Colour Temperature and White Balance

In this tutorial, we are going to take a look at the **white balance setting** on your camera. In short, adjusting the white balance allows you remove unrealistic colour casts from your photos.

These colour casts can give your photos an orange, blue or even green tint. This is caused by differences in the **colour temperature** of the light source(s) in your scene.

What is colour temperature?

Colour temperature is the **measurement of the hue of a given light source**. This can range from very cool blue tinted light to very warm yellow or orange tinted light.

Have you ever noticed how in the evening or morning time when the sun is low in the sky, it often bathes a scene a very attractive warm

golden light? Candle light is also an example of a light source with a warm colour temperature.

On the other hand, the light from the midday sun will often cast a harsher and cooler blue tinted light. Shaded locations can also cast a cool light on the subjects you are photographing.

Fluorescent lights will actually lead to a green colour cast in photographs! These colour casts are particularly noticeable on anything that is supposed to be white in the scene.

Take a look at the following photographs taken at the same location. This first photograph of a boat house was taken under a harsh midday sun at the height of summer. Notice how the tones in the image are quite cool.

In the second image, I photographed the same boathouse in autumn in the morning when the sun was low in the sky. Notice how much warmer the tones are on the boat house in particular.

Midday Sun

Morning Golden Hour

I have no idea if they caught any fish by the way. I've tried fishing and the only thing I caught was a seagull that flew into my line as I cast out.

Thankfully he managed to free himself but I decided it was best to retire before I managed to catch a swan or an owl or a possibly a badger. Fishing is not where my talents lie.

Anyway, where was I? Ah yes, colour temperature! We tend not to take too much notice of colour casts as our eyes and brain do a good job at neutralising them. We simply don't notice colour casts unless they are particularly strong.

We can look at a white chair under a warm incandescent light bulb and it will still appear white to us.

Our camera however, may produce a photograph where the chair comes out with an orange tint. Take a look at the example below.

In the first photo, the incandescent light bulb has caused the whole scene to take on a very warm orange tint.

In the second photo, this has been neutralised by adjusting the white balance setting. The chairs are now white again.

Different types of light bulbs can give off light with colour temperatures ranging from a very cool blue to a warmer orange.

Colour temperature is measured in **Degrees Kelvin** with **warmer light** represented by **lower temperatures** and **cooler light** by **higher temperatures**. This might seem counterintuitive at first (a bit like f-stops).

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This chart shows a range of light sources and their corresponding Kelvin temperatures. You don't

need to know the temperatures off by heart by any means. It is a good idea however to know what types of light lead to warmer or cooler casts.

Why is it important to neutralise colour casts?

Being familiar with the effects of colour temperature is particularly important for certain types of photography.

Portrait photographers are very careful to eliminate colour casts so that the subject's skin tones look natural.

Eliminating colour casts is also important in **product photography** to ensure an accurate representation of the true colours of the product in question.

Have you ever bought something online that looks nothing like the colour you saw on screen when you receive it? This may be down to the photographer not correcting the white balance

properly. Alternatively, it may be an issue with the white balance settings on your screen.

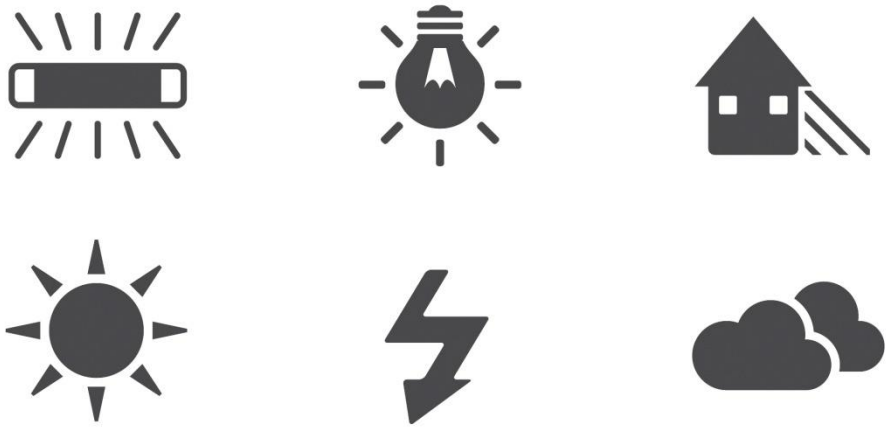
My sister is a **wedding photographer** and a good knowledge of colour temperature is vital for her work. She often tells me that if you get nothing else right on camera, get the dress right! Indoor lighting can often make a wedding dress look orange in photographs.

