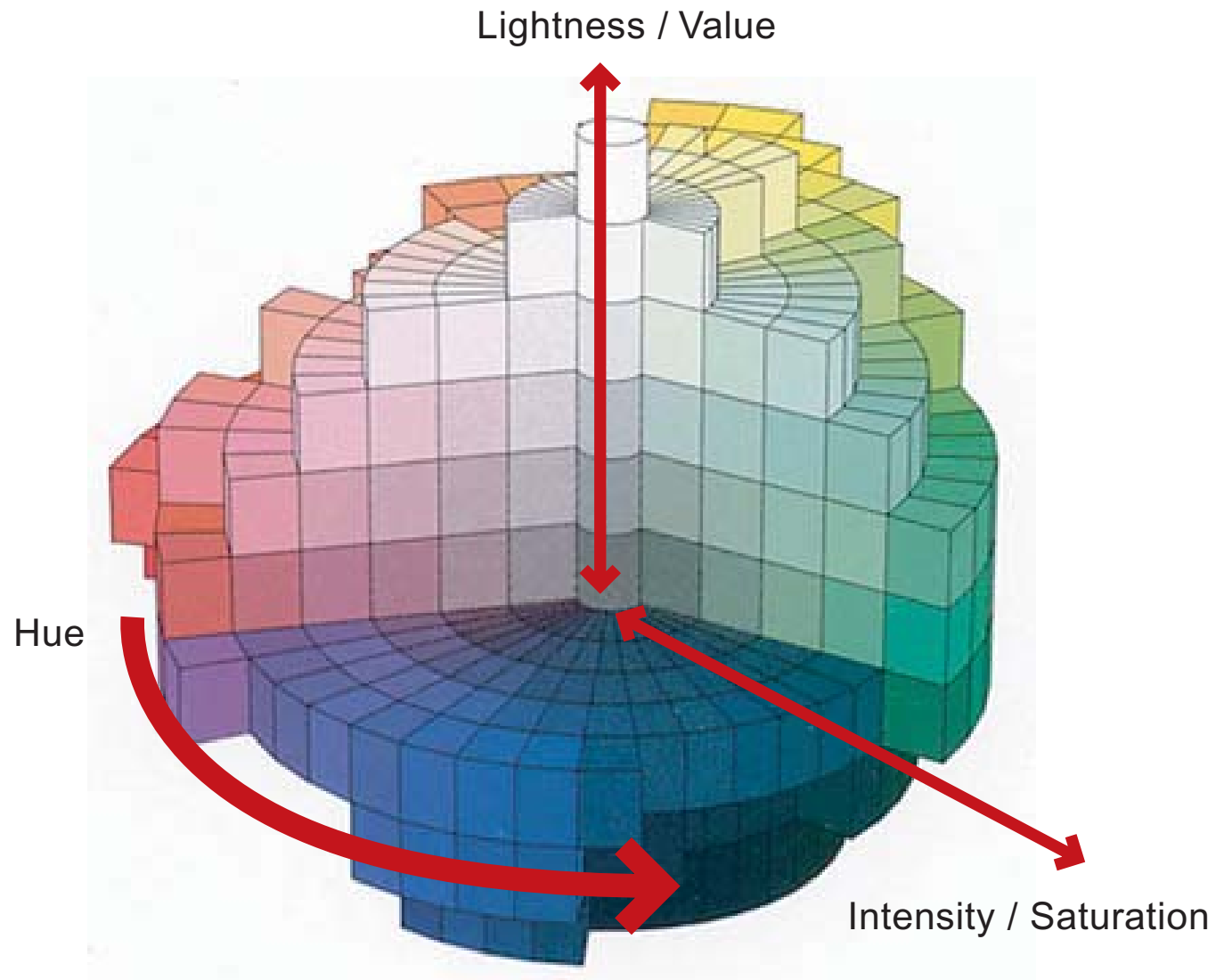
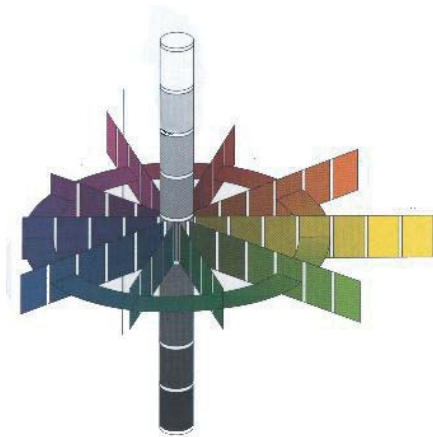
Munsell's 3D Color Wheel



