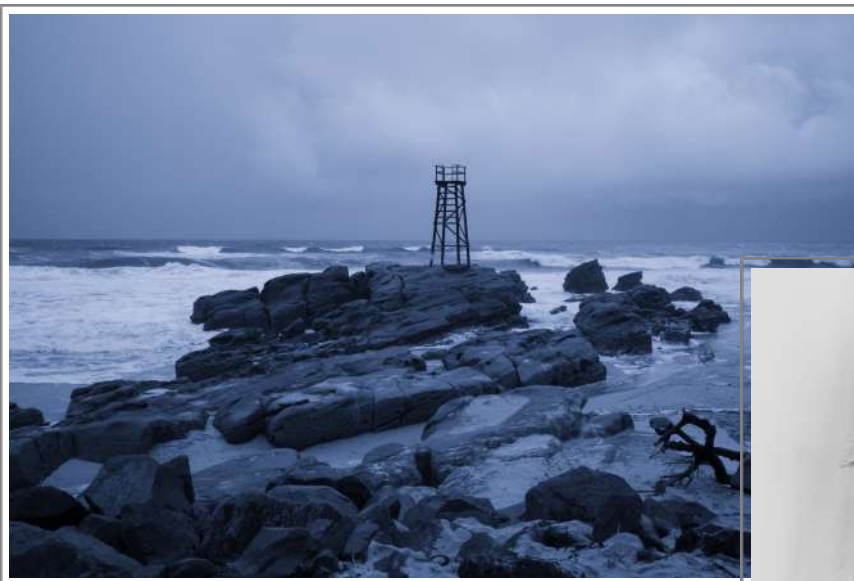


# THE BASIC PRINCIPLES OF CONVERTING COLOUR IMAGES TO MONOCHROME



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February 2023

# CONTENTS

Monochrome definitions	1
Why convert images to monochrome?	3
What makes a good monochrome image?	3
Should I set my camera to monochrome?	4
Colour is the key to monochrome	6
Tonal range	8
Controlling colour in Photoshop	10
Monochrome conversion techniques in Photoshop	12
Method 1 - Convert to grayscale	12
Method 2 - Desaturate	13
Method 3 - Hue/Saturation adjustments	18
Method 4 - Lab Colour	22
Method 5 - Gradient map	23
Method 6 - Channel Mixer	25
Method 7 - Black and White Conversion	31
Method 8 - Calculations	34
Method 9 - Colour Blending	36
Monochrome conversion in Adobe Camera Raw (ACR)	37
Monochrome conversions in Lightroom	39
Plug-ins for monochrome conversions	40
Which images best suit monochrome?	41
High Key Monochrome Images	42
Sometimes monochrome is not a good option	44
Toning Monochrome Images	45
Some General Conclusions	46

# Monochrome definitions

The **International Federation of Photographic Art (FIAP)** defines monochrome images as:

A black and white work fitting from the very dark grey (black) to the very clear grey (white) is a monochrome work with the various shades of grey. A black and white work toned entirely in a single colour will remain a monochrome work able to stand in the black and white category; such a work can be reproduced in black and white in the catalogue of a salon under FIAP Patronage. On the other hand a black and white work modified by a partial toning or by the addition of one colour becomes a colour work (polychrome) to stand in the colour category; such a work requires colour reproduction in the catalogue of a salon under FIAP Patronage.

The **Photographic Society of America (PSA)** defines monochrome images as follows:

An image is considered to be Monochrome only if it gives the impression of having no color (i.e. contains only shades of gray which can include pure black and pure white) OR it gives the impression of being a grayscale image that has been toned in one color across the entire image. (For example by sepia, red, gold, etc.) A grayscale or multi-colored image modified or giving the impression of having been modified by partial toning, multi toning or by the inclusion of spot coloring does not meet the definition of monochrome and shall be classified as a Color Work.

These definitions are rather wordy, but to put it simply - **a monochrome image must contain only one colour, but it can be any colour.** Using the above definitions, the following images would all be classified as monochrome:



The following images would NOT be classified as monochrome because the image of the girl has areas that are coloured and the landscape is a duotone image with blue tones in the shadows and yellow tones in the highlights.



# Why convert images to monochrome?

By translating the colours into monochromatic tones it is possible to emphasise lines, tones, contrasts, textures, composition, framing, selective focus, interactions between image elements, etc., WITHOUT THE DISTRACTION OF COLOUR. This is illustrated in the following image:



Removing the colours focuses attention on the interaction between the children and makes it easier to remove some of the potential distractions (such as the leaves on the ground and the crowd in the background)].

Monochrome images allow the photographer to selectively emphasise the compositional elements that are important to the message that is intended to be communicated by the image.

## What makes a good monochrome image?

It is easy to produce a monochrome image - a later section of this paper explains several different ways of doing it. However, powerful monochrome images are usually previsualized as monochrome images rather than the monochrome conversion being an afterthought. Of course, good monochrome images will have all the usual strong features - good composition, appropriate clarity, and so on, but the at the time of capture and during processing the following factors are particularly important:

**A good colour image:** If you start with a poor quality colour image you will rarely produce a good quality monochrome image. You will see later that successful

monochrome conversions rely on translating colours into appropriate shades of grey, so it is helpful if you start with images that have well defined colours and no colour casts.

**Tonal Contrast:** Strong contrast helps to define shapes and bring out textures. Well-defined whites (not over-exposed) and well-defined blacks are critical in most monochrome images. Controlling the dynamic range of your captured image is critical.

**Separation of the subject from the background:** Monochrome images rely on tonal differences for separation (whereas colour images can use colour differences for separation) - so clear backgrounds can be helpful.

**Simplicity of composition:** Images that have obviously strong or dominant compositional elements such as shapes and lines can often be simplified and strengthened by removing the colour.

**Expression:** Removing the colour from images of people (particularly portraits) can concentrate attention on their expression and help to create an emotional connection with the viewer.

**Texture:** Textures created by contrast and by directional light can add depth and interest to a monochrome image.

**Shadows:** In a monochrome image a shadow can often carry more visual weight (and more interest) than in the colour original.

These concepts are illustrated later in this paper in the section on “Which Images Best Suit Monochrome”.

## Should I set my camera to monochrome?

Most digital cameras will allow you to save monochrome images rather than colour images to the memory card. Generally this is NOT a good idea. The main reason is that the “Black and white” setting on most digital cameras records a JPEG file rather than a RAW file. Recording RAW files gives you better quality images and greater flexibility when editing your images. Recording RAW files also means that you have a colour version of your images should you decide later that this is what you want.

The second reason for not setting your camera to monochrome is that the camera will apply a standard conversion process to the colour information. It will convert *all* images using the *same* ‘formula’. This may give satisfactory results of **some** images but it is very unlikely to give the best results possible for **all** images, especially when the content of the images is very different (some landscapes, some portraits, and so on).

*Doing your monochrome conversions in an image editor such as Photoshop allows you to use a conversion process that suits each individual image, and it gives you control over how that conversion process is applied.*

The problem with not having control over how your camera makes monochrome conversions is illustrated with the following images:



This is the original colour image.



This is the monochrome image taken with "Camera 1".



This is the monochrome image taken with "Camera 2". You can easily see that the two cameras treat the colours differently when making the monochrome conversion.

The benefit of being able to control the monochrome conversion in your image editor is illustrated with the following conversion of the colour image shown above:



One possible monochrome conversion in Photoshop.

You can see how the tonality of some of the original colours is very different from that obtained 'in camera'.

A third reason for not setting your camera to monochrome is that you will be throwing away the colour information. You cannot get it back! If you decide later that you would like a colour version of the image you will not be able to get it.

**NOTE:** Some digital cameras are able to record a RAW file and a JPEG file simultaneously. By selecting this option and then selecting the "Black and White" option on the camera you are able to record all the colour information in the RAW file and also save a JPEG version of the monochrome image. You see a monochrome version of the image on the camera preview screen. This can be useful if you know that you want to later produce a more refined monochrome version of the image in your image editor.

## Colour is the key to monochrome

The secret to being able to select the best process for a monochrome conversion and apply that process skilfully is understanding **colour** and **tone**. So before considering some specific conversion techniques I will review some basic ideas about colour and tonal range.

Colours can be described by three characteristics - hue, saturation and brightness.

**HUE:** The name of the colour – e.g., red, green, blue, yellow, purple.

**SATURATION:** The intensity or depth of the colour – e.g., pale pink, vibrant red.

**BRIGHTNESS** or **LIGHTNESS:** How light or dark a colour appears.



Changing just one of these characteristics while keeping the other two constant makes a big difference to what we see. For example, if we start with pure red:

Changing saturation



Changing lightness



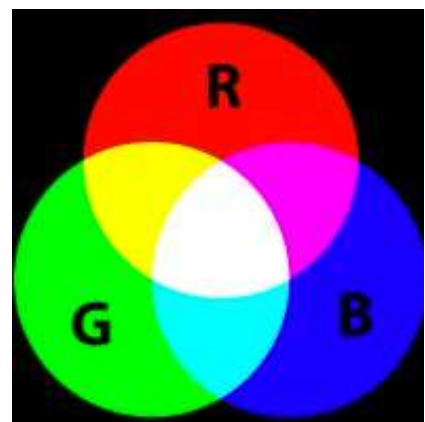
Changing hue



You will see the importance of being able to control the hue, saturation and lightness of colours in an image when we explore various techniques for monochrome conversion. But first we will consider how image processors such as Photoshop deal with colour information in an image file.

During digital processing, each pixel in an image is represented in the computer as specific values of red, green and blue colour components (that's why it's called an RGB image). Combining these colour components produces a spectrum of possible colours. The perceived colour of any pixel depends on the intensity of each of the three component colours (R, G and B) used to produce that pixel.

Red, green and blue are referred to as **primary** colours and they have been chosen because of the particular sensitivity of the human eye to light. (Some other colour systems use different primary colours.) When two primary colours of equal intensity are combined, the only colours they can produce are the **secondary** colours (cyan, magenta and yellow in the RGB system). Combining the three primary colours in equal intensity produces white. The absence of all colour produces black.

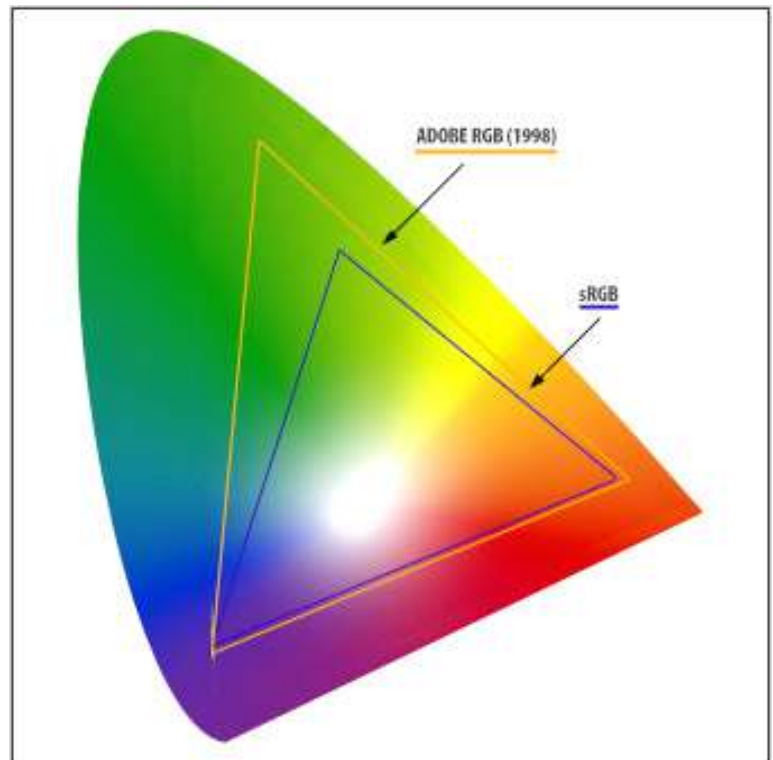


The range of colours that can be reproduced when red, green and blue of different intensities are combined is called a *colour space*. The values of the hue and intensity that define red, green and blue set the boundaries of the colour space (the limits to the colours that can be reproduced in that colour space). The two most common colour spaces that you will encounter in photography are called Adobe RGB (1998) and sRGB.

The total range of colours shown in the diagram below represent the typical limits of the human visible spectrum. As you can see in this image, the sRGB colour space is smaller than the Adobe RGB colour space (it contains fewer possible colours) and the RGB colour space is smaller than the range of colours that humans can typically see.

This just means that modern technologies, such as monitors and printers, are not capable of producing all the colours that humans can see. The difference is most obvious in the green areas of the spectrum.

I will not go into the pros and cons of capturing and processing images in different colour spaces in these notes. However you should be aware that at the present time it is only high-end (expensive) monitors, printers and photographic papers that are capable of reproducing the full Adobe RGB spectrum. For most of your photographic work the final print or digitally displayed image will be quite satisfactory in the sRGB colour space.



When exploring colours in an image editor (such as Photoshop) you will find that the intensity of each of the three primary colours (R, G and B) can have a value between 0 and 255 where 0 means none of the colour is present and 255 means the colour has its maximum intensity. For example, whatever your monitor represents as “pure red” will have R = 255, G = 0 and B = 0. Likewise, cyan will have R = 0, G = 128, and B = 128.

