COLOR CORRECTION
PHOTOSHOP CC

About Color Correction

Color correction in Photoshop has many theories, hard core basics and tall tales of what should and shouldn't be done. The point of this class is to show you the fundamental basic principals—and application of those principals—using non-destructive Photoshop techniques.

Working non-destructively

Using Levels, Curves and Hue and Saturation adjustment layers, the basics of color correction in Blacks & White, RGB and in CMYK modes will be demonstrated as well as matching color from one image to another and balancing color to give "pleasing color" to images. Many of these adjustments will be done using adjustment layer, other adjustments such as Match Color require working directly on (a copy of) the image be adjusted.

Beginning with the basics of color correcting

Color correction has always been something that many people—from novice Photoshop users to experienced creative people—have heard many different theories and apply many different techniques. With color correction, there are many different ways to achieve the same results so, the basic building blocks on what and how to adjust on the image are what will be addressed.

Color Correction vs. Correct Color Calibration

Color correction and color calibration are two very different topics. Peoples perception of color is different as is how monitors show colors, printers print color, web sites display color and how different materials show that the same color. This difference in color representation has been a constant issue for everyone in the industry. **Color Calibration** tries to make the representation of color standard across as many mediums as possible. **Color Correction** is adjusting the image to look good (pleasing color) or to match another image or color. Color correction is very subjective, but the basics of making images more vibrant, saturated or even color across the image has several basics that are highlighted in this class.

Highlights, Midtones and Shadows

Images are referenced by three ranges in the image: Highlight range, Midtone range and Shadow range. Portions of the image that are lighter (lighter than 50% of the pixels) in tone are in the

Highlight range, portions that are in the darker areas (darker than 50% of the pixels) in the Shadow range and Midtone range (50% mark in the image).

Adjustments made on images are generally done using these main areas, with finer adjustments done over the entire range of the image.
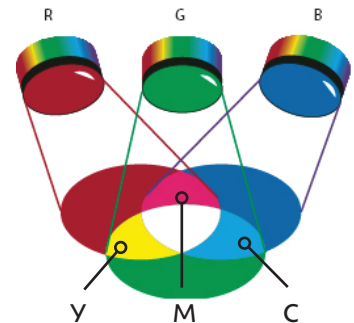
RGB vs. CMYK

All images shot by camera, either digital or traditional film or scanned in is in RGB mode. **RGB** is the natural spectrum of light that is captures and displayed by light emanating devices. **CMYK** is the printable spectrum that is part of the visible spectrum of light, only much more limited. CMYK is actually derived from the overlap of RGB colors.

Adjusting images in RGB mode or CMYK mode?

A common discussion among people color correcting images is the issue of color correction in RGB mode or CMYK mode. Here are the reasons and rationale using on over the other:

Reasons for adjusting in RGB mode:

- RGB retains a far greater range of color than CMYK

- Images that are going to be used in RGB mode should stay in RGB mode as changing modes degrades the image

- Images that are going to be reproduced or used for photographic purposes such as slides, transparencies or stock photos

- Images that are going to be used for Web, video or on any light-emanating device

- 8-bit and 16-bit images can use all the color adjustments provided in Photoshop

- Images in RGB take up less hard-drive space given that they have only 3 color channels as opposed to CMYK which has 4 channels

- Converting back from CMYK will NOT restore the information lost when an original RGB images is converted to CMYK and then back to RGB

Reasons for adjusting in CMYK mode:

- CMYK mode is the for images that the final output will be printed using inks
- Images that are to be used for print that are adjusted in RGB then converted to CMYK lose many of their color correction layers
- Images adjusted in RGB then converted to CMYK can be out of gamut (areas that won't print using inks) and won't render bright colors correctly and will generally flatten the image

The long and short of RGB versus CMYK in color correcting

Most photographers work in RGB for everything they do–mainly because their work rarely goes right to print from their end product. Also, Camera RAW works in RGB and not CMYK (and for that matter, Adobe Lightroom only works with images in RGB mode also, but that isn't really relevant for color correction).

Many image retouchers work in RGB mode because the full color range of the image is available and use the Gamut Warning to see what ranges of the image will not translate into CMYK correctly.

Once the image is converted to CMYK, all the additional information that is in RGB is lost in the conversion. Converting first saves many hassles later in the process as opposed to converting after all the correction and retouching is done.

