CHAPTER 1

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# Color Management for Black and White

*by Leslie Alsheimer*

## Pre-Workflow: Color Management Integration

**Color management for black and white, really? Sounds like a serious yawn fest!**

Color management is an extremely complex topic and one that has haunted digital photographers since its inception. Most students' eyes glaze over when this topic comes up in my workshops. "Interesting, but a waste of time, not pertinent to black and white, already know it all, and even too technical" are the comments I hear in its wake. Color management was explained to me

several times by several different Photoshop experts before it all integrated effectively into my workflow. As an honor student in my undergraduate studies, as well as my graduate work, I typically do not consider myself particularly stupid, but this color management stuff twisted my head into knots for quite some time. As an experiential learner, I love to jump into new things with both feet and, as a result, I often end up doing things the wrong way first. Although I did have more fun in the beginning of my digital learning process, I eventually learned the hard way that skipping over color management was definitely not the best choice. Color management is without a doubt an absolutely essential piece of the workflow process. Although not the most exciting topic, color management is the foundation upon which everything in the digital darkroom process is built. So whether you work in color or black and white, learning the basics up front will serve you well in the digital process.

Unfortunately for the creative user, color management really is quite complex. There are reasons why there are in-depth, full-length texts devoted entirely to this topic alone. Fortunately, for most users, grasping the entire scope of all the technical information available is not an absolute necessity. For the purposes of this book, I have weeded through all of the technical jargon and simplified the majority of the complexity into five easy steps. These five steps will not only get you in the ball park … but probably all the way to third base with color knowledge in your own personal digital darkroom. The last bit – from third base to the home plate – is the volumes of information within those full-length texts that will either bore you to tears or tantalize your inner nerd beyond comprehension. So, for the sake of making this text user-friendly, I hope to avoid boring you to tears, while leaving the rest to the technical gurus who have already extensively detailed all the finer nuances of this topic. Check out the Digital Dog a.k.a. Andrew Rodney's *Color Management for Photographers: Hands on Techniques for Photoshop Users* published by Focal Press for more in-depth information.

### What does color management have to do with Black and White anyway?

It is true that color management for black and white purposes just does not seem quite right. Managing your system for color, however, is actually the truest test for black and white accuracy. If you have a completely accurate color balanced system, you are in a position to produce more neutral black and white prints, make the best possible conversions, and assess contrast and tonality variations within an image. For the traditional photographer, this is the digital equivalent to standardizing development variables in a darkroom workflow: Dektol 1:1 at 68 degrees for example. Understanding what all this is about can actually help you create far better prints than ever before!

## The Essential Overview

### Color management defined

Color management is basically the ability to consistently control the reproduction of color and tonality in the digital environment; or more

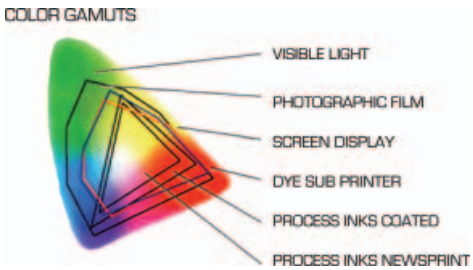
simply, making the print match the image you see on the monitor. A color management system attempts to maintain the "appearance" of consistent color as an image is transferred between different devices, from the camera and/or scanner, to the monitor and across other monitors, through software and ultimately to an output device such as the printer. We like to stress the term "appearance" of consistent color in our definition because each of these devices (the camera, scanner, monitor and printer) has a uniquely different ability to reproduce and interpret color. We can therefore draw the analogy that each device tends to speak in its own "language" of color. The differences in how each individual device – over the hundreds of makes, models and manufacturers – interprets and "speaks" in color can actually be astounding. In order to resolve these differences, color management creates a system whereby the different devices can "talk" to one another in a common language of color.

## Why Do We Need Color Management?

We want color consistency as the image travels through the workflow process across various devices, so we can ultimately make prints that have some resemblance to the image we evaluate and process on the monitor through our digital darkroom practices. For black and white, color consistency is ultimately crucial as the neutrality, brightness, tone, contrast and shadow detail are all functions of the color management system. It is, therefore, extremely important – whether we work in color or black and white – to be relatively certain that what we are looking at on the monitor has some level of numeric accuracy in concurrance with the actual image before we begin the digital darkroom editing process.

### Why colors change

All devices have a different and fixed range of colors they are capable of reproducing, dictated by the laws of physics. A monitor cannot reproduce a more saturated red than the red produced by the monitor's red phosphor. A printer cannot reproduce a green more saturated than the printer's green ink. The range of colors a device can reproduce is called color gamut. It is probably easiest to think of gamut as the assortment of crayons a device is able to color or reproduce your image with. Remember the box of Crayolas? The box of 64 crayons with the sharpener in the back had a larger gamut of



color than the boxes of 8, 16 and 32. Burnt sienna, carnation pink and ocean teal provided a much greater gamut for the Crayola artist to work with. It is important to note however that no device can reproduce the full range of colors viewable to human eyes, and no two devices have the same color space/color gamut (or set of crayons to color with).

- The visual spectrum includes 16.7 million colors.
- The human eye can physically see only 12 million colors of those 16.7 million colors.
- The average 4-color press can reproduce only about 70,000 colors.

As an image moves from one device to another, image colors may change because each device interprets color differently. When a color cannot be produced on a device, it is considered to be outside the color gamut of that particular device, or, in other words, simply **out of gamut**. You can view out-of-gamut colors by turning this option on in Photoshop, or when softproofing the image before printing. The out-of-gamut colors, or colors not reproduceable by the ink and paper combination you have chosen for a print, will be displayed with gray as a default, however one can view them in other colors by changing this in the preferences. (See image on page 5 and "Softproof", on page 27 for more information.)

As this is truly an imperfect process, we are really learning to use its strengths to our greatest advantage while simultaneously navigating the weaknesses of the system. It is important to know that it is actually impossible for all the colors viewed on a monitor to be identically matched in a print from a desktop printer. There are many reasons for this. First, a printer operates in a CMYK (cyan, magenta, yellow, black) color space, and a monitor operates in an RGB (Red, Green, Blue) color space, each with entirely different color gamuts. (See "What is a color space?" on page 8 for more information.) Also, some colors produced by printer inks cannot be displayed on a monitor, and some colors that can be displayed on a monitor cannot be reproduced using inks on paper. Paper surface types, such as glossy and matte, also have varying abilities to reproduce color. Further, a monitor produces an image from an illuminated light source, while a print is viewed by reflected light. If the print will never exactly match the monitor, than creating a good print may sound fairly hopeless at this point.

