

week::one

Introduction to Color Management

Traditional vs. Digital Color Management

Based largely on subjective measures of color

- Experience—knowledge of the process and much exposure to results – apprenticeships.
- Intuition
- Memory
 - What does the sky look like? What does grass look like? What do fleshtones look like? What are the limits and capabilities of the reproduction system?

Many advantages over digital color management

- Based on value judgments—what is important? Face? Cloths?
- Adjustable for circumstances, can take things into account that digital color management cannot.
 - Temperature, humidity, new papers, position in a layout, and a million other little things that would be impractical to incorporate into a digital color management system.
- Based on real color perception in real conditions, which is really what color management should be all about.
 - We perceive colors differently when they appear near other colors. Colors are never absolute.
- Invites (requires) individual human control and interaction.

A few notable disadvantages compared to digital color management.

- Not reproducible—judgments on one day may be different on another.
- Rely on professional operators expertise – very expensive.
- Not very hardware versatile – may only be good for what the operator is experienced with.
- Computers cannot duplicate the nature of human experience, intuition, memory and perception. We are subjective; computers need objective.

Modern Digital Color Management Basics

Based on objective measures of color

- Numerical
- Measurable
- Digital
- Absolute

Some advantages over non-digital color management

- A computer can “understand” and use digital color management.
- Relies on technology, not individual experts with years of training.
- Can be quickly adapted to new devices.
- Can be transferred from one computer to another—distributable.
- Very consistent and reproducible (the digital part).
- Can be measured.

Some significant disadvantages over subjective color management

- Supposed to remove the “expert,” but is very complex.
- Does not consider value judgments – the computer cannot tell what is important and what is irrelevant information.
- Can only account for variables that it is explicitly programmed, calibrated and designed for.
- Discourages individual human interaction.
- Likely to repeat mistakes over and over.

How ICC Digital Color Management Works

Color Look Up Tables (CLUT)

- Lists of numbers that translate one color space into another.
- Based on measurements and tests.
- Can be produced by a user with software (tedious) or downloaded (for most devices).

Central, theoretical color space (LAB) used as an intermediate space

- Requires that each device have a CLUT to and/or from LAB color.
- More efficient than device-to-device CLUTs because you only need one for every device instead of one for each device pair.
- LAB is a good intermediate space because it encompasses all perceivable colors.

Working with Color Spaces

Overview

- Color spaces are a mathematical representation of the range of a real-world color device.
- Color spaces directly map colors in an image to colors of an input or output device.
- Scanners, monitors, TVs, and printers have unique color spaces, though some attempt to share one in common.

Two Key Color Spaces

- **sRGB**: A narrow-gamut color space for computer monitors, TVs, etc.
- **Adobe RGB**: A wide-gamut color space for prepress photo retouching.
 - Both of these spaces use the RGB color model, but produce different results for the same color number. This makes RGB a **device-dependent** color model.
 - In the screenshot to the right from Apple’s ColorSync utility, note how a color has different numerical output values, depending on which color space is used.