Real life experience:

If the end result of the image is in RGB, keep it in RGB.

If the end result of the image is in CMYK, convert it to CMYK before working on it.

If the image is being used for the Web and print, convert it to CMYK, color correct and retouch the image, then convert the final image to RGB for Web use.

About Adjustment Layers

Adjustment layers apply color and tonal adjustments to your image without permanently affecting the image or layer that it is adjusting. By applying a Levels or Curves adjustment directly to your image, you change the pixels of that image; and in order to undo those edits, you must go back in history—but once the file is closed you cannot undo those edits.

Work non-destructively

By creating a layer that contains the color or tonal adjustments, you can turn on and off that layer restore the original image at any time. Color adjustment layers are saved with the

Photoshop file and can edited or deleted at any time. These adjustment layers can also be controlled by using the opacity setting of the layer and also the blending mode.

Another big advantage of color adjustment layers is you copy these adjustment layers to other images so the same adjustments are applied. The major point of color adjustment layers is to work non-destructively.

Organization of Layers

As with layers in Photoshop, the placement of color adjustment layers in the correct layer order of the file is important. When placed above pixel based layers, color adjustment layers will affect all the layers beneath unless a mask is applied.

File size concerns

As with all Photoshop files, the more layers you create the larger the file gets. Some people regard larger files as a negative but with color adjustment layers, the infinite adjustability and non-destructive nature of these layers far out weighs the concerns of larger files sizes.
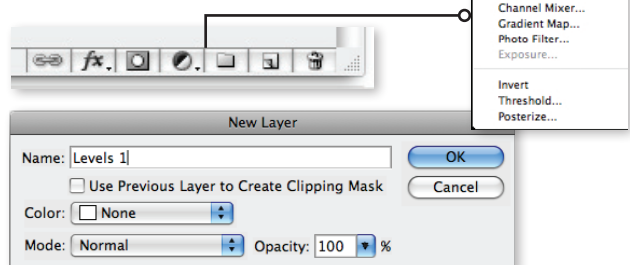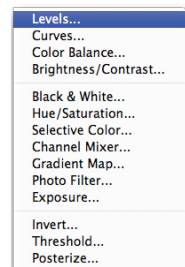
Creating Adjustment Layers

To apply adjustments **directly** to the images pixels, you would use Image>Adjustments>Levels, Curves, etc.

To create an Adjustment Layer, select the layer in the Layers Panel you want to adjust and choose **Layer>New Adjustment Layer**.

Or click on the Layer Adjustment icon at the bottom of the Layers Panel to get a list of adjustment layers. This drop down menu gives you more combined options.

When you create a New Layer Adjustment, that adjustment layer will appear above the layer you have selected in the Layers Panel. You can name the layer, control the opacity of the layer and apply a color highlight to the layer.
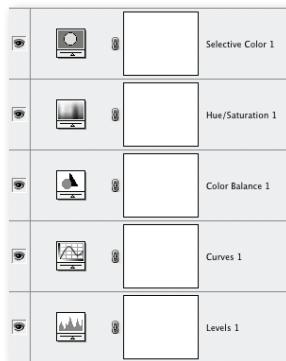
Each adjustment layer has its own icon for the type of adjustment.

To edit the layer once it has been created, **double-click on the icon** in the layer.

By default, adjustment layers have layer masks when they are created.

To create adjustment layers without layer masks, change this option in the Layer Palette Options drop down menu.
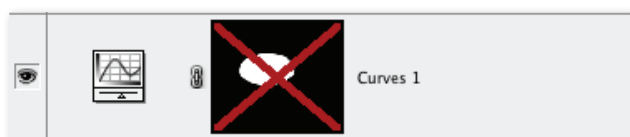

Selective Color 1
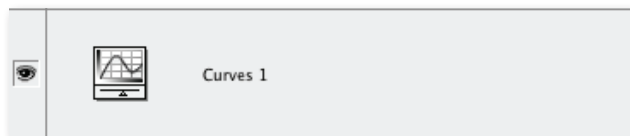Hue/Saturation 1
Color Balance 1
Curves 1
Levels 1

Curves 1

Adjustment Layer Masks

When creating adjustment layers, you may want to isolate certain areas of an image to adjust. When you create a selection and then create a color correction layer, the selected area will automatically be masked.

Curves 1

To turn the Layer Mask on and off, **SHIFT + CLICK** on the mask to turn it off and repeat to turn it on. A red "X" will appear on a mask that is deactivated.