However, this is precisely where the color management system fits in, and why it is so important. Since images come in from many different devices, color management helps you produce more consistent colors by creating **profiles** (or, translators) to correctly transform and resolve color discrepancy as an image travels from one space, or device, to another. This allows devices to speak to one another in the same language of color. Colors in the digital environment are described with a series of numeric values for each corresponding color, and neutral. For example, middle gray can be described numerically in the RGB space as 128 Red, 128 Green, and 128 Blue; similarly a

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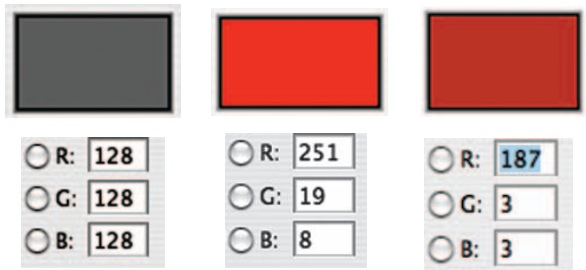
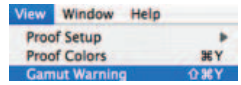
specific tone of red can be identified and matched by its numeric distribution between the red, green and blue values. Different numbers describe a different color.




Profiles are embedded into the image data providing a definition of what these color numbers mean in terms of actual colors we can see, and consequently make translations from one device to another. In this translation, the differences in the color spaces of each device are reconciled as much as possible. Precision matches, however, are incredibly difficult because there are inherently different abilities and limitations to reproduce color with each device.

This color interpretation is just like how international policy and issues of world affairs are discussed in the United Nations among ambassadors who speak many different languages. Profiles are the digital equivalent to the translators that interpret the dialogue between ambassadors from one

language to another. Therefore, it is extremely important to know how to set this profile information in your camera or scanner, to create one for your monitor, and learn to use them effectively as the image transfers from capture and editing to the output device (printer, paper and ink sets). If the digital devices that you work with are not tagging your document with profiles, the numbers for color become ambiguous to the devices, and maintaining consistent color in your workflow will ultimately be quite difficult.


### Managing color with profiles

1. *Camera Profile*: Digital cameras capture a wider range of colors than the human eye can see, and the camera's embedded profile determines the colors available to be processed.
2. *Monitor Profile*: Digital cameras also capture a wider range of colors than monitors can display, and the profile associated with the monitor determines what colors are actually displayed.
3. *Printer Profiles*: Digital cameras further capture a wider range of colors than most printers can print, and the profile associated with the printer determines which of the colors presented to it will be printed.

## Outline: The Color Managed Workflow

### The six basic components to managing color throughout the workflow process

Managing color as well as black and white processes – from film or digital capture to the final output print – is a challenge for even the most sophisticated user. However, before image editing begins there are some relatively painless steps one can take to standardize the process, such as setting up your workspace environment to optimize color consistency, as well as system preferences and software tools to conform to a color managed workflow. These basic steps will aid in maintaining the appearance of consistent color as an image is reproduced on different devices – from capture to the print.

**Keep in mind that the nature of different devices makes exact matches incredibly difficult.

**I. Capture**
Set camera's color working space or embed scanner profiles.

**II. Workspace**
Control ambient lighting conditions and working environment.

**III. Monitor Control**
Calibrate your monitor for color accuracy and consistency over time.

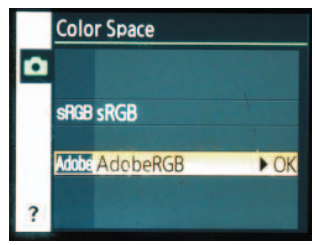
**IV. Software Policies**
Set Photoshop color management policies and color working spaces in accordance with capture and print output variables.

**V. Print Profiling and Printer Settings**
Set up the print driver with correct profiles for desired output.

**VI. Softproof, Evaluate, Tweak and Repeat**
View and evaluate the print under lighting conditions specific to the monitor calibration settings (6500 K for Adobe 1998 and D 50 for Color Match) and re-edit the image accordingly. (See Phase 5 "Print Profiling and Printer Settings," on page 25 for more information.)

# I. Set Up Color Working Spaces

In order to achieve the best possible color from your digital camera, especially the latest pro digital Single Lens Reflex (SLR) cameras, dealing with the concept of color working spaces, both those you choose in the camera and those you use for editing, is a necessity. There are a few choices in the mix to evaluate, but choosing the best one for you will not be that difficult. It is not all that crucial to learn everything there is to know about color spaces in the beginning. To keep matters simple, most users will want to work in **Adobe RGB**, as it serves as the industry standard today, until more sophisticated decisions become necessary. You will have to consult your camera manual in order to establish this setting correctly for your specific camera make and model.




### Camera settings: choose a color space

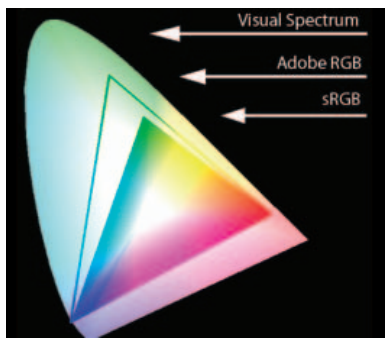
- **Adobe 1998**, also called Adobe RGB, is the current industry standard for most photographic purposes, such as stock submissions.
- **ProPhoto RGB** is a larger space many professionals are turning to, but this choice brings in a few more advanced complications. Also this choice is not available for all cameras.
- **sRGB** is the smallest color space available, and as such, functions best for web work.

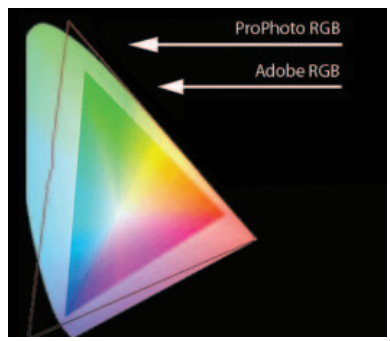
### What is a color space?