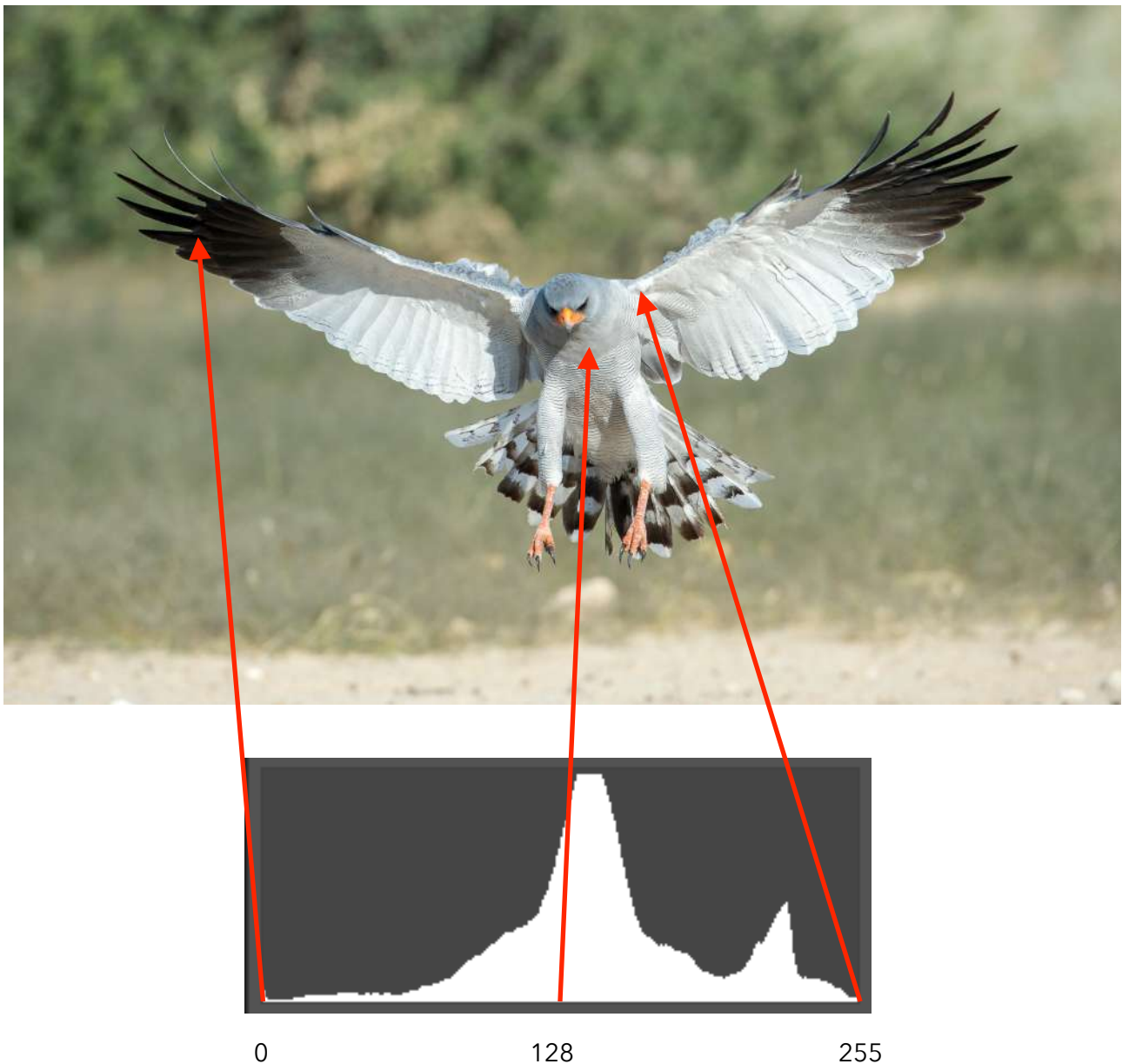
To experiment and see what colours are produced by different combinations of R, G and B have a look at [www.magicschoolbook.com/science/colourmix.html](http://www.magicschoolbook.com/science/colourmix.html).

## Tonal range

In any scene that you photograph, the difference between the darkest and brightest areas in the scene is referred to as the dynamic range of the scene. In many cases (because of the limitations of your camera or because of poor exposure choices) the captured image will not include the full range of tones in the scene. When the tonal range of the captured image is less than the dynamic range of the scene the image may lack contrast and look ‘flat’. This is generally not desirable when you are producing monochrome images so it is important to consider how you can maximise the tonal range at the time of capture and when processing your images.

The easiest way to check the tonal range of an image is to look at its histogram. The histogram, whether displayed on your camera or in an editing program, is simply a graph that shows the distribution of the brightness values of the pixels. Those values

can range from 0 (the blackest black) to 255 (the whitest white). The following example shows how the brightness values of an image map onto its histogram.



There is no 'perfect' histogram, it is always simply a way of representing whatever tones are in the image. However, it is a useful way of quickly identifying whether or not your image has an appropriate range of tones so that it is not seriously under-exposed or over-exposed.

As an approximate guide, shadow areas that fall below about 15 on the histogram will have no visible detail and highlight areas that fall above about 240 on the histogram will have no visible detail.

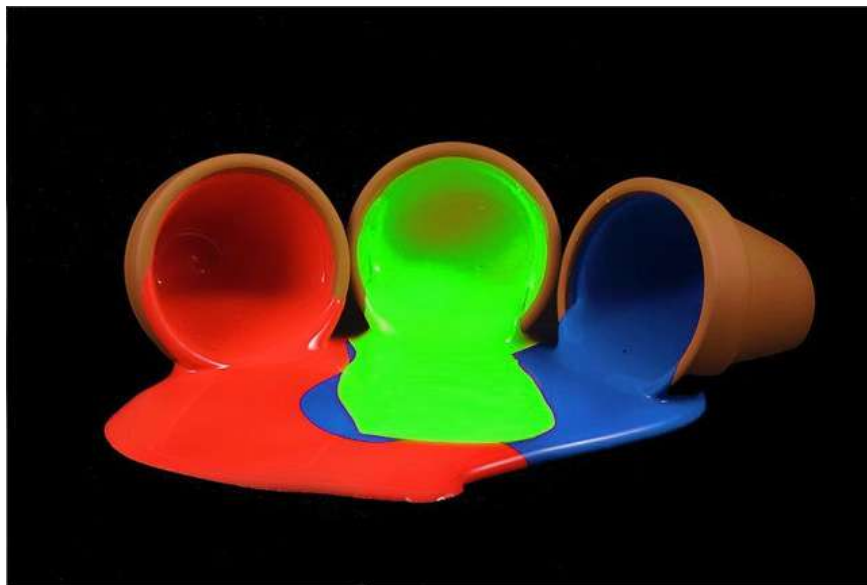
Before considering how to convert any colour image to monochrome, it is important to consider whether or not the image has an appropriate range of tones; that is, whether or not it is correctly exposed. If necessary, the overall exposure and the black and white points should be adjusted before a monochrome conversion is made.

# Controlling colour in Photoshop

**The secret to producing good monochrome images lies in being able to control colour;** it is not simply a matter of “getting rid of colour”. To control colour, it helps if you understand how programs such as Photoshop produce colour images.

Photoshop (and similar image editors) store colour information in CHANNELS. When the colour mode is set to RGB, there are three channels, one each for the red, green and blue colour information in the image that is being displayed. Each channel is effectively a grayscale map that shows the intensity of the relevant colour (R, G or B) for each pixel in the image.

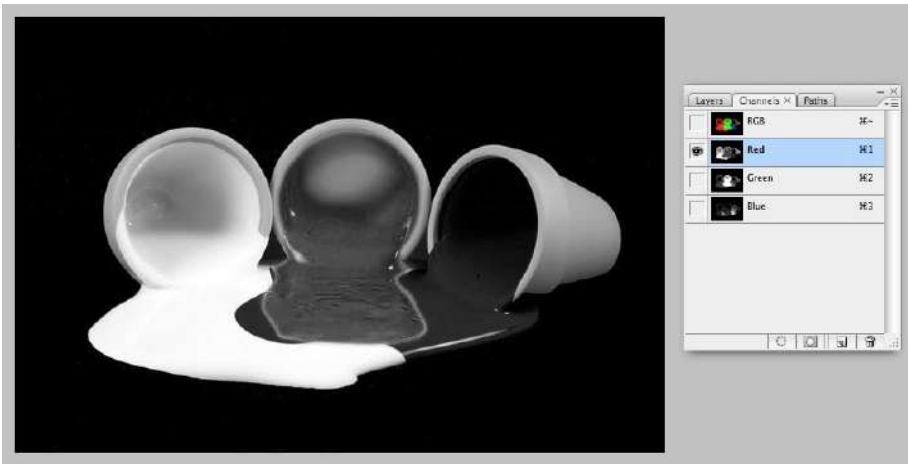
Consider this simple image that has areas that are approaching “pure” red and green, and a blue area that looks as though it could have considerable amounts of other colours mixed in with it.



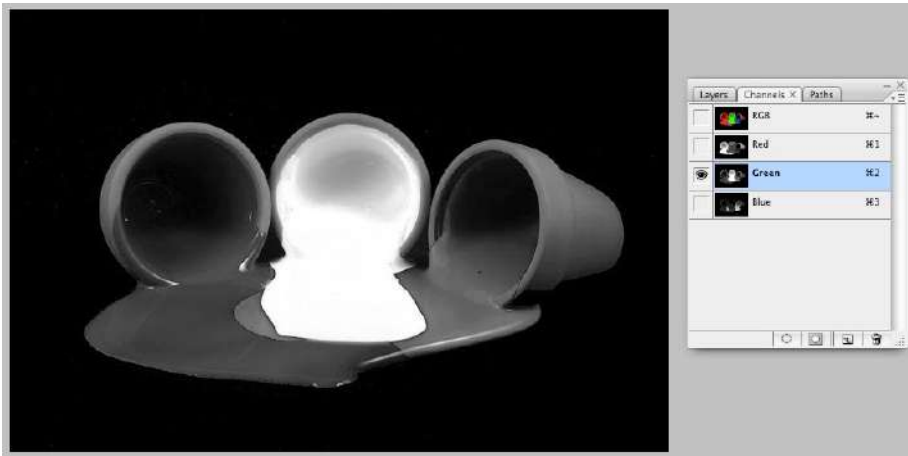
If we open this image in Photoshop and then open the Channels palette (from the menu select Windows>Channels) we see the following:



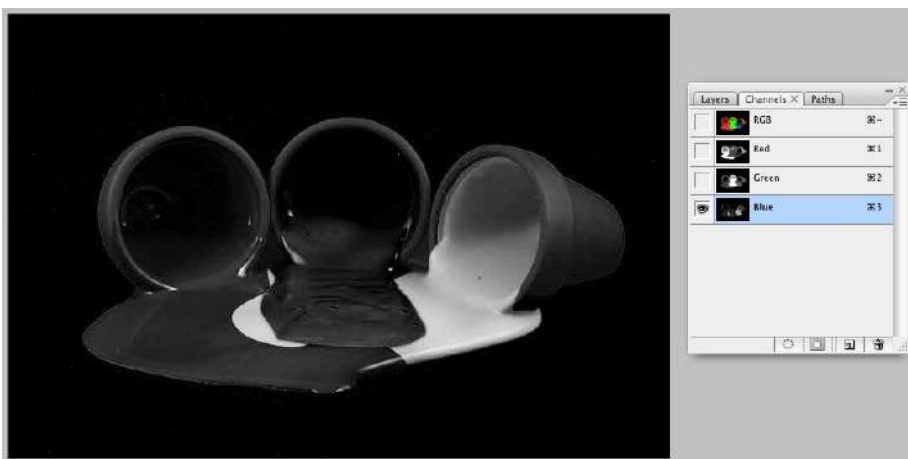
By viewing each channel separately (turn off the "eye" for the channels you do not want to be displayed) we can see how the colour image is made up of varying amounts of red, green and blue information.



RED channel



GREEN channel



BLUE channel

In each of the channels, light areas represent intense amounts of the relevant colour and dark areas represent an absence of that colour. In the red and green channels there are very bright areas corresponding to the intense amounts of red and green that we saw in the colour image. However, in the blue channel the light areas are not nearly so bright, which is what we expected since the "blue" area of the colour image is obviously not "pure". By looking at the red and green channels we can see that the "blue" areas of the image contain a considerable amount of green (they are almost mid-grey in the green channel) but very little red.

At this stage in the journey towards producing monochrome images the following points have been established:

- Each pixel in a colour image has varying amounts of red, green and blue.
- The colour information is stored in three channels.
- Each channel shows the distribution and intensity of the relevant colour.
- When the red, green and blue components in a pixel are equal, that pixel will be a shade of grey; the more intense the colours the lighter the shade of grey.

We will now use this information to explore a range of ways of converting colour images to monochrome images.

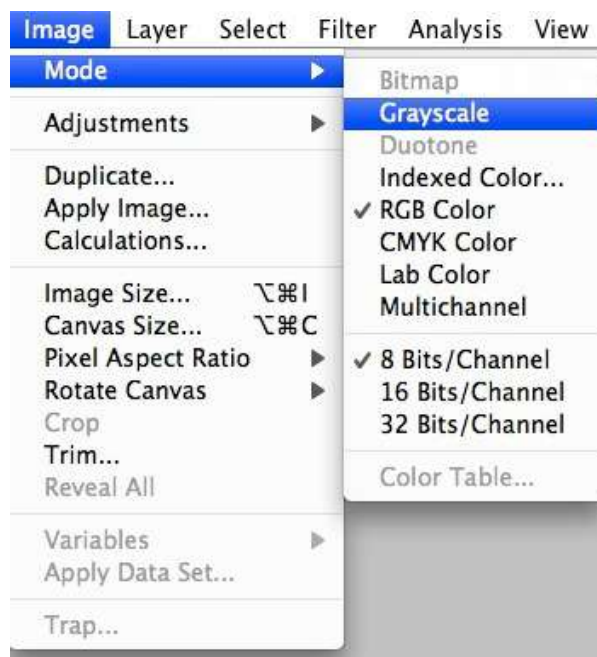
## Monochrome conversion techniques in Photoshop

Although the following notes are based on the use of Photoshop, many of the techniques described here are available in other image editors. If you understand the principles behind each technique it should not be too difficult to work out which techniques are possible in your favourite image editor.

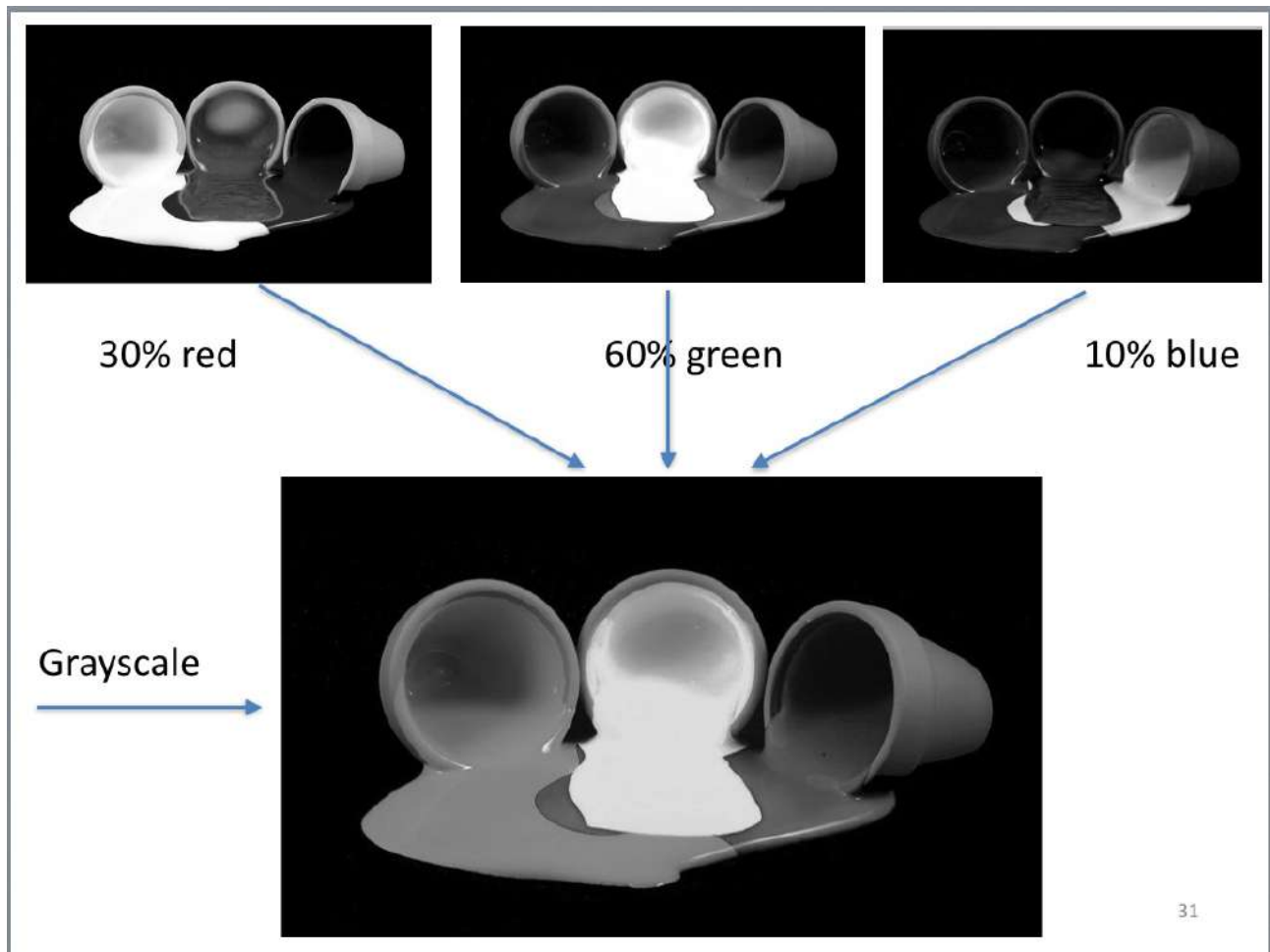
The techniques described here progress from the very simple to the more complex. As a general rule, the more complex techniques are capable of producing better results because they give you more control over the conversion process. However, there are some images that convert quite well using the simple techniques. The basic rule is: ***use a conversion technique that suits your image.***

### Method 1 - Convert to grayscale

To achieve this conversion, select **Image>Mode>Grayscale** from the menu.



