

Digital Photography School

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RAW vs. JPEG



The following tip on RAW vs JPEG was submitted by Richard and Rebecca from [Finn Productions](#) (You can see their [Flickr account here](#)). It came out of a discussion in our Flickr Group titled [JPG or RAW](#). There is actually a lot of good discussion already in this thread so once you've read the following head over and see what others have to say on the topic.

So, you've forked over at least \$600 (but probably \$1000) for your first DSLR camera. You have more buttons, dials, and menus than you know what to do with, even after reading through the fat booklet that came with your camera and explains its usage in ten different languages.

It's all you can do to understand ISO, shutter speed, and how less is more when it comes to aperture. This beast of a camera can produce files in a Raw format, whatever that means, but it also has the nice comfortable JPEG format that we all know and love.

Like me you probably happily shoot in JPEG for quite awhile - getting used to the myriad of options available to you. One day you look at that Raw setting and ask, "should I be using Raw for the best quality? What is Raw, exactly?"

Excellent question. First, let us define these two formats.

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A Raw file is...

- not an image file per se (it will require special software to view, though this software is easy to get).
- typically a proprietary format (with the exception of Adobe's DNG format that isn't widely used yet).
- at least 8 bits per color - red, green, and blue (12-bits per X,Y location), though most DSLRs record 12-bit color (36-bits per location).
- uncompressed (an 8 megapixel camera will produce a 8 MB Raw file).
- the complete (lossless) data from the camera's sensor.
- higher in dynamic range (ability to display highlights and shadows).
- lower in contrast (flatter, washed out looking).
- not as sharp.
- not suitable for printing directly from the camera or without post processing.
- read only (all changes are saved in an XMP "sidecar" file or to a JPEG or other image format).
- sometimes admissible in a court as evidence (as opposed to a changeable image format).

- waiting to be processed by your computer.

In comparison a JPEG is...

- a standard format readable by any image program on the market or available open source.
- exactly 8-bits per color (12-bits per location).
- compressed (by looking for redundancy in the data like a ZIP file or stripping out what human can't perceive like a MP3).
- fairly small in file size (an 8 megapixel camera will produce JPEG between 1 and 3 MB's in size).
- lower in dynamic range.
- higher in contrast.
- sharper.
- immediately suitable for printing, sharing, or posting on the Web.
- not in need of correction most of the time (75% in my experience).
- able to be manipulated, though not without losing data each time an edit is made - even if it's just to rotate the image (the opposite of lossless).
- processed by your camera.

These differences lead implicitly to situations that require choosing one over the other. For instance, if you do not have much capacity to store images in camera (because you spent all your money on the camera body) then shooting in JPEG will allow to capture 2 or 3 times the number you could shooting in Raw. This is also a good idea if you are at a party or some other event afterwhich you want to share your photos quickly and easily.

On the other hand, if capacity is not an issue at all (1 GB and 2 GB flash cards are getting cheaper every week) you might consider shooting in Raw + JPEG, just to cover all the possibilities. If you cannot or do not want to do any post processing, then you simply have to shoot in JPEG. Taking a picture in Raw is only the first step in producing a quality image ready for printing. If, on the other hand, quality is of the utmost importance (like when you are shooting professionally), and you want to get every bit of performance your DSLR can offer then you should be shooting in Raw.

That being said, I know many professional photographers who do not shoot in Raw for one of two reasons: 1.) they don't know how, or 2.) they don't want to take the time to process the images afterwards.

Shooting in JPEG

When you shoot in JPEG the camera's internal software (often called "firmware" since it's part of the hardware inside your camera) will take the information off the sensor and quickly process it before saving it. Some color is lost as is some of the resolution (and on some cameras there is slightly more noise in a JPEG than its Raw version).

The major actor in this case is the Discrete Cosine Transforamtion (or DCT) which divides the image into blocks (usually 8×8 pixels) and determines what can be "safely" thrown away because it is less perceivable (the higher the compression ration/lower quality JPEG, the more is thrown away during this step). And when the image is put back together a row of 24 pixels that had 24 different tones might now only have 4 or 5. That information is forever lost without the raw data from the sensor recorded in a Raw file.

The quality of a JPEG taken with a DSLR will still be far better than the same shot taken with a top-of-the-line point-n-shoot camera that is as old as your DSLR. If your camera can burst (shoot continuously for a few seconds) you'll actually be able to shoot more shots using JPEG than Raw because the slowest part of the whole process is actually saving the file to your memory card - so the larger Raws take longer to save.