Color spaces define specific boundaries of color within the visual spectrum. A color space is like the box in the crayon analogy: all the colors inside the box are represented in that color space; any colors that are not inside the box are not represented in the space. The colors inside the box are referred to as the color space's color gamut. Effective color management requires that a color profile be attached to every image or graphic to indicate its "native" color conditions – also known as the color space – under which the file was created. Adobe was actually one of the innovators in creating and implementing the concept of a color management system, and introduced the idea of a "working" color space, with the ideal conditions for image reproduction and editing – not specific to any device. A device color space simply describes the range of colors, or gamut, that a camera can see, a printer can print or a monitor can display. Editing color spaces, on the other hand, such as Adobe RGB, sRGB, ProPhoto and Color Match RGB are device-independent. They also determine a color range, as their design allows you to edit images in a controlled, consistent manner.

The differences between the different RGB working spaces are predominantly defined by the color gamut of each space. However, as with many digital topics, there has been some recent debate over which color space is "best" for photographic purposes. The following definitions will outline some of the differences between the color working spaces and overview some of the advantages and disadvantages of each.

**Note:**
Notice how Adobe RGB extends into richer cyans and greens than does sRGB.




**sRGB** is the smallest working space. It is ideal for web work as it was developed by HP and Microsoft, to approximate the color space of a typical computer monitor. It therefore serves as a "best guess" for how another person's monitor produces color, and as such has become the standard color space for displaying images on the Internet. The downside of capture in the sRGB space is that most cameras and output devices are capable of producing a much wider gamut, or a lot more colors, than sRGB space contains.

**Adobe 1998** (or **Adobe RGB**) was designed by Adobe Systems, Inc. to encompass most of the colors that can be generated by using only RGB primary colors on a device like your monitor. The Adobe RGB working space has been

widely adopted as the industry standard for the print world because it provides a relatively large and balanced color gamut that can be easily repurposed for reproduction on a variety of devices. Most users find that it contains a sufficient gamut for most output needs, while having only a slightly larger gamut than the monitor can display. Further, Adobe RGB improves upon sRGB's gamut significantly in cyan and green values. If your camera offers it, Adobe RGB is an excellent color space choice if your images are destined for the printed page, or both the printed page and the web.

**ProPhoto RGB** is the largest working space and contains even more colors than Adobe RGB. This space has many advocates, but is not available in all cameras.

Sensors on most high resolution digital cameras produced today are capable of capturing more colors than even the Adobe RGB color space allows. ProPhoto RGB is the only color space that can contain all of the colors digital cameras are capable of producing. At the moment, however, there are no monitors or printers even remotely capable of displaying or outputting the full array of colors ProPhoto RGB is capable of capturing, which therefore creates a large propensity for problems. At some point in the future, however, this may change. Many commercial photographers are starting to adopt this space as a "better" space, as it provides more freedom to grow into more colors as output devices get better.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For a more in-depth discussion of color spaces and color management, check out Jeff Schewe and Bruce Fraser's *A Color Managed Raw Workflow – From Camera to Final Print* published on Adobe's website.

**ColorMatch RGB**. This color space is not an available option on any camera as a capture space, but is an available choice in editing spaces. Its color space is wider than sRGB, but not as broad as Adobe RGB. As a mid-sized editing space, it can often help control oversaturation problems with images captured in Adobe RGB, as well as produce better skin tones. Some fine art printers advocate using this editing space with Piezography black and white printing, coupled with monitor calibration settings at D-50. (See Chapter 8, "Printing", for more information.)

Hopefully, you can see that changing the color space definition of an image changes the appearance of the image altogether. The numbers that describe each pixel in the image are meaningless without a color space associated with those numbers. The color space defines what color is represented by a set of numbers describing an image pixel; it defines, in effect, what the color of the pixel actually looks like. Since achieving the best-looking color (and ultimately best tonality in black and white) is what we are after, selecting the right color space in the camera and in your viewing software is a fundamental step in the process.

### *Color Space Recommendations*

• *Grayscale Capture*: If your camera is capable of capturing in Grayscale, you will want to resist the temptation to choose this setting. Although it may be fast and easy, the results will be fast and easy as well. You get what you pay for, and image capture is no exception. The capabilities you gain with image quality as well as editing and conversion options are far superior with RGB capture and post production conversions.

• *Choose a Color Space Best for You*: If your camera offers a choice of sRGB and Adobe RGB, choose Adobe RGB (if you are interested in learning more about ProPhoto RGB, read Bruce Fraser's *Real World Color Management*). There are some interesting and valid reasons for moving into ProPhoto RGB. One must, however, really understand the complexities of color space, and the advantages and limitations well. The selection of a wider-than-sRGB color space does generally translate into an image with better color, and can be easily converted into smaller spaces. Going the other way, however, such as converting an image originally captured in sRGB to Adobe RGB, does not bring with it the benefits of shooting in a broader color capture mode such as Adobe RGB.

• *Syncronize Capture Color Space with Editing Color Space*: When editing your images, make sure that you set the software to view them in the corresponding color space chosen for capture. For instance, if you capture

an image in Adobe RGB, then you will want your image browser and image editor to display your images in Adobe RGB so that the colors maintain consistency across the devices. (See "Set Up Color Working Spaces," page 7.)

• *Embed scanner profile:* While scanning, be sure to embed the scanner's profiles into the image files so that Photoshop can make accurate conversions. (See Chapter 2, "Scanning Capture: An Overview," page 64.)

## II. Workspace: Control Ambient Lighting Conditions and Working Environment

### Control ambient lighting conditions

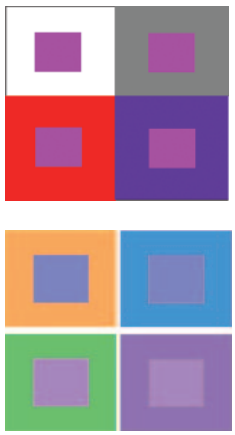
When I first moved out of the darkroom, I was so excited about being in the light that I moved my computer right in front of the biggest window with the best view. Because I skipped my color management lessons, I had no idea why my prints were not quite right. When you are performing color and tonal adjustments to images on screen, it is essential that your digital darkroom lighting conditions be controlled properly. If your computer is set up in front of a big bay window with light pouring in, it would be a good time to invest in a dark shade to pull down during the day. Lots of ambient light hitting and bouncing off the monitor can make your images appear brighter. Also, overhead light and sunlight produce reflections and glare on the monitor which can influence our ability to achieve consistent results. A working environment with consistent ambient, or room light, eliminates uncertain color and tonal results in image evaluation.



