5 COLOR MANAGEMENT TIPS FOR PHOTOGRAPHERS

The importance of a calibrated monitor, how to choose a working color space, and other color management tips to help photographers master the tech and software in their workflow.

1. BUY A GOOD MONITOR AND CALIBRATE IT

Back in the days when the majority of photographers shot on film it was pretty easy to see what you had captured.

You could hold a transparency or negative in your hand and that was your photograph. There was stuff you could do to your image in the darkroom but you were always certain where you had started from. Now, when most of us shoot digitally, our images consist of a series of pixels that can look very different depending on the screen that we are viewing them on.

So, if you want to be certain of what you've actually captured then you need to view it on the most accurate, well-calibrated and properly profiled monitor that you can afford.

You are probably very aware of the qualitative differences that there might be between two lenses of similar specifications but very different price points. You know that some manufacturers produce mass market lenses and others use better quality optics and materials.

However, when it comes to buying a computer monitor many photographers assume that all that matters is the size or resolution and they don't dig further into the specs.

Most computer monitors are designed for general purpose uses such as web browsing, word processing etc.

This is especially true of built-in screens in laptops or iMacs. Photographers are a tiny proportion of the computer monitor market and so most mass market brands simply don't spend much time making products with the features that they need to get color accurate images on screen, but there are some specialist brands or models that are designed from the ground up for image editing.

A good photography monitor should have most of the following features:

- **Wider color gamut** – most monitors only cover the sRGB color gamut but there are models that cover most of the larger Adobe RGB color space and so will show you more of the colors that you captured in the camera.

- **Uniformity compensation** – due to the way that LCD panels are manufactured there are always some color or brightness differences across the screen. Good quality monitors are measured in several places across the panel in the factory. Any variations are corrected for in the software of the monitor and so you get a much more uniform image.

- **Factory gamma calibration** – this isn't a replacement for you calibrating the monitor but it does mean that you get a better monitor out of the box and is a sign of a commitment to quality by the manufacturer.

- **High bit look up tables** – the only physical adjustment you can make to an LCD monitor is backlight brightness. All the controls for RGB adjustments, contrast, gamma etc. are all actually software changes based on manipulating look up tables (LUTs) within the monitor. Most cheaper screens have 8-bit LUTs and this can make them difficult to adjust accurately. Better quality screens have 14 or 16-bit LUTs and this makes them much easier to calibrate.

- **Other features** such as an unreflective matte surface, shading hood, built-in colorimeters, their own calibration software etc. It's always worth looking in depth at the manufacturer's websites and reading as many reviews as you can before buying a monitor.

Any monitor, no matter how good, still requires calibration and profiling.

The calibration and profiling software that comes with devices like the Spyder5 or i1 Display Pro, or that is supplied with a high quality monitor, may not make large changes to a factory calibrated screen but it will produce an ICC profile for that individual monitor.

This profile will be stored on your computer. Image editing software, such as Adobe Photoshop, will use it to display your images accurately. There are a wide array of monitor calibration and profiling systems on the market. The two main brands – Datacolor and X-Rite – both have entry level, mid level and professional products.

Generally you should avoid the entry level as they often don't have enough features to get your monitor to the high level of accuracy you need if you are going to make color judgements on it. You should also make sure that you buy your calibrator, and indeed monitor, from a company that can offer you support and advice because the options and features that you are presented with in the calibration software can be confusing for the novice user.

2. VIEW PRINTS IN DAYLIGHT

As a photographer you are aware that different light sources have different color temperatures; candle light has a low color temperature and is quite warm, cloudy daylight will

be cooler with a higher color temperature. The human visual system has quite a good in-built auto white balance feature that means that given time you can adapt to different color temperature lighting.


