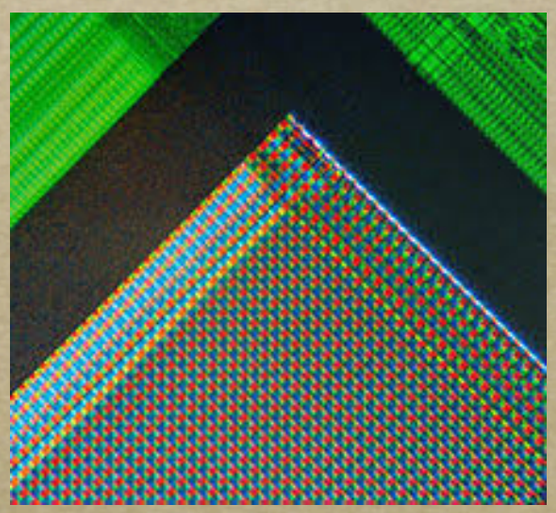
What's so Good about Raw Files ?

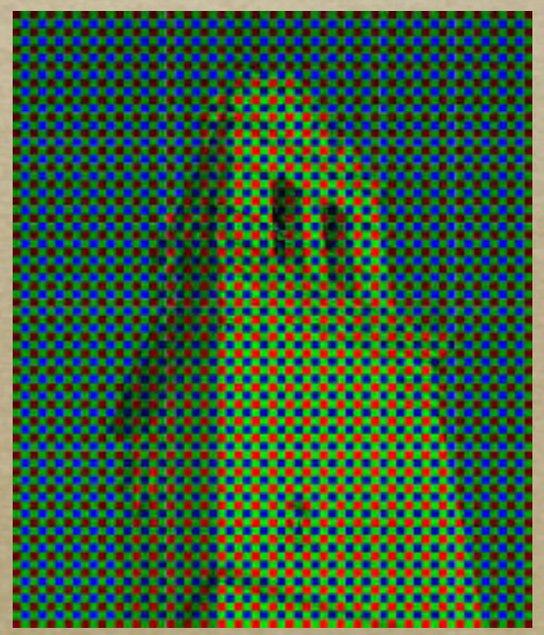
A digital camera has a sensor with rows of “pixels” (picture elements) to record the brightness of each tiny spot.

In front of the pixels is a grid of coloured filters (red, blue and green) so the sensor can record colours.



After taking a picture the camera extracts the data line by line. This is raw, unprocessed data, just a long series of 0s and 1s.

It’s quite unintelligible until software in the camera or on a computer translates it.



JPEG

Usually the camera then modifies this data

to improve the colours, contrast,

sharpness and so on.

It creates this improved image in a “jpeg” file.

(the name comes from an organisation called

the Joint Photographic Experts Group).

The camera uses this jpeg information when

you review your picture on the back of the camera.

For many years jpeg has been the most common type of picture file, recognised by almost every camera and computer.

It’s identified by an extension at the end of the file as **.jpeg** or **.jpg**.

Camera Settings

Cameras generally save pictures as jpeg files by default.

Many let you save as jpegs, raw files or both.

As memory cards are so cheap now I usually save both.

If you do use jpegs Most cameras allow you to save at various quality settings, depending on what you want to do with the photos.

Here are some examples :

My test subject

16 Mp Fine

File size 5.9MB

I’ve enlarged the centre from the best quality setting.

Note how big the file is.

16 Mp Fine

File size 5.9MB

12 Mp Fine

File size 3.6MB

16 Mp Fine

File size 5.9MB

12 Mp Fine

File size 3.6MB

8 Mp Fine

File size 1.9MB

16 Mp Fine

File size 5.9MB

12 Mp Fine

File size 3.6MB

8 Mp Fine

File size 1.9MB

8 Mp Normal

File size 0.9MB

You can see that lower quality files save space on your memory card and are more convenient for use on the internet but I'd recommend only the highest settings, just in case you find later that you've a competition winner on your computer!

If you want smaller files later on you can always reduce them later on the computer.

JPEG Advantages

Before saving the picture your camera can :

* increase contrast
* improve tonal range
* increase saturation
* set white balance
* heighten edge sharpness

These “improvements” are incorporated into the jpg file.