Controlled working space

© Bryan O'Neil Hughes

Problematic workspace



### Set desktop to solid gray medium

This component is for the Macintosh user only, as the PC sets up Photoshop on a gray screen regardless. For those of you who just love seeing your favorite image from your last surf trip to Mexico or the happy snap of Christmas with the kids displayed while you work, this is going to hurt. Attempting to evaluate images on top of other images is not a very accurate way to evaluate color, nor the neutrality of grayscale images, as our eyes can play tricks on us based on the comparative differences. As illustrated with the color patches to the left, colors from surrounding sources can affect our color vision and influence decisions in the editing process in ways that we may not be aware of.

Problematic desktop


Not the best or most effective way to evaluate color or neutrality


Best practice!!!

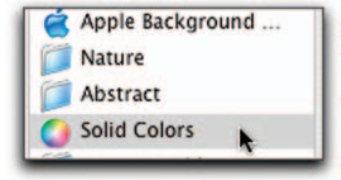
In order to control this phenomenon, it is best to set your desktop to a neutral gray.

**1.** Under the Apple Menu choose "System Preferences"


**2.** Click "Show All"


**3.** Click "Desktop & Screen Saver"


**4.** Select "Solid Colors" from the Collection




**5.** Choose "Solid Gray Medium"

### Set monitor resolution and color preference

Under Apple Menu > System Preferences > Displays, set colors to millions. This is also where you can adjust the resolution of the monitor. Depending on the size of your monitor, this number will be different (1152×720 or 1440×900 are recommended).

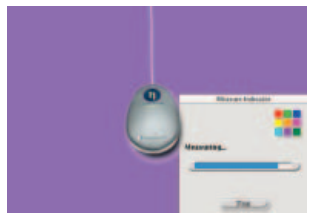
Under the Display Preferences or Colorsync Preferences, you can also check to make sure the Display profile created from a calibration device is correctly chosen.

## III. Monitor Control

### Calibrate your monitor and change settings

Have you ever been to the home electronics store and noticed how every television set displays the same broadcasted information differently? While one set's display may look a little magenta compared to another with a lighter more cyan appearance, we would probably be most inclined to pick the one that looks the best and most pleasing to our eyes. Computer monitors are exactly the same in that each and every monitor right out of the box will display the same data differently. Monitors will age over time, and colors tend to shift with usage. Without several monitors in our home side by side how do we know if our monitor might be the slightly magenta one, or the lighter one with a more cyan cast? Although the side by side comparison for the most pleasing display may work fine for the television, it is important that what we see on our monitor is relatively accurate if we ultimately want our prints to match what we see on the monitor. If the monitor is not calibrated, or the calibration is inaccurate, we can end up making changes to data based on a false interpretation of the colors presented on the display, and, ultimately, maintaining consistent color results as the document crosses through different devices will be difficult at best.

In order to control the monitor output most accurately for color consistency, it needs to be calibrated. When you calibrate your monitor, a profile is created to adjust the behavior of the monitor so it conforms to known color specifications, and describes how the numeric color values in an image must be converted so that colors are displayed accurately on screen. Calibration neutralizes any color casts the monitor displays, and adjusts its gamma (brightness of the midtones) to set black and white points for accurate color

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viewing. All monitors not only display color differently like the TV sets, they also vary their color output display over time as they age, just as a light bulb, or enlarger bulb, will dim with use. Calibration, therefore, also keeps monitors operating in a stable way and returns the display to an accurate and known value.

### How do I calibrate?

To calibrate and profile your monitor, you can use visual calibrators like Adobe Gamma as a starter; however, these are not highly recommended as they rely on the human eye and one's perception of color, which is inherently inaccurate by nature. The best method is to use third-party software and measuring devices for more accurate results. There are many devices on the market today at many different price points. The devices are always packaged with their corresponding software as well as instructions on how to use them. Typically, the software has a "wizard" or instructional feature to guide you through the process with ease.

The hardware calibration device affixes to the monitor and reads patches of color generated on screen by the software in order to create a profile that "fingerprints" the monitor. The software will typically prompt the user to make a few adjustments in brightness and contrast during the process. The profile created then tells other applications (like Photoshop) how to convert or translate the color settings embedded from the capture device so that the image is displayed accurately on the monitor.

### How often should I calibrate?

Just as you may want to change the oil in your vehicle every 3000 miles, or wax and edge your skis to maximize their optimum performance periodically, a monitor needs the same kind of regular tune-ups and care to perform well over time.

- Monitors should be calibrated every 2–4 weeks depending on the amount of usage.
- For the most accurate results, be sure to let the monitor warm up for at least 30 minutes in order to stabilize before calibration is performed.
- Periodic calibration will help maintain consistent color display on the monitor over time.

Settings for calibration will vary depending on your output. If you are working in your own closed loop system – that is your own camera, printer and monitor – our best recommendation for most users would be to work with daylight settings, 6500 K and Gamma 2.2 as a starting point. This setting is usually best for working with Adobe 1998. If working with Piezography inks, results have often been more accurate using a D-50 or 5000 K calibration setting. You will need to experiment to find the best settings consistent with your workflow and output variables.

