A human's perception of colors when the brain responds to the stimuli that are produced when incoming light reacts with the several types of cone photoreceptors that contain three different pigments: Red, Green and Blue. So, everything we see is reduced to these colors or combinations of, which in the real and digital worlds means distinguishing between millions of bright, beautiful colours. White is a nonspectral colour meaning it can't be generated by any single wavelength of light. White is the experience we have when all three of our cone types are activated in approximately equal proportion. (see RGB)

In short, white light is a physical entity, colour is a perception. Black and white are colours without hue.

While we have three different types of cones, we only have one type of rod and therefore can't distinguish colours in dim light; to see colour we need to compare the activity in two different classes of photoreceptors.

The sense of colours vibrating, dancing is the difference in wavelength sensitivity between the cone and rod system.

Luminance, or how bright or dim something appears, is analyzed separately in the brain from colour. Whether it's rods or cones that are predominantly responding determines our perception of brightness. It's easy to confuse with colour. (show book page 36) Colour adds much of the emotional information but not the compositional information. The two are processed by different areas of the brain.

What/where system

Where system: motion perception, depth perception, spacial organization, figure/ground segregation; it's colourblind

What system: object and face recognition, colour perception and is unique to primates. Our night vision, however is colourblind.

CONSIDERATIONS IN THE DESIGN WORLD:

Edward Tufte: "…avoiding catastrophe becomes the first principle in bringing color to information: Above all, do no harm." (Envisioning Information, Edward Tufte, Graphics Press, 1990)

Consumers judge an environment or object within 90 seconds of initial viewing and most of that assessment is based on color.

Neural processes can get fatigued: contrasting colours competing for attention. So subjective and contextual: using the same colour to convey information can either confuse or enlighten.

Analogous colors, side by side on the colour wheel, can be soothing and look pleasant to the human eye. Complementary colours, opposite each other on the wheel like green and red, are

high-contrast and can look very energetic on the page. 

Colour harmony is something that is pleasing to the eye and a desirable goal. 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 (bland, understimulating by the brain) or chaotic (difficult to look at; rejected by the brain what it cannot organize or understand).

With what we know about sight:

- colour coding enhances comprehension, association/disassociation
- improves object recognition (an orange photographed in isolation without its colour could be a grapefruit or lemon)
- enhances meaning (think of a black site with a lone but powerful colour used in the most carefully selected places)
- provides structure, hierarchy
- establishes identity (if I see bright green and rich purple combined, I will forever think of TELUS; royal blue for Bell, red for Rogers, and yellow and black for Fido. White is a very effective colour in both TELUS and Bell marketing
- colour provides symbolism - red = passionate, yellow = energetic, blue = serene and melancholic; beware of cultural relevance
- colour promotes usability - wayfinding;
- to communicate mood, emotion, provide "personality"

CONSIDERATIONS IN THE DIGITAL WORLD:

- Blue ultramarine paint from Afghanistan was more expensive than gold; in the print world, prior to digital printing, colour was a luxury and cost money; often rationalizing colour and the number of colours was a necessary conversation with your client. Today million colour choices are available and so comprehending colour is even more valuable.
- bad monitor, window reflections, sunlight hitting the screen

COLOURBLINDNESS:

About 8 percent of the male population and 0.5 percent of female, are color blind in some way or another, whether it is one color, a color combination, or another mutation. Red-green is the most common type followed by blue-yellow, which usually includes blue-green.

The most usual cause is a fault in the development of one or more sets of cones that perceive color in light and transmit that information to the optic nerve.

With color deficits, the ability to discriminate colors on the basis of all three attributes -- hue, lightness and saturation -- is reduced. Designers can help to compensate for these deficits by making colors differ more dramatically in all three attributes.