However, most artificial light sources such as tungsten, fluorescent or LED light bulbs not only vary in color temperature but also in the range of light wavelengths that they emit. For example, fluorescent tubes emit wavelengths in several spikes, depending on the coatings and gasses inside them. These spikes or biases in output can interact with the reflectance properties of your
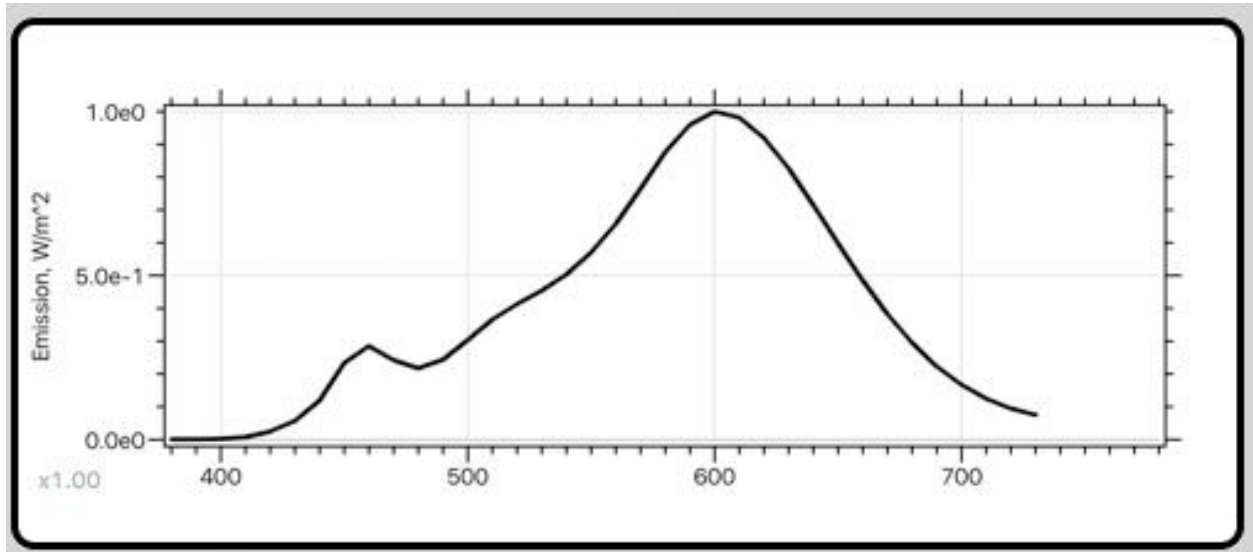
ink or paper and so make prints look very different than they would under a more even light source, such as daylight.
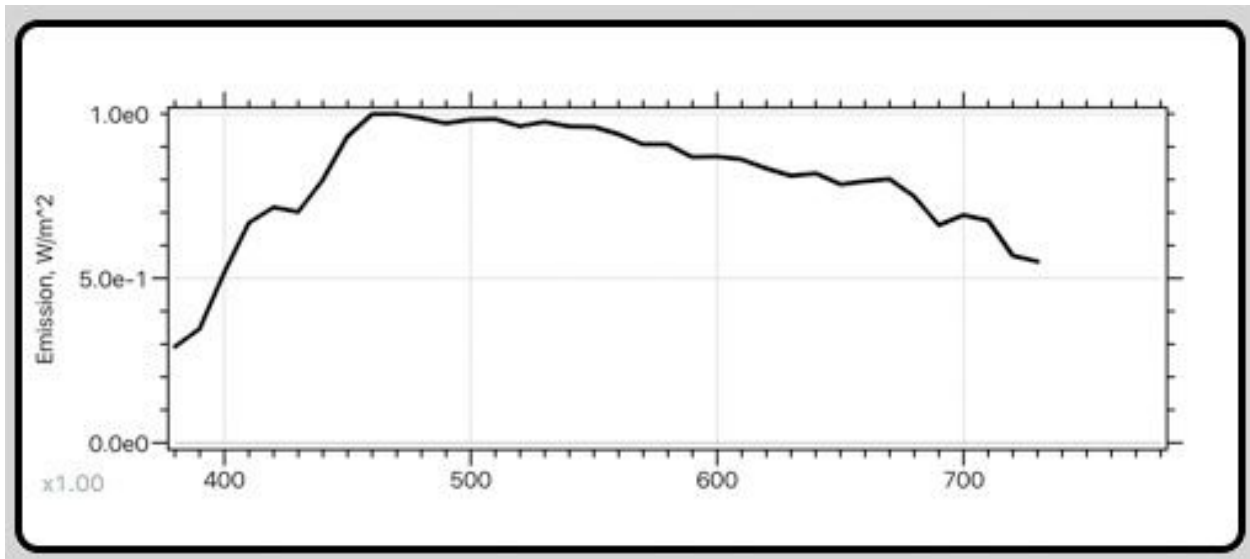
Daylight
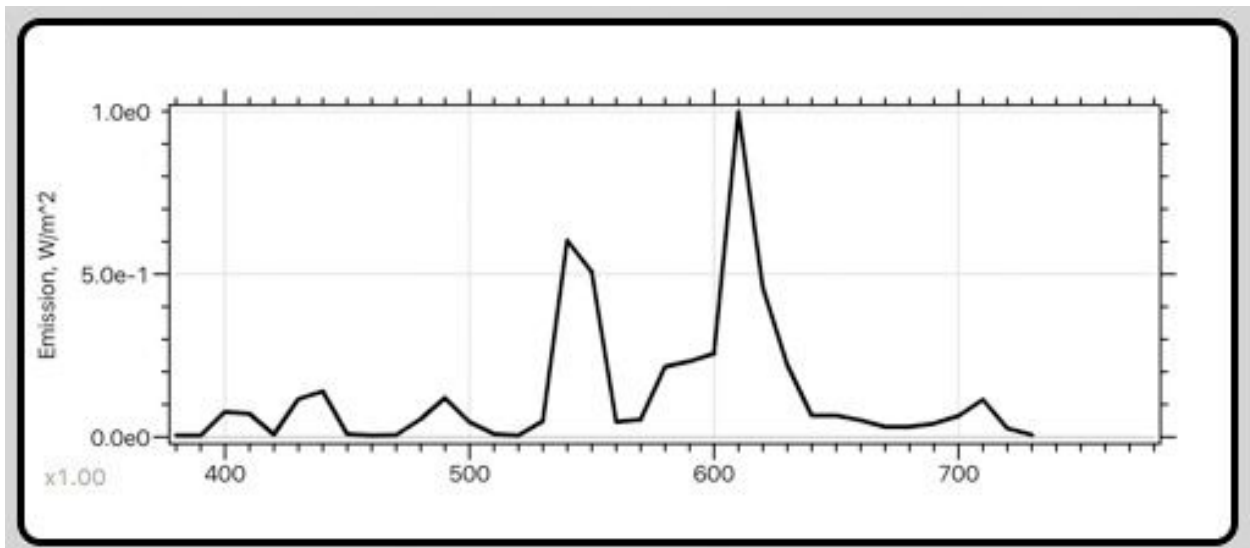
Fluorescent (note the spikes)