How can colour casts be removed with the white balance setting?

The white balance setting works by your camera searching for what it thinks is a **neutral tone** in the scene and referencing everything else from that. This is not always particularly accurate however.

When white balance is set to auto, your camera will often exaggerate the warm or cool temperature of the light source like we saw in the photos of a table and chairs earlier.

Setting the correct white balance setting will neutralise the light colour temperature so that objects that are supposed to be white will actually appear white in the final photograph.



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Here, you can see the main white balance settings available on most cameras.

Let's say you are taking pictures of people indoors. As already mentioned, incandescent light bulbs tend to give off a very warm, orange tinted light. This can cause skin tones to look very unrealistic.

Switching your white balance to the light bulb setting will counteract this by cooling down the colour tones in your photos.

To neutralise colour casts and achieve more natural and realistic tones, simply set your white balance to the setting that best matches the lighting conditions.

Grey Cards and Custom White Balance Settings

Earlier, we saw that capturing accurate colour tones is very important in certain types of photography such as portrait, wedding and product photography. For this reason, some photographers often use a tool called a **grey card** to set a more accurate custom white balance.

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A grey card is.... well it's a grey card. More accurately, it is a card coloured with a **mid-tone grey**. These can be as large as a bicycle wheel or as small as a credit card.

There can also be black and white cards or sheets with a whole range of colours in a grid. These can also be used to correct the white balance especially in post-processing.

In the tutorial on aperture priority, shutter priority and manual modes, we saw that your camera tries to see a scene in terms of the mid-tones. Once it finds what it considers to be a mid-

tone it can use it as a reference to work out the exposure for the rest of the scene.

White balance works in the same way. A grey card acts as a reference for the camera letting it know exactly what mid-grey in the scene should look like. Once it has this reference point, it can work out the other colour tones.

This works best in controlled lighting, such as in a studio for example. Once you set the correct white balance using the grey card, you don't have to worry about it again unless you change the light source.

Obviously, this will not be the case for outdoor landscape photography when the light may be constantly changing. There may even be several different light sources in one scene. This can be a particular challenge when it comes to setting the white balance.

How do you use a grey card to set a custom white balance?

Every camera brand does this a little differently but the following description gives a basic idea of how the process works.

1. Take a picture of your grey card in which the card fills up the entire frame. This is easier with larger grey cards obviously. The card should be lit by the same light source you will be using on your subject.

2. Go to the custom white balance setting on your camera menu. It will ask you to choose a reference image. Choose the photograph of the grey card you just took.

3. Set your white balance setting to "custom" →

Your photographs should not have any unrealistic colour casts if you have completed this process

properly. Some photographers repeat the process a few times to ensure the settings are absolutely accurate.

Check your user manual to see how this process works on your camera

Changing the White Balance in Post-Processing

If you shoot in **RAW format** (and you should), you can actually change the white balance setting after you have taken the photograph. This can be done in RAW processing software such as Adobe Lightroom.

A grey card can also be used in this situation. Often a portrait photographer will take a photograph of the subject while they are holding a grey card. In post-production, they then use an "eye-dropper" tool to click on this grey card in the photo to let the software know where mid-grey is.

