

Color Management Can Be Simple

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Many questions are asked about color management. Color management is a complex subject based on a great deal of technology and imaging theory. There is lots to learn about ... color spaces, profiles, translations, etc ... if you are so inclined. There are a couple of great information resources about this subject on the web:

see Wikipedia for starters

http://en.wikipedia.org/wiki/Color_space

or Dry Creek Photo's discussion

http://www.drycreekphoto.com/Learn/color_spaces.htm

For a good book if you want to learn color management theory in depth, take a look at "*Real World Color Management*" by Bruce Fraser et al.

But that's much more than most photographers really need to know to take advantage of color management in their work. Digesting the theory into a simple idea, the fundamental goal of color management is to be able to edit an image on one properly configured system and have it look the same on other properly configured systems and when printed. All the complexity is what is required, under the hood, to get there.

Setting up your system for proper color calibration and management doesn't have to be very complicated nor does one really have to understand all of color management theory to do it. It's all achievable with a simple set of instructions, whether using Lightroom or other image editing software.

Let's talk about it in the context of using Lightroom.

SET UP YOUR COMPUTER CORRECTLY

Most of the job is done in this step. This means calibrating and profiling the display, and then setting that profile for the operating system to use. You cannot do color management or manipulate color spaces effectively until you calibrate and profile your monitor.

Calibrating and profiling the display means

- choosing display calibration targets,
- setting them with appropriate tools,
- and then creating a display profile or ICM for the display.

There are software tools and hardware tools to achieve this. No software-only tool to do this is as consistent as using a hardware colorimeter and its matching software. I recommend you ignore using software tools and choose a hardware colorimeter to do this task. The one I use is the Xrite *"Eye One Display 2"* unit with its *"Eye-One Match 3"* software, but other similar products all work the same way.

When you are setting up the display, there are three calibration target parameters to be concerned with.

- **luminance** :: the brightness of the display
- **gamma** :: the contrast curve you want to display to follow, normally 2.2 or 1.8.
- **white point** :: what color temperature is considered "white". These are numbers in degrees Kelvin based on the wavelength of light ... short wavelengths (blue) have higher numbers, long wavelengths (red) have lower numbers. Sunlight is more blue than indoor room light, so white in sunlight has a higher color temperature than white in an indoor space illuminated by warm-white tungsten or fluorescent bulbs.

Display brightness has to be matched to reasonable ambient light in your workspace for best results ... this is important as it affects how your eyes see color and brightness. Reasonable ambient light means normal reading/working illumination without direct sunlight or other high intensity light sources falling on the monitor.

An example: My workroom light is provided by a pair of 60W equivalent bulbs in a soft overhead light, supplemented by light filtering in around mostly closed blinds during daylight hours. A meter reading off the wall beside my desk shows ISO 100 @ f/4 @ 1/5 second, to give you an idea how bright this is.

For this environment with an Apple Cinema Display 23" display, my targets for calibration are 120 cdM² luminance, 1.8 gamma, and white point of 5500K. The current "industry standard" settings would be cooler white and higher contrast: 120 luminance, 2.2 gamma and 6500K white point are also reasonable—I prefer the warmer white and softer gamma as it matches my printing and exhibition needs more closely. Once the colorimeter has set up the display and created the profile, I set this display profile to be used by the operating system.

Note: *This is the only use for the display profile.* A common mistake is to set the image processing software to use the display profile as the working color space.

LIGHTROOM SET UP

Lightroom requires little set up beyond setting up the display. It automatically promotes all files you import into it to a 16-bit-per-component, large gamut working colorspace for editing. However, if you are also using Photoshop in conjunction with Lightroom, you need to configure the Lightroom "*Edit In Photoshop...*" command settings and also configure the Photoshop "*Color Settings...*" for a good match.

I have instructions on how to do this in two other articles, see <http://www.gdgphoto.com/articles> #03 and #04.

That's about all it takes to set up and use color management... But what else do you need to know to make sure your photos look right when you post them to the web? Lightroom offers three color space profiles to use when exporting images: sRGB, Adobe RGB and ProPhoto RGB. You can also assign printer/paper color space profiles when exporting files as well. Which should you choose?

SETTING COLOR SPACE FOR USE OUTSIDE OF LIGHTROOM

- Image files to be used on the web should always be exported with **sRGB** colorspace setting for the best results given that you never know what browser or system is going to render them. sRGB profile was designed to model the average color characteristics of an uncalibrated computer monitor and is the de facto choice for web images. Using sRGB gives your image files posted to the web the best chance to look like what you intended on anyone's computer display.
- **Adobe RGB** is a device neutral color profile for exporting 8 or 16 bit image files when you are exporting them for use with a specific program that will interpret the profile correctly. It was designed to model the color space requirements of a CMYK web press. Only use Adobe RGB when you are exporting image files for use in editing applications you know will work with it or when the files are intended for professional printing use.

- **ProPhoto RGB** is a device neutral color profile that should only be used when exporting to *16-bit* PSD or TIFF files intended for further editing, by you or a client. ProPhoto RGB was designed to model the maximum color space capability of digital capture. and should only be used for images that are going to be edited further in suitable image processing applications.
- **Printer/paper profiles** should only be used when you are creating files to be printed at a specific printing service and they've supplied the profile for their setup. These profiles are designed to model a specific printing engine, set of inks and and paper characteristics—they are device dependent and not for general purpose use. Color-managed printing and embedding a printer profile for use with a print service is another topic which I'll write another article about in the future ...

SO SIMPLE

That's all there is to it, in practice. Set up the system correctly, configure the software correctly, and output image files with the right color space for the intended use.