

What is a RAW file?

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.

You're getting the hang of ISO, shutter speed, and how less is more when it comes to aperture and you've discovered that 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 a while - 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? Lots of people say it's best, so what is Raw, exactly?"

A Raw file is...

- not an image file per se (it will require special software to view, though this software is easy to get), it's what all digital cameras produce - but most point and shoot cameras immediately process this file and turn it into an acceptable Jpeg, with sharpening, contrast and colour saturation applied.
- typically a proprietary format (with the exception of Adobe's DNG format that, sadly, isn't widely used yet).
- at least 8 bits per colour - red, green, and blue (12-bits per X,Y location), though most DSLRs record 12-bit colour (36-bits per location) or 14-bit (42 bits per location).
- uncompressed (a 10 megapixel camera will produce a 10 MB Raw file).
- the complete (loss-less) data from the camera's sensor.
- higher in dynamic range (ability to display more details in the highlights and shadows).
- lower in contrast (flatter, washed out looking).
- not as sharp as a Jpeg - because it hasn't had any sharpening applied to it.
- 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.
- exactly 8-bits per colour (24-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.
- able to be manipulated, though not without losing data each time an edit is made and then saved - even if it's just to rotate the image (the opposite of loss-less).
- processed by your camera.

These differences lead 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 you to capture 2 or 3 times the number of images you could shooting in Raw. This is also a good idea if you are at a party or some other event, after which you want to share your photos quickly and easily. On the other hand, if capacity is not an issue at all (high capacity 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, 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 will take the information off the sensor and quickly process it before saving it. Some colour is lost as is some of the resolution (and on some cameras, due to the 'firmware', it can try to process the shadows a little too much and there will be slightly more noise in a JPEG than its Raw version).

The major actor in this case is the Discrete Cosine Transformation (or DCT) which divides the image into blocks (usually 8x8 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, it 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, because it uses a larger sensor, 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. 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). The "Adobe Camera Raw" plug-in that

comes with Adobe Photoshop and Photoshop Elements is very good at processing Raw files (even batch processing them), though everybody has their favourite and if your camera came with some software it should include a Raw-Processing program. When you load a Raw file using Adobe Photoshop or Elements, the Camera Raw dialogue 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, digital noise reduction, sharpening and even calibration of the red, green, and blue or correct for lens aberration - all loss-less, because all the changes made by Camera Raw are added as editing information in a 'sidecar' file - leaving the Raw itself intact, unchanged. If your camera can record in Adobe's own DNG Raw format, the changes are added inside the file, but can be re-processed at any time.

If the white balance is off 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), colour 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. Loading a Raw file in a program such as Adobe Photoshop or Elements will automatically open Camera Raw and the last saved settings will be applied to the image.... white balance, sharpening, contrast, brightness, etc... and can even batch process Raw files. Camera Raw also recognise the White Balance that was set on the camera - but it can be changed. There are lots of settings in Camera Raw that need some explaining - one thing to know is that the ACR in Elements is a cut-down version of the one that comes with full Photoshop. It seems to be a marketing trick by Adobe, to get people to buy the full program (which is, for 90% of photographers, far more than they need)

What other software is good to use with Raw?

- [Picasa](#) (Free!)
- [ACD See](#) (for Digital Asset Management)
- [Portfolio Extensis 8](#) (for Digital Asset Management)
- [Adobe Lightroom](#)
- [Capture One](#)
- [IrfanView](#)
- DXO Optics Pro
- the software that came with your camera

Considerations

Some cameras also have the option of taking either their proprietary Raw files (with extensions like .CRW, .CR2, .NEF, etc..) or shooting in the Adobe digital negative format (.DNG) to make sure those files will be readable in the far flung future. My Pentax can do this and I find it a slightly simpler process - I can see thumbnails on my computer (or anybody else's) because DNG is now a such a common format that Windows and Mac systems can 'read' a DNG enough to make the small thumbnail, making file management a lot easier. It also keeps its Raw processing information "within itself", as opposed to needing a 'sidecar' file (mentioned earlier).