Photoshop will then combine the information in the red, green and blue channels in the following way to produce a grayscale image and a new grayscale channel:



It is fairly obvious in this image that the green components of the original image dominate the conversion process and the blue components have almost no effect. For some images this may be what you want, but it rarely produces the best possible result.

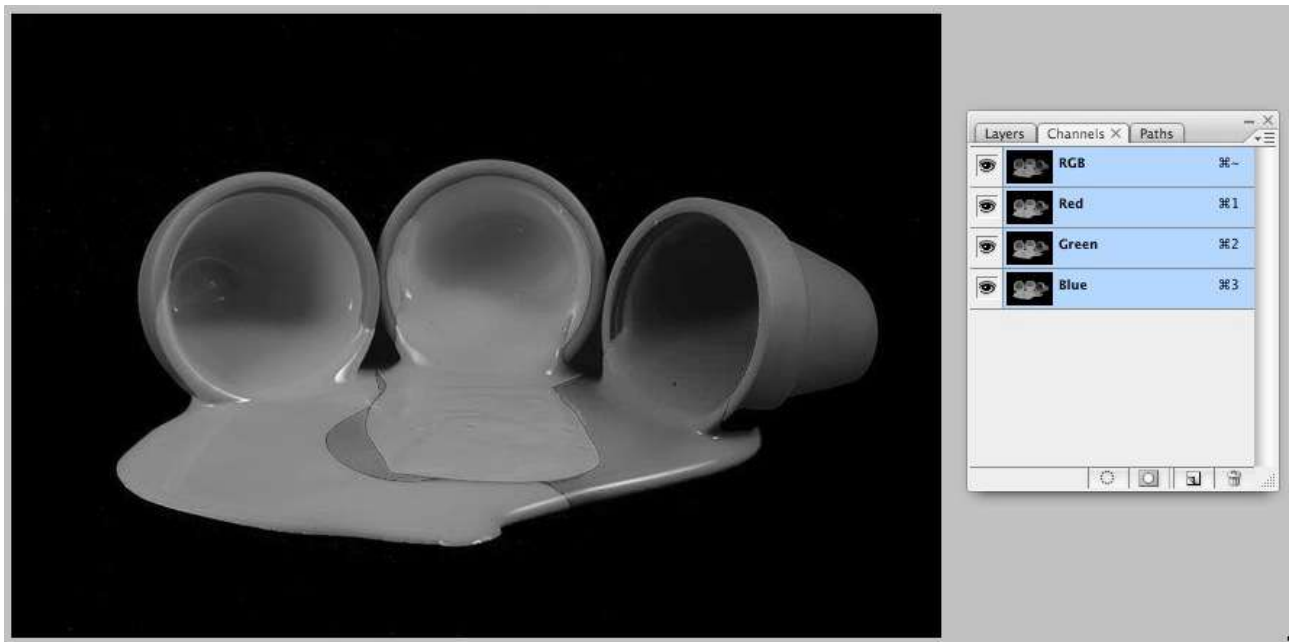
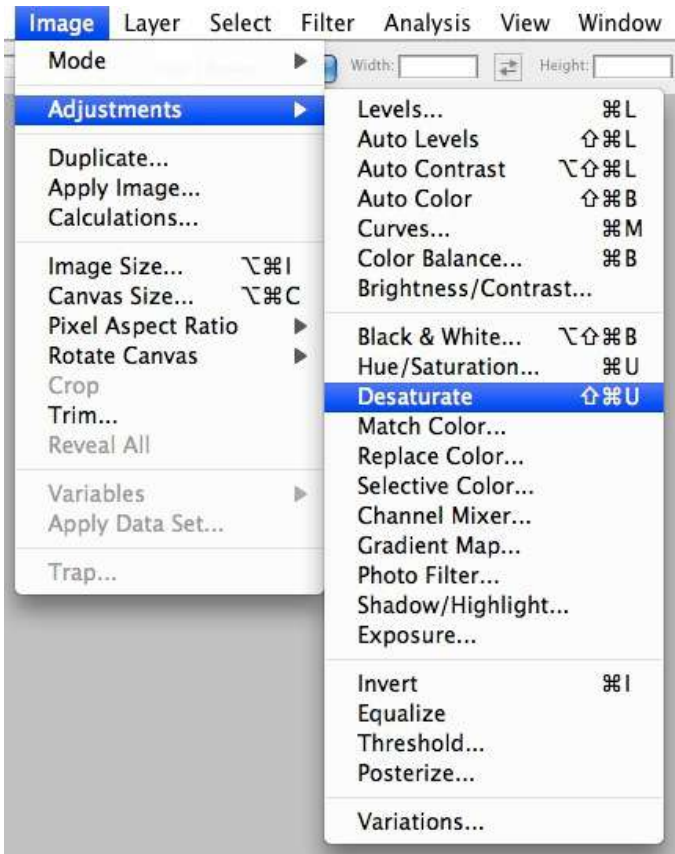
Most importantly, this is a destructive process. The three colour channels (R, G and B) are discarded immediately so **there is no longer any colour information associated with the image**. If you save and close this grayscale image you cannot reverse the process and get back to the colour image. Because there is no longer any colour information available, your options for further adjusting the image are severely restricted. *This method of monochrome conversion is not recommended.*

## Method 2 - Desaturate

Desaturation means removal of colour and it is a simple process that is achieved by selecting **Image>Mode>Desaturate** from the menu.

This process retains the R, G and B channels but they now all contain the *same* information. You have NO control over how Photoshop makes this conversion. If the image is saved, the colour information is lost and the process cannot be reversed.

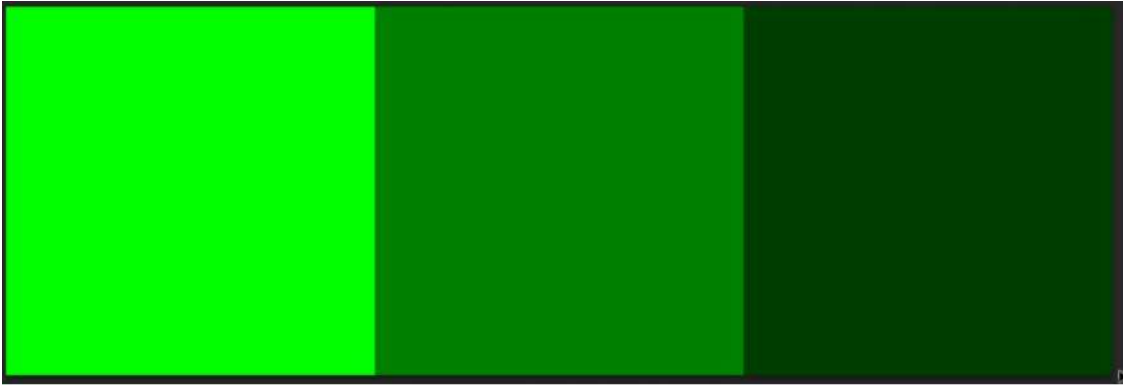
Conversions made in this way generally produce poor results, often with very low contrast, as shown in the following example.



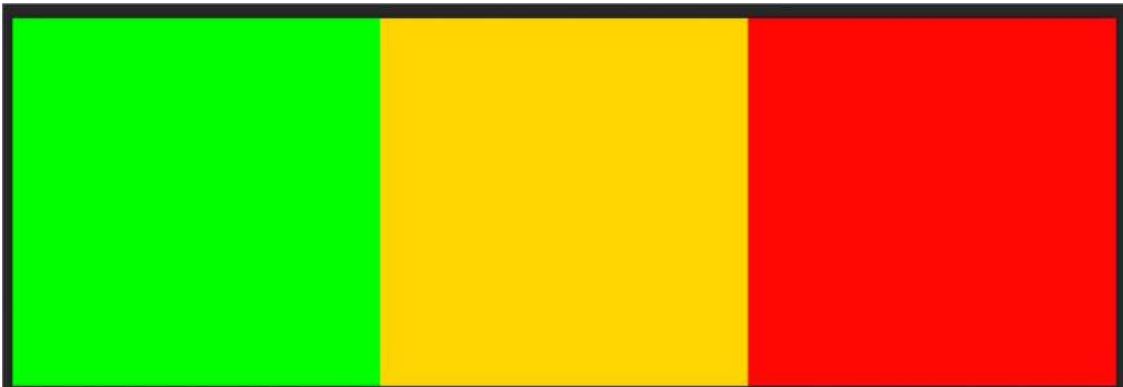
As you can see, the result is far from satisfactory and will almost never give the best possible result.

To understand the importance of using conversion techniques that retain colour information and give you control over how it is used, consider the following examples of what happens when colours of similar hue, brightness or saturation are changed to grayscale by either the desaturation or convert to grayscale methods.

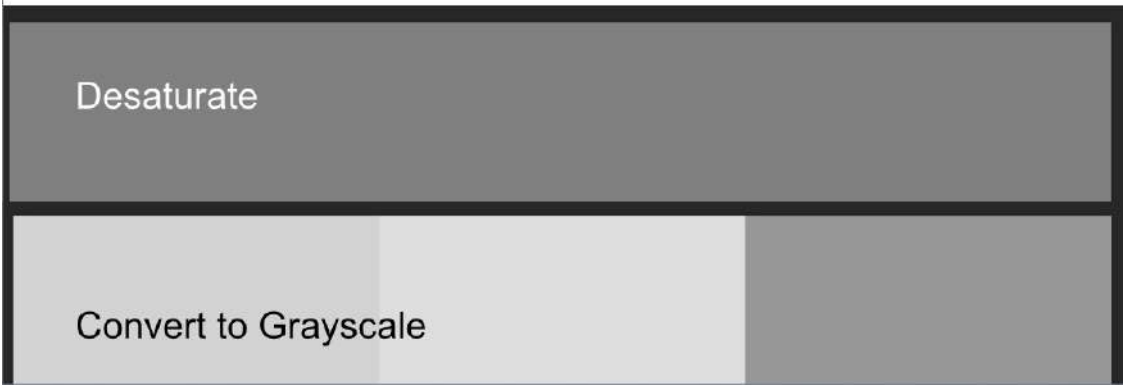


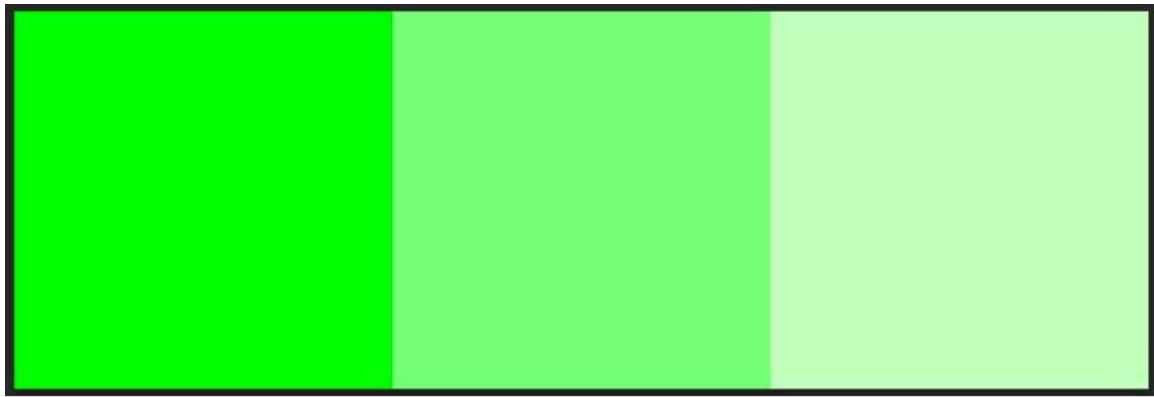


Same hue and saturation– different BRIGHTNESS.

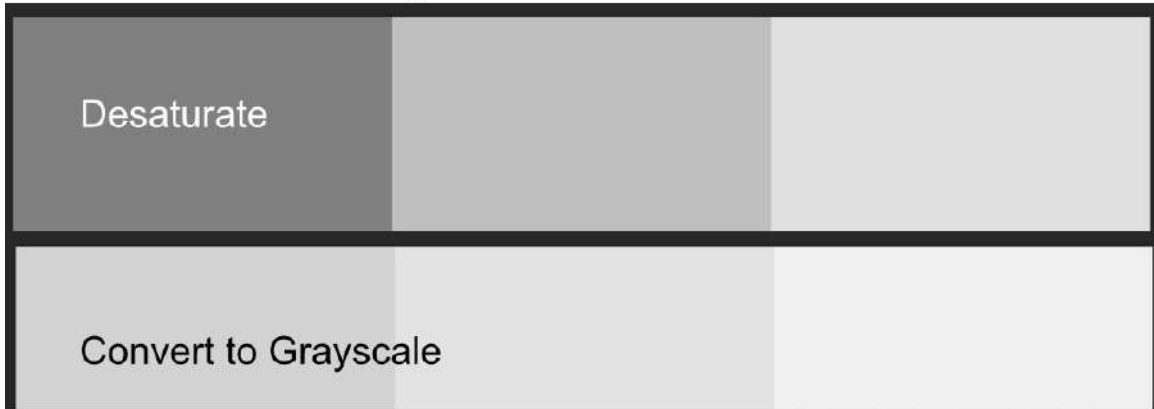


Same saturation and brightness – different HUES.