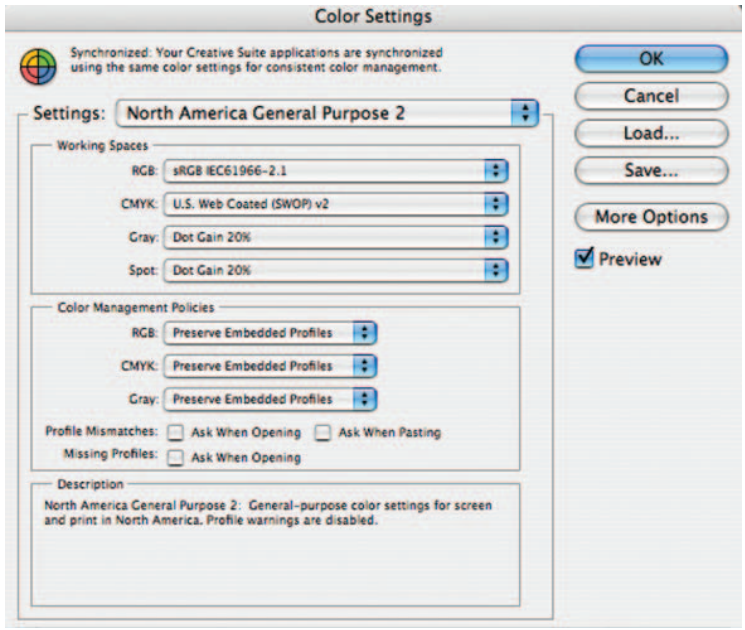
## IV. Software Policies

### Set Photoshop color management policies and color working spaces

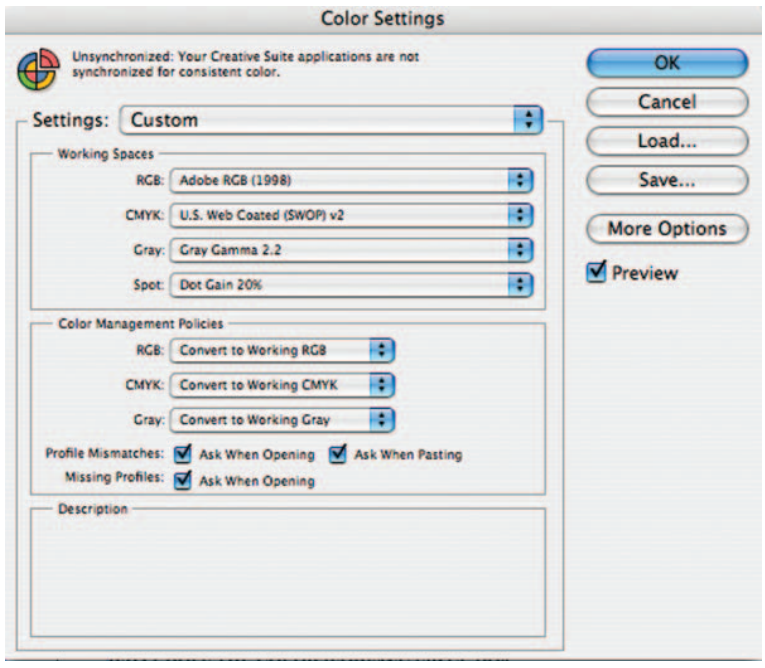
The next step in our color management system is to set up the software color policies to interpret the color information correctly on your calibrated monitor! Just like the choices we have in setting the digital camera to a specific color capture space, we will want to set Photoshop policies to match the camera capture settings.

There are very few image browsers that offer control over the viewing color space. Instead, most software applications can only display the images in the color space of the operating system. In Windows XP, as well as most older versions of Windows, that would be sRGB (remember that is the smallest working space, which is not recommended for print reproduction work). Images captured in the Adobe RGB working space will appear on screen somewhat flat and desaturated when (incorrectly) viewed in sRGB.

Photoshop is, however, an incredibly color savvy software that offers the best environment in which we can view Adobe RGB images, ProPhoto RGB, or images defined by any other color space. You can, with accurate color display for each space, simultaneously view an sRGB image in a side by side comparison with an Adobe RGB image.




Photoshop default color working space and default color policies. Notice the RGB is set to sRGB

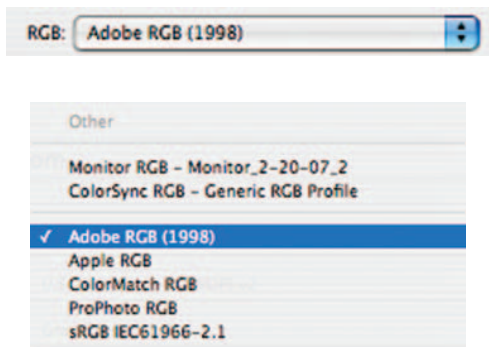



Photoshop color working space for Digital Darkroom print reproduction with inkjet printers

To specify color settings in Mac OS, choose Edit Menu > Color Settings and in Windows choose Photoshop Menu > Color Settings to bring up the Color Settings dialog box in Photoshop. This dialog box is the single most important place where color management information is gathered and controlled – one box, one convenient location. As incredibly color savvy as Photoshop is, however, it unfortunately ships out to users set with sRGB as the default working space, which is not the most ideal setting for print-oriented photographers. It is therefore necessary to make some changes in color setting policies before image editing begins.

## Photoshop Color Management Policies and the Editing Color Working Space

Color management policies are simply a set of rules defining protocol for opening files into Photoshop with or without embedded profiles. The color working space specifies what colors (brightness and hues) will be available when working in Photoshop. Whichever color working space you choose to work in directly effects how many colors you will be able to see on your monitor and potentially reproduce in the print. The color space choices for image editing in Photoshop are Adobe RGB 1998, ProPhoto RGB, ColorMatch and sRGB. (See "Set Up Color Working Spaces", page 7 for definitions.)



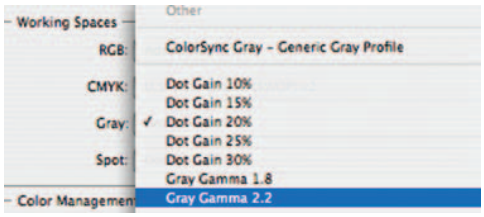

## Working Gray Policies

Grayscale does have its own governing profiles independent of RGB or CMYK. However, it is important to note that the grayscale profiles do not contain any information about the papers nor the color of the inks, which are all factors in creating neutral values in producing black and white prints with desktop printers. (See Phase 5 "Print Profiling and Printer Settings", page 25 for more information.)

The Gray working space determines how a grayscale image will look on your monitor. Within the Grayscale working space, we have access to gamma settings, dot gain curves and the ColorSync Gray Working Space (Mac only) as well as the ability to customize the dot gain to specific requirements.