Curves 1

To delete the Layer Mask, click on the mask and drag it into the trash icon at the bottom of the Layers Panel.
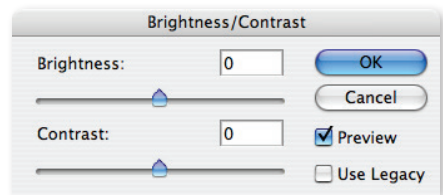

Curves 1

Layer Masks can also be edited using the Paint Brush and the Eraser tool to create a mask after the Adjustment Layer has been created.

NOTE: These masks also serve as a way to save a selection instead of using channels. COMMAND + CLICK on a layer mask and you will load a selection of that mask.

To see a mask as an overlay on the image, press \ (backslash) to turn on and off the visibility of the mask.
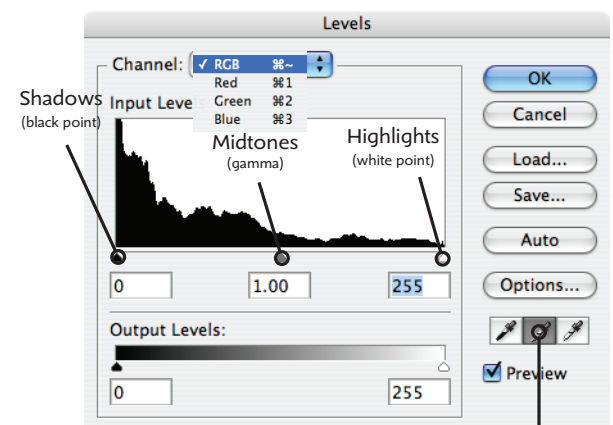
Adjusting with Brightness/Contrast

Don't. That's right—don't. And here's why. All the versions of Photoshop up to CS3 had Brightness/Contrast and people who knew little or nothing about color correction loved it (and that isn't the reason why you shouldn't use it) but it didn't really do a good job at either adjusting the brightness or contrast of the image without adverse effects.

But there is always an exception. In Photoshop CS3, the Brightness/Contrast has been reworked and it works much better than it ever did–you can see the results by clicking on or off the Use Legacy button. And still there are better ways to do color correction.
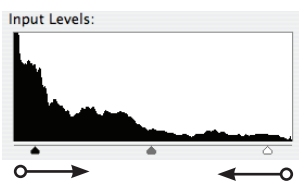
Adjusting with Levels

Levels are much better for color correction since it shows a Histogram of the image. The histogram indicates the amount of information is in the image over the range of highlights, midtones and shadows. Every image has a different histogram indicating where the information if distributed in the image.

Eye droppers to set highlights, mids and shadows

Histogram aside, levels allow more control over the brightness and contrast than using the Brightness/Contrast option.

To add contrast to an image, call slide the highlight slider to the left and the shadow slider to the right. This is making the light areas lighter and the dark areas darker and thus making the image appear to have more contrast.

Input Levels:

To control the brightness, slide the mid slider to the left or right to make the image or brighter or darker.

How much correction is too much?

Each image is different and too much or too little color correction is subjective. However, using the histogram, you can perform a well educated color correction based on what is displayed in the histogram.

Images that have a large amount of information in the shadow end indicates a predominantly dark image and therefor images that have a large amount of information in the highlight end indicates a predominantly light image.

Image 1 is an image with no dark shadows and no bright highlights. To add contrast to this image, slide the highlight and shadow sliders in until the slider begins to touch the area

1.

on the histogram that shows image information (indicated by the arrows). Any further adjustments would cause more contrast (and possibly too much).
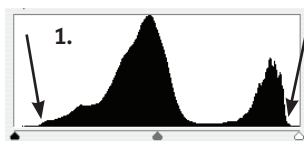
Image 2 is an image with dark shadows and bright highlights, however there are very few areas of shadow due to the very small levels indicated in

2.

the histogram. Since the information goes right to the edge of the histogram, moving the sliders in toward the center makes dark areas darker and light areas lighter–there is very little information in the image that is effected so the sliders can go further into the histogram to create more contrast in the image (indicated by the arrows). This is not an exact science but is a general understanding of how images vary.
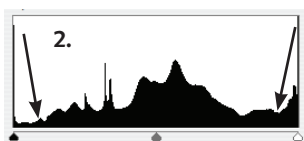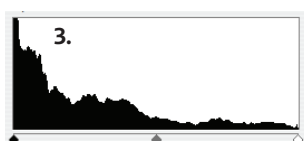
Image 3 is an image with dark shadows but few highlights. To add contrast to this image, slide the highlight slider in until the image looks

3.

good in the highlight areas but not too far to over brighten the

highlights (indicated by the arrow). Any further adjustments on the shadow end would cause more contrast since the shadows are dark and prominent in the image.

