# Homework – Week 7

Due Week 8

## Reading:

- BOOK: Understanding Comics by Scott McCloud
  - Chapter 8: A Word About Color
- BOOK: Introduction to Two-Dimensional Design: Understanding Form and Function by John Bowers
  - Chapter 4, Color: Types, Interactions, and Roles

## Assignment:

Color Theory

**1. Color Wheel**

Create a color wheel IN ILLUSTRATOR

- See color wheel example on website
- Draw on top of imported image with Illustrator's drawing tools
- 8" x 8" square picture plane (not stroked)
- Your color wheel should show the following:
  - Primary, Secondary, and Tertiary colors
- Your color wheel should result in the twelve tone scale: yellow / yellow orange / orange / red orange / red / red violet / violet / blue violet / blue / blue green / green / yellow green
- Bring in Digital file for Class Crit
- Print in Color

**2. Nine Color Studies in Illustrator**

- Bring in 9 Digital Files with .ai extension for Class Crit
- Print in Color
- Select 1 of your compositions from week 5 ( Compositions using Relational Elements)
- 8"x 8" stroked, square picture plane on 8 1/2" x 11" paper
- Use this same composition for each of the 9 color studies

1. **Achromatic colors (grayscale)**
2. **Analogous colors**
3. **Warm Colors**
4. **Cool Colors**
5. **Neutral Colors**
6. **The contrast of hue**
7. **The contrast of value (or light and dark or monochromatic)**
8. **The contrast of warm and cool**
9. **The contrast of complements**

**Analogous colors**
Analogous colors are any three colors which are side by side on a 12 part color wheel, such as yellow-green, yellow, and yellow-orange. They are closely related because they have a color in common. For example, blue, blue-green, and greenall contain blue. Red, orange, and yellow are analogous because red and yellow make orange.

This is one of the most simple, yet elegant schemes to use. Look around you, and you will see that Mother Nature paints the best examples of analogous schemes. The warm, rich colors of firelight, the cool colors of twilight, the sea greens and blues of the ocean, the jewel-toned tail of a peacock, the stripes of a tabby cat . . .the soft fuzz of a peach.

Nature illustrates this scheme far better than any example which could be provided here, leave your computer, take a walk, and really look at the colors around you.

**Warm colors**
Warm colors are made mostly of red, orange and yellow. This family of colors is called warm because they remind you of warm things like the sun or fire. Warm colors can even make you feel warmer because they can slightly increase your circulation and body temperature!

Artists use warm, cool and neutral colors to create moods, show contrast and create depth in artworks. Vincent van Gogh used warm colors in his paintings of Sunflowers.

**Cool colors**
Cool colors are made mostly of green, blue and violet (purple). This family of colors is called cool because they remind you of cool things like a cool forest or a cold lake. Cool colors can even make you feel cooler because they can slightly decrease your circulation and body temperature! Claude Monet's Water Lilies (see website) uses cool colors to suggest a quiet pond.

**Neutral colors**
The last family of colors are neutral: black, white, gray, and brown

Neutral colors or earth tones are not seen on most color wheels. Black, gray, whites are neutral. Browns, beiges and tans are sometimes neutral too. Neutral colors can be made by mixing:
- black and white
- complementary colors
- all three primaries together (plus some black or white)

Mood is the feeling created by an artwork. In the painting, Paris Street: Rainy Day, French artist Gustave Caillebotte (see website) creates a gloomy mood by showing the neutral gray and brown colors of a rainy day.

Artists use warm, cool and neutral colors to create moods, show contrast and create depth in artworks.

**The contrast of hue (also known as contrast of saturation)**
Contrast of hue is illustrated by undiluted colors in their most intense luminosity. Just as black-white represents the extreme of light-dark contrast, so yellow/red/blue is the extreme instance of contrast of hue. The intensity of contrast of hue diminishes as the hues employed are removed from the three primaries. Thus orange, green, and violet are weaker in character than yellow, red, and blue; and the effect of tertiary colors is still less distinct.

When the single colors are separated by black or white lines, their individual characters emerge more sharply. Their interaction and mutual influences are suppressed to some extent.

**The contrast of value (or light and dark) also known as contrast of monochromatic**
The contrast is formed by the juxtaposition of light and dark values. One color? How can I possibly use only one color? Why, by using some of its tints, shades, and tones, of course; with the addition of a basic neutral or neutrals, (black/white/grey); and varying the values in order to add contrast and interest.

**The contrast of warm and cool**
The contrast is formed by the juxtaposition of hues considered 'warm' or 'cool.' This is often the easiest contrast to achieve perceived three dimensional depth due to advancing & receding characteristics of most warm colors in relation to cool colors.

**The contrast of complements**
Complementary colors are directly across from each other on the color wheel.

Complementary pairs all contain one primary and one secondary color. So, together each complementary pair has all three primary colors!