So other than being a common standard what benefits can the jpeg file give us?

When the picture file is saved as a jpeg it ends up as a much smaller file. It has been compressed.

It does this by finding areas, say a plain blue sky, where it can reconstruct the area later from a formula rather than defining every detail.

Also by discarding just the finest details.

This is good because you can then store many more pictures in your camera or on your computer.

The smaller files can be handled much more quickly by the camera so many sports or wildlife photographers use just jpegs when shooting at fast frame rates because they can shoot more frames before everything slows down.

Also, the camera saves those adjustments which improve the image's colour, tones, sharpness, etc. As rule your camera will make a good job of this so you can save a lot of time in Photoshop if it's already been done for you.

Once on your computer you'll find that jpegs load up faster than other file types.

JPEG Disadvantages

But it’s not so good that information you might want to include later is being removed.

And what’s worse is that the losses occur every time you save a jpeg. Try to avoid repeat saves.

So jpegs lose sharpness but they lose tonal detail too.

The range of dark to light tones in the real world is far wider than any camera can record, so you will always lose some detail in the darkest or lightest areas. But saving as a jpeg makes the problem worse because it throws out information at the extremes.

At least that’s what the books tell me.

I can show you in a moment how much detail is

lost when the camera creates the jpeg but

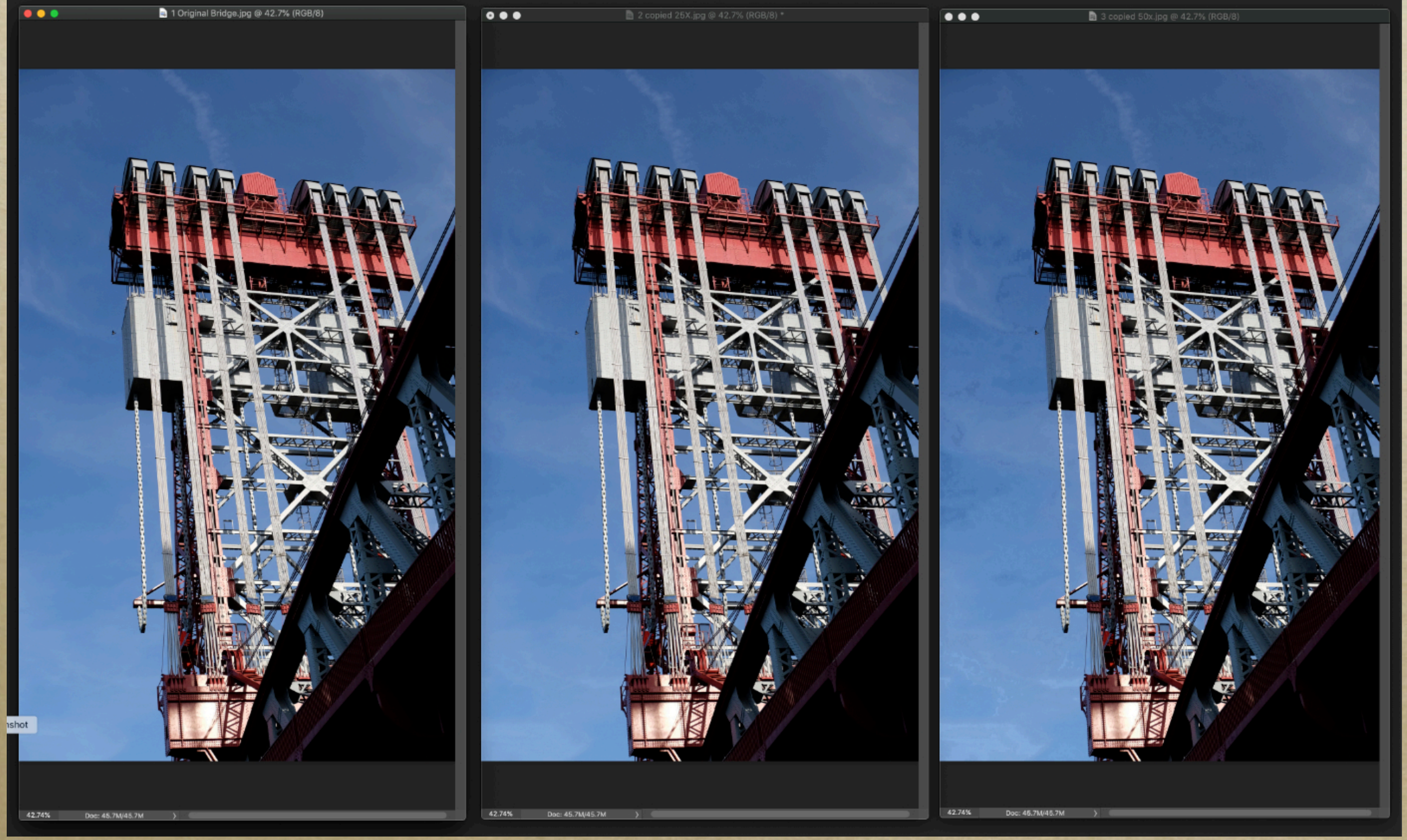
I know that repeatedly saving to jpeg on the