A few quick tips:

When adjusting levels in RGB, hold down the **OPTION KEY** and click on the highlight or shadow slider. This will show the range of the image that is being adjusted, but it doesn't work in RGB mode.

Hold the **OPTION KEY** and the **CANCEL BUTTON WILL CHANGE TO RESET** so you can cancel your changes without leaving the dialog box.

Making finer, more specific adjustments

When color correcting, the most common correction is to the image overall. This is fine in many cases but there are times when an image has a hue or cast to it that may be to red or green. These types of color correction are done in the Channels instead of the composite.

By choosing a channel from the drop down menu in the Level dialog box, you can isolate just the image in that channel and adjust it. The shortcuts for these are indicated by the name of the channel.

✓ RGB	⌥2
Red	⌥3
Green	⌥4
Blue	⌥5

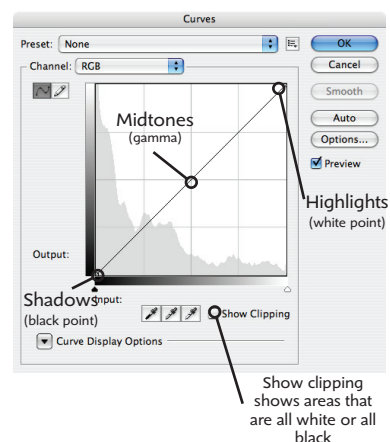| ✓ CMYK | ⌥2 |
Cyan	⌥3
Magenta	⌥4
Yellow	⌥5
Black	⌥6

The shortcuts to access these channels have changed from CS3 to CS4.

A bit of hitch with Levels

When adjusting with levels, the sliders won't allow you to go beyond the edge of the image range and so there is no way to make the shadows lighter or the highlights darker. If you apply levels to an image **without** using an adjustment layer, you actually cut off the information that is outside of the sliders and you cannot get it back.

Adjusting with Curves

Color correction with curves follows the same basic ideas that we laid out using Levels, but adds more features and allows adjustments back to the original state. New in Photoshop CS3 is the addition of a histogram in the Curves dialog box, something that only adjusting with levels offered.

Curves

Preset: None

Channel: RGB

Midtones (gamma)

Highlights (white point)

Output:

Shadows (black point)

Input:

Show Clipping

Curve Display Options

OK
Cancel
Smooth
Auto
Options...
☑ Preview

Show clipping shows areas that are all white or all black

Curves allow several adjustments (14 to be exact), more so than Levels that just adjust high, mids and shadows areas. Curves also allow adjustment beyond the image values, bit just inside the image values–meaning highlights can be made darker (saturated) and shadows can be made lighter (desaturated).

NOTE: Shadow and Highlights orientations are switched between RGB and CMYK mode

How Curves work

Curves can be hand drawn or points can be added to the existing curve by choosing either icon in the Curves dialog box.
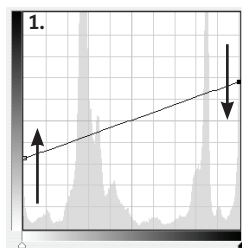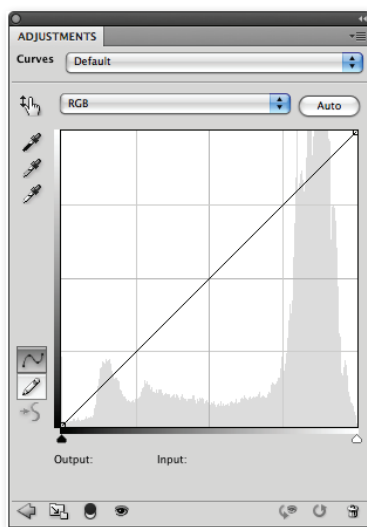
By adding and moving points the image is adjusted in the tonal range that the point is applied.