LED

If you are judging a print for color then take it to a window in good daylight.

Let your eyes adjust for a few minutes and then look at the print. Even though daylight varies with location, time of day, and the weather, it's pretty much always better to view color under than standard home or office lighting.

You can get viewing lights that conform to international standards such as CIE D50 or D65 and these can be used as an alternative but many cheaper "daylight" bulbs aren't much better than normal light bulbs.

3. CHOOSE YOUR WORKING COLOR SPACE CAREFULLY

You will find a lot of conflicting information on the internet about which RGB working space to use in Adobe Photoshop or other software.

An RGB working space is a special type of ICC profile that has been designed to be a uniform and consistent color gamut to edit your images in. There are three common choices; sRGB, Adobe RGB (1998) and Pro Photo RGB. I could, and frequently have, filled entire articles about which to choose but the most

important thing I can say is that there is no wrong choice. Each has its pros and cons.

sRGB

sRGB is a small color space based on the color gamut of those old-style VDU computer monitors you see on desks in movies from the 1980s.

#AskBC Episode 32: Embedded Profiles and Why Labs Prefer the sRGB Color Space

Modern digital cameras can capture a far wider range of colors and so if you use sRGB you may be losing color from your images. However, the big strength of sRGB is that most web browsers assume all images are sRGB, so whenever you upload an image to a website it will often display best if you convert it to sRGB first.

Adobe RGB

Adobe RGB (1998) was developed by Adobe specifically to be slightly larger than the color gamut of a printing press. It's larger than sRGB and has been popular with photographers who want to retain more of the color that their camera captured, but it is still smaller than a camera gamut so some color