computer loses detail on every save.

I decided to find out for myself just how serious

an issue this is so I opened a jpeg in Photoshop

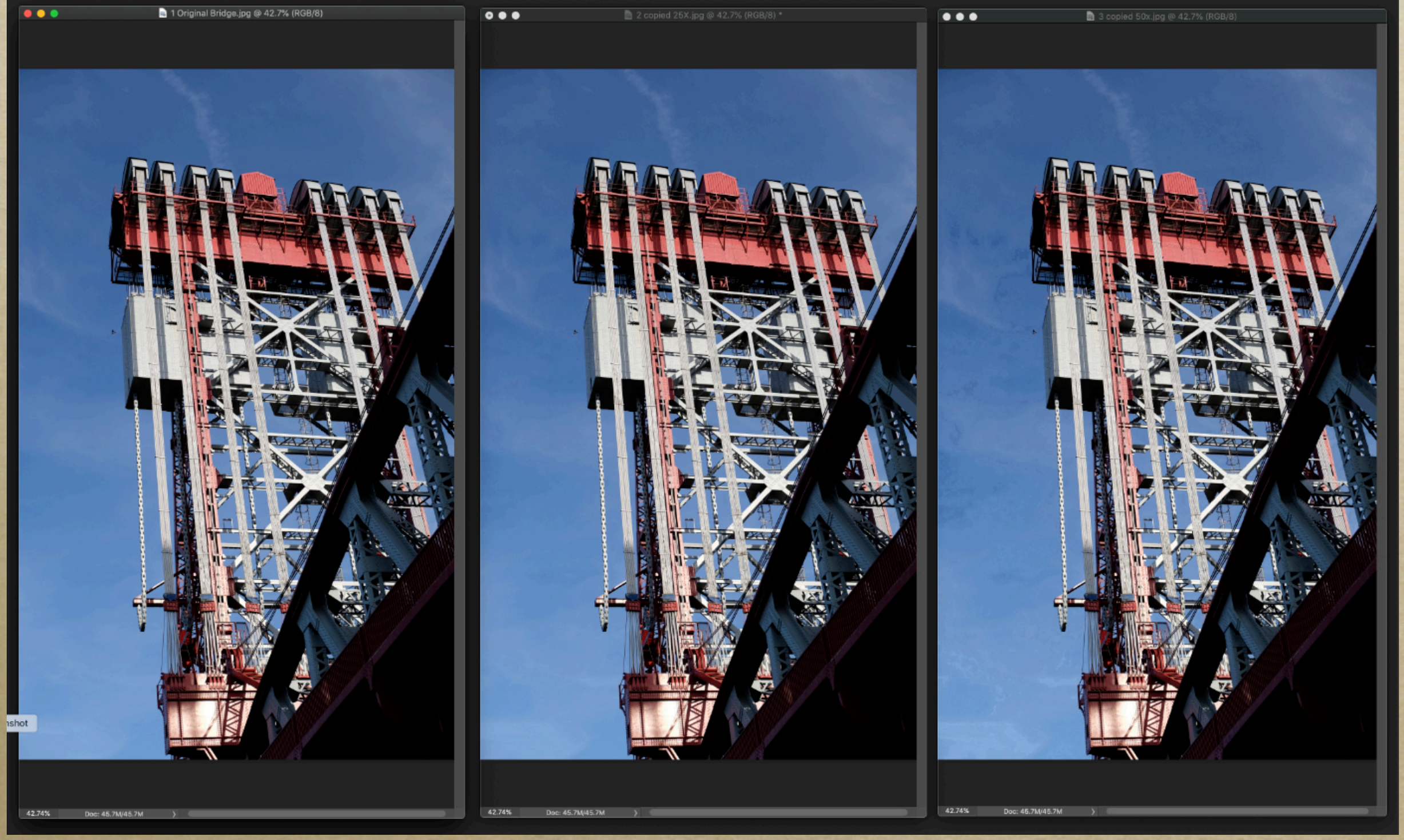
and copied it 50 times.