When it comes to your photography, however, you are the ultimate decision maker on what

is best. You certainly won't harm yourself or your camera if you give Raw a go. In fact, if your camera allows you to shoot "Raw + Jpeg" simultaneously, 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 and take them back to your computer and compare after processing the Raw files. Zoom right in close and see if there's a difference - you may not notice a difference, mainly because a computer's screen resolution won't show it, but it's certainly there - and would become very obvious when printing. Also think of all the improvements you've been able to make by 'developing' the Raw. There again, take into consideration the time you take in the extra 'work' and see if the gain is worth your extra time.

I recently came across a website that asked its readers to tell which format they used, and why. This is a sample of the replies.

- I made the switch to RAW a few months ago and haven't looked back. The ability to do white balancing after the fact was reason enough. Plus I do just enough processing to warrant the extras that come with uncompressed. Now I just need to buy some bigger CF cards.
- Primarily it will be in RAW. This does two things: it gives me the flexibility to change the exposure and whatnot with a bit more latitude than JPEG, the large file sizes keeps me separating the wheat from the chaff by necessity (I shoot largely from my laptop and it's got limited drive space.)
- RAW all the way. For me the exposure latitude inherent in RAW makes the difference in file size worth while. Storage media is cheap – cheaper than film ever was – and for me shooting RAW vs jpg is similar to shooting negative vs polaroid: you can do a whole lot more with your neg.
- This is always a contentious topic, for some reason, so it should form some interesting discussion. I know that some of the top wedding photographers in the country shoot jpg and don't see the point of RAW. That's mainly because they need to 'turn round' their shots quick and can't spare the time to process every image (in fact Lightroom now makes this a much simpler process for bulk jobs of this kind and wedding photographers are now adapting to Raw)
- RAW almost 100% of the time. The only other setting I use is Small JPEG & that's just for goofy email stuff that I use my cell phone for nowadays.
- RAW has a huge advantage over JPEG in terms of white balance correction and Exposure adjustment. Some of the new Photoshop tools allow you do make similar adjustments to JPEGs, but you still don't get the kind of control that you have with RAW.
- With storage being as cheap as it is, and Lightroom/Aperture being such a good workflow, why bother with JPEG?
- I only recently switched to RAW as being new to digital SLR's didn't feel the increase in file size to be worth the hassle as the JPEG's are arguably superb in their own right. However, after trying the format and realising that there was much more scope for post processing I switched over.
- From a technical standpoint it now makes more sense to me to work with RAW as it is loss-less The files are big but I feel the end results and the greater range of adjustments available (that actually look good) are worth it.