1. Gamma settings define the brightness of the midtone values on screen. The choices of gamma settings enable you to base the display quality equivalent to either a Macintosh (1.8) or PC (2.2) monitor, although there is evidence that all monitors have become 2.2 these days, whether they are Mac or PC.
   Gray Gamma 2.2 is probably the best for most users, but feel free to experiment. This setting anticipates the viewing conditions of a PC monitor (important for web graphics), and the darkening is roughly equivalent to a 25% dot gain setting.
2. The dot gain settings, choices of either 10%, 15%, 20% or 30%, depend on your printing conditions. The dot gain settings darken the on-screen image, effectively anticipating the effect of the ink dot gain (or spread) during on-press reproduction.
   (To set your own dot gain profile, choose "Custom" from the top of the pop-up.) Note that these values only lighten or darken the appearance of an image, while the actual output values are not affected.

If you are outputting primarily to inkjet printers, matching the Gray working space to the RGB color space is a good move. Simply translated, if you are working in Adobe RGB or sRGB, use Gamma 2.2. If you are working in ProPhoto RGB or Colormatch RGB, choose 1.8. This prevents any additional gamma adjustments as we switch back and forth between color and grayscale images.

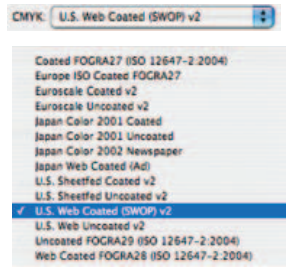




If you work in a prepress environment, it is best to match the grayscale space to the dot gain of the black ink. North American Prepess 2 setting presets will create this match. However, it is always wise to consult your service provider for customized settings in accordance with press specifications.

## CMYK Working Space

Desktop inkjet printers from most of the major manufacturers (like Epson, HP and Canon) actually require RGB data rather than CMYK data to produce prints, even though these printers operate in a CMYK working space. What this means to the average user is that the choice you make for CMYK settings will have no influence in the actual image output (to an inkjet printer). Therefore, the CMYK settings are better left to the default U.S. Web Coated (SWOP) v2 until you need to work with offset press. As press settings vary considerably, and getting accurate color or neutrality on press is incredibly difficult, you will need to consult your service provider for the best conversion settings according to the specifications of the printer and output variables (and pray you get to work with someone who actually knows what they are doing).

CMYK working spaces are essentially printing processes characterized by various ink-and-paper combinations, dot gain settings and separation options such as ink limits. If you have a custom press profile, you would select it as your CMYK working space. When you perform a mode change to or from CMYK, Photoshop will use the CMYK working space profile for the conversion. Photoshop will also use the CMYK working space profile when you open a CMYK image that lacks an embedded profile.



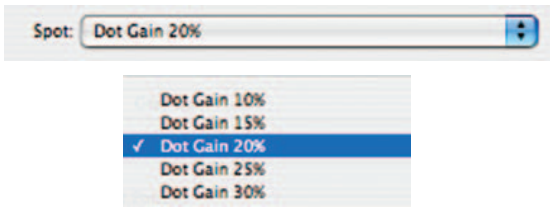

If you need to convert images to CMYK but do not have a custom press profile, and one is not available from your printer, you will have to select one of the profiles provided by Adobe, basing the selection on the type of printing process and paper that will be used, such as U.S. Web Coated (SWOP) v2. The results however, will unfortunately be fairly disappointing.

As with RGB working spaces, Photoshop provides the ability to create custom CMYK working space profiles. This is useful if your print provider does not have a profile but can tell you what separation settings to use when converting your images to CMYK. Good luck!

## Spot Working Space

The Spot working space is somewhat similar to the grayscale space, but for spot colors. The options available are a series of five preset dot gain settings and the means for customizing the dot gain curve if desired. The Spot working space provides a setting for spot colors, such as Pantone colors, that may be

used in the printing process. Similar to CMYK settings, spot settings are the most crucial when working with offset press and depend on ink and paper combinations to be determined. Leave this setting unchanged at the default until press specifications require otherwise.




## Color Management Policies

Color management policies therefore determine how to handle documents that do not match your chosen color working space. These policies provide guidelines for how Photoshop should proceed when a document is opened and color data is imported into an active document with color spaces that do not match the set policies. With specified predefined color management settings, Photoshop can proceed within the user defined color management workflow as standard protocol for all documents and color data that you

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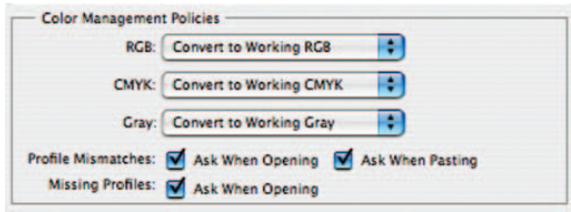
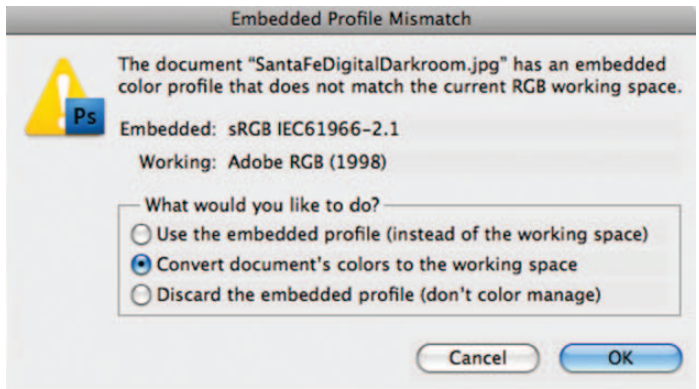
open or import. These color management policies look for the color profile associated with a document or imported color data, and compare the profile (or lack of profile) with the current editing working space settings in order to make default color management decisions for conversion and color display. If the profile is missing or does not match the working space, Photoshop displays a warning message that indicates the default action for the policy (as long as the alert option is selected in the color settings). For a newly created document, the color workflow usually operates behind the scenes; unless otherwise specified, the document uses the working space profile associated with its color mode for creating and editing colors.

In this text, we are going to set the color management policies to convert all incoming documents to the specified working space. This simply means the active radial button will be automatically preset to "Convert to the Working space". However, you will always be able to choose otherwise.