may still be lost. Many computer monitors designed for image editing cover most of the Adobe RGB gamut.
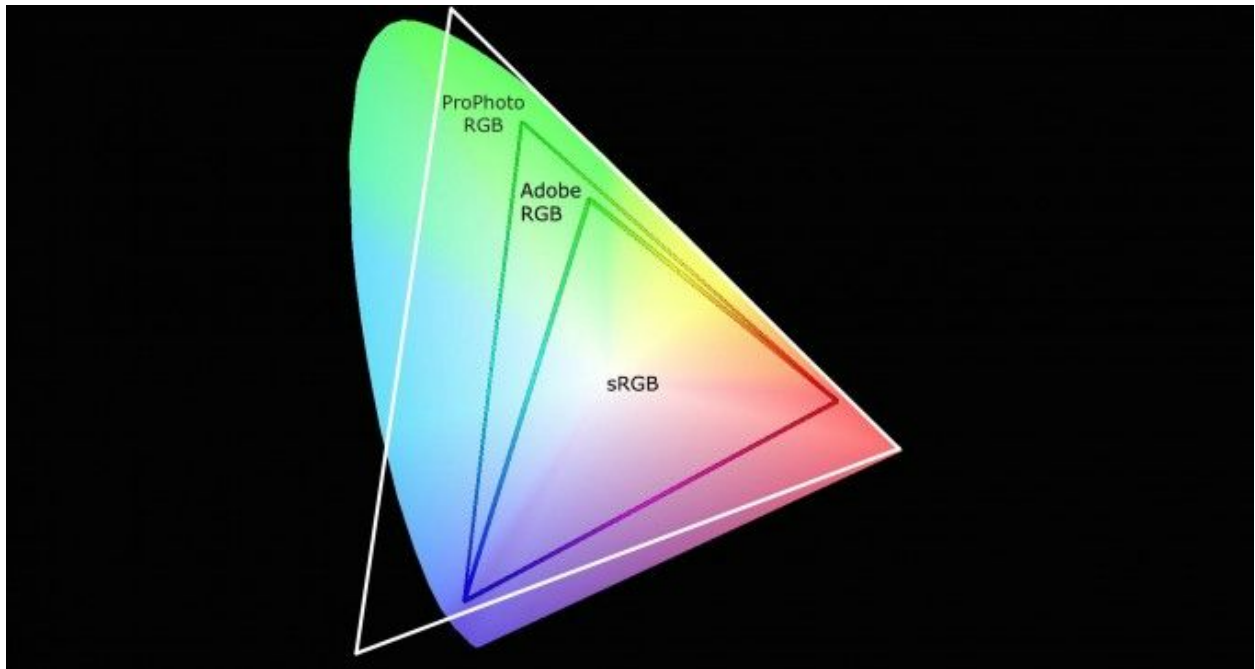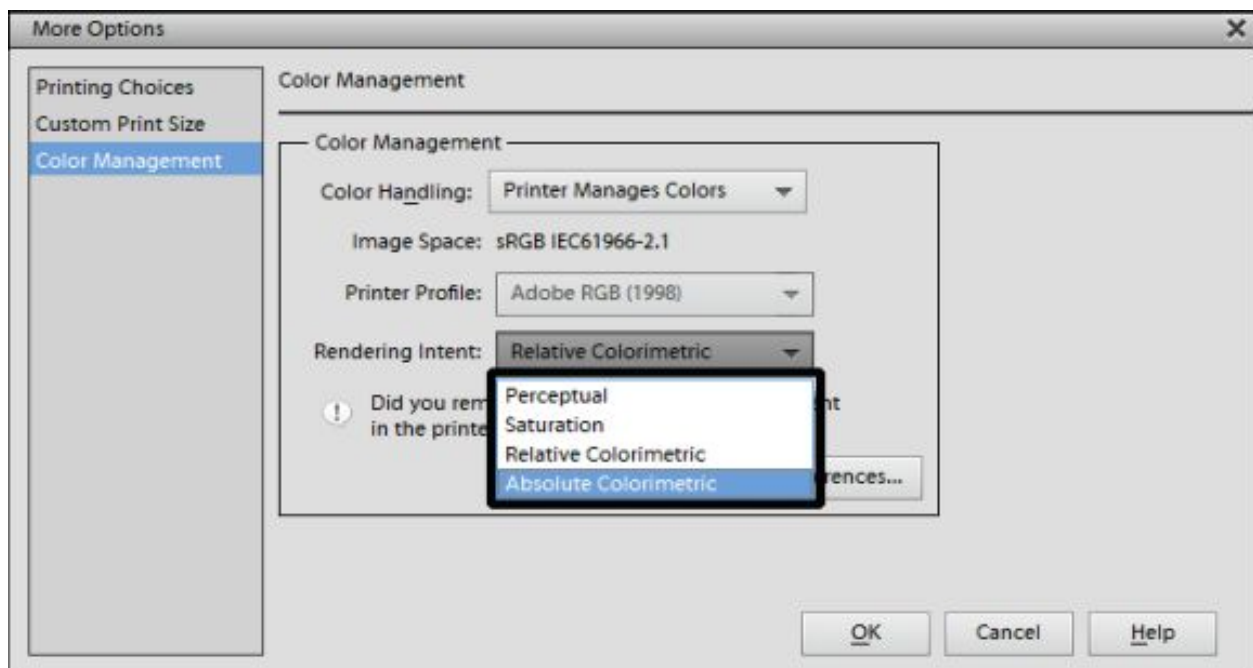

ProPhoto RGB

ProPhoto RGB was created specifically to be larger than a camera color gamut.

If you convert a raw file into ProPhoto RGB then there should be no loss of color, no matter how saturated the colors in the image are. Also ProPhoto is the only one of the three that is larger than all inkjet printer color gamuts. If you want to maximize the colors in your prints ProPhoto is a good choice. However, ProPhoto is larger than any monitor color gamut and even exceeds

human vision in some areas so you need to use it carefully. You must also always work with 16-bit images in ProPhoto to avoid problems when editing.

In Photoshop you can select your default RGB working space by going to the Edit menu and Color Settings.

