

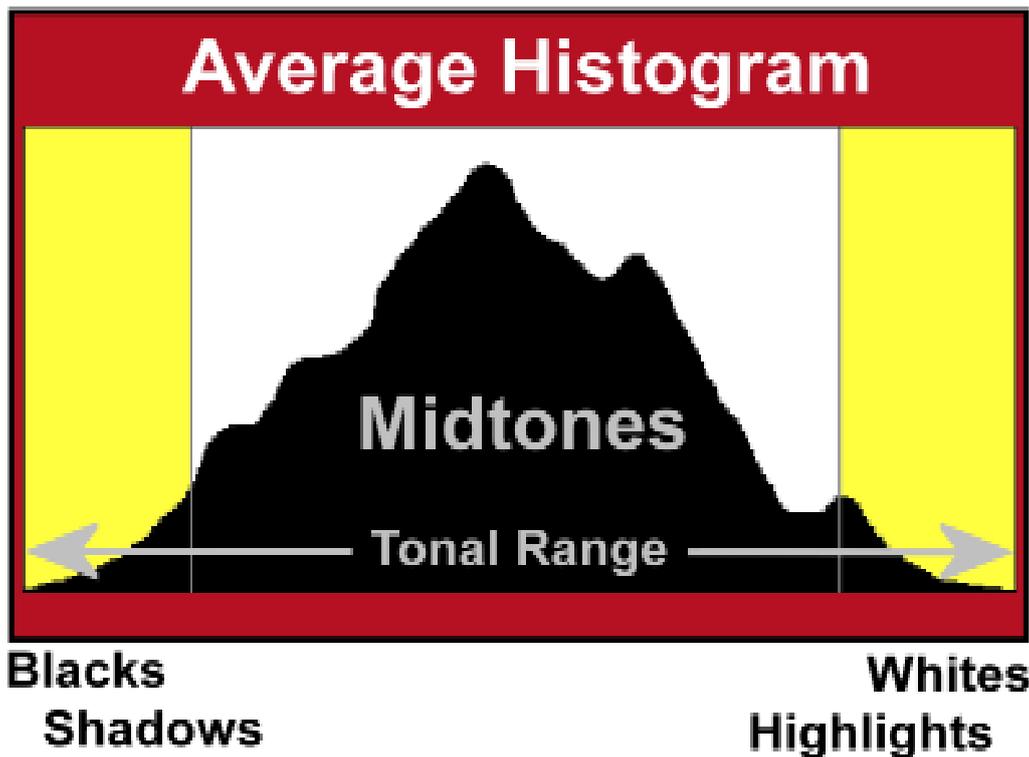
An Introduction to Histograms in Photography

Histograms are a graphical representation of all the pixels that make up an image, and are plotted by 'Luminance' or brightness. Every pixel, regardless of its colour, has a certain brightness, or Luminance to give it its proper photographic name.

All the pixels, of different levels of brightness, come together to create a balanced mix of varying tones, ranging from **Black**, through dark greys (or **Shadows**), medium greys (or **Mid-Tones**), through light greys (or **Highlights**) towards **White**.

This 'greyscale', or range of greys, is known as the '**Tonal Range**', or sometimes referred to as the '**Dynamic Range**'.

When an image's histogram displays an even spread, with the majority of pixel data in the centre, trailing off towards the outer edges, we know that the exposure is reasonably correct, and the image will display tones from dark to light, ensuring a good contrast.

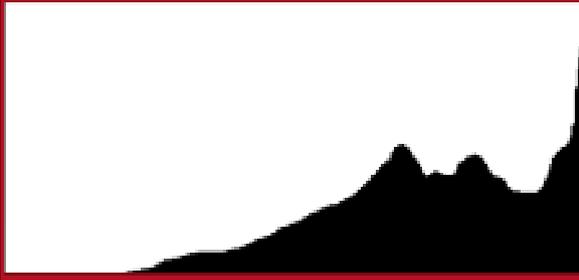
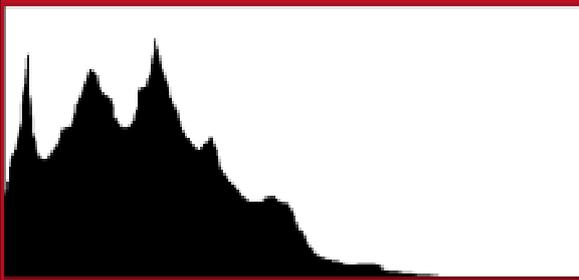


As a photographer, we have two ways of using the histogram to control our image's exposure and tonal range. The first method is whilst we are taking our shots using our DSLR camera. Some compact cameras also have this feature, but it is always available as an option on DSLRs.