In **Example 1**, the Highlights have been moved UP the output side making them darker as indicated by the grayscale ramp, and Shadow sliders have been moved DOWN, making them lighter. This flattens the appearance of the image. Levels cannot do this.

In **Example 2**, the Highlights have been moved DOWN the output side making them lighter as indicated by the grayscale ramp, and Shadow sliders have been moved UP, making them darker. This adds contrast to the appearance of the image.

In **Example 3**, the Highlights have and Shadows have remained in the same place, but points along the line have been added (just click on the line and the point appears) and moved to create more contrast.

This widely-used method is called the

"**S-Curve**". It's used to quickly add contrast while keeping the shadows and highlights of the image the same.

To **remove points** along the line, simply click on the point and drag it off adjustment grid to delete it.

Adjust only what you want

Curves, like Levels adjusts the image overall but with more control. Curves can also be adjusted by choosing the individual channel and adjusting just the information in that channel.
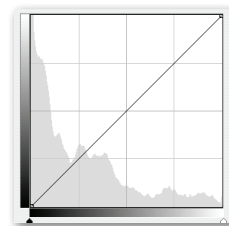

While adjusting channels gives more control, to the untrained eye it is difficult to adjust the specific areas of the image by using Curves. Each and every point along the line in the Curves dialog box indicates a specific area in the image that can be adjusted. The addition of the histogram tells you how the information is distributed across the image but not **where** the information is in the image.

In RGB mode and in Curves, if you hover over the image with the cursor (the cursor changes into an eye dropper), a small circle will appear on your ramp indicating where in the image that area is in relation to the ramp–you can then adjust the exact tonal range instead of guessing.
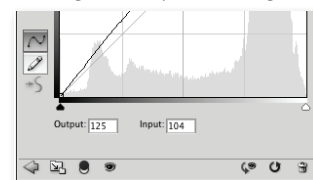
This works when each individual channel is selected also as well as in composite view. There is a catch however, as this **doesn't work in CMYK composite mode**, but it does work in CMYK channels.

NEW to CS4 is the ability to adjust the image by clicking on the image (when you have the Hand Tool Icon in the Curves panel) and adjust the curves in the exact location on the Curves ramp with out having to guess where to adjust.

Adjust Curves with Input and Output

Curves allow adjustment by choosing a point along the ramp and adjusting the output. In this example the input is at 39 and the output is at 47. The input is the point along the ramp of the original image–0 being white and 100 being black. The Output is the adjustment at that given point (47 in this example) is making the input point of 39 darker.

The Input and Output windows ONLY appear when a point is added to the ramp and can have values manually input.

Input and Output for Black and White

Input and output may seem a bit more complex but in reality it is quite easy when applied to color correcting images.

When preparing and image for newsprint, the specification for an image are generally to have an minimum of 8% highlight tone and an maximum of 88% shadow tone. Working with Curves this is easy to achieve–click on the highlight point and change the output to 8 (the input remains 0 since it is white) then click on the shadow point and change the output to 88 (the input remains at 100 since it is black). The 8% highlight and 88% shadow have been set!

Input and output for color matching

Color matching is where input and output are used quite extensively in conjunction with the Information Panel. Under the Information Panel choose Options and set one of the read outs to be CMYK as shown.

To **match the color of an image** to another, choose your eye dropper tool and do an 11 x 11 sample of the area of the image you want to match the color to and make a not of the color from your Information Panel. We'll use a CMYK value of 53%, 39% 47% and 6% as an example of the sampled color.
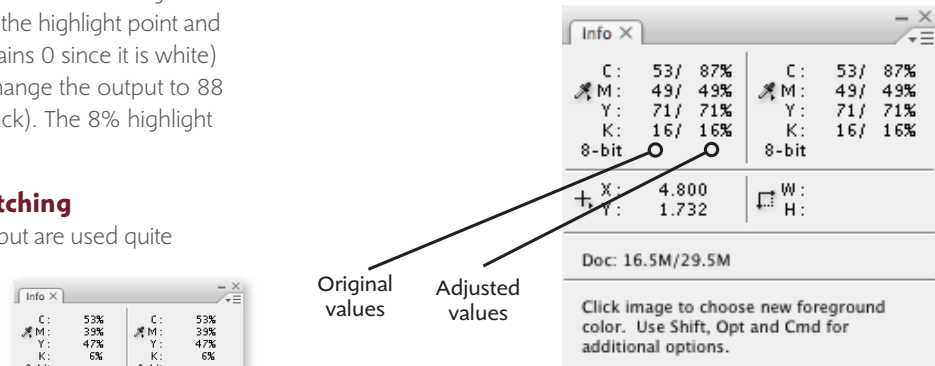
By using Curves on the image you want to adjust, start by adjusting the Cyan channel, then each subsequent channel. To adjust the channels to match the color, sample the image you want to adjust in the same area you sampled the color from the image you want match (this keeps the tonal range the same or similar).