When you convert a raw file in Photoshop you can choose which working space you convert the file into. In Adobe Lightroom you don't get to choose the working spaces. In the Develop module a profile similar to ProPhoto RGB is used. In the Library module, and most of the others, the previews are based on Adobe RGB.
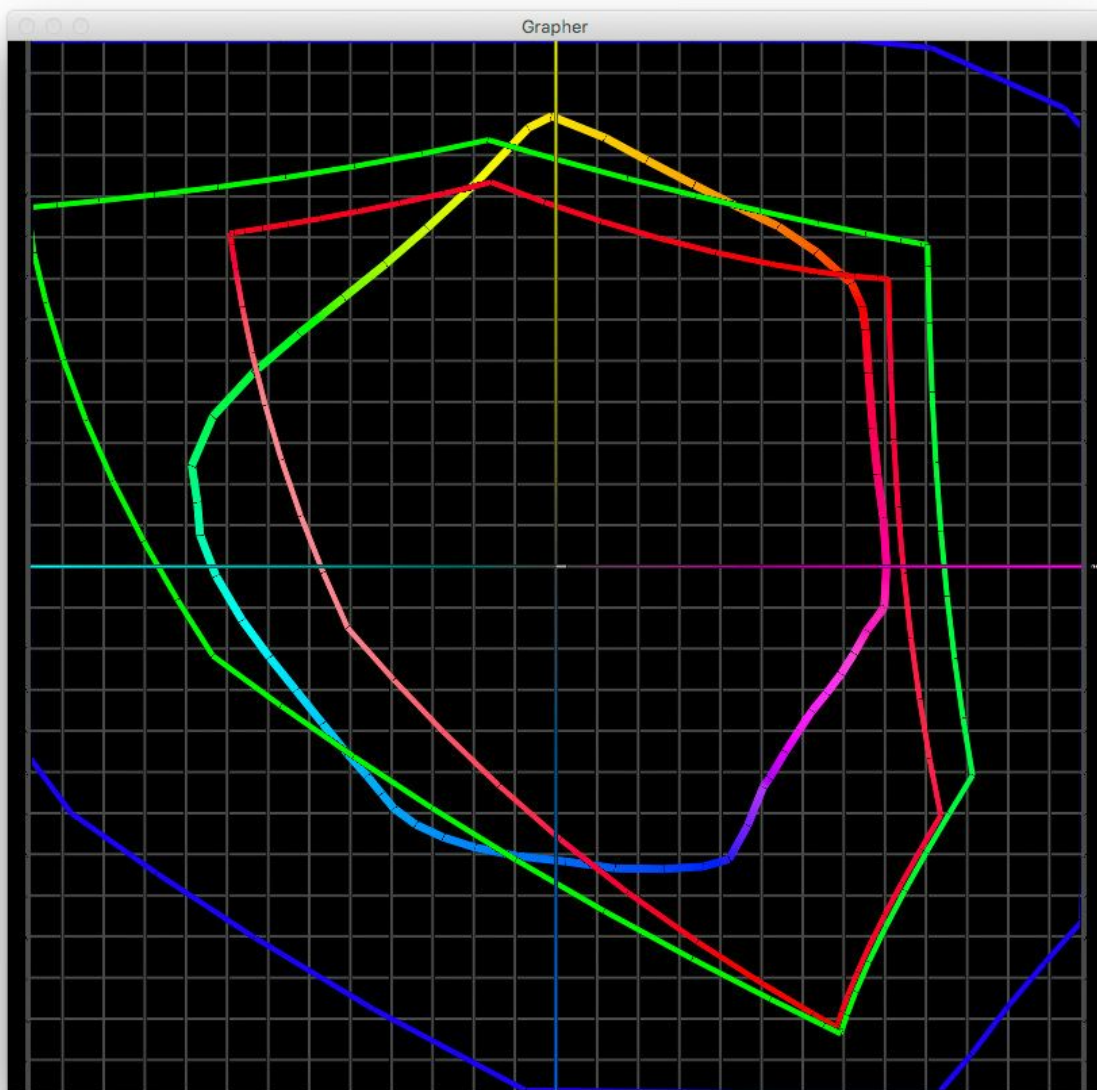
The three common RGB working spaces have very different color gamuts. sRGB (in red) has the smallest range of colors. Adobe RGB (green) is larger, especially in reds and greens. ProPhoto RGB is by far the largest (blue) and is the only one to completely encompass the color space of a good inkjet printer, in this case an Epson R3000 on Breathing Color Vibrance Baryta (multicolored).

Before you choose a working space make sure you weigh up the pros and cons of each of them for your own type of photography, skill level and workflow.

## 4. DON'T ALWAYS USE THE SAME RENDERING INTENT

One comment that I hear frequently when I'm training a photographer on color management is that they've previously been told that they should only use one rendering intent when printing an image from Photoshop or Lightroom.

*A rendering intent is a mathematical algorithm that converts colors from one ICC profile to another.*

As a photographer the only time you'll come across them is when you are printing. There are three that you can use; perceptual, saturation and relative colorimetric. If all the colors in an image are in gamut of a printer profile (by that I mean they can be printed without being changed very much) then you won't see a big difference, whichever intent that you choose.