Original

Copied 25x

Copied 50x



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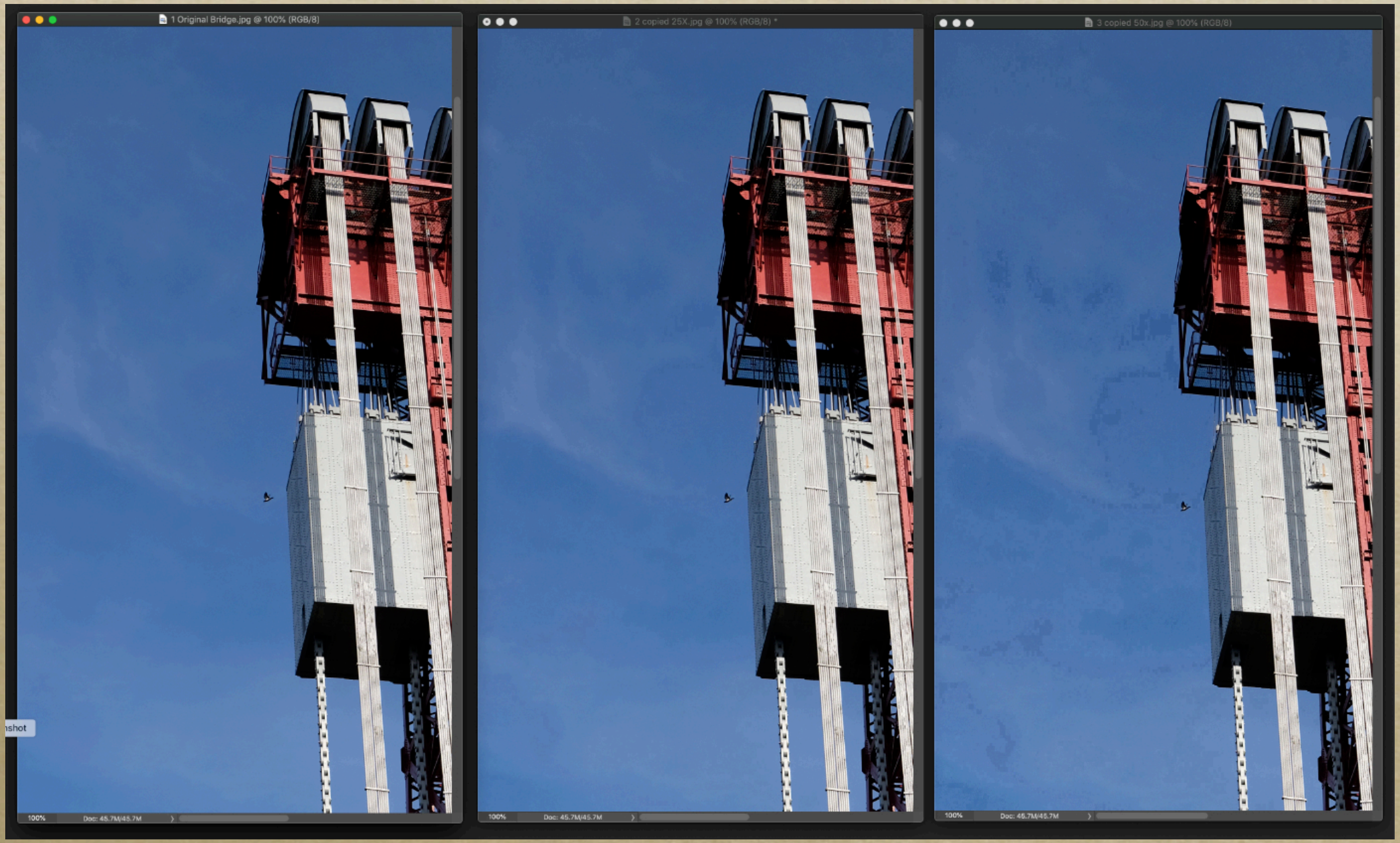
I can’t see any differences in shadow or highlight detail but there are artefacts (faults in the rendering).



