

Color Management

For Color and Black & White Photographers

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Agenda

- Scope of Presentation
- Three characteristics of light
- What is/is not Color Management
- Color Management for Cameras
- Review: Color Profiles and Color Spaces
- Color Management for Image Editing Software
- Color Management for Printing
- Color Management for Web Sites
- Monitor Calibration

Scope

- Digital Cameras
- Film Cameras and Scanners
- Software – Raw Converters and Image Editing
- Printing, both vendor and DIY
- Preparing an image for the web
- Monitor Calibration

Three Characteristics of Light

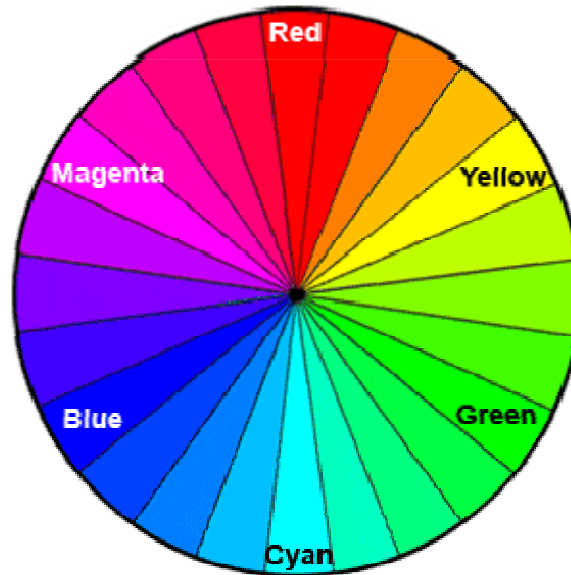
- Hue
- Saturation
- Lightness*

* also known as Brightness, Luminance, Tone or Value

Three Characteristics of Light

Hue

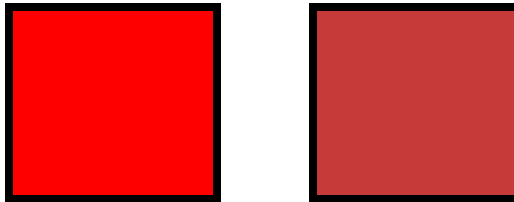
The base color of an object. Where the object is on the color wheel. A dark red sweater has a hue of red.



Three Characteristics of Light

Saturation

How pure hue is. A pure red (on the left) is more saturated than a brownish red (on the right).



Three Characteristics of Light

Lightness

An object's brightness. It is how light or dark something is. It ranges from solid black to solid white. A dark red sweater has a tone of dark.



