

Why we need to expose to the Right

Let's assume for the purposes of illustration that a digital SLR has a dynamic range of 5 stops (*it's usually closer to 6 stops, but let's not quibble*).

When working in RAW mode, which you should be, most cameras record a 12 bit image. (*Yes, we say it's in 16 bit mode, but the reality is that it's only recording 12 bits in a 16 bit space. Better than 8, but not as good as a real 16 bits would be*).

A 12 bit image is capable of recording 4,096 (2^{12}) discrete tonal values. One would think that therefore each F/Stop of the 5 stop range would be able to record some 850 ($4096 / 5$) of these steps. But, alas, this is not the case. The way that it really works is that the first (brightest) stop's worth of data contains 2048 of these steps — *fully half of those available*.

Why? Because CCD and CMOS chips are linear devices. And, of course, each F/Stop records half of the light of the previous one, and therefore half the remaining data space available. This little table tells the tale.

Within the first F/Stop, which contains the Brightest Tones 2048 levels available

Within the second F/Stop, which contains Bright Tones 1024 levels available

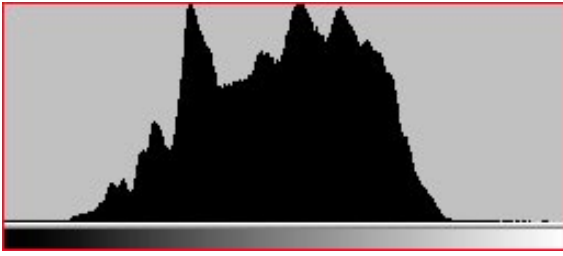
Within the third F/Stop, which contains the Mid-Tones 512 levels available

Within the fourth F/Stop, which contains Dark Tones 256 levels available

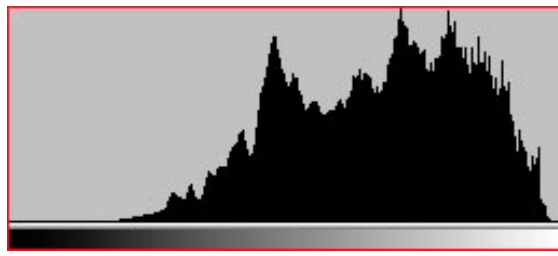
Within the fifth F/Stop, which contains the Darkest Tones 128 levels available

This realization carries with it a number of important lessons, the most important of them being that if you do not use the right-hand fifth of the histogram for recording some of your image you are in fact wasting fully *half* of the available encoding levels of your camera.

But, we all know (*or at least should by now*) that the worst sin in digital imaging is to blow out the highlights — just as it was when shooting slide film. Once they're blown (*past the right-hand edge of the histogram*) it's bye-bye data.



**Normal Exposure
Centered Histogram**



**Histogram to the Right
For Maximum S/N Ratio**

The simple lesson to be learned from this is to bias your exposures so that the histogram is snugged up to the right, but not to the point that the highlights are blown. This can usually be seen by the flashing alert on most camera review screens. Just back off so that the flashing stops.

Now of course when you look at the RAW file in your favourite RAW processing software, like [Camera RAW](#), the image will likely appear to be too light. That's OK. Just use the available sliders to change the brightness level and contrast so that the data is spread out appropriately and the image looks "right". This will accomplish a number of things. The first is that it will maximize the signal to noise ratio. The second is that it will minimize the posterization and noise that potentially occurs in the darker regions of the image.

Please be aware though that for proper results you need to make these corrections while working in 16 bit (12 bit) mode in a RAW converter. Unlike what some people think, in RAW mode the camera is *not* doing *any* non-linear processing. All non-linear processing is done in the RAW converter. This is why if you're going to try this trick you must shoot in RAW and then manually readjust the image in the RAW converter *before* exporting the file into Photoshop. By doing this you'll be maximizing the data bandwidth of your entire system. Another reason to be working in RAW mode whenever possible.

Also be aware though that by doing this you are in fact effectively lowering the ISO used to capture the image, requiring slower shutter speeds and/or larger apertures. If you are hand-holding the camera, or shooting moving objects, the tradeoff may not be worth the reduced noise level.