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At 100% you can see faults, light and dark areas in the sky.

So it looks as if I can stop worrying too much about faults with jpeg copies on the computer.

But that doesn’t mean that they’re perfect.

Why is raw better then?

RAW (at last!)

If you want to preserve the finest detail and the full range of tones, raw files are the way to go.

It’s a lossless format, i.e. all the data is preserved.

Some cameras offer “lossless raw” compressed files which save space while claiming to keep all the data. Don’t ask me how!

The problem with raw files is that there have been no improvements in colour, contrast, etc. so you have to do it all yourself afterwards !

A raw picture is dark, flat and dull in colour and less sharp but it does have more detail in the shadows and in the light areas.

For flexibility I usually set my camera to save both RAW and jpeg files for each picture I shoot ……

JPEG file

Punchier contrast and greater saturation.

Raw file

Looks flatter, lighter shadows and more detail in highlights.

Every camera manufacturer uses a different method to save its raw files. Canon is CAF, Nikon is NEF, Sony is AWR, Pentax is PEF and Fuji is RAF. Other types raw of file are available!

So you get with your camera a special bit of software to download your pictures and modify them.

You can then convert them to other types of file such as jpeg.

But Photoshop and Lightroom will recognise and open raw files from most cameras so try doing that first.

If it doesn’t work open your picture in the programme you got with the camera and do the basic adjustments.

You will need at least to increase contrast and colour saturation.

For more advanced adjustments you may need to transfer your picture to an editor such as Photoshop.

When you need to save an image on a computer, either because you've finished it or to transfer it to another programme, there are various different file types you can choose from.

JPEGs you know about. You have to save to .jpg to enter competitions or to send over the net. Other than that you're probably better off with some other file type.

Raw. Actually, you can’t save as a raw file. You need a type which will preserve information.

PSD. This is Photoshop’s file format.

If you retouch in Photoshop this is the best one to save to because it automatically saves all the layers and some other data. Then you can re-edit the image later, although you do end up with a pretty large file!

TIFF. Lightroom can store raw images and jpeg images. If you want to edit either in Photoshop then Lightroom automatically converts them to a TIFF file. This keeps all of the information you need, including layers, though the file size is huge.

afphoto is the file extension for Affinity Photo, which is a Photoshop competitor. It too saves layers, etc. but gives quite big files.

DNG or digital negative. If you're really stuck transferring images Adobe will always read these files and they preserve data very well.

PNG is very good for graphic images as it can use vector graphics (shapes defined by mathematical formulae). Great for text and symbols. Phones and computers use them for screenshots but other than that we photographers only use them occasionally.

HEIC or HEIF High Efficiency Image Format

is similar to jpeg but it maintains better detail

while compressing the file size even more.

Apple adopted it for iPhones and iPads in their update

iOS 11 in 2017. By default photos are saved

as HEICs instead of jpegs, to save space.

You can change settings to save to a jpeg instead, or

you can save as HEICs and send out as jpegs.