Three Characteristics of Light

Light's attributes are hue, saturation and lightness

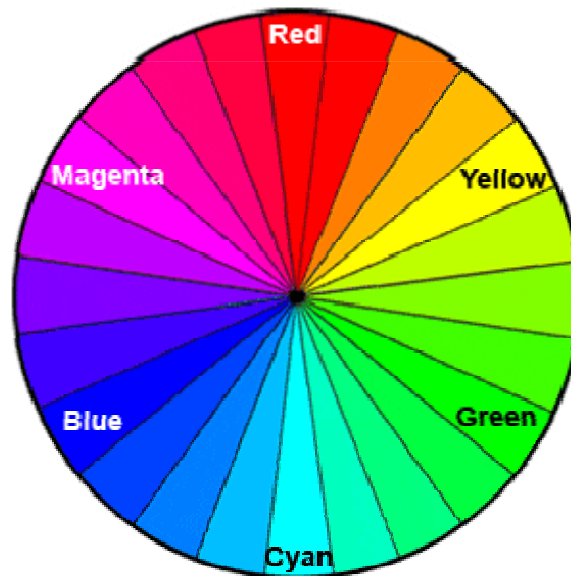
Since, hue + saturation = color

Then light's characteristics are color and lightness

Three Characteristics of Light

Pop Quiz

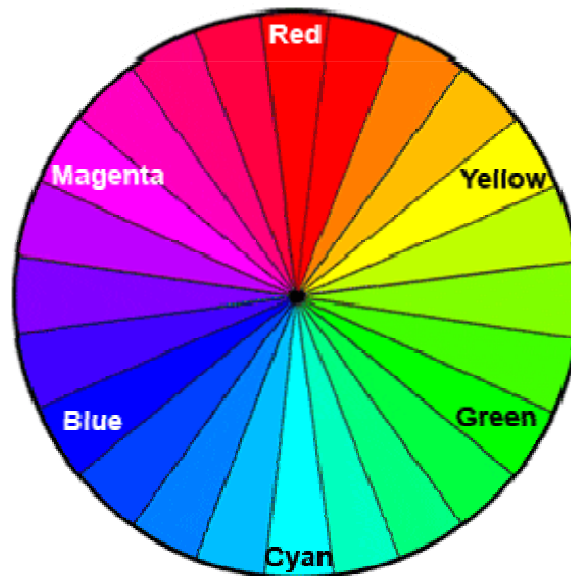
Why do you never see white, black or gray on a color wheel?



Three Characteristics of Light

Answer

Solid white, solid black and neutral grays are pure tone. They have neither hue or saturation.



Color Management

What is Color Management?

Color Management is a set of techniques and associated hardware, software and computer files used to ensure **consist** colors *and* lightness throughout your entire workflow, from capture to final output, be it print or electronic file.

Because it also manages tone, or lightness, color management should be used by black & white photographers as well as color photographers.

Color Management

What Color Management Is Not

It is not just a 'spider'. A 'spider' is an unofficial term for just one of the pieces of hardware and software we use to apply color management to our workflow. Specifically, a monitor colorimeter.

p.s. Spyder is a brand name for Datacolor's display calibration colorimeter. There are other fine colorimeter's whose brand name is not Spyder.

Color Management

What Color Management Is Not

It is not calibrating your monitor to your printer.

Color management calibrates individual pieces of equipment (e.g. monitor, printer, etc) to a known standard; not to each other. Since each piece of equipment is calibrated to the same standard, you will get consistent results across your equipment.

Why is this distinction important? If you calibrate your monitor and your prints still do not match your monitor, then you may not be properly color managing your printer.

Color Management

What Color Management Is Not

Color management is not about color accuracy or color correction. It is about color consistency. Color management ensures that the colors in your image are the colors you see on a monitor and in a print.

Color accuracy and color correction are used to ensure the colors in your image are the ones you want.

You need both color management and color accuracy.

Why is this distinction important? If you implement a color managed workflow and you are still not satisfied with the results, it may be an issue of accuracy and not consistency.

Color Management - Camera

All Cameras

Calibrate your camera's exposure meter. Exposure is what determines tone in your image.

Learn exposure. What it is, how it works and how to use your light meter.

Color Management - Camera

Scanning

Scan using the Adobe RGB 1998 (preferred) or sRGB color space. Do not save your scanned images in a raw format. Save them in a lossless format, such as TIFF, with the color space embedded.

Color Management - Camera

Digital Cameras

- Shoot either Raw or Raw + JPEG. This includes B&W photographers.
- If you shoot Raw + JPEG (or just JPEG) set the camera's color mode to the same as the rest of your workflow. Usually this is Adobe RGB (1998) or sRGB. If you use ProPhoto RGB in the computer, set your digital camera to Adobe RGB.
- If you shoot just Raw, color space in the camera is not relevant because Raw images do not have a color space.

Review

Color Profiles and Spaces

There are two kinds of color profiles: image profiles and device profiles.

An **image profile** is embedded in the image file and tells the computer what **color space** an image is in.

Device profiles, such as monitor profiles and printer profiles, are computer files that tell the computer and printer how to read, interpret and reproduce the colors in your image.

A **color space** is a predefined set of colors. sRGB and Adobe RGB (1998) are two common color spaces.

In many cases, the color space and the color profile go by the same name.

