CHAPTER 1

Setting The White Balance
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We tend to have certain preconceptions of how subjects should appear, so we often accept images from our summer holiday with a slightly warm bias yet expect product shots in a studio to be perfectly neutral; judging their success accordingly.

To produce an image where the overall tone is in line with our expectations it's important to set the appropriate White Balance as a starting point. A neutral White Balance sets the base colour temperature for the scene, so greys lose any colour bias, while whites remain clean without hints of magenta or blue for example.

Colour temperature is typically expressed in degrees Kelvin, which may sound complex but it’s simply a numeric value used to indicate whether the light has a cold or warm appearance. In contrast with a normal temperature gauge a higher colour temperature indicates a colder light with a blue bias, whereas a lower value points to a yellow/red light.

I have created a quick table on the next page that illustrates a range of colour temperatures, ranging from warm to cold with examples of typical light sources as a means of explanation. It should be noted that the Auto White Balance in addition to the White Balance presets found on your camera are generally restricted from 3000K to 7000K. This covers most common light sources but by no means all, so in certain lighting conditions setting a custom White Balance is the only means of achieving a neutral colour balance.

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<table>
<thead>
<tr>
<th>COLOUR TEMPERATURE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850K</td>
<td>A candle flame</td>
</tr>
<tr>
<td>2200K</td>
<td>Sunset</td>
</tr>
<tr>
<td>2700K</td>
<td>60 watt incandescent light bulb</td>
</tr>
<tr>
<td>3200K</td>
<td>Studio tungsten or photofloods etc</td>
</tr>
<tr>
<td>4000K</td>
<td>Moonlight or standard fluorescent tubes</td>
</tr>
<tr>
<td>6000K</td>
<td>Electronic flash</td>
</tr>
<tr>
<td>6500K</td>
<td>Average daylight around midday</td>
</tr>
<tr>
<td>7500K</td>
<td>Open shade at midday</td>
</tr>
<tr>
<td>15000K</td>
<td>Clear blue sky</td>
</tr>
</tbody>
</table>

* A rough guide to the approximate colour temperature of some common light sources
The confusing part for many comes later during Raw processing where everything seems to be in reverse but there is a simple explanation. When processing Raw files we effectively use the colour temperature slider as a form of compensation to assign an adjustment in a non destructive manner without touching the original file. Simply move the slider as needed to create the desired visual effect and don't sweat the numbers.

![Colour temperature slider in Lightroom](image)

There are smartphone applications available that measure colour temperature but none so far that I could happily trust, so the only practical means to accurately measure colour temperature prior to taking a picture is by using a professional colour meter. In practice not many photographers are that concerned about knowing the precise Kelvin value, though it holds great value to more advanced users. Fortunately we can still obtain clean neutral colours by using other tools, such as a simple grey card or ExpoDisc to set a custom White Balance.

On an average sunny day at noon the colour temperature is typically around 6500K, while electronic flash would measure anywhere from 5500K to 6000K. You will sometimes see images with mixed flash & daylight around sunset where there is a clear variation in tone between the main subject and the ambient lit background, however some TTL flash units automatically transmit White Balance information back to the camera, thus reducing or eliminating this disparity.

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In the days before digital photography we used to muddle by with a choice of daylight or tungsten balanced film, since these were the two most common light sources. Daylight film was generally set around 5600K, so in essence the film's White Balance was fixed to deliver a neutral/warm tone in most typical daylight conditions. Much the same happens today when shooting digital if you have the White Balance set to the cloudy preset.

Alternative light sources such as tungsten, candlelight or neon are all different and every light source has its own colour temperature. Tungsten for example generally measures around 3200K, which produces a warmer light but to compensate either select the tungsten balance preset on your camera or better still take a custom White Balance reading from a neutral subject under that light. The yellow bias will disappear and your colours will appear perfectly neutral.

Most modern cameras do a very good job at setting the White Balance automatically in outdoor situations, however it encourages a lazy approach that is actually counterproductive in many situations. Frankly there are times when manually overriding the Auto White Balance is the only logical way to work.

Any half capable digital camera nowadays will have various presets for dealing with lighting conditions such as sunny, shade, cloudy and tungsten etc, so if you've never experimented with these settings I would encourage you to do so; first to gain a sense of how they alter the colour temperature and secondly to see how accurate they are in practice.

By experimenting with these White Balance presets you'll soon build up a picture for when it makes sense to use them and how colour temperature is affected in different conditions. NB Remember that these presets are generic and may not deliver the exact results you hoped for in all cases, especially in conditions of mixed or reflected lighting where a custom White Balance would be more effective.

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Photographers shooting Jpeg need to understand that the image is processed by the camera, so it's imperative to set the correct White Balance prior to shooting or risk serious file damage during post production when attempting any kind of colour correction. This frequently leads to histogram combing with missing data and in practice that means horrible tonal transitions. For this reason alone it's worth shooting Raw just to maintain that safety net.

You might be asking why it isn't better to just correct everything during post production and that is certainly an option for Raw files if you include a suitable target area to be sampled with the White Balance tool. My preferred method, however is to take a custom White Balance reading and set the camera accordingly, so the images come out of camera already correct.

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This practice has various additional advantages:

- **It reassures clients as images are imported onto the computer if the colour balance is already correct.**
- **Camera data travels with the Raw file, so they already have the correct White Balance if supplied to others.**
- **It saves time looking for a neutral reference point later on in post production.**
- **The preview on the camera LCD is a Jpeg and will be most accurate with a custom White Balance.**

Some photographers use a plain white card, while others invest in commercially produced versions that are logically more accurate. The prices vary but need not cost a fortune and some are small enough to fit neatly inside your camera bag or even a back pocket.

Commercial White Balance targets are often light grey for technical reasons related to modern digital sensors though it’s still possible to use plain white. The important point is that the target must be spectrally flat i.e perfectly neutral and not tinted in some way. A little grey also provides some good data to work off that may have been lost in a pure white target.

Correct exposure is very important when setting the White Balance because it can otherwise distort our colour balance and the camera assumes the exposure is correct. Try using the White Balance tool in Lightroom on an area with burned out highlights and you will see a message saying there was insufficient data, so you need to choose a darker neutral area.
The reason we call it a White Balance is simply because colour casts are more visible to the eye in areas of white. The phrase was first coined during the early days of television when studio cameras needed a reliable way to produce accurate colour under various light conditions. Those adjustments in red, blue and green required a screwdriver with some specialised knowledge but now we just press a magic WB button while pointing at a card like the one shown below.

The grey card from an X-Rite ColorChecker Passport used for custom White Balance settings.
The image below showing some gold cufflinks is an example of where a custom White Balance was set using the white paper background and though the cufflinks appear relatively normal at first glance there is a distinct magenta tint that shows up in the white areas. This has occurred because the paper itself has a slight green tint that may not be visible to the eye but results in an opposite bias when used to measure the White Balance, affecting the entire image.

![Incorrect White Balance](image1)

The tint we see here can be corrected using a program like Lightroom but wouldn't be necessary if a good quality grey card had been used instead. Needless to say unless you take control of your colour balance and use the correct tools problems like this will occur constantly.

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Grey cards are great in a controlled studio environment where all the light matches but in outdoor situations light comes from all directions and assumes different temperatures. The sky is blue but the late afternoon sun is warm and who knows what tone the background is reflecting. A high quality grey card will actually manage all this quite well but an unexpected spray of water could definitely ruin your day, so they do need to be treated with care.

Indoor situations can...

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