Selecting the Right Color Palette: Understanding RGB and CMYK Color

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What will be covered

- Introduction to Color
- RGB - Additive System
- CMYK - Subtractive System
- Describing Color
- Color Gamut
- Color Profiles
- Color Viewing Conditions
Introduction to Color

- **Rods** - a nerve in the eye sensitive to low levels of light - night vision.

- **Cones** - a nerve in the eye that can distinguish between the components of light.
Introduction to Color

• All color is in light - without light there is no color

• The absence of light is black
Introduction to Color

• Visible light is a narrow range of electromagnetic energy

• The human eye is sensitive to only a small portion of this range

• It’s called a visible spectrum
Introduction to Color

• How many colors can we see?

• Nature .......... 10 -11 Million
• Slides .......... 12,000 - 14,000
• Color Proofs ... 7,000
• Press ............. 5,000
RGB - Additive System

• The additive color system starts with a black background

• White light is added in different proportions to reproduce a color spectrum

• RGB devices include TV screens, monitors, video projectors, stage lighting, scanners, digital cameras
CMYK - Subtractive System

• The subtractive color system starts with a white background
• The paper is white because it reflects the full spectrum of light (RGB)
• Subtractive color is the process of removing color from the white surround
• The whiter the substrate is, the more colors we can reproduce
CMYK - Subtractive System

- When we combine two primary colors (RGB), the result is called a secondary color
  - Green + Blue = Cyan
  - Red + Blue = Magenta
  - Red + Green = Yellow
CMYK - Subtractive System

From RGB to CMYK
CMYK - Subtractive System

- The printing inks serve as filters on the surround
- They absorb light, subtract some of it and reflect the rest
Color Gamut

• Color gamut (color space) is the range of colors a device is capable of recording or reproducing.

• Different devices have different color spaces, and when changing one to another some color information might be lost because it cannot be represented in the new space.
Color Gamut

- **RGB** - bigger gamut
- **CMYK** - smaller gamut
Describing Color

• Color is a visual sensation therefore it is as subjective as other sensations (taste, smell, hearing, touch)

• It is difficult to describe color over the phone

• We cannot tell what we want unless we see it
Describing Color

Some vague terms to describe color:

- Flat
- Needs more snap
- Muddy
- Too warm
- Too cold
- Make it jump off the page
Describing Color

• Warm Colors:  Cold Colors:
  • Magenta  Cyan
  • Red  Blue
  • Yellow  Green
Describing Color

• Although color perception is subjective, color reflection can be measured and communicated

• Spectrophotometers measure reflectance throughout the visible spectrum
ICC Profiles

• ICC (International Color Consortium) Profile describes the property of a color space

• Every device that captures, displays or prints color has its own profile

• ICC Profiles can be created or purchased (some downloads are free)
ICC Profiles

• Adobe RGB (1998)

• U.S. Web Coated (SWOP)v2

• SWOP (Specification for Web Offset Publication)
Color Viewing Conditions

• Color proofing needs to be consistent and repeatable

• American National Standard Institute (ANSI) viewing conditions: 5000 Kelvin (contains an even mix of red, green, and blue light)

• Viewing booth, 5000K light bulbs
Color Viewing Conditions

• Monitors

• Monitor calibration, profiling

• Soft proofing - Photoshop allows you to preview the effect of printing by loading a color space profile of an output device (printer, press)
Questions?