

# How JPEG Differs From Raw

Bruce Fraser 2004

When you shoot JPEG, a raw converter built into the camera carries out all the tasks to turn the raw capture into a colour image, then compresses the file using JPEG compression. Some cameras let you set parameters for this conversion typically, a choice of sRGB or Adobe RGB as the colour space, a sharpness value, and perhaps a tone curve or contrast setting.

Unless your shooting schedule is very leisurely, it's difficult to adjust these parameters on an image-by-image basis, so you're locked into the camera's JPEG interpretation of the scene.

JPEGs offer fairly limited editing headroom—large moves to tone and colour tend to exaggerate the 8-by-8-pixel blocks that form the foundation of JPEG compression. While JPEG does a decent job of preserving luminance data, it applies heavy compression to the colour data, which can lead to issues with skin tones and gentle gradations when you try to edit the JPEG.

When you shoot raw, however, you get unparalleled control over the interpretation of the image through all the aspects of the conversion.

**\*\*When you shoot raw, the only on-camera settings that have an effect on the captured pixels are the ISO speed, the shutter speed, and the aperture setting. Everything else is under your control when you convert the raw file you can reinterpret the white balance, the colorimetric rendering, the tonal response, and the detail rendition (sharpening and noise reduction) with a great deal of freedom. Within limits (which vary from one raw converter to another), you can even reinterpret the exposure compensation.**

Almost all cameras that shoot raw capture at least 12 bits, or 4096 shades, of tonal information per pixel. The JPEG format, however, is limited to 8 bits per channel per pixel, so when you shoot JPEG, you're trusting the camera's built-in raw converter to throw away a large amount of the captured data in a way that will hopefully do the image justice. This is exacerbated by the tendency of most camera vendors to impose a fairly steep contrast curve in the raw-to-JPEG conversion in an effort to produce a JPEG that resembles a transparency. In the process, they throw away about a stop of usable dynamic range, and you have essentially no control over what gets discarded.

In some ways, it's tempting to draw the analogy that shooting JPEG is like shooting transparency film while shooting raw is more like shooting negative film. With JPEG, as with transparency film, you need to get everything right in the camera, because there's very little you can do to change it later. Shooting raw provides considerable latitude in determining the tonal rendition, like negatives, and also offers great freedom in interpreting the color balance and saturation. The fact that raw also lets you control detail rendition noise reduction and sharpening breaks the analogy but offers a further advantage.

Raw offers one more potential advantage that may be hard to demonstrate but is, I believe, real nevertheless. If you shoot raw, you'll be able to take advantage of future improvements in raw converters. Digital photography may no longer be in its infancy, but it hasn't yet reached adolescence, let alone maturity, and anyone who has spent more than a couple of years working with digital imaging knows that digital imaging software improves with each iteration. JPEGs are relatively inflexible files, we may see improvements in their handling, but any such improvements are likely to be modest. Raw converters, however, have undergone radical improvements in the 10 years or so that colour filter array cameras have been around, and there's little reason to think that the next 10 years

won't see similar improvements. Shooting raw will allow you to exploit these improvements as and when they happen.

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