### Profile mismatches

If you are presented with an "Embedded Profile Mismatch" dialog when you open an image, this means that the image was captured or created in a different working space than your chosen working space policies. This warning dialog is how you tell Photoshop to proceed with opening the document. Your choices are the following: (1) Use the embedded profile (instead of the working space), (2) Convert document's colors to the working space, and

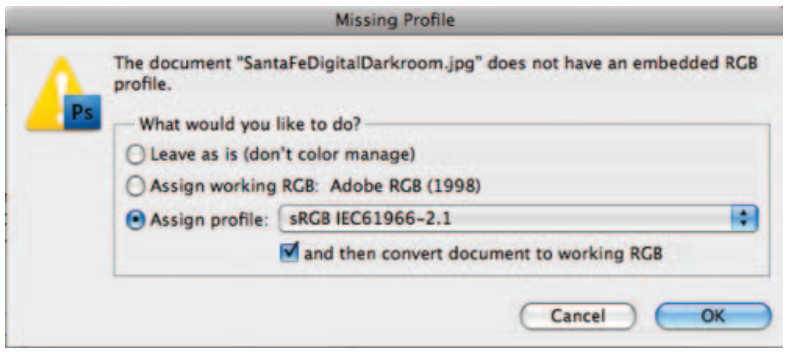


(3) Discard the embedded profile (do not color manage). In most instances, it is best to go ahead and convert everything over to your set working space in order to simplify and standardize your workflow, unless of course there is reason to keep the image in the space in which it was created.

It is important to note that the optimum color space will not always be a match for what you set in the camera. With midtone heavy and/or overly saturated Adobe RGB images captured from the D1X and EOS-1D, for example, assigning the ColorMatch RGB color space often offers a more realistic and pleasing color translation with problem images.

### Missing profile

This warning dialog box is not a good one to receive. This means that the document file does not have any profiles or translators to convey information about the color of the image. Photoshop will not know where this file came from, nor how to translate its color information accurately. Photoshop can do a darn good job at guessing, but that is akin to me giving a blank piece of 4×5 film to my students and asking them to shoot the image and process it in the chemical darkroom without knowing its ISO or film type. It would be fairly difficult for even a well-seasoned pro to render a good exposure and development time with virtually no information about the film. In this case the profile will need to be assigned. If you know that the image came from an sRGB space, for example, you would first assign sRGB, or the known space, and then convert to the working space. If the incoming source is unknown, assign the working RGB and move on from there.




### How to set: Photoshop color management policies

Setting up your Photoshop color management policies and preferences is absolutely essential before you begin working in Photoshop. Remember, these are the settings that specify the handling of color profiles associated with the RGB, CMYK and Grayscale color modes in every document. This means that the color management settings affect how images are displayed on screen, and how Photoshop operates color separations. These profiles are known as working spaces. Being aware of your color settings and image

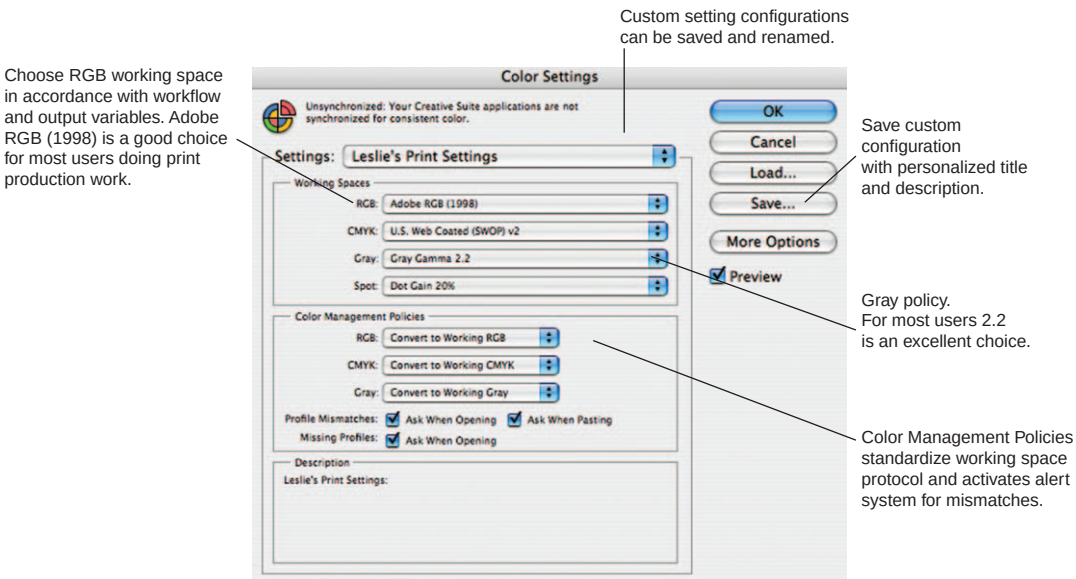
profiles will help you produce consistent color results for the most common on-screen and print output conditions.

**Edit Menu** > **Color Settings** You may choose a preset color management configuration from the settings menu or customize one of your own. Adobe sets the default workspace for web work, which is far too limiting for print output with high quality photographs. We are going to create custom settings for print output.

**RGB** > **Adobe RGB (1998)** is today's industry standard. This space is best for RGB print production work. You may want to research ProPhoto RGB for details on whether it might work for you.

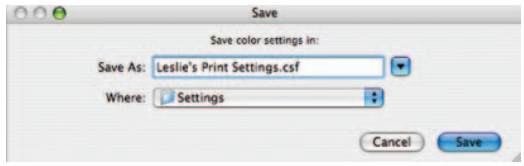
**Color Match** > this space can be an excellent choice when working with offset press and converting to CMYK. It is also recommended for working with Piezography ink sets.

**sRGB** > is an excellent choice for images destined for the web.



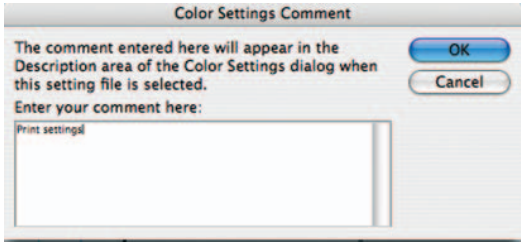

## Save and Name

It is important to save your custom settings so that they can be reused and shared with other Adobe applications that use the same color management workflows, as well as with other users. The color management settings that you customize in the Color Settings dialog box are contained in a preferences file called Color Settings.