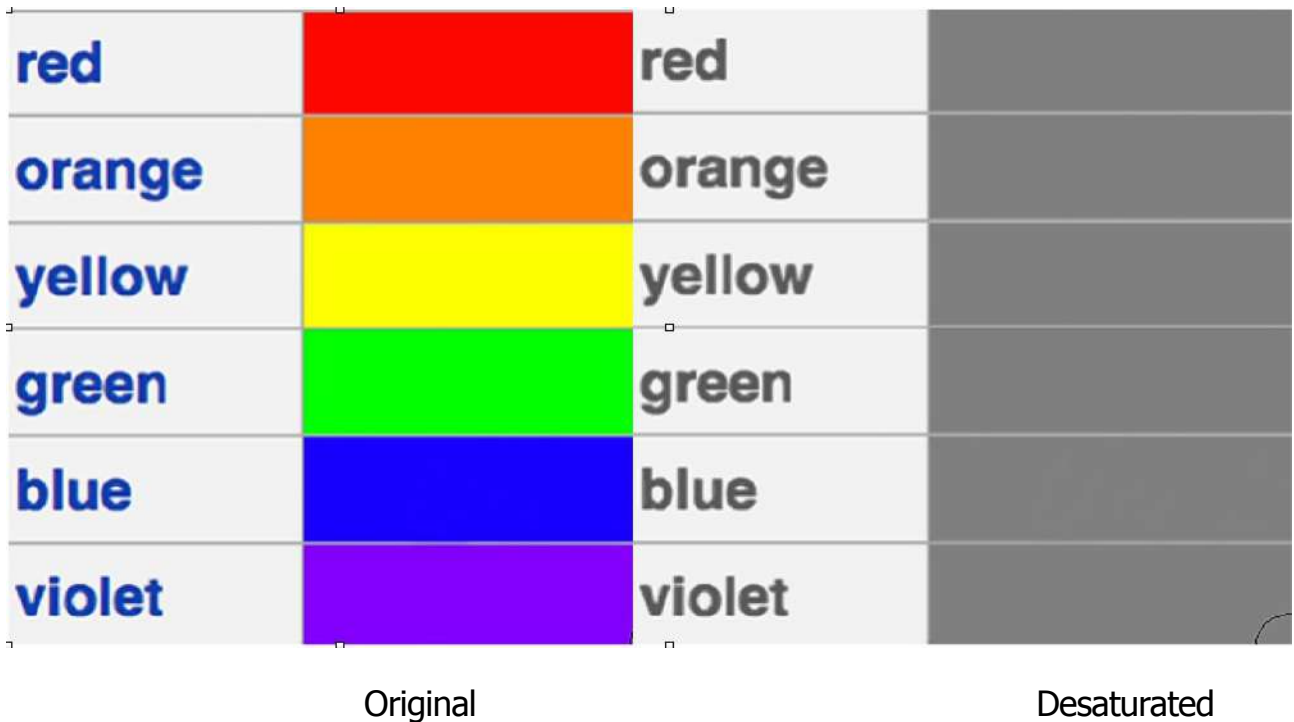




Same hue and brightness – different SATURATION.



And if you still need convincing, consider what would happen if you simply desaturated a multicoloured image in which the colours had the same levels of brightness *and* saturation:



In this case, all the desaturated colours finish up being the same shade of grey.

On 'real' images, the result could be disastrous as these examples illustrate:



Original



Desaturated



Original



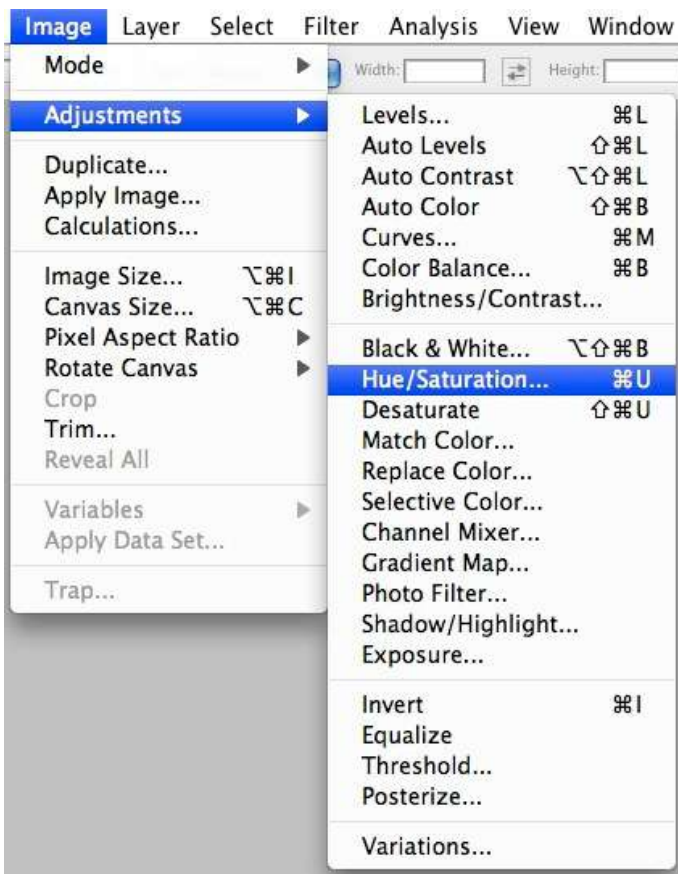
Desaturated

Because of the limitations of the simple conversion processes described so far, it is useful to consider conversion methods that do two important things:

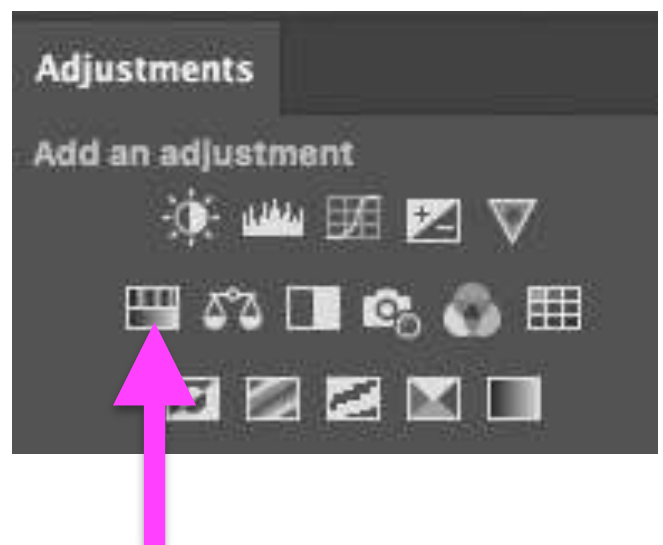
1. Give you more control over the conversion process.
2. Retain the colour information so that the conversion process can be reversed or adjusted at a later time.

## Method 3 - Hue/Saturation adjustments

The Hue/Saturation adjustment can be activated in two ways, either from the menu or from the Adjustments Panel. Activating it from the Adjustments Panel is preferred because this creates an adjustment layer, whereas activating it from the menu means the adjustments are made directly to the image and they become destructive (changing the actual pixels rather than just changing the appearance of the image).

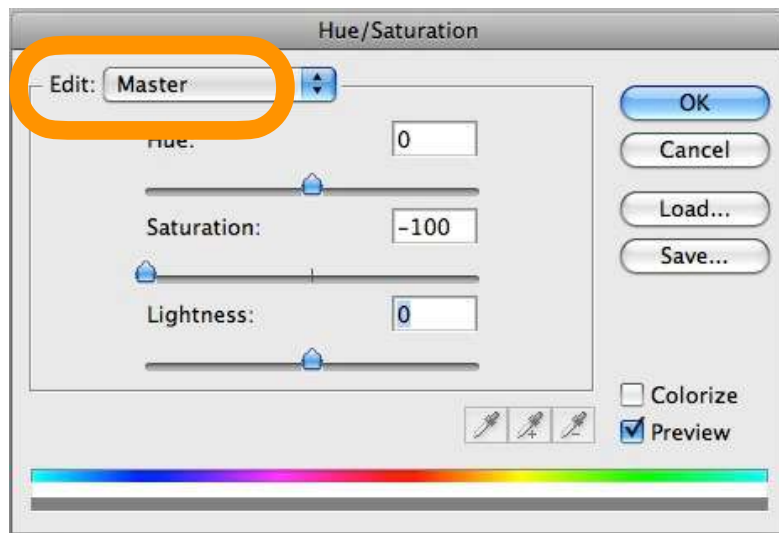


MENU



ADJUSTMENTS PANEL

Once the Hue/Saturation panel appears, moving the “Saturation” slider fully to the left will desaturate the image and give the same appearance as that obtained with the Desaturation method described previously.



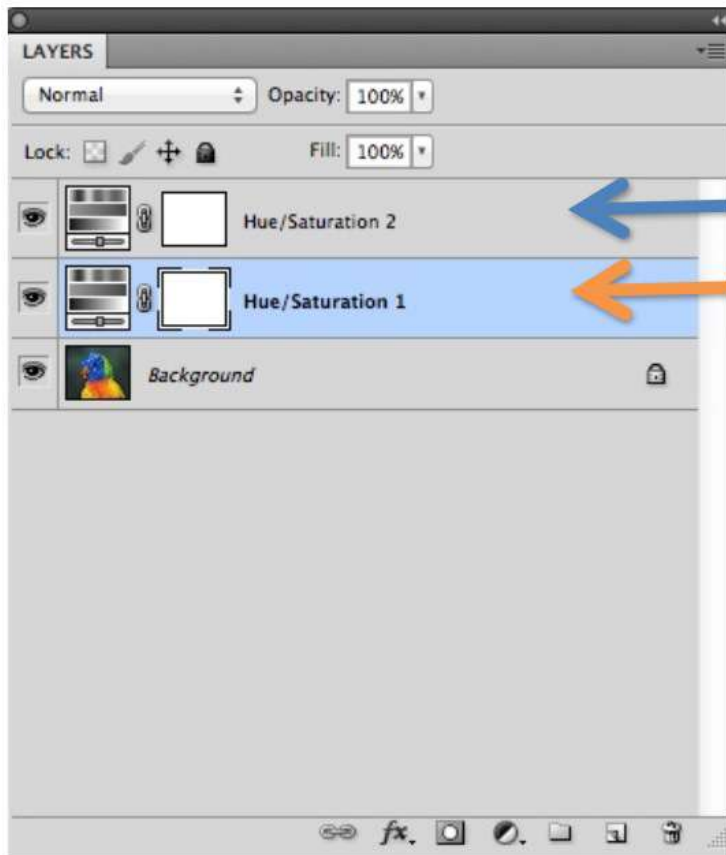
At first, that might seem rather pointless, but there are two ways of gaining some control over this conversion process. The first approach is to leave the “Saturation” slider fully to the left, then select a primary or secondary colour from the “Edit” drop down menu and adjust the lightness of that colour. Each of the primary and secondary colours can then be selected and their brightness adjusted independently of how the first colour was adjusted.

A couple of quick adjustments to the brightness of the reds, blues and yellows transformed the previously dull balloon image to this:



Still not fantastic, but a big improvement over a simple desaturation.

Another way of gaining more control over the conversion is to add a second Hue/Saturation adjustment layer and use it to adjust the lightness of the various colours.



“Master” desaturation

“Lightness” adjustments on various colours

This gives a considerable amount of extra control over the monochrome conversion, as illustrated in the following image that compares the results of using one or two Hue/Saturation adjustment layers on the lorikeet image.



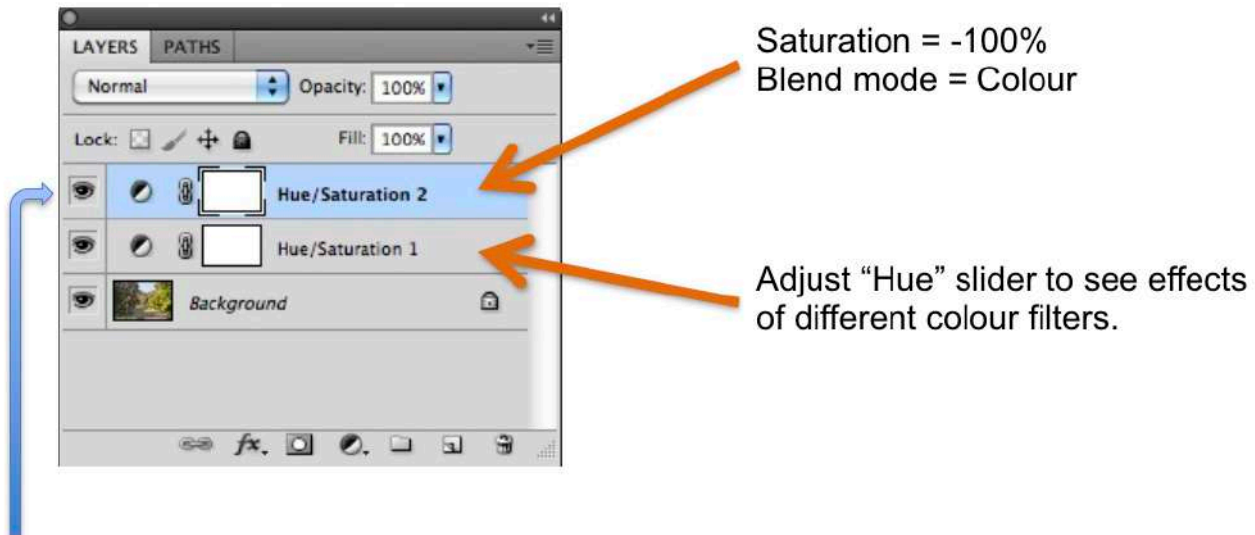
Single Hue/Saturation adjustment layer with saturation slider taken to -100.



Two Hue/Saturation adjustment layers - one to desaturate, one to adjust lightness of individual colours.

One advantage of experimenting with this method of conversion is that it helps you to understand the relationship between the intensity of various colours and the tonality of the final image. The main problem with this approach is that it can become very fiddly. The lightness adjustments of the various colours tend to interact since areas that contain a lot of red often also contain a lot of yellow; areas containing a lot of blue often have a lot of cyan, and so. To get a satisfactory result you may have to readjust several of the colours.

A further refinement of this approach uses two Hue/Saturation layers to simulate the effect of using a colour filter when capturing the image:



Create two hue/saturation layers

Selecting different Hue values on the bottom Hue/Saturation layer can give different effects, as shown in this example:



## Method 4 - Lab Colour

This method converts your image from the RGB colour space to the Lab colour space. The Lab colour space has three channels, one of which is the Lightness channel. The conversion process is:

1. Select Image>Mode>Lab Colour
2. In the Channels panel select the Lightness Channel (if the Channels panel is not open select Window>Channels from the menu).
3. Select Image>Mode>Grayscale to get out of the Lab colour mode.
4. You will be prompted to discard the other channels, so click OK.

The result of this process may be similar to Method 1 (convert to grayscale) but it usually gives a better result.