With the Cyan Channel selected in the Curves Adjustment, hover over the sampled area on the image you want to adjust (the eye dropper will appear and show the area on the Curves ramp to click on). The area that you sample will give a CMYK reading in the Information Panel–we'll use a CMYK value of 87%, 44% 52% and 9%. Once that sampled area on the ramp appears as a circle, click on the ramp to add a point–the input and output box will appear.

Now, adjust that point on the Cyan ramp (down in this case) to match the original sampled number of 53% Cyan we used in the example.

Pay attention to the Information Panel, the read out of the values will show the values of the original image and the values of the same area that has been adjusted.

Original values   Adjusted values

Repeat each adjustment in Curves on the Magenta, Yellow and Black Channel using the initial values of 53%, 39% 47% and 6% that were used in our sample example.

The ending image will have been adjusted very closely to your original sampled image.

Match Color

Images>Adjustments>Match Color is available and does a similar job to matching the color as described using Curves. It requires 2 images, a source image for the color sampling and an image to apply the sampled color to. This however only works in RGB mode, not CMYK so try this before you convert you images.
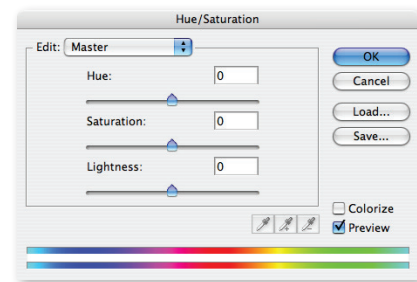
Match color also allows a bit more control of the image saturation and contrast but not much. Curves are better suited for final adjustment of images.

Hue and Saturation

The Hue/Saturation command lets you adjust the hue, saturation, and brightness of a specific color component in an image or simultaneously adjust all the colors in an image. This command is especially good for fine-tuning colors in a CMYK image.

Hue - is the color

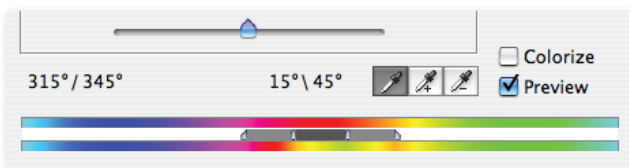**Saturation** - is the intensity of that color
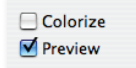
Lightness - is adds white or black to the Hue

With Hue and Saturation you can adjust the image by using the drop down Edit Menu to control certain areas of colors. These are not channels but ranges of color.

In this example, if the Reds were selected, the Hue and Saturation dialog box would isolate just the range of red and allow manipulation of the Hue, Saturation and Brightness as shown.

The Colorize button allows the image to appear monotone with just a Hue applied overall, much like a sepia-tone image.
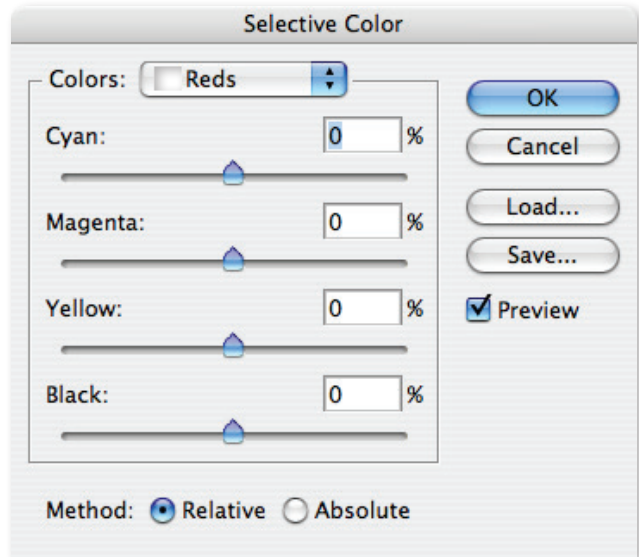
Hue and Saturation in the real world