### Comment

Enter your own description of the settings you created for future reference.




**Important note:**
Lightroom users need to make sure that the Photoshop color management settings match the output color space in the Adobe Lightroom export settings. Images may have distinctly different colors than in Lightroom if the settings are not congruent.

**Note:**
The default location of the Color Settings file varies by operating system; use the Find command in your operating system to locate this file.

## V. Print Profiling and Printer Settings

**Set up the print driver with correct profiles for output**

Once a color space tagged image makes it from the camera (or scanner) and passes onto a calibrated monitor, and is edited through Photoshop and Lightroom, the next step is to pass the image out through the printer onto paper or other surfaces. This phase of the workflow requires a print profile. A print profile tells the printer how to translate and convert the colors from the monitor so that the image outputs correctly onto the paper. This translation is specified according to the type of printer, paper, surface and ink the image will be output onto. Every paper, however, will require a different profile because every paper, ink, printer combination has a different color gamut, or ability to reproduce colors. For instance, glossy papers have the ability to produce more saturated colors than matte surfaces. Most printers come with a number of common paper profiles installed with their drivers. These "canned" profiles are a great start in facilitating the monitor to print color translation. At some point, however, you might want to invest in custom profiles, made specifically for your printer, paper and ink combinations. Custom profiles can be purchased online at an exceptional price from Santa Fe Camera's online store: www.santafecameracenter.com or call (866) 922-6372 for more information.

Because every paper, ink and printer combination requires a different profile, and the print settings in both the Photoshop and Printer dialog boxes are neither simple nor user-friendly, many common mistakes inevitably happen. If the print driver options are not set correctly, using the correct profile, it will be difficult to even come close to replicating the image you see on your monitor

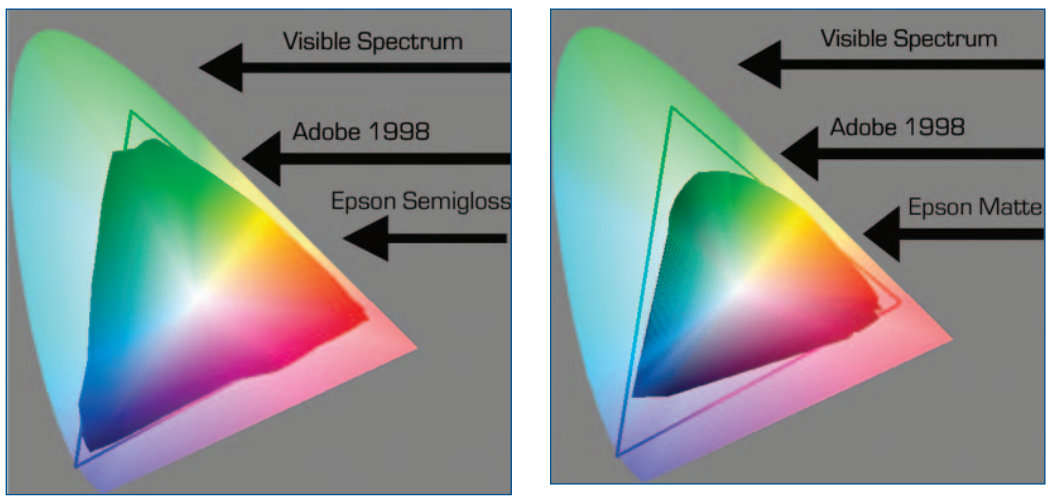
to the output print. See Chapter 8, "Printing", for more in-depth step-by-steps on print profiles and printer driver settings.

## Output and Media Considerations

Another significantly influential piece of the color reproduction puzzle involves the variable gamuts of chosen media surfaces. Glossy surface papers tend to have a much larger reproduction gamut than do matte and fine art surface papers. Larger gamuts allow for more saturated and richer color and black reproduction. It is often a difficult sacrifice for a photographer to lose color saturation in order to work with textured fine art papers. But if saturation is the look you are after, you may get the best results moving to glossy surface papers. Notice the difference in the color output reproduction gamut between Epson Matte and Semigloss papers.

## Softproof, Evaluate, Tweak and Repeat

As we are limited by the boundaries of the laws of physics, the final component of both the print workflow and the color management system is the softproof, tweak and repeat system we apply in order to resolve the remaining differences in color and output consistency. The process of softproofing and tweaking is the final phase of practice that brings an image from the third base to the home plate in the otherwise nerdy tech speak world for achieving color accuracy within the system.




Glossy papers have a larger gamut than matte surfaces

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### Softproof

This is a technique to simulate on your monitor what your image will look like when it is printed, before actually printing the image. This offers you a "reality check", or the ability to view the physical differences between what is displayed on the monitor and how the image colors will translate on to the chosen paper with the applied profile. Photoshop CS4 incorporates softproofing into the print dialog interface with match print colors, show paper white, and gamut warning previews. Keep in mind, however, that the reliability of the softproof depends upon the quality of the monitor, as well as the monitor profiles, and the ambient lighting conditions of your work environment. Softproofing can also be simulated full-screen under the View Menu > Show all Menu Items, View > Proof Setup > Custom. (See Chapter 8, "Printing", page 249 for more information.)

Softproof for Epson Matte paper MK ink

### Evaluate

As various lighting sources have distinctive differences in color temperature, it is important to be sure to evaluate prints under the same lighting source as they are intended to be displayed under. The kitchen fluorescent or office floor lamp will have a distinctively different influence on color interpretation than daylight or a D-50 gallery flood light. Be sure to evaluate prints under

the correct lighting source; try using a viewing booth in order to eliminate discrepancies and maintain more color evaluation accuracy.

### Tweak – making digital darkroom adjustments based on output results

This editing component is the heart and soul of color management and the print making process. Tweaking is truly the "art" of the fine art print. The process of tweaking occurs after you have followed all of the previous steps and suggestions in the color management workflow, and your print still does not exactly match what you see on the monitor. Just as your first print in the traditional darkroom provided the visual feedback to drive any number of refined re-prints, the digital darkroom is no different. Tweaking is the process of making corrections again and again until you are happy with the translation of the image onto the output surface. This is the test print phase of the workflow. (See Chapter 8, "Printing", page 249 for more information.)

Now wake up! The rest will be much more fun I promise!