However, if your image contains colors that the printer cannot print then the rendering intent that you choose becomes a vital tool that can help you get the print that you want.
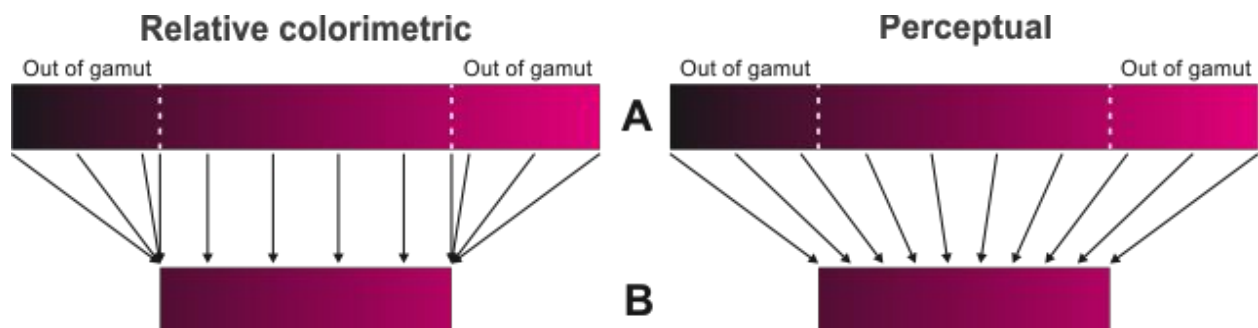
Each rendering intent deals with out of gamut colors slightly differently.

Relative Colorimetric
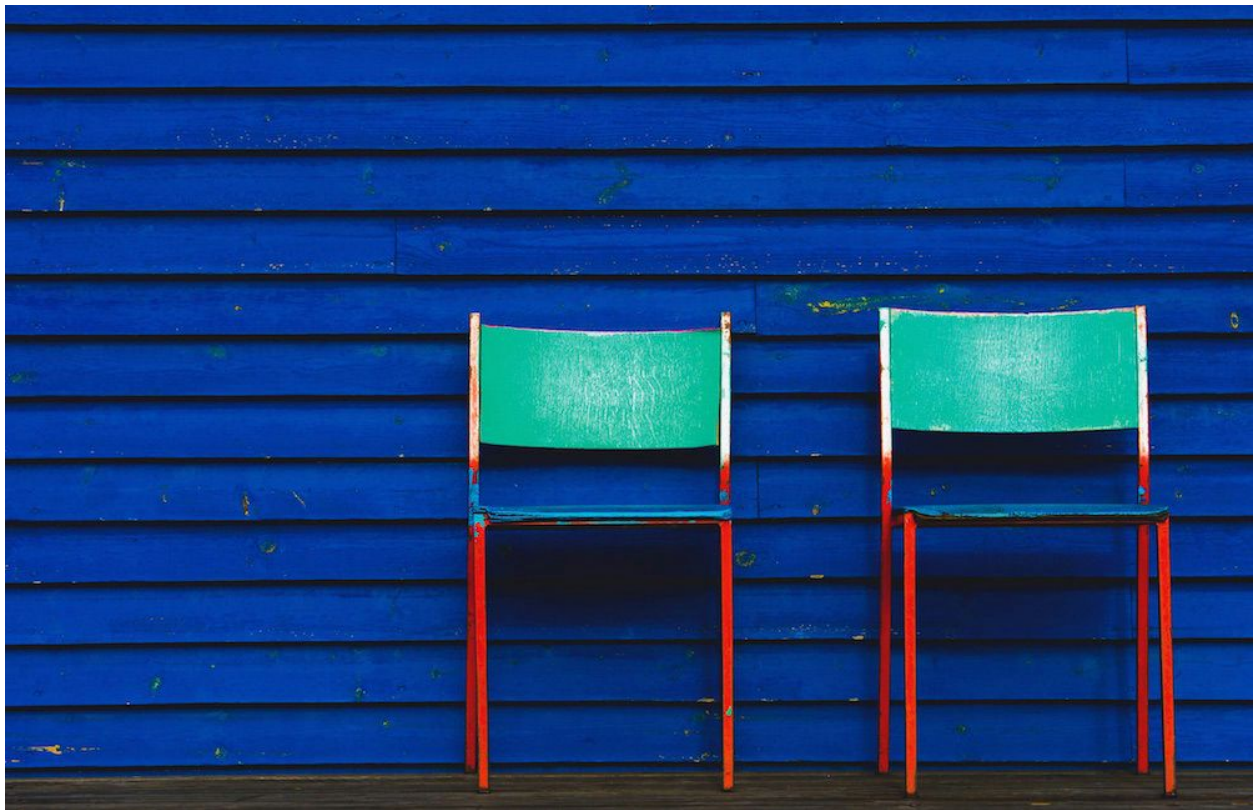
The default intent in Adobe software is relative colorimetric. Relative colorimetric only changes the colors that are out of gamut. Those that can be printed are pretty much left alone. The out of gamut colors are converted to the closest printable color. This makes the in gamut colors print more

accurately, but the downside is that colors that were very different in the image come out looking similar on the print. This is because the out of gamut color has been brought into gamut but the in gamut color has been left alone, so the relative color distance between them gets smaller.