Munsell



Munsell's 3D Color Wheel



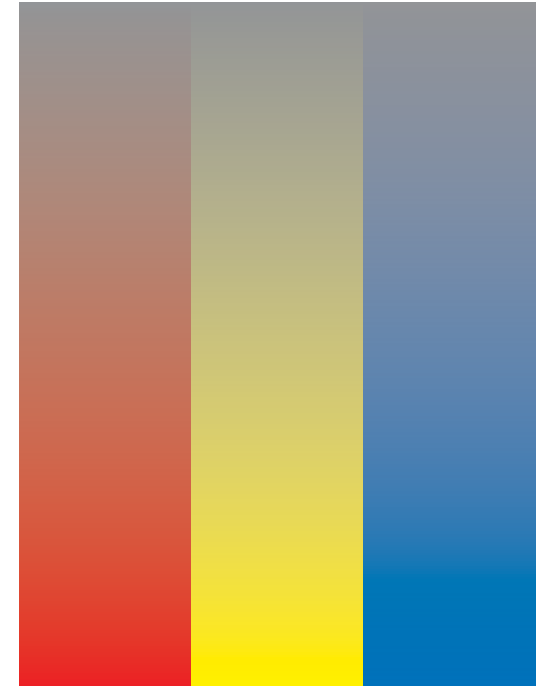
Tint / Shade / Tone



A **tint** is made by adding white to a color



A **shade** is made by adding black



A **tone** is made by adding gray

Chromatic/ Achromatic



Chromatic: being or pertaining to color



Achromatic: colorless, made up of Black and Whites and the various range of neutral grays

Polychrome/ Monochrome / Duotones



Polychrome (Polychromatic): having or exhibiting several colors, color w/ many colors



Monochrome (Monochromatic): having or exhibiting in one color or in tints, shades, and tones of one color excluding Black and White

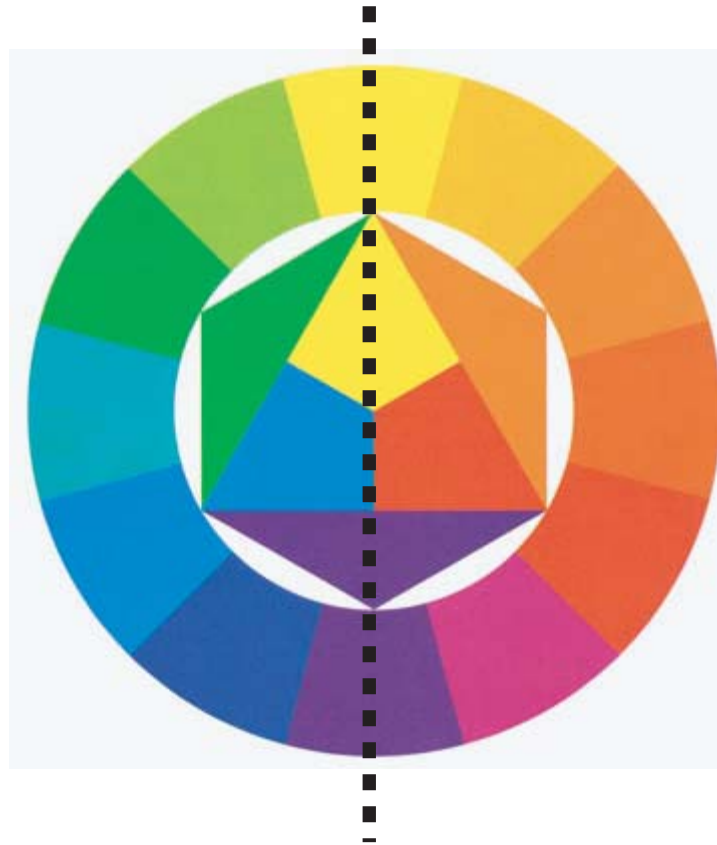


Duotones(or Tri or Quad): having or exhibiting in two (or 3 - 4) colors or in tints, shades.