That means complementary pairs contrast because they share no common colors. They are complete opposites!

Complementary colors **complement** each other! You may have heard "opposites attract." In the same way, complementary pairs look good together. They complement each other! However, sometimes complementary colors can seem to vibrate when placed side by side.

When mixed together, complements make a neutral gray. You can make a color less bright and intense by blending in a small amount of its complement.

**Split Complementary**
Key color combined with the two colors that are next to its complement.

**COLOR THEORY**
Color is a phenomenon of perception not an objective component or characteristic of a substance. Color is an aspect of vision; it is a psychophysical response consisting of the physical reaction of the eye and the automatic interpretive response of the brain to wavelength characteristics of light above a certain brightness level (at lower levels the eye senses brightness differences but is unable to make color discriminations). (see spectrum.gif on website)

That light is the source of color was first demonstrated in 1666 by Isaac Newton, who passed a beam of sunlight through a glass prism, producing the rainbow of hues of the visible spectrum. This phenomenon had often been observed before, but it had always been related to latent color that was said to exist in the glass of the prism. Newton, however, took this simple experiment a step further. He passed his miniature rainbow through a second prism that reconstituted the original white beam of light, His conclusion was revolutionary: color is in the light, not in the glass, and the light people see as white is a mixture of all the colors of the visible spectrum.

The colors of the visible light spectrum are red, orange, yellow, green, blue, indigo and violet.

White light consists of all of the colors mixed together. The color of an object depends on how it absorbs and/or reflects light. If an object absorbs all of the light wavelengths, it will appear black. If it reflects all of them, it will appear white. If an object absorbs all wavelengths except red, for example, it will look red.

The reason rainbows appear colored is because the light is broken down into its constituent parts by passing through the water droplets in the air. (The perception of color in a rainbow is proportional to the viewer's perspective, you move, it moves.)

The theory of color has gone through some changes over time, and it is now an accepted fact that color is truly in the eye of the beholder. "This is due to the fact that, as sensed by man, color is a sensation and not a substance."

Different people can also see color differently. We all agree the sky is blue, but a piece of reflective art may look slightly blue to one person while another sees it as slightly cyan. If you don't know the difference between the look of blue as opposed to cyan then communicating your preferences to a technician can be problematic. Subtle color variances are best seen under correct viewing conditions (not by a window, etc.) and can take some time to learn to even see them.

Color is an enormous topic. We are constantly processing visual information based on color references. In understanding color theory it's helpful to break it down into three parts: IMPRESSION / visually, EXPRESSION / emotionally, and CONSTRUCTION / symbolically. This initial class on color deals with the more objective principles.

Since 1676, when Issac Newton analyzed sunlight through a glass prism and the color it produced, many color theories have been put in place. It should be mentioned that color theory is just that, theory. For centuries people came to understand and use color based on their inherent perceptions and emotional responses. Theory helps us to understand their practices and our own perceptions.

Artists have invented many different media that imitate the colors of light. Painters, for example, use powdered pigments to reproduce the colors of the rainbow. Color is yet another elements of art and design, like point, line, and shape.

**Color wheels**
(see colorwheel.jpg on website)

Color wheels show how visible colors are related. Primary, secondary, and intermediate (or tertiary) colors are organized on a circular chart. Color wheels help artists remember how to mix and think about pigments.

Sir Isaac Newton developed the first circular diagram of colors in 1666 (see website). Since then scientists and artists have studied and designed numerous variations of this concept. Differences of opinion about the validity of one format over another continue to provoke debate. In reality, any color circle or color wheel which presents a logically arranged sequence of pure hues has merit.

Color wheels are based on color theory, which is based on the physics of light.

There are two common types of color: additive color and subtractive color.

Additive color refers to the mixing of colors of light. Example 1 (see website) shows how the light from red, green and blue flashlights would appear if shone on a dark wall. The three primaries in light are red, blue, and green. When all of the colors of the spectrum are combined, they add up to white light.

Subtractive color refers to the mixing of colors of pigment, such as paint or the ink in your computer's printer. This type of color is what is used in the art and design world. When learning basic color theory, students typically use familiar colors like red, yellow, and blue. Printers' primaries—yellow, cyan, and magenta—are typically used by professional designers and printing presses. Example 2 (see website) illustrates subtractive color by showing how primary colors mix on a piece of white paper.

**Primary colors**
(see primarywheel.gif on website)

The primary colors are:
- red,
- blue, and
- yellow.

In traditional color theory, these are the 3 pigment (see definition below) colors that can not be mixed or formed by any combination of other colors. All other colors are derived from these 3. Artists create secondary and intermediate colors by mixing primary pigments.