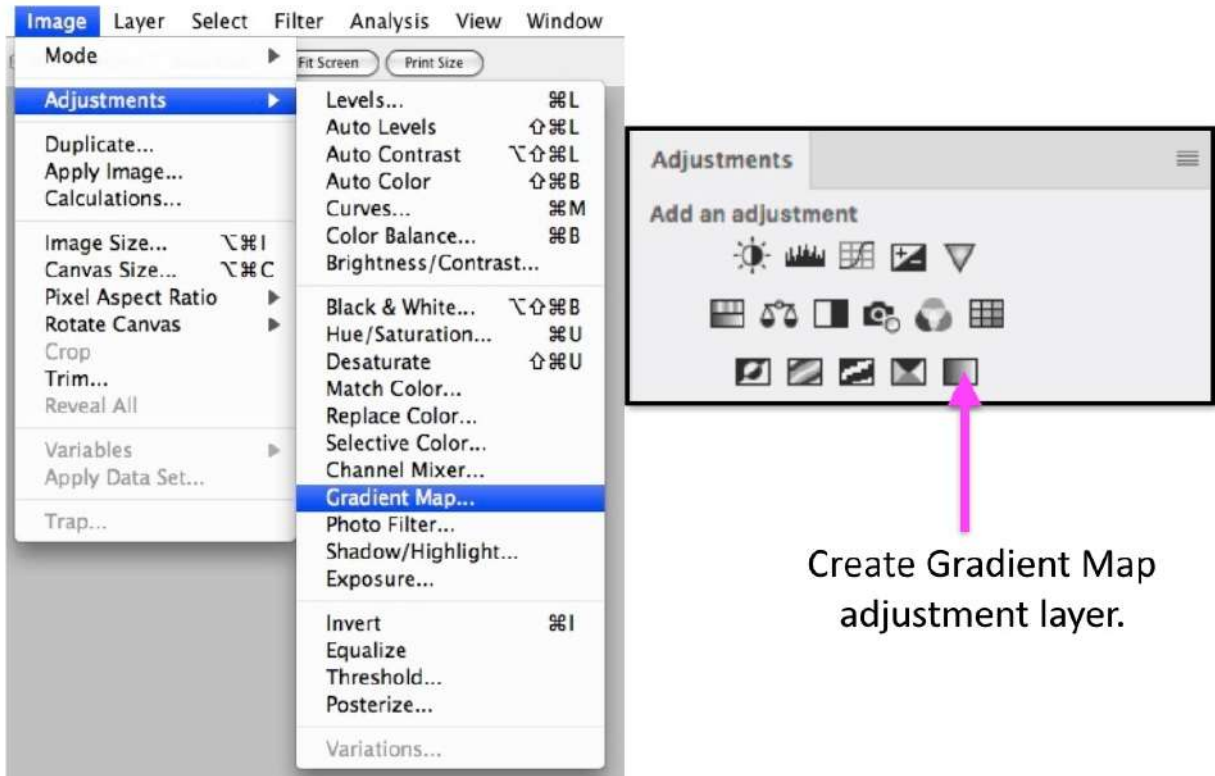
The disadvantage of this method is that it is destructive (cannot be reversed) and you have limited control over the conversion process. The result for the balloon image was this:



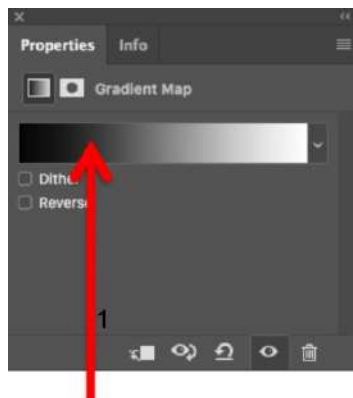


## Method 5 - Gradient map

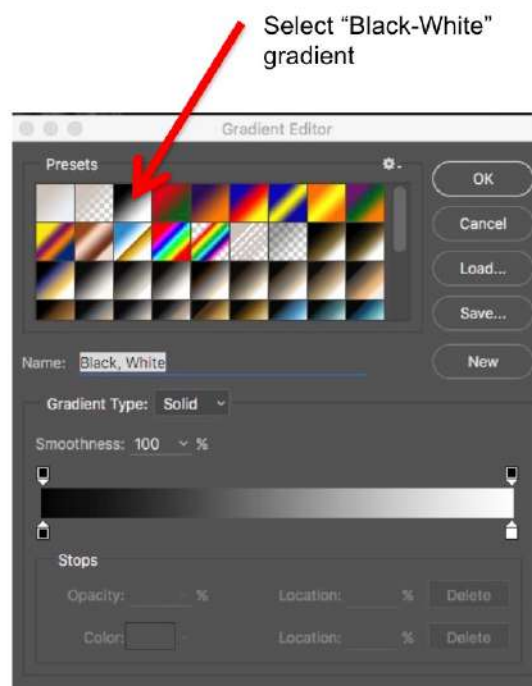
This is a simple way to maximise the tonal range in an image as you convert it. The Gradient Map can be selected from the menu or applied as an adjustment layer (which is recommended).



Either approach brings up the Gradient Map window. If the gradient that is showing is not the black-to-white gradient simply click on the gradient to bring up the Gradient Editor window. Then select the the black-to-white gradient by clicking on it.



If the black-to-white gradient is not showing, click here to bring up the gradient editor.



*This Gradient Map has the effect of making the lightest pixels in the image white and the darkest pixels in the image black. The lightness of the other pixels is then converted to shades of grey in a linear fashion (equal changes in brightness correspond to equal changes in the shades of grey). A typical result is:*



Comparing this to what we would get by simply desaturating the colour image we can see that the Gradient Map produces a much crisper image with more contrast.



Desaturated

Gradient Map

It is often worth applying a gradient map to give your image a little more 'punch' after you have done an initial monochrome conversion by some other method.

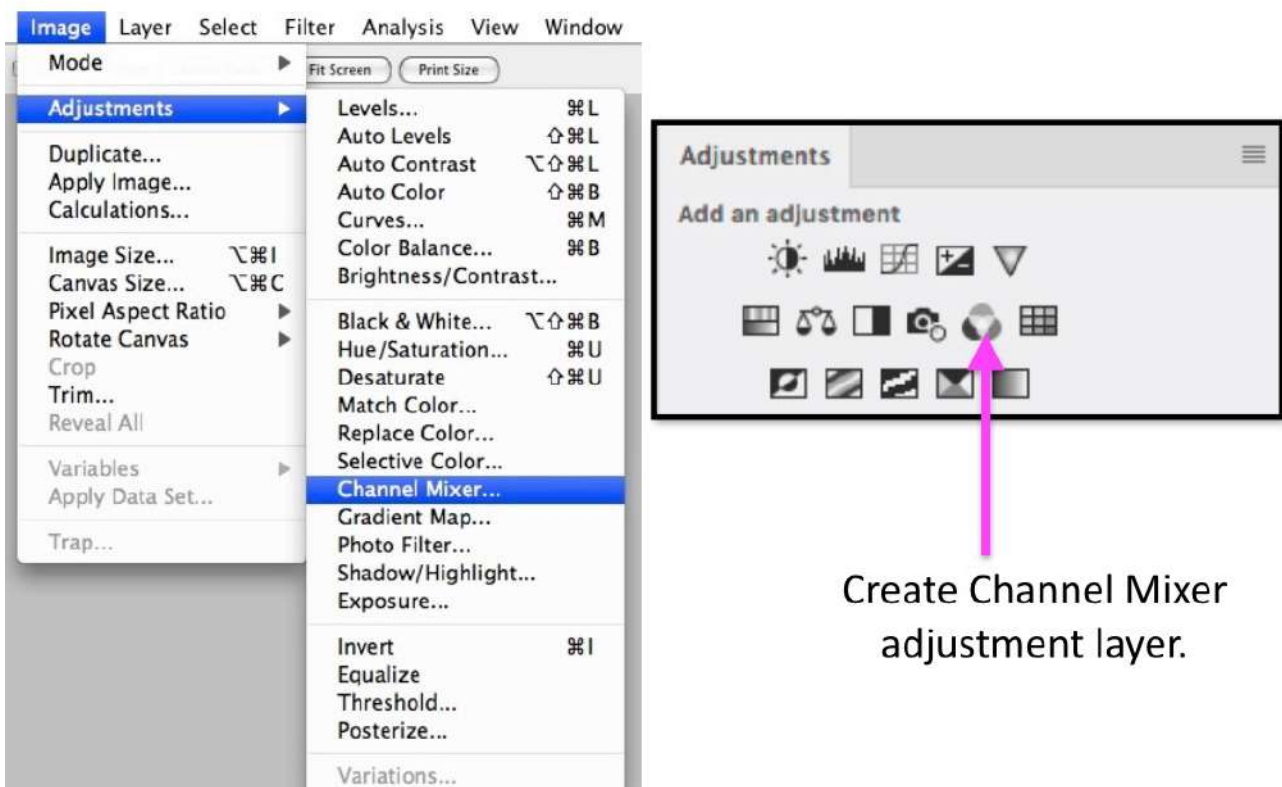
## Method 6 - Channel Mixer

We saw earlier that Photoshop stores colour information in three Channels (R, G and B) and that the luminance values of that information can be used to create monochrome images. For example, when you convert an image to grayscale Photoshop combines 30% of the red channel luminance with 60% of the green channel luminance and 10% of the blue channel luminance.

The Channel Mixer approach to monochrome conversion allows you to control how much each of the three channels contributes to the final monochrome image rather than just accepting the Photoshop defaults that are used for for grayscale conversion.

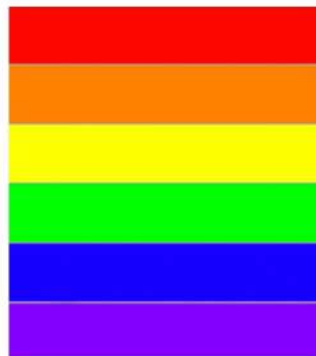
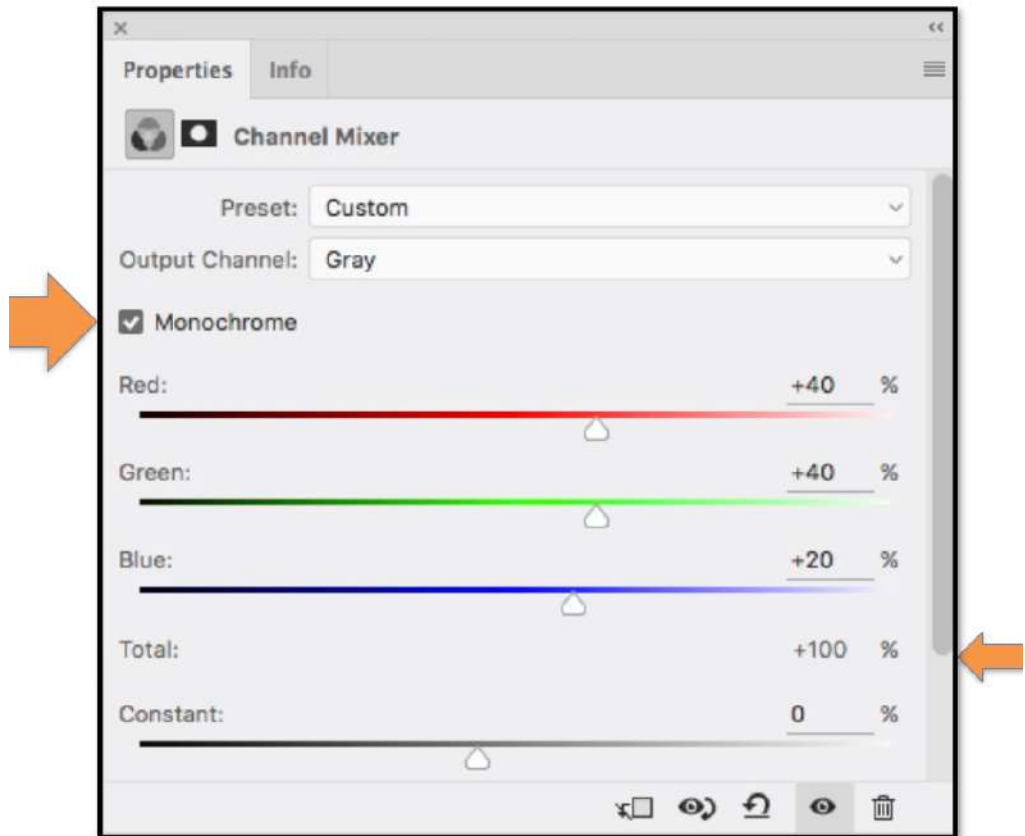
This method of conversion can be very useful if, for example, one channel has more noise than the others (typically the blue channel will have more noise than the red or green channel) or if one channel has more mid-tone contrast than the others (typically the green channel will have the best mid-tone contrast). You simply add more of the channel that has the features you want and less of the channel that has features that you do not want.

As usual, you can select the Channel Mixer from the menu or from the Adjustments panel (which is recommended as it puts the Channel Mixer in an adjustment layer):



Whether you activate the Channel Mixer from the menu or create a Channel Mixer adjustment layer the Channel Mixer panel opens. The first thing to do in this panel is to tick the “Monochrome” box.

You will see that by default the “mix” is 40% red, 40% green and 20% blue (which is different from the 30:60:10 mix used as the default for grayscale conversion). You can change this mix in any way that you want to and observe the effect on your monochrome image. For example:



Channel Mixer (40 40 20)



Channel Mixer (70 15 15)



Channel Mixer (5 15 80)

When you move one of the colour sliders to the right you lighten that channel. When you move one of the colour sliders to the left you darken that channel.

When you are adjusting the sliders to vary the amount of each channel that is being used it is important that the sum of the red, green, and blue percentages is close to 100%. (Anything between about 85% and 115% is usually OK.) If the total is too high the image will “wash out”. If the total is too low the image will be too dark.

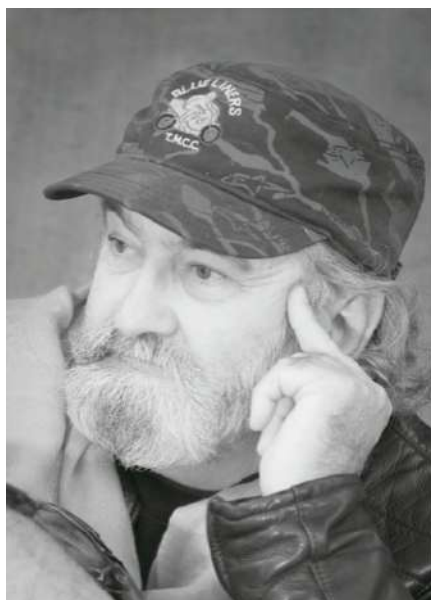
You can adjust the overall brightness of the image with the "Constant" slider near the bottom of the Channel Mixer panel.

The versatility of this method of monochrome conversion is illustrated with following image.