The Hue/Saturation is widely used to make products different colors such as shoes, shirts, pants and cars. Instead of photographing numerous items of different color, one is used and the colors are adjusted starting with Hue and Saturation then with Curves and other adjustments to make the colors match the products.
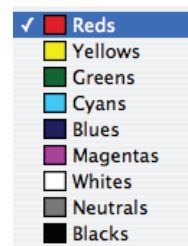
Selective Color

There are some images that are very difficult to color correct using Levels, Curves or Hue and Saturation. Selective Color is another color adjustment tool that allows the user to select from a **color range** and not a specific channel.

Relative - Changes the existing amount of cyan, magenta, yellow, or black by its percentage of the total. For example, if you start with a pixel that is 50% magenta and add 10%, 5% is added to the magenta (10% of 50% = 5%) for a total of 55% magenta. (This option cannot adjust pure specular white, which contains no color components.)

Absolute - Adjusts the color in absolute values. For example, if you start with a pixel that is 50% magenta and add 10%, the magenta ink is set to a total of 60%.

By choosing a color range from the color drop down menu, you can control the amount of Cyan, Magenta, Yellow or Black in that **specific color** by using Relative or Absolute color adjustments. This allows for finer color correction control than channels and also allows complete saturation or desaturation of the colors in the range.

Selective color adjusts in CMYK values but will work on both CMYK and RGB images.

Black and White images

Converting images to B&W was simple for many people, simply change the mode to Grayscale and the image dumped the color and converted everything to values of gray.

Easy… and it gives you the worst possible grayscale conversion in the process.

The way professionals have done it for years is to use the Image> Adjustments> Channel Mixer. By clicking on Monochromatic in the Channel Mixer, you can then adjust the values of gray from each channel to make the image look its best.
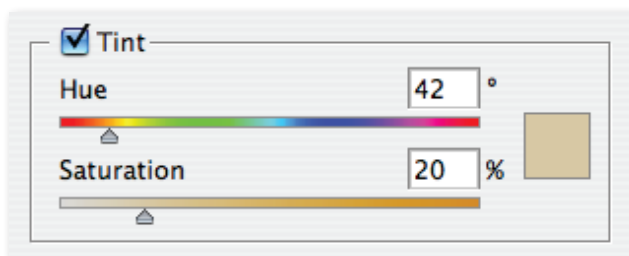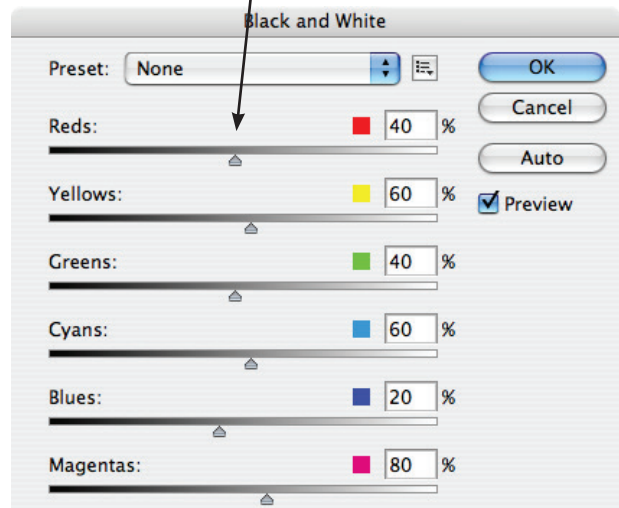
Or, do it the easy way!

Black & White adjustment under Image> Adjustments> Black & White.

This means little to most people as they never used anything else other than convert to Grayscale mode. And also with this, you'll need to make your image RGB, this doesn't work in CMYK mode.

Here is the cool part! Once the B&W adjustment is applied, this dialog box comes up with all these sliders for tonal adjustment. So why color with B&W?

The answer is that you can control these colors tonal ranges when converted to B&W–but in a way that is much more intuitive.

By clicking on the image when the B&W adjustment is active, the eye dropper will turn into a hand with 2 arrows. By sliding the hand left and right, the corresponding color in the image will be adjusted for the proper tonal range. All you have to do is pick the area of the image to adjust and slide it back and forth.

RGB images can also be made into sepia-tone images or images that have a hue and saturation applied by using the Tint options.