Imagine a shot of a flower with bright orange petals. There will be a lot of different shades of orange and some will be in gamut but some may be out of gamut. Using relative colorimetric may reduce the variety of oranges in the image.

Perceptual
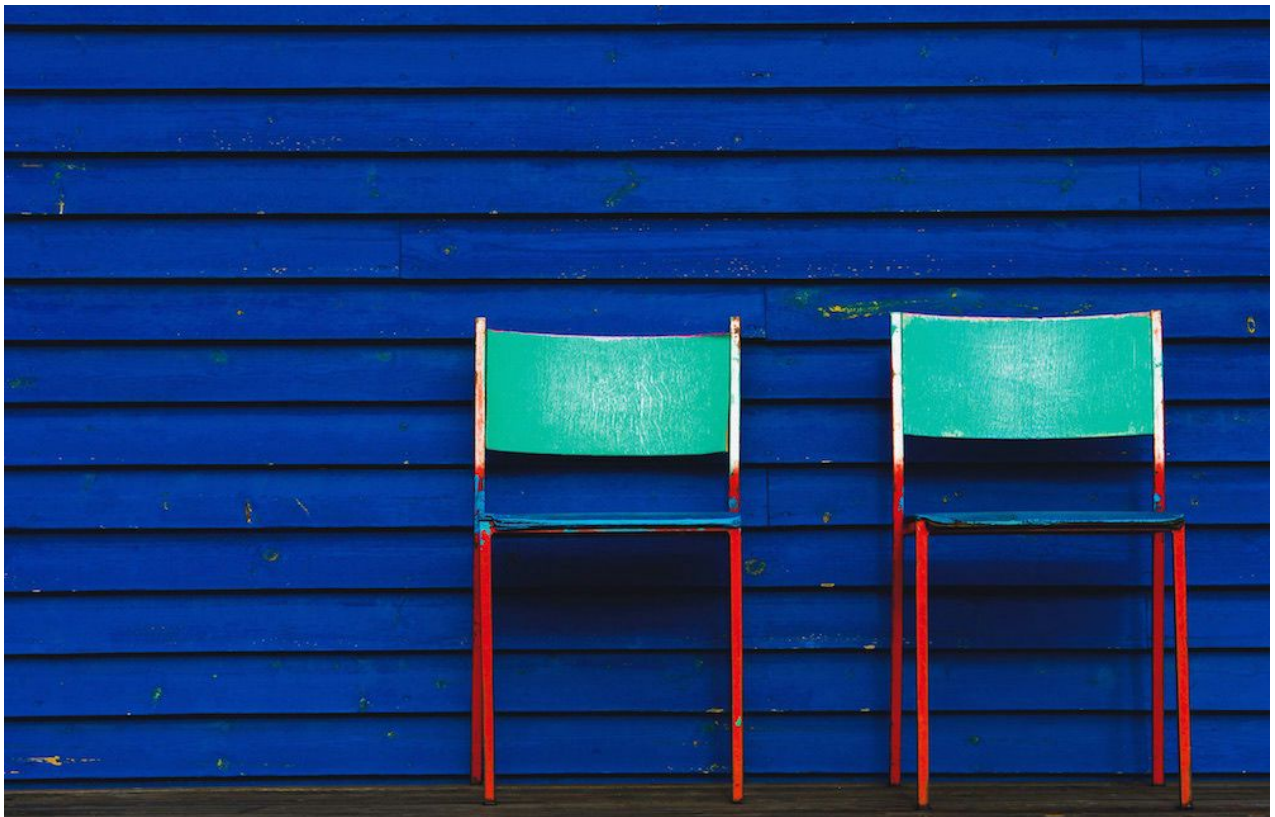
Perceptual rendering changes all the colors. Out of gamut colors are brought into gamut but in gamut colors are also changed to retain the relationships between colors. So, in our orange flower example a larger range of colors might be printed maintaining the look of the flower better, even though more colors have been changed. Also, perceptual can be better than relative colorimetric at retaining highlight and shadow details.

Saturation

Saturation rendering is very similar to perceptual and changes all colors in a similar way, but whereas perceptual prioritizes tonal detail saturation, as the name suggests, prioritizes color saturation. So, going back to the orange flower saturation rendering might just produce a print with a bit more punch to the colors.

Be open to experimenting

Some photographers can be very resistant to changing rendering intents. I was working with a very good professional landscape photographer a few weeks ago and he would not try anything but relative colorimetric, even after I explained the benefits. He just didn't want to add another variable to his workflow, even though many of his prints could have benefitted.

However, photography is full of variables starting with shutter speed or aperture and going on through the editing process. Denying yourself the final variable on the way to make a good print doesn't make much sense. For some shots changing the intent can make all the difference. I was training some of the staff at London's Royal Academy of Art last week. We were using a image of a model on a staircase to test some printer profiles we had just made. The

image had some really deep sapphire blues and crimson reds, plus large areas of the image that were in shadow.