Color Management – Software

Raw Converter

- White Balance: Set to As Shot, but you will adjust it as needed.
- Color Space: Adobe RGB (1998) or ProPhoto RGB for print workflows. Adobe RGB (1998) or sRGB for pure web workflows. Photoshop Elements does not support the setting of color spaces in its raw converter.
- Bit depth: Use 16 bpc if you can. If you use ProPhoto RGB, you really need to use 16 bpc. B&W photographers also should use 16 bpc. 8 bit can capture 256 luminance values per channel. True 16 bit can capture 65,536 luminance values.

Color Management – Software

Photoshop Elements

You have four options for Edit > Color Settings.

- **No Color Management.** If you want to use a color managed workflow, you really should not use this option.
- **Always Optimize Colors for Computer Screens.** This will automatically apply sRGB to untagged images and Raw files.
- **Always Optimize for Printing.** This will automatically apply Adobe RGB (1998) to untagged images and Raw files.
- **Allow Me to Choose.** Elements will prompt for a profile for untagged images. But for Raw files, it will automatically apply sRGB.

Color Management – Software

Photoshop CS*n*

Edit > Color Settings

Working Spaces:

- RGB: Adobe RGB (1998) or ProPhoto RGB for print workflows. Adobe RGB (1998) or sRGB for pure web workflows. If you use ProPhoto RGB, you really need to use a 16 bpc workflow.

Color Management Policies:

- Set them all to Preserve Embedded Profiles
- Profile Mismatches: both checked
- Missing Profiles: checked

Conversion Options:

- Engine: Adobe (ACE)
- Intent: Relative Colorimetric
- Use Black Point Compensation: checked
- Use Dither: checked

Advanced Controls:

- Desaturate Monitor Colors: unchecked
- Blend RGB Colors Using Gamma: unchecked

Color Management – Printing

Online Services

Give the vendor what they want (file dimensions, file format, file resolution and color space) so they do not have to change your file before they print it.

See the CPA web site, Education section, for details.

Color Management – Printing

DIY

See the CPA web site, Education section, for the details. But the highlights are as follows.

- Color Handling: Let your image editing software manage colors
- Printer Profile: Use the appropriate color profile for the printer, paper and ink being used. If a profile is not available, consider purchasing custom profiles.
- Rendering Intent: Relative Colorimetric
- Black Point Compensation: Checked [CS*n* only]

If you do not use your printer on a regular basis, print a nozzle check pattern once a week to keep the nozzles from clogging.

Color Management – Web

Internet

The Internet is the least supported environment for managing colors. Monitors and some browser's do support the sRGB color space. But only a very small minority of web users calibrate their monitor. Therefore, the best you can do is convert and embed the sRGB color space into your JPEG images that are to be used on a web site.

Color Management – Monitor

Monitor Calibration

Use a colorimeter to calibrate your display. The end result is a color profile on your computer that your video card uses to adjust the signals it sends to the monitor. Two popular colorimeters are the X-Rite i1 Display and the Datacolor Spyder. B&H prices at the time of this presentation:

- X-Rite i1-One Display LT \$124
- X-Rite i1 Display 2 \$179
- Datacolor's Spyder 3 Express \$80
- Datacolor's Spyder 3 Pro \$150
- Datacolor's Spyder 3 Elite \$195

If you use an old version of Photoshop, make sure Adobe Gamma is not running on your computer.

If you have more than one monitor and your OS and video card supports separate color profiles for each monitor, calibrate all monitors to the same luminance value (cd/m² or candela per square meter.)

Color Management – Questions

Wrap Up

- Do I really need to calibrate my monitor?
- I wish to become an advanced amateur, do I need a monitor that displays most, or all, of the Adobe RGB color space?
- I wish to become an advanced amateur, do I need a spectrophotometer for my printer?

Color Management – Answer

- Do I really need to calibrate my monitor? *If you want a color managed workflow, then the answer is Yes.*
- I wish to become an advanced amateur, do I need a monitor that displays most, or all, of the Adobe RGB color space? *No, many amateurs produce outstanding images and prints without using these top of the line monitors.*
- I wish to become an advanced amateur, do I need a spectrophotometer for my printer? *No, you do not need to create your own printer profiles. However, you do need to use a profile that is correct for the printer, paper and ink you are using.*

Color Management

End