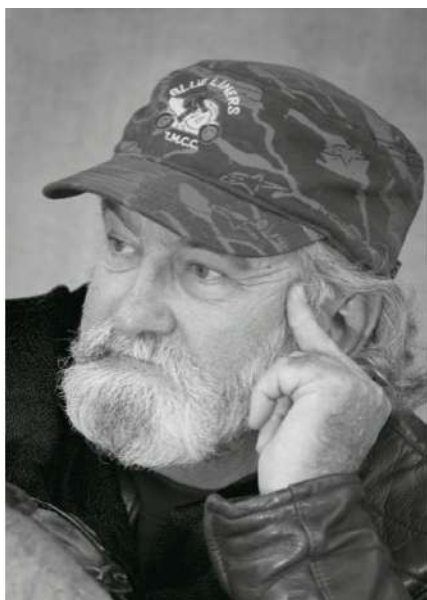


Before attempting the conversion, it is important to examine the individual channels. For this image we can note several important things:

1. In the red channel the skin tones are very light.
2. In the blue channel the skin tones are relatively dark.
3. The green channel has more mid-tone contrast and better structure than either of the other channels.



RED channel



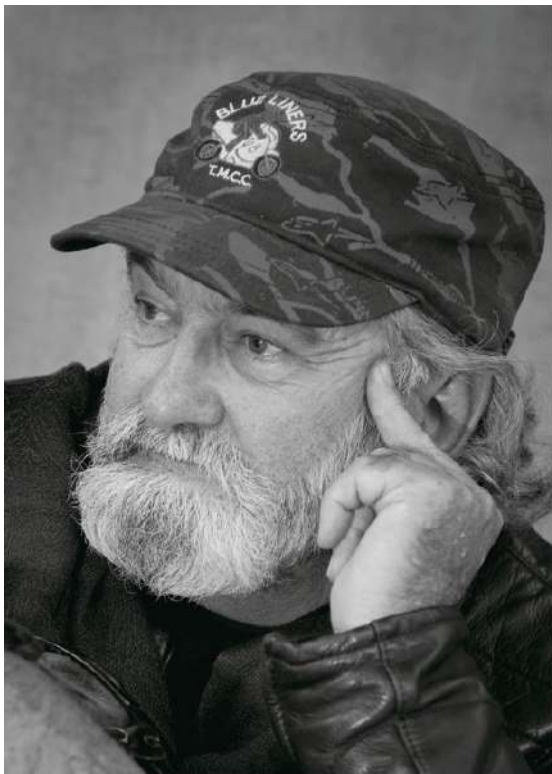
GREEN channel



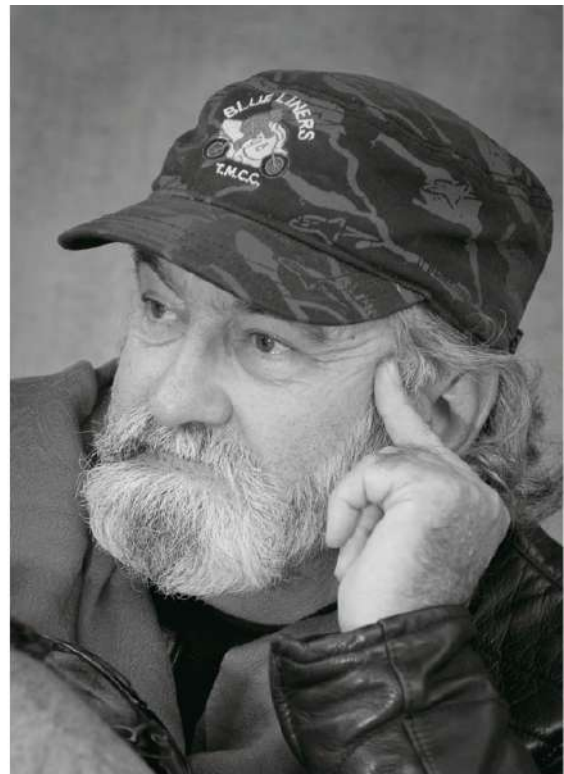
BLUE channel

We can now use our knowledge about the information in each of the channels to construct a monochrome image in the style we want. And since we have the Channel Mixer as an adjustment layer we are not locked in to any particular adjustment - we can create as many versions of the monochrome image as we want without destroying any of the information in the original image. Here are some examples:

A natural looking result with good (but not extreme) contrast can be created with the majority of the information coming from the green channel. For comparison, it is shown against the same image simply desaturated.



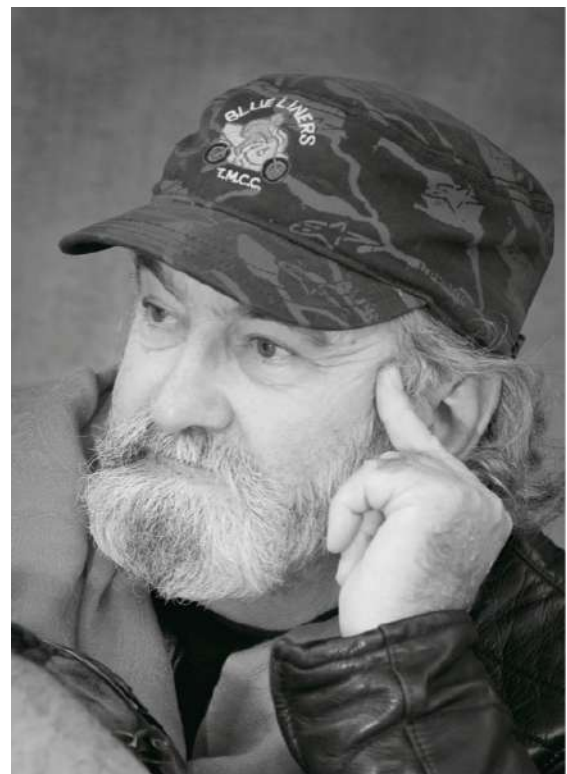
Channel Mixer (15 60 25)



Desaturate

If you wanted much lighter skin tones you could let the red channel dominate. This is the sort of light, smooth skin tone you might want on an image of a child.

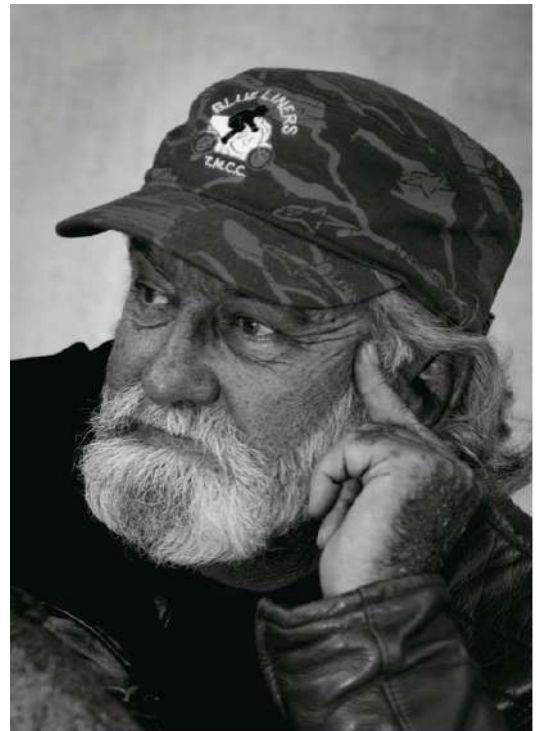
Note here that the blue channel value is actually negative. The scales on the colour sliders go from -200% to +200%. Don't worry too much about this, just remember that moving any slider to the right increases the contribution of that channel and lightens the image; moving any slider to the left decreases the contribution of that channel and darkens the image.



For a darker (grungy) look in this current example I can let the blue channel dominate.

In this case I have used a negative value for the red channel, and this also contributes to the much darker skin tones.

The point to remember is that by controlling how much of each channel is used in the construction of the monochrome image you can create whatever style of image you want.



R=-68 G=40 B=128

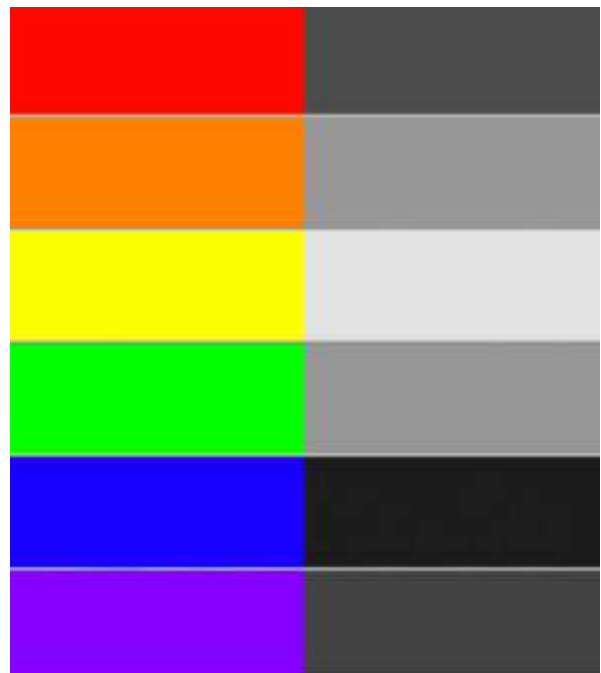
If you want the monochrome image to look “natural” you have to understand something about how the human eye responds to light of different colours.

Human eyes are more sensitive to green than red, and more sensitive to red than blue. Because of this characteristic of human vision, when we look at a coloured image, some colours appear brighter than others *even when they have the same luminosity*.

If we want to make a monochrome conversion that preserves this “natural” look then we need to mix the channels in the ratio of R = 30%, G = 59% and B = 11% (which is why the default for the desaturation adjustment is 30:60:10).

In this example, the colours all have the same luminosity and saturation, but some appear brighter than others.

The perceived differences in luminosity are preserved if we use channel mixing with R=30, G=59 and B=11. For example, yellow appears to be the lightest colour and it converts to the lightest shade of grey. The blue appears to be the darkest colour and it converts to the darkest shade of grey.



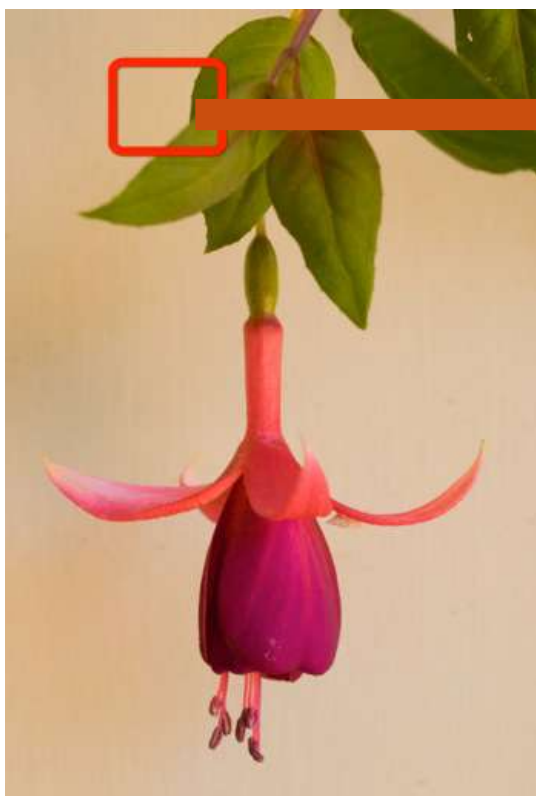
The 30:59:11 ratio is often a good starting point for a Channel Mixer greyscale conversion but there may be specific reasons for changing it. That’s why it is always

important to examine the R, G, B channels carefully before starting the channel mixing process. This point is illustrated in the following example.

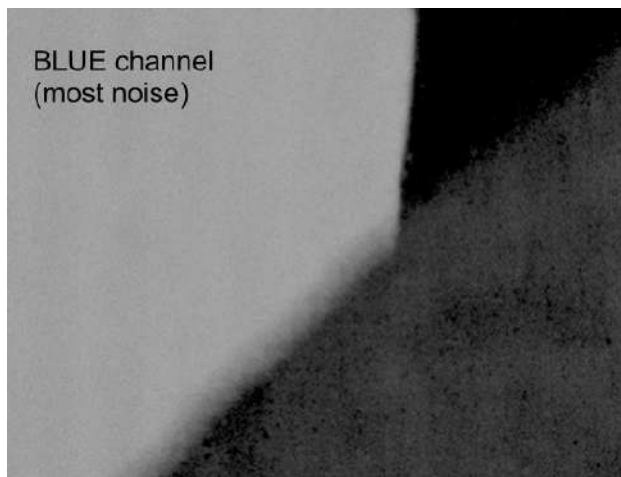
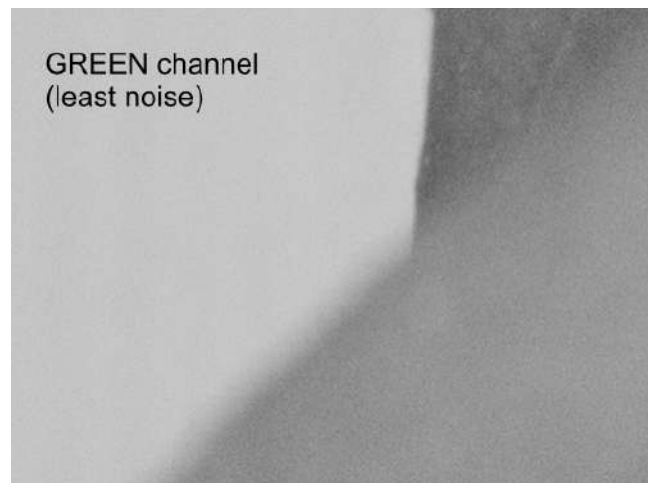
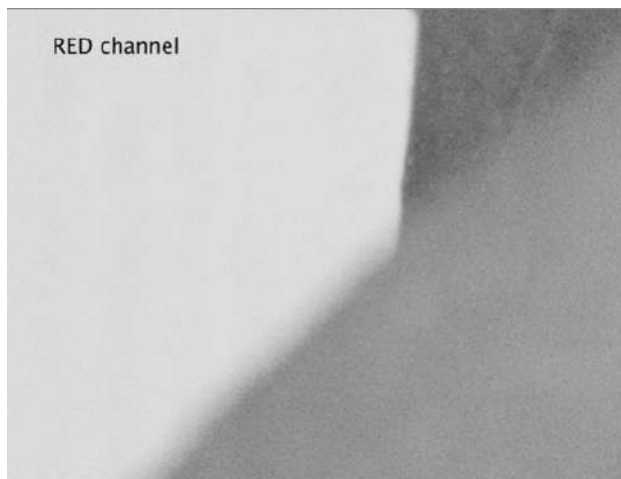
This 'natural' ratio of channel mixing is illustrated in the following mage:



We can use a small section of this image to illustrate that when you use long exposures and/or high ISO values there may be considerable noise in one or more of the channels.