The staff had been told always to use relative colorimetric when printing but I convinced them to try the other intents. They were very surprised how much better the prints were using perceptual or saturation. The shadows had more detail with perceptual, and the colors were better in both but were slightly more vivid with saturation. For that particular image it really made the print come alive.

There is no right or wrong choice when it comes to rendering intents. There is no one of the three that will suit every image.

It depends on the colors in the image and the color gamut of the printer profile. You may not be able to afford the time or materials to print every image with all three intents but it is worth trying with an image that you really care about; for example an exhibition or competition print. You can also use Photoshop's soft-proofing feature to preview the likely difference between the intents for an image before you commit to paper.

Photoshop also offers absolute colorimetric rendering but that intent isn't used for photographic printing. It also has an option called black point compensation that should always be used, it helps preserve tonal detail.

5. IF YOU HAVE TO EDIT EVERY IMAGE FOR COLOR AND EXPOSURE YOU ARE DOING SOMETHING WRONG
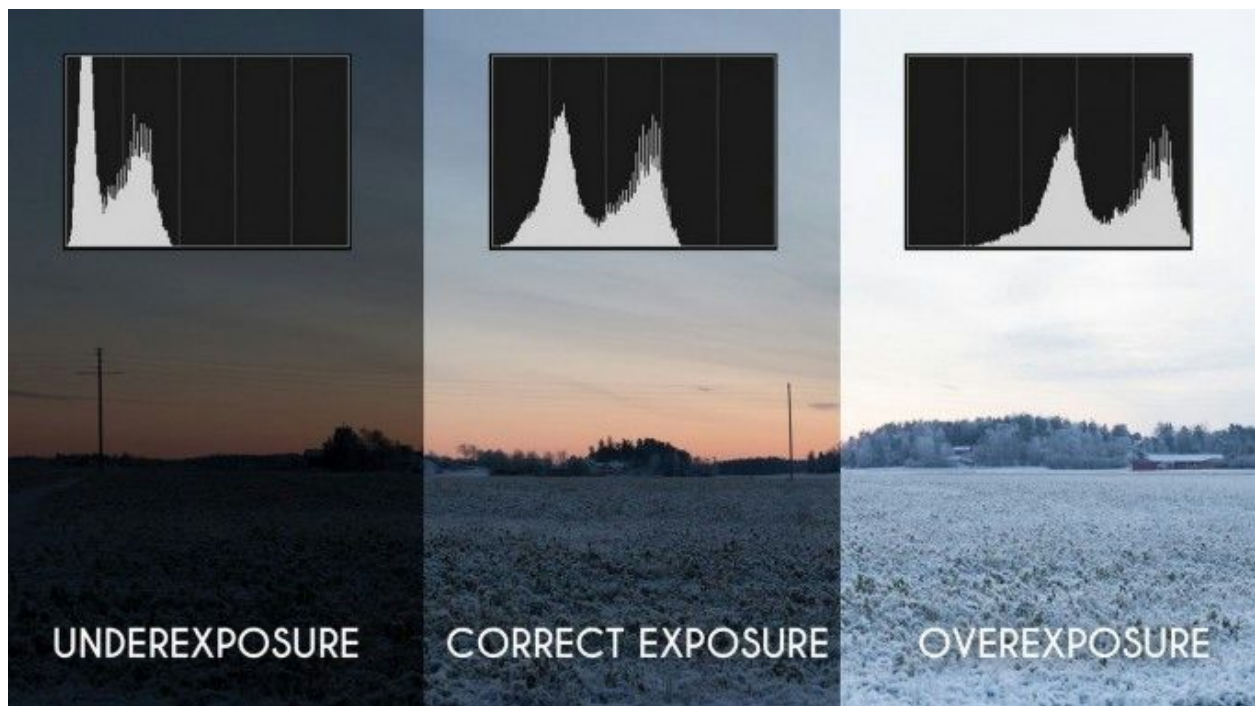
My final tip is a simple one.

Camera exposure systems, raw processing software, quality computer monitors, monitor calibration solutions, inkjet printers, and printer profiling technology are all now so good that if you are finding that you have to heavily

edit every image to get the print that you want then there is something wrong with your settings, workflow or hardware.

There is no excuse now for poor quality results.

I've worked with photographers who had been bringing the exposure down on every single image they processed because their monitors were not calibrated correctly and were far too bright. I've had customers who spent hours reprinting and editing images to get a decent print because they were weren't using a printer profile for the paper they were actually printing on.

With a small investment in a decent monitor, a good calibrator, and quality inkjet media from a vendor who offers good printer profiles and support, there

is no reason why you cannot produce the best possible images from your camera and consistent, accurate prints.

Rob Griffith has been a color management consultant, trainer and writer for more than fifteen years. He's worked with internationally famous museums, corporations, fashion brands, and hundreds of amateur and professional photographers. You can find his more of his articles on his website.