- RAW - If you do any amount of post-processing, once you go RAW there's no going back. It offers such a wide range of control over the image, from exposure to colour balance to contrast to saturation, that you can change in the smallest degrees that I can't see going back to jpeg, ever. Of course, my only quibble is that RAW images are naturally soft, and I have to add more time to my processing by adding some sharpening, but I think it's a small price to pay.
- It comes down to speed and convenience vs. optimal image quality. If you are going to producing high quality prints, then RAW is the way to go, and with today's high capacity storage devices, file size is no longer an issue. However, RAW processing does take some time. If you need to deliver moderate quality fast, then JPEG will certainly suffice. The trained eye can easily see a difference between RAW and JPEG, but 8 of 10 people on the street probably wouldn't know the difference. I shoot RAW + JPEG so I'm prepared for either option.
- RAW here, too. It lets me turn way too many mistakes into keepers for me to consider turning back to jpg. I've had shots where that would have otherwise been ruined because I either forgot to change the white balance or exposure bias or I didn't have time to do it in the face of a fleeting shot.
- RAW. Call it the lazy approach, but I love the easy editing possibilities it gives me later. I shoot a lot of photos, and I'm not a pro- I need room for mistakes.
- I shoot in JPEG because it requires less processing to get acceptable results. Interestingly, I explicitly purchased a compact digital camera with RAW support (Fuji FinePix E900) because I planned to use it mostly for simple astrophotography. But it turned out that, despite the wider tonal range, the RAW format requires too much processing for my simple needs. Life is short.
- RAW on cameras that can do it. Unfortunately they've stopped putting that capability in virtually all point and shoots so if I use one of those, I'm stuck with JPG.
- RAW always I'm not shooting in auto mode – only the WB and exposure options worth while the extra file size.
- I've had RAW save my hide a number of times. Especially when you shoot where there's consistent lighting, such as an event. Under these circumstances, if your exposures, white balance, or flash settings are off - all of which are surprisingly easy to do, a good RAW workflow will let you fix all the images at once. Once one image is corrected, the changes can be applied to all with a couple of clicks.
- While some tools might let you do at least part of this in JPEG, a good RAW workflow also lets you undo the changes equally quickly (again to all images at once) since the actual changes are made only in metadata (and to the rendered presentation) without manipulating the actual stored image data.
- A related topic is: if you shoot RAW, what format do you use for storage and manipulation, once the image is retrieved from the camera - native (CRW/CR2/NEF/PEF, etc. with sidecars) or standard/general (DNG). I would argue strongly for DNG since it saves the headache of tracking images in pairs. Think of the hassles of keeping file pairs in sync through rename and moves. Yes, some RAW processors don't support DNG; and others have their own sidecar formats (ex: Bibble). While Bibble is a fantastic product, using it with Bridge and Photoshop will necessitate you having to track your original raw file, plus an .XMP created by Bridge as well as a .BIB from Bibble. Now think of the headaches of tracking file triplets through moves and

renames. Yes, there are tools that will do all this, but if you use a DNG-based workflow you can bypass the whole mess. This is why I'm heading towards using DNG & Lightroom - fewer tech headaches and more time for pictures.

- I shoot a mix of RAW and jpg. If it is just going to be something quick to throw on a website for friends then I usually shoot jpg. If it is something I care about and think I might make prints of then it is always RAW.
- I find that if I am shooting RAW, I also shoot a small jpg just for quick email purposes. Just yesterday I took the RAW file and the jpg file and decided to do a test and see how good I could make them. There was no contest, the RAW images was far superior when I was done working on them. It had far more shadow and highlight detail among other things.
- Depends completely on the situation. Where I would normally have used a point and shoot camera, jpeg. For a special event, or where I know I will want to tweak things afterwards, RAW. Storage media is very cheap these days, but when I just want to have a couple fun pictures of the kids at a party, I'm not going to sit down and edit them.
- Shooting in raw offers up such a great amount of flexibility within processing that I generally shoot in raw when it makes sense. Unfortunately if I am shooting an event which needs me to be quick my camera's automatic functions don't offer the option to shoot with raw .jpg only. So if I have time to really set up a shot and if it is one that I need a great amount of flexibility with and need to be a perfect image then I always shoot with in a manual set up and in the raw format.
- RAW. ... Many people still stay in jpg because it was the way their camera was setup initially, and they are used to it. It is easier to stick with something you think you know, and are comfortable with, than to learn something new.
 - No matter what the rationalizations to shoot other than RAW, the bottom line is that, with RAW, you have every piece of information available to you that the camera had. If you shoot something else, you have a compressed interpretation of that information (less information). Just like making the purchase of a car, or of a house, the more information you have, the better decision you can finally make.
 - I went through a period where every photograph I made, I made it in RAW format. It takes forever to download all those RAW files onto my computer, and longer more to edit all of them. Many times I would take the companion Jpeg file and edit it along with the RAW, then bring them both up on my screen side by side to compare. Well, sometimes the RAW would be a little better but not that much. As I compared more and more like this, it became evident to me that my JPEG files were coming out just fine, and with a lot less effort and time. Now, if there is a very special photo I want to keep forever I will resort to RAW so I can keep a large TIFF file. But now it's just JPEG for 90% of my photos.
 - I'm a member of the Kingston Photographic Club and I often need to print my images at greater than 14" x 11"..... so it has to be Raw.