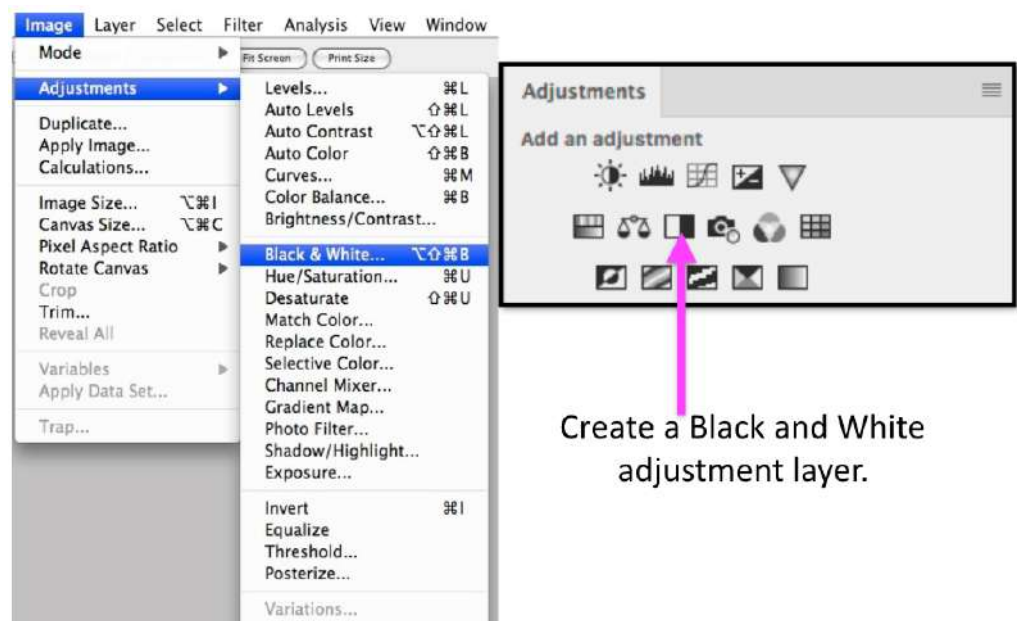




The excessive noise in the blue channel is very evident in this image, so keeping the blue channel component to a minimum in the monochrome conversion is probably a good strategy.

## Method 7 - Black and White Conversion

In early versions of Photoshop, the Channel Mixer was often the preferred method of monochrome conversion because of the control it provided. With version CS3 of Photoshop, Adobe introduced a simpler way of “mixing the colours” to produce a monochrome image. It was known simply as a “Black and White” adjustment. As with most other conversion methods, this one can be activated from the menu or as an adjustment layer (preferred).



Create a Black and White adjustment layer.

The Black and White adjustment panel allows the *luminance* of the three primary colours and three secondary colours to be adjusted.

The default settings of the sliders are shown here:

R=40 Y=60 G=40 C=40 B=20 M=80

Each of the sliders can be set to ANY values from -200 to +300 and *there is no need to try to achieve any particular total for the values* (as you needed to do with the Channel Mixer).

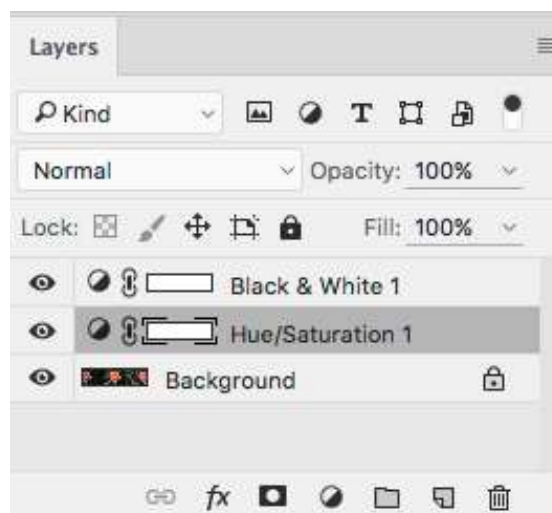
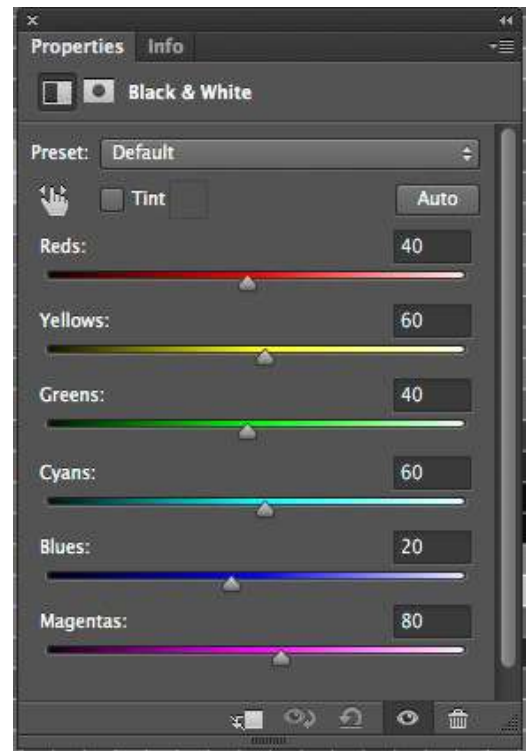
In addition to the default setting, there is an “auto” setting that is designed to maximise the number of shades of grey in the image. The difference might be strong or subtle, depending on the content of the image - try it and see what happens.

Moving a slider to the right lightens that colour, moving it to the left darkens that colour.

This method of monochrome conversion has three main advantages over the Channel Mixer, particularly for users not familiar with manipulating channels - it is more intuitive than channel mixing; it gives control over six colours rather than just three colour channels; and there is no longer any need to worry about trying to get the 100% total that is recommended with channel mixing.

In the Black and White panel you can select from a range of in-built *presets* (different starting positions for the sliders). You find them by clicking on the window adjacent to “Presets”. If you make custom settings that you want to be able to apply to other images you can save those adjustments as a custom present.

Although the Black and White adjustment allows you to control the luminance (brightness) of the primary and secondary colours it does not allow you to change the saturation or hue of those colours. However, you can control the hue and saturation of these colours by putting a Hue/Saturation adjustment layer in between the colour layer and the Black and White layer - like this:





Starting image



Black and White conversion in Photoshop

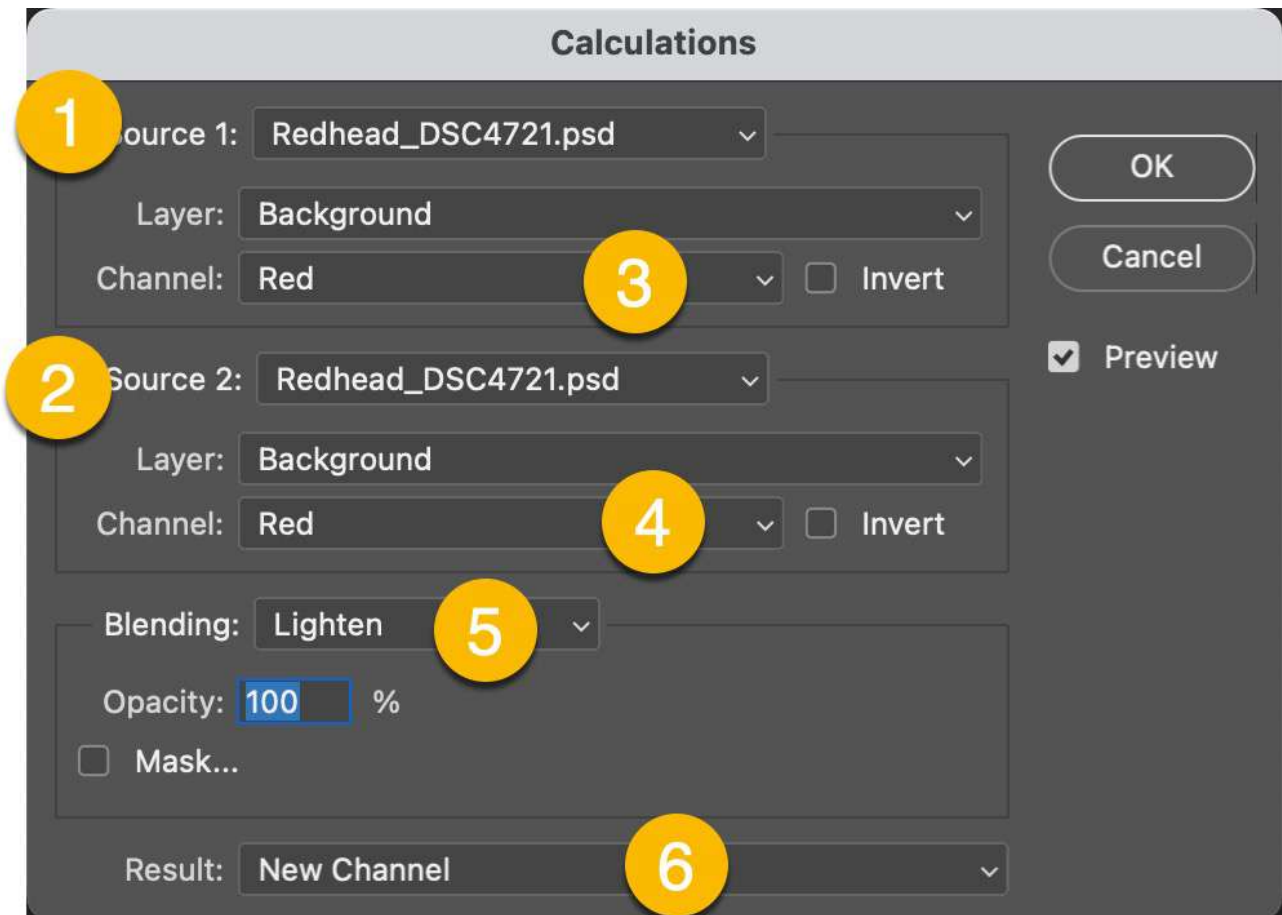


Addition of Hue/Saturation layer to modify the Black and White conversion.

## Method 8 - Calculations

This method may seem complex, but it is worth trying because it gives you a range of possibilities that will suit some images. You cannot use this method on an adjustment layer, so follow these steps:

1. Flatten your colour image so you have just the 'background' layer in Photoshop.
2. Select *Image>Calculations* from the menu to open the Calculations dialogue:



(1) and (2) are simply showing the name of your file and since there is only one layer in the file (because you flattened it) it shows "background" in the layer field.

(3) and (4) show the channels you have selected for this process (experiment).

(5) shows the blend mode you have selected (try experimenting).

(6) allows you to select where you want to save the output. If you select "New Channel", the output goes to an alpha channel. You can select the alpha channel, copy it, and paste it into a new layer above the background layer of the colour image.

The Opacity option lets you change the strength of the blending. By selecting different channels in Source 1 and Source 2, and by selecting different blending modes, you can create many different versions of the monochrome image. The following images illustrate the diversity of the results you can achieve.



Starting colour image - flattened to a single layer in Photoshop.



Calculation with:  
Source 1 - Red Channel  
Source 2 = Red Channel  
Blending = Lighten



Calculation with:  
Source 1 - Red Channel  
Source 2 = Red Channel  
Blending = Soft Light



Calculation with:  
Source 1 = Green Channel  
Source 2 = Green Channel  
Blending = Soft Light

## Method 9 - Colour Blending

Most of the monochrome conversion techniques described so far require little more than a fairly basic understanding of Photoshop. This is an advantage but also a limitation. The limitation is that they do not allow you to harness a lot of the power of Photoshop. This next technique allows you to gradually extend your use of some additional features of Photoshop to produce an extremely versatile method of monochrome conversion.

The **basic** steps in this process are:

1. Open the image in Photoshop.
2. Add a black, white or grey Fill Layer above the background image.
3. Change the blend mode of the fill layer to "Colour".

The result is an image that retains the luminance of the pixels in the original image but uses the hue and saturation of the fill layer. Since the hue and saturation for grey tones are both zero, the colour blending removes all colour from the resulting image. You might expect this to produce the same result as simply desaturating the image but it generally does not, particularly for images that have highly saturated colours, as in this example:



Colour blend



Desaturate

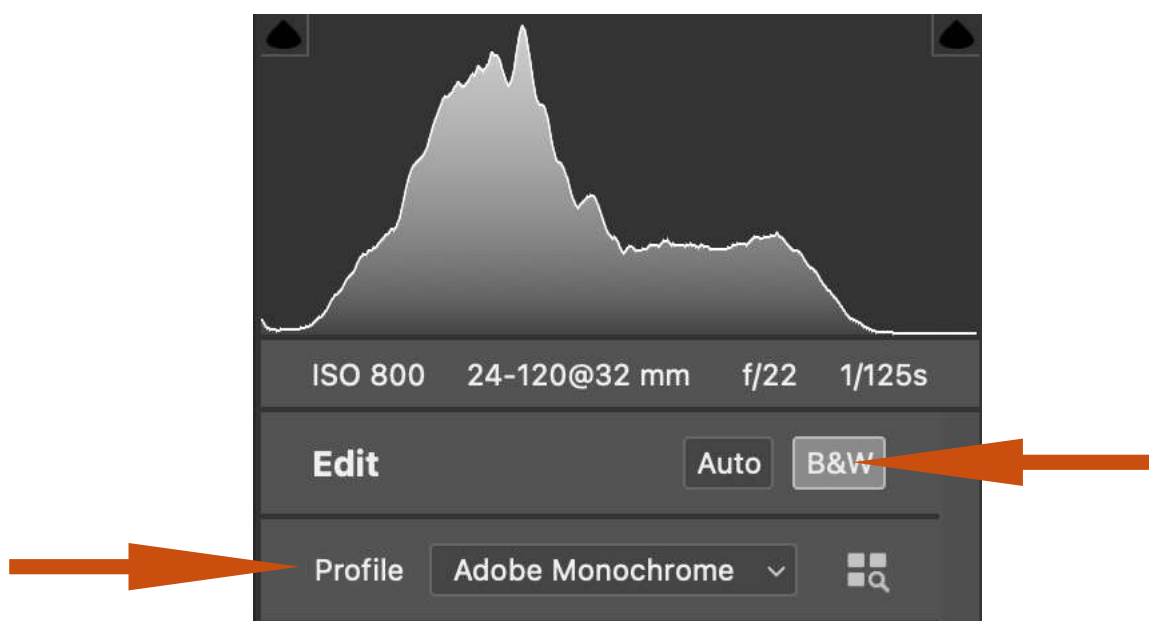
You can extend this approach by independently adjusting the contrast in the highlight and shadows areas - as described in the "Monochrome - Colour Blending" tutorial on my web site: [www.roykillen.photography](http://www.roykillen.photography).

# Monochrome conversion in Adobe Camera Raw (ACR)

This is similar to the Black and White conversion in Photoshop but there are some important differences.

Before attempting a monochrome conversion, make whatever adjustments are necessary to exposure, shadows, highlights, etc.

At the top of the adjustment panel (just below the histogram) select “B&W” and the “Profile” will then show as “Adobe Monochrome” and the image in the preview area will change to monochrome.

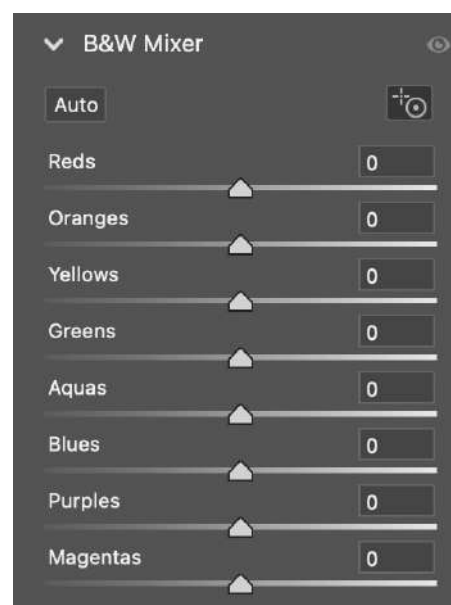


Scroll down and open the “B&W Mixer” panel.