After you have taken a photograph, the image usually appears as a preview on the back LCD screen. There is usually a further option to display, either side by side, or as an overlay, the histogram for that image. You can usually toggle this view on/off from the back selector button (up/down), or from a menu option.

Some cameras also have the option to show 'clipped areas' as a flashing overlay, to draw your attention to the fact that the data for that image has gone beyond the normal histogram range, either far left or far right.

With the histogram preview on, you can check after each shot whether your image's histogram is acceptable or not, and if you see from the display that the histogram data is shifted to left or right, you can adjust the exposure by altering the camera's 'exposure compensation' setting, and try again until you are satisfied that the histogram displays a 'normal' centralised position.

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| <p style="text-align: center;">OVEREXPOSED</p>  | <p>Over exposed images normally look very light in tone, with washed out colours and low detail. Their histogram profile will be mainly positioned towards the right, so that a lot of the image's pixel data is sitting in the highlights to white range. Any pixels that are in the far right white range will display as 'blown highlights'. That is to say, any of the image pixel data here, that would normally be sitting the grey range, is lost, as it is shown as white, so little or no detail is visible.</p> |
| <p style="text-align: center;">UNDEREXPOSED</p>  | <p>Similarly, in under exposed images, the pixel data has shifted to the left of the histogram. This means that image data that would normally sit in the mid-tone range, is lost in the dark shadow or black range. It is however easier to retrieve some detail from dark areas than from blown highlights, although in doing so additional 'noise' will be visible. However, if possible, it is best to manage your exposure histogram to prevent it in the first place.</p> |
| <p style="text-align: center;">Low Contrast</p>  | <p>The third common histogram fault is that found on a low contrast image, where all the image data is within the central mid-tone band, and no or little pixel data stretches into the Black or White extremes. This usually occurs either in overcast or low and artificial light conditions. You may not be able to alter conditions to improve the exposure for this kind of shot, but this, as with some other histogram conditions, can be corrected quite easily during post processing.</p> |

You should not have to check your camera's histogram after EVERY shot taken, and to be honest, modern DSLR metering systems are becoming extremely good at achieving balanced exposure, even under harsh lighting conditions. However, after a while, you become experienced at recognising what shooting conditions may be problematic, and therefore may need some extra attention.

Fear not though, even if the odd rogue shot slips through the net, there are tools available to us, as part of our post processing workflow, which can give us a level of control over our image's histogram.

Digital Post Processing - Histogram Adjustment

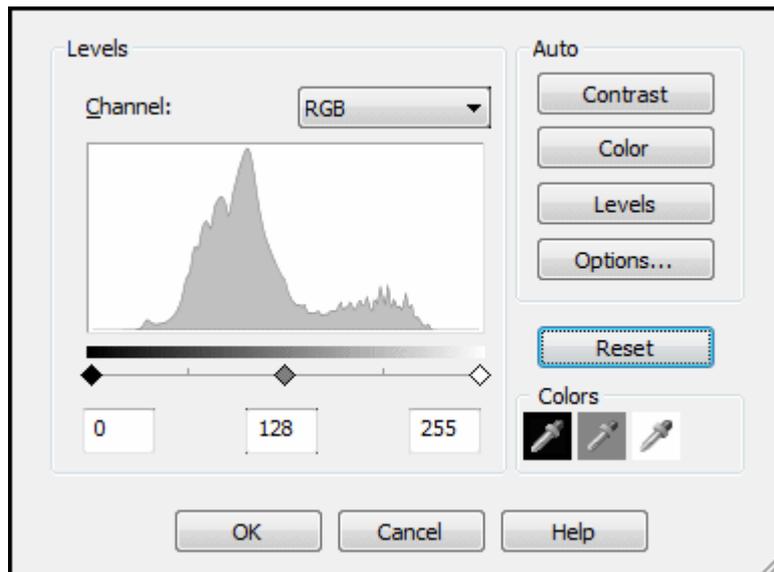
Those of us who shoot in **RAW** know that the next most important step, after taking our photographs, is the RAW conversion stage, where we convert the raw digital source file, and after some tweaks to exposure, colour, sharpness etc. save a new file, using a file format (tif, jpg) which is useable by all sorts of software for various uses.