The software adjusts the white balance accordingly. The photographer can then apply

these settings to all of the other photographs taken during the session.

Product photographers use the same method by placing a small grey card beside the product they are photographing.

Do you always need to "fix" the white balance?

If you are a portrait, wedding or product photographer, the answer will almost always be yes. For outdoor landscape photographers however, this may not necessarily be the case.

In many cases, I actually want to retain the warm tones in a photograph for artistic and aesthetic reasons. When photographing a sunrise or sunset for example, I want to retain those attractive warm tones.

The same goes for taking photographs during the morning and evening golden hours. The warm side lighting at these times can make a scene look far more inviting and interesting than if

photographed under the harsh midday sun or on a dull cloudy day.

If I am photographing a candle lit scene, I will often want to portray the warmth and cosiness of the candlelight as it casts its glow on the subjects in the scene. There are occasions when "correcting" the white balance is not the preferred option.

There are other times you may just partially correct the white balance to tone down particularly strong colour casts.

Human beings tend to have a preference for warm tones. Most of my best selling photographs were taken in warmer toned light. That is not to say that photos taken in cooler light are necessarily less attractive. It all depends on the mood you are trying to capture and portray.

Take a look at how different white balance settings affect the mood of the scene below.

The photo becomes less realistic and cooler/more blue the further to the left we go.

Here are some examples of photographs I took where I deliberately did not correct (or not much at least) the colour balance in order to portray a particular mood.

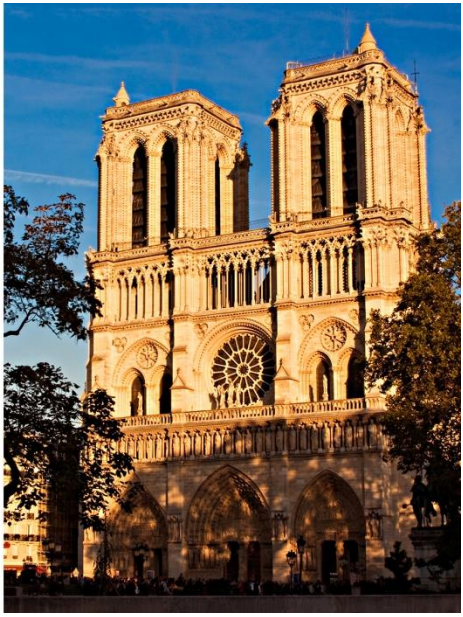
Grand Canal Dock in Dublin

In this photo from Grand Canal Dock in Dublin the sun has just risen and is casting a golden glow on the buildings along the water's edge. This is typical "golden hour" light which we will cover in more detail in a later tutorial.

Bridges of Prague

This next photograph was taken from the hills of Letna Park in beautiful Prague. Notice how the cool blue tones of this overcast evening in Prague contrast with the warm tones of the buildings in the left of the frame. These are illuminated by warm yellow tinted incandescent light. I like the contrast between the cool and warm tones in the scene.

Mixed light sources can often be a challenge when photographing cities in particular.



Notre Dame de Paris

Take a look at the next two photographs of Notre Dame Cathedral in Paris. The photograph on the left was taken in the middle of the day when the sun was high in the sky.

The shot on the right was taken during the evening golden hour. What a difference in the tones a few hours make! This is one time when I definitely do not want to "correct" the white balance.

As an outdoor photographer, what white balance setting should I use?

Personally, I tend to simply use the **auto white balance setting** when photographing outdoor scenes. I always make sure to shoot in RAW format.

I then adjust the white balance in post-production to a setting that best matches the particular mood I am looking to portray. This is very easy to do using software such as Adobe Lightroom.

There is no right or wrong way to do this. You may prefer to set the white balance in camera rather than changing it afterwards. The best thing to do is to get out and experiment and see what works best for the type of photography you enjoy doing.

In our next tutorial, we will look at focal length and how it affects the look of your photographs.