Shooting in Raw

If you do shoot in Raw, your computer rather than the camera will process the data and generate an image file from it. *Guess which has more processing power: your digital camera or your computer?* Shooting in Raw will give you much more control over how your image looks and even be able to correct several sins you may have committed when you took the photograph, such as the exposure.

To take advantage of this you will certainly need to use some software on your computer to process the files and produce JPEGs (or TIFFs). I have found the Camera Raw that comes with Adobe Photoshop CS2 to be very good at processing Raw files (even batch processing them), though everybody has their favorite (RawShooter has a lot of fans). When you load a Raw file using Adobe Photoshop CS2 the Camera Raw dialog will automatically pop up. Most of the time the automatic settings are fairly decent, but you have the chance to change the white balance, exposure, contrast, saturation, and even calibration of the red, green, and blue guns or correct for lens aberration - all lossless.

If the white balance is off I have found that it is much easier to fix using the Camera Raw screen than loading the JPEG and manipulating that - the end result is much better as well. The richness, detail (sharpness), color range and ability to adjust these settings end up being so much greater with a Raw file, even though what a Raw file looks like before processing is anything but rich and sharp. As a side note, all of my work that uses creative coloring was colored using the white balance settings in the Camera Raw dialog.

Part of the conversion to JPEG are sharpening algorithms and as a result, the unprocessed Raw file is less sharp. Two things can affect this, one is the brand of camera (Nikon cameras are generally considered sharper, but this is not true across all models) and the other factor is the user settings for sharpening in the camera. Loading a Raw file in a program such as Adobe Photoshop CS2 will automatically apply white balance, sharpening, contrast, brightness, etc... and can even batch process Raw files. I often use this feature as a first pass and then go back and adjust the settings if needed. This is especially helpful because even if I did everything correct in camera when I took the photo and my conversion software was able to use the full processing power of my desktop computer, the conversion to JPEG could still trick the camera or my computer and only my eye can produce the correct white balance, contrast, brightness, etc...

What software is good to use with Raw?

- [Microsoft RAW Image Thumbnailer and Viewer for Windows XP](#) (essential for Windows based photographers)
- [Picasa](#) (Free!)
- [Adobe Photoshop CS or CS2](#)
- [RawShooter Premium](#) (recently bought by Adobe)
- [ACD See](#) (for Digital Asset Management)
- [Portfolio Extensis 8](#) (for Digital Asset Management)

- [iView Media Pro](#) (DAM, recently bought by Microsoft)
- [BreezeBrowser Pro](#) (DAM, I also love their [Downloader Pro](#) for use with my card readers)
- [Adobe Lightroom](#) (beta)
- [Capture One](#)
- [IrfanView](#)
- [DXO Optics Pro](#)
- [Picture Window Pro](#)
- the software that came with your camera
- more software comes out all the time...

Considerations

There are a few other issues to worry about when shooting in Raw, such as color space (Adobe 1998 vs. sRGB). I've used both color spaces, but sRGB is closer to most ink jet, pigment, and lab printers (the place where I get my photos printed requires sRGB). If you want all 12-bits of color (as opposed to the 8-bits of a JPEG) you will need to store your image as a TIFF.

Some people will also convert their proprietary Raw files (with extensions like .CRW, .CR2, .NEF, etc..) into the Adobe digital negative format (.DNG) to make sure those files will be readable in the far flung future. I have yet to spend the time doing this because I haven't seen the need. For archival, however, consider getting gold DVDs because the gold lining lasts 50 - 100 years (much longer than the maximum of about 25 years for silver lined DVDs or CDs). Keep more than one backup if your images are important (and keep the second backup at a different location, such as the house of a friend or relative).

When it comes to your photography, however, you are the ultimate decision maker on what is best. I recommend that, if you haven't, you play with the Raw format. You certainly won't harm yourself or your camera. In fact, a great test is to go out just to shoot something (even just in the backyard or around the block). Shoot several photographs under various lighting conditions using the Raw + JPEG setting on your DSLR (if it has that capability). Take them back to your computer and compare after processing the Raw files. Take into consideration your time in doing so and see if the gain is worth your extra time.

Thanks again to Rebecca and Richard from [Finn Productions](#) for this article on JPEG vs RAW. Head over to our [Flickr Discussion group](#) on the topic to read more on the topic or to have your say.

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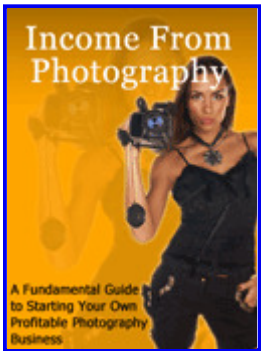
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