Psychology of Color

Warm and Cool Colors
Color Symbolism

Cool Color



Warm Color

Cool Colors

- Cool colors: Green, Blue and Violet
- The colors of 'Cold': Colors like Blue, green and Blue-green are associated with cold, and calm
Promote the feeling of austerity, cleanliness, invigorating freshness, coldness
- The colors of 'Cool': Blue is the base for these colors but added are reds and yellows to bring out a wide range of color from minty green to a soft violet
Promote the feeling of calm, serenity, trust and relaxation



Warm Colors

- Warm colors: Red, Orange and Yellow
- The colors of 'Hot': Red is the highest chroma color there is or the most powerful hue
 - Evoke strong emotional responses and stimulate physical activities
 - Express an aggressive feel or to create an emphasis
- The colors of 'Warmth': Based in Red but softened and suffused with orange and yellows
Suggest comfort and warm heartfelt emotions



Color and Psychology

แดง เหลือง เขียว ฟ้ำ ชมพู ม่วง

ส้ม น้ำเงิน เทา น้ำตาล ดำ ขาว

Color and Psychology

Red: rage, anger, courage, sacrifice

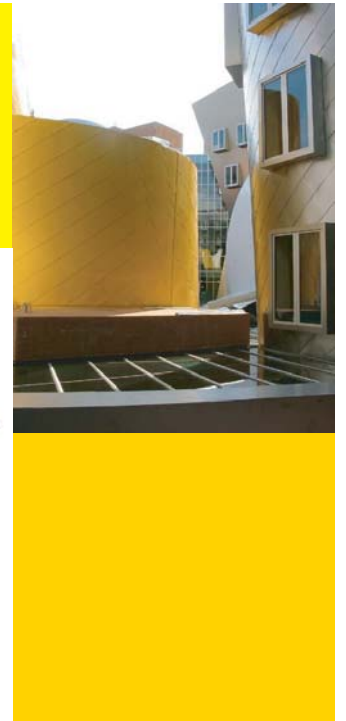
The most emotionally intense color, red stimulates a faster heartbeat and breathing. It is also the color of love. Red clothing gets noticed and makes the wearer appear heavier. Since it is an extreme color, red clothing might not help people in negotiations or confrontations. Red cars are popular targets for thieves. In decorating, red is usually used as an accent. Decorators say that red furniture should be perfect since it will attract attention.



Color and Psychology

Yellow: sun, wealth (Gold), envy, cowardice

Cheerful sunny yellow is an attention getter. While it is considered an optimistic color, people lose their tempers more often in yellow rooms, and babies will cry more. It is the most difficult color for the eye to take in, so it can be overpowering if overused. Yellow enhances concentration, hence its use for legal pads. It also speeds metabolism.



Color and Psychology

Blue: peace, sky, heaven, water

The color of the sky and the ocean, blue is one of the most popular colors. It causes the opposite reaction as red. Peaceful, tranquil blue causes the body to produce calming chemicals, so it is often used in bedrooms. Blue can also be cold and depressing. Fashion consultants recommend wearing blue to job interviews because it symbolizes loyalty. People are more productive in blue rooms. Studies show weightlifters are able to handle heavier weights in blue gyms.



Color and Psychology

Green: conservative, hope, spring, life, food

Currently the most popular decorating color, green symbolizes nature. It is the easiest color on the eye and can improve vision. It is a calming, refreshing color. People waiting to appear on TV sit in "green rooms" to relax. Hospitals often use green because it relaxes patients. Brides in the Middle Ages wore green to symbolize fertility. Dark green is masculine, conservative, and implies wealth. However, seamstresses often refuse to use green thread on the eve of a fashion show for fear it will bring bad luck.



Color and Psychology

Purple: rank, authority, luxury

The color of royalty, purple connotes luxury, wealth, and sophistication. It is also feminine and romantic. However, because it is rare in nature, purple can appear artificial.



Color and Psychology

Orange: energetic, fresh



Color and Psychology

Black: power, death, underworld, mourning

Black is the color of authority and power. It is popular in fashion because it makes people appear thinner. It is also stylish and timeless. Black also implies submission. Priests wear black to signify submission to God. Some fashion experts say a woman wearing black implies submission to men.



Color and Psychology

White: purity, innocence, chastity

Brides wear white to symbolize innocence and purity. White reflects light and is considered a summer color. White is popular in decorating and in fashion because it is light, neutral, and goes with everything. However, white shows dirt and is therefore more difficult to keep clean than other colors. Doctors and nurses wear white to imply sterility.