**Pigments**
Pigments give color to paint. In the past, pigments were powders made by grinding up minerals, plants and animal parts. The most expensive pigments used to be gold, vermilion (a red pigment made from sulfur and mercury) and ultramarine (a blue pigment made from a stone called lapis lazuli). Modern pigments are made from chemicals which come in brighter colors, resist fading, and are less expensive. Pigments are mixed with a "binding agent" such as egg, oil, animal fat, water or synthetic resin to make a paintable liquid that dries.

Secondary colors (see secondary2.gif on website)
A secondary color is made by mixing two primary colors:
- blue + yellow = green
- red + blue = purple
- red + yellow = orange

The secondary colors are:
- green,
- orange, and
- violet (purple).

**Intermediate (or Tertiary) colors**
(see tertiary__triange__wheel.gif on website)
Intermediate colors are made by mixing a secondary and a primary color together.

The intermediate colors are:
- yellow-orange,
- red-orange,
- red-purple,
- blue-purple,
- blue-green and
- yellow-green

**Triadic Colors**
Three colors that are evenly and equally spaced from each other forming an equilateral triangle within the color wheel.

**Tetrad**
A double complementary contrast as illustrated by a square or a rectangle

**The question:**
Now that we have 12 colors...where do the rest of the colors come from?

**The answer:**
Variations in value, tint, shade, tone, and saturation.

**Chromatic**
Our common notion of color refers to the chromatic colors, which relate to the spectrum as can be observed in a rainbow. Each chromatic color can be described in three ways:

hue,
value, and
saturation or intensity or chroma

**Achromatic**
Neutral colors (black, white, and grays) are not part of these chromatic colors and can be referred to as achromatic colors. (see munsell.html on website)

**Hue (color with no black, white or gray added)**
Hue is the attribute that permits colors to be classified as red, yellow, blue, etc. The description of hue can be more precise by identifying the color's actual inclination from one hue to the next. For example, a particular red may be more accurately called orange-red.

**Value**
Value is the lightness or darkness of a color. You can get different values of a color by mixing in white or black to create shades, tints, and tones.

**Shades (Color + Black)**
Shades are dark values of a color. One usually makes shades by mixing a color with different amounts of black.

**Tints (Color + White)**
Tints are light values of a color. One usually makes tints by mixing a color with different amounts of white.

**Tone (Color + Grey or Color + varying degrees of its complementary color)**
Tones are muted saturations of a color.

**Saturation (or Intensity or Chroma)**
The brightness or dullness of a color; the intensity or purity of a color. Saturated colors are the most brilliant, most vivid colors that can be obtained. Desaturated colors are dull; they contain a large proportion of gray.

Many people find choosing colors that "go together" an intimidating and confusing process. Certainly it can be when confronted with all the colors of creation! The first step, then, is to keep it simple.

**Color Harmony**
Harmony can be defined as a pleasing arrangement of parts, whether it be music, poetry, color, or even an ice cream sundae.

In visual experiences, harmony is something that is pleasing to the eye. It engages the viewer and it creates an inner sense of order, a balance in the visual experience. When something is not harmonious, it's either boring or chaotic. At one extreme is a visual experience that is so bland that the viewer is not engaged. The human brain will reject under-stimulating information. At the other extreme is a visual experience that is so overdone, so chaotic that the viewer can't stand to look at it. The human brain rejects what it can not organize, what it can not understand. The visual task requires that we present a logical structure. Color harmony delivers visual interest and a sense of order.

**In summary,**
**extreme unity leads to under-stimulation,**
**extreme complexity leads to over-stimulation.**
**Harmony is a dynamic equilibrium.**

When people speak of color harmony, they are evaluating the joint effect of two or more colors. Experience and experiments with subjective color combinations show that individuals differ in their judgements of harmony and discord. There are many theories for harmony, but we can make the general statement that all analogous colors, complementary pairs, all triads whose colors form equilateral or isosceles triangles in the twelve-member color circle, and all tetrads forming squares or rectangles are harmonious.

**Seven kinds of color contrast**
Johannes Itten was one of the first people to define and identify strategies for successful color combinations. Through his research he devised seven methodologies for coordinating colors utilizing the hue's contrasting properties.

We speak of contrast when distinct differences can be perceived between two compared effects. When such differences attain their maximum degree, we speak of diametrical or polar contrasts. Thus, large-small, white-black, cold-warm, in their extremes, are polar contrasts. Our sense organs can function only by means of comparisons. The eye accepts a line as long when a shorter line is presented for comparison. The same line is taken as short when the line compared with it is longer. Color effects are similarly intensified or weakened by contrast.

The seven kinds of color contrast are the following:
- **Contrast of Hue**
- **Light-Dark Contrast**
- **Cold-Warm Contrast**
- **Complementary Contrast**
- **Simultaneous Contrast**
- **Contrast of Saturation**
- **Contrast of Extension**

**References:**
The Art of Color by Johannes Itten and
Principles of Color Design by Wucius Wong
Interaction of Color by Josef Albers
Color (4th Edition) by Paul J. Zelansk