This RAW conversion step uses a lot of the histogram information to show us the default settings in our raw software, which we can then either leave as is, or modify to fine tune or customise our image. By rights, at this stage we should be correcting any histogram faults as we see them. There are many controls at our disposal that allow us to make major correcting changes to our image's exposure... Highlights/shadows, Tone curves, White balance etc. By all means, use these tools to do just that, and you should end up with a reasonably balanced image. But sometimes, doing *just* that results in a correctly exposed image, but with no creative impact.

Recently, new software packages have come to the fore, not only offering the ability to accurately convert our RAW files, but also, whilst in the 'raw state' use other creative tools to add an element of flexibility and creativity. The most popular of these programs is Adobe's Lightroom, which is packed with features and functions, allowing the user to extract the very best from their images.

The histogram is shown central to Lightroom's display, and all the 'Basic' adjustment sliders will affect its range & position. You should decide whether, when working on an image, to keep a wary eye on the histogram, to make sure it is 'correct', or whether you prefer concentrating on your image, visually tweaking the various settings to your satisfaction, by eye.

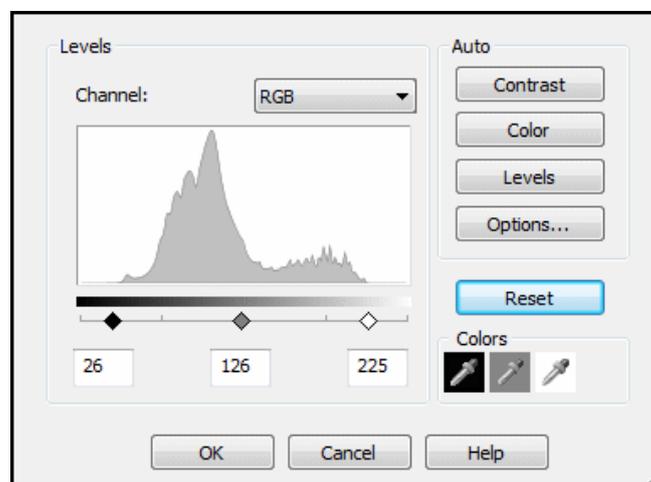
Personally, I prefer the latter method, working towards a final 'look' of the image I want to achieve. However, as part of my normal workflow, I will always set the Black & White points in Lightroom's Basic panel as a starting point, which should normally correct any Dynamic (tonal) range issues. This will need to be done again as a final step if you have made any major crops, vignettes or exposure tweaks during your further workflow, as they can radically alter the original's tonal range.



To view an image's histogram in other software, and correct it's settings is easy enough, and can be done with most graphics software, such as Corel Paintshop Pro, Photoshop or Elements.

With your image in Paintshop Pro or Photoshop, select the **Levels tool** which brings up a dialog box showing the image's histogram. Underneath the histogram display there are 3 markers, normally set to **left marker 0**, middle marker 128 (1.0 in Photoshop), and **right marker 255**. If they are not, click the Reset button.

Normally you can just click the **Auto** button, but I prefer to manually adjust the markers for more accuracy. You should only adjust the outer two markers, as the middle one (gamma setting) auto-centres as you move the other two.



Basically, all you have to do is move the left & right markers in to where the histogram data hits the baseline. Obviously if the data stretches fully to the edge you don't need to adjust that marker.

By bringing in the markers to match with the start & end points of the *actual* data, you are re-setting the point where black (left), and white (right) begin, thus matching the image data with an albeit slightly reduced dynamic range, but at least introducing dark tones and light tones at a point where mid-tones were. This ensures a balanced contrast.

'Levels' tool locations...

Levels in Corel Paintshop Pro... **Adjust/Brightness & Contrast/Levels**

Levels in Photoshop... **Image/Adjustments/Levels**

That's it! A small feature in most graphics software, but one that can make all the difference to your image's final look, exposure and tonal accuracy.