You will then see a set of sliders that are similar to the Black and White sliders in Photoshop. The main difference is that you now have 8 sliders rather than the 6 sliders that are available in Photoshop (Oranges and Purples have been added and Cyans is now called Aquas.)

Adjusting these sliders allows you to alter the lightness of the various colours. When you are satisfied with the result you open the image in Photoshop to continue your editing.

In the B&W Mixer panel there is an “auto” button that analyses the image and sets the sliders in an attempt to maximise the number of shades of grey.



Near the top right of the B&W Mixer panel there is this symbol:

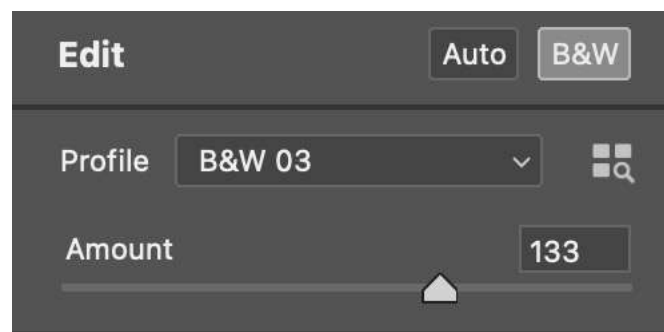


Clicking on that activates the “Grayscale Mix Target Adjustment Tool”. If you now hover the mouse over the image, click and move the mouse left or right it will darken or lighten the colours beneath the selected spot (and you will see the relevant sliders move in the B&W Mixer panel).

An alternative to changing the Black and White Mix (as described above) is to apply a monochrome *profile* other than the default “Adobe Monochrome”. To the right of the profile name there is an icon (4 squares) and clicking on that opens the Profile Browser to give you access to a set of built in profiles. (You can add other profiles or make you own if you want to). These profiles can be shown as a list or as a grid (which shows thumbnails of the result of applying each profile).

As you move your mouse over each profile name (or thumbnail) the preview image changes and this allows you to select an appropriate *starting point* for your monochrome conversion.

Once you have selected a profile, close the Profile Browser and back in the adjustments panel you will see an “Amount” slider beneath the name of the profile you have selected.



This allows you to apply a conversion that is the ACR default (amount slider on zero) or various amounts of the selected profile. You can still make further adjustments to the eight ‘colour’ sliders to fine tune the conversion.

**IMPORTANT WARNING:** *If you convert an image to grayscale in ACR and then transfer it to Photoshop, the image that opens in Photoshop contains no colour information - so you cannot “fine tune” it with any technique that relies upon colour information. You can, of course, still make adjustments that do not rely on colour - such as brightness or contrast.*



# Monochrome conversions in Lightroom

The process of monochrome conversion in Lightroom is similar to the process in Adobe Camera Raw - but with one very important difference. If the conversion is done in Lightroom the colour information is not lost - so the conversion can be reversed if necessary. Lightroom uses both Profiles and Presets as a means of converting images to monochrome. Profiles that are installed in Lightroom are also automatically available in ACR.

The basic process is:

1. Locate the image in the Grid view of the Library module.
2. Make a Virtual Copy.
3. Open the Virtual Copy in the Develop module.
4. Select Black & White as the Treatment.
5. Open the Profile Browser by clicking on the '4 squares' icon. You will then see the same collection of profiles that are available in ACR on your computer.

The Lightroom Develop module also contains a collection of presets that you might like to use as a starting point for your monochrome conversion. They are located in the Presets panel on the left of the screen. Some of these presets are designed to produce effects that are similar to the use of analogue filters. For example, applying the 'green filter' preset will lighten foliage and darken anything that is magenta.

# Plug-ins for monochrome conversions

There are many plug-ins (programs that are activated from within Photoshop or Lightroom) that can produce very good monochrome conversions. Three of the most popular plug-ins are:

NIK - Silver Efex Pro

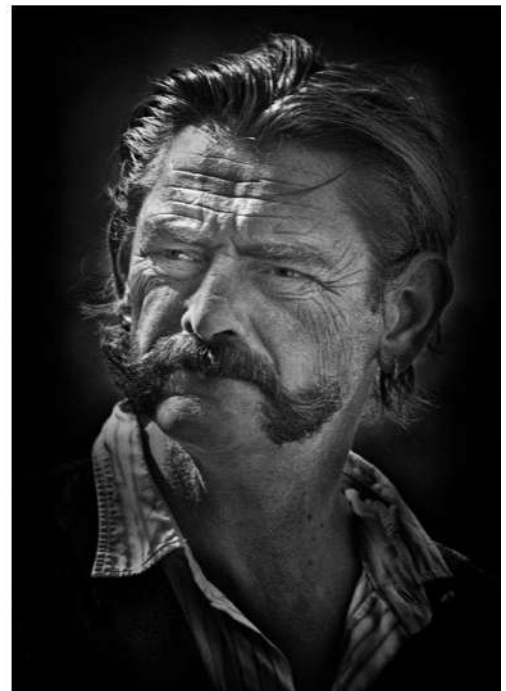
Topaz - B&W Effects

On1 Photo Raw - Black and White presets in the Effects module

These plug-ins all incorporate a range of presets that can be used as a starting point for your monochrome conversions.

Each one has advantages and limitations and there are plenty of tutorials on the web to show you how to use them. My advice is to download free trial versions and try them.

One advantage of plug-ins such as NIK Silver Efex Pro is that they can enable you to fairly rapidly achieve dramatic conversions (perhaps several versions) that would be very time consuming to attempt otherwise. This point is illustrated in the following example.



Original and monochrome conversion using NIK Silver Effects Pro.

# Which images best suit monochrome?

Almost any subject matter is suitable for monochrome images, but portraits, architecture and landscapes are often good subjects to start with when you are exploring different conversion techniques.

For monochrome landscape images, two factors will generally help to enhance the image:

1. Lighting that produces definite shadows and highlights.
2. Strong surface textures.



Of course, there will be some images in which other factors are more important and the following examples are intended to give you some ideas as a starting point.





What feeling is conveyed by the toned image of the macaque that is not conveyed by the colour image?

When trying to decide if a scene you are about to capture (or an image you have already captured) might be suitable for monochrome conversion, ask yourself these questions: “What do I find most interesting in this scene/image? Am I attracted to particular shapes, lines, textures or shadows? Does this scene/image depend on colour for its interest or impact? If colour is important in this scene/image could that effect be retained if the colours were converted to tones?”

## High Key Monochrome Images

High key images, whether colour or monochrome, have a majority of the tones above mid-grey. The majority of the image will be bright, shadows will be limited and often the background will be white or very light. The result is usually an image that feels light and airy, and often it will have a minimalistic appearance.

High key images typically have very limited dark areas, but it is often useful to include a small amount of dark tones in specific areas of the image to provide contrast and add visual interest. The choice of whether to include dark areas in high key images is a matter of personal style and artistic vision. You may prefer to stick to produce a minimalist look without dark areas or incorporating some contrasting elements to create interest or a visual anchor.

It is often easier to produce a high key monochrome image if you start with a high key colour image. The main features of colour high key images include:

- Bright tones - most tones above mid-grey.
- Vibrant Colours - typically one or two colours that stand out against a bright background.
- Minimal Shadows.
- White or Light Background.
- High Contrast.

The proportion of a high key image that should be mid tone or lighter will depend on your personal style and artistic vision. There is no strict rule, so it is useful to experiment and see what works for each image. Here are some examples.

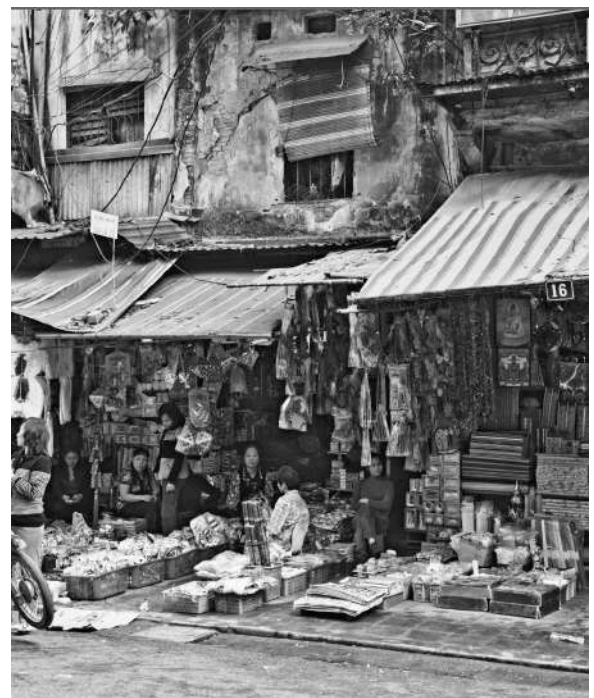
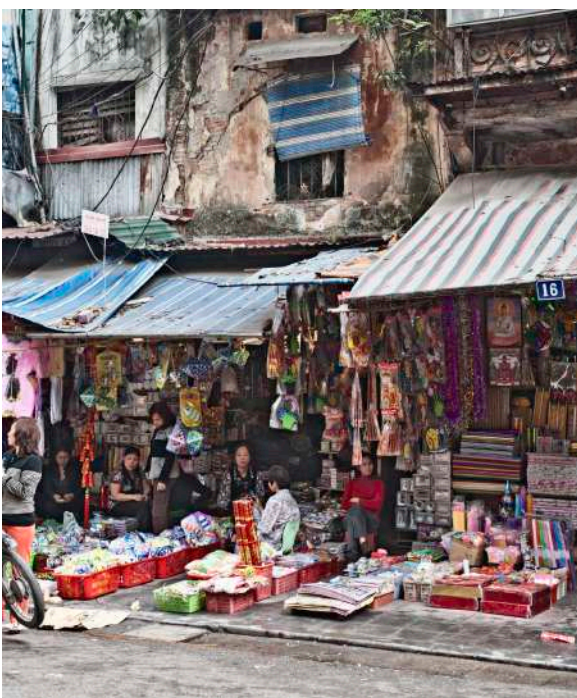


# Sometimes monochrome is not a good option

You should not assume that every image is suitable for monochrome conversion. There are two common situations in which retaining the colour may be a better choice. The first case is when the colour is critical to the information or story that you want the image to communicate. For example, in this nature image removing the colour removes some important information that is relevant to the nature story:



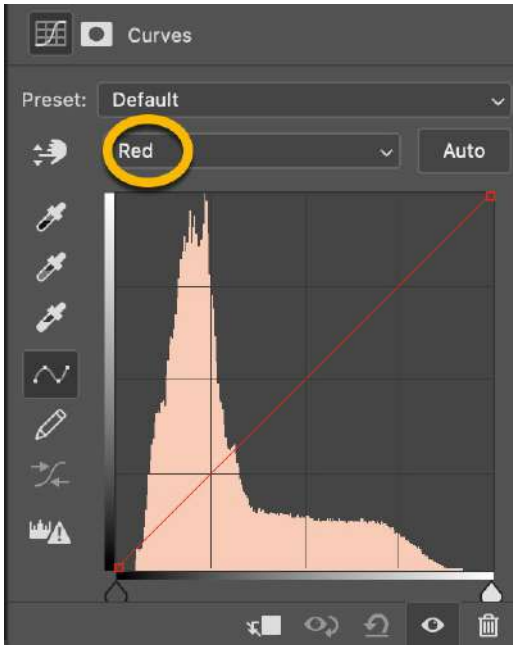
The second situation in which monochrome conversion may not be a wise choice is when removing the colour removes or diminishes important details, such as in this image:



# Toning Monochrome Images

There are various ways to apply a tone to a monochrome image, and one way you may not have tried is to use a Curves adjustment layer in Photoshop (or in ACR or Lightroom).

**In Photoshop**, place a Curves adjustment layer about the mono image. In the Curves adjustment panel select one of the colour channels instead of RGB:



With Red selected, click on a point on the curve and move it up to add a red tone or down to add a cyan tone.

With Green selected, click on a point on the curve and move it up to add a green tone or down to add a magenta tone.

With Blue selected, click on a point on the curve and move it up to add a blue tone or down to add a yellow tone.

If you repeat this process with adjustments to the Red and Green and Blue channels the effect will be cumulative and you can finish with any desired tone you want. You can save the result as a Curves preset and apply it to other images.

An alternative is to use three separate Curves layers and adjust the Red, Green and Blue curves on those separate layers.

**In Lightroom or Adobe Camera Raw** you can use the same process but select the colour to adjust with the buttons above the curve:

Again, the effect will be cumulative if you adjust more than one of the colour curves.

In Lightroom you can save the result as a Curves present.

In Adobe Camera Raw you can save the Curves adjustment (along with any other adjustments you have made to the image) as a "Setting" that can be applied to other images.



# Some General Conclusions

Although it is sometimes possible to perform 'magic' with your monochrome conversions (see page 40 for one such example) you will get the best monochrome results if you 'get it right in the camera' - exposure, composition, etc. Most importantly, give yourself the best files to work with by capturing RAW files rather than JPEG files.

When the dynamic range of the screen exceeds the dynamic range that your camera can capture, expose for the highlights because over-exposed highlights tend to look worse in monochrome than under-exposed shadows.

In general, the best results will be achieved when the colour image you are working with has correct white balance (pixels that should be neutral grey actually are neutral). So it is a good idea to try to remove unwanted colour casts before you start the conversion process. However, there will be some occasions when altering the Temperature or Tint sliders in the white balance section of Lightroom or Adobe Camera Raw will enhance your monochrome images.

All of the monochrome conversion techniques described above (except for those done with plug-ins) have a common limitation. They all apply the conversion globally (across the whole image) and uniformly (applying the same mathematical formula to the conversion of each pixel). For example, if you set the Channel Mixer to R=30 G=60 B=10 then that "mixing formula" will be applied to every pixel in the image regardless of its hue, saturation or lightness. This may give you the desired result or it may not.

To achieve greater control over the final result you need to be able to apply your monochrome conversions selectively. This can be achieved with various standard Photoshop techniques such as layer masks or with various Photoshop plug-ins. You also have some limited opportunities for targeted adjustments with tools such as the "Grayscale Mix Target Adjustment Tool" described in the ACR section on page 38.

Whatever conversion technique you use, it is always worth considering how you might be able to fine tune your result with some conventional image adjustments such as curves or dodging and burning.

**No monochrome conversion technique will be the best one to use with all your images.** Try to select the method that is the most suitable for the particular image that you are working on and the ideas/feelings that you want to communicate with your image. Making a choice will become easier as you gain more experience and experiment with a variety of techniques.

If you have any comments or suggestions for improving these notes please email me.

Roy Killen

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22 February, 2023