There may be issues with PCs for a while though

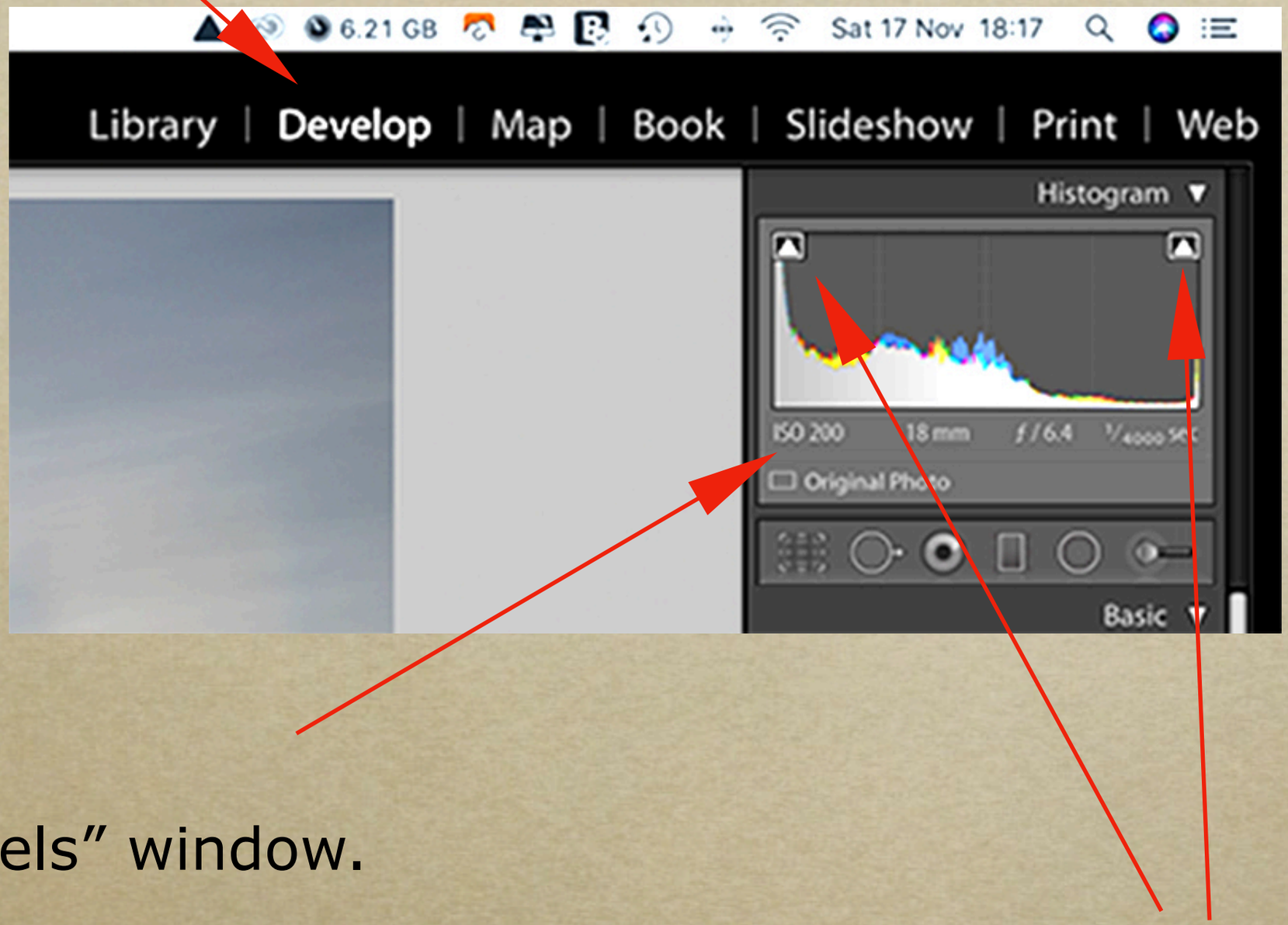
Microsoft will adapt them to eventually.

Let’s see how much detail is lost when you shoot jpegs.

Photoshop allows you to see where the highlights and shadows are clipped (losing detail by burning out to white or becoming solid black).

Different versions of Lightroom also achieve this but in different ways.

In Lightroom Classic choose an image and open the “Develop” mode.



Open the “Levels” window.

In the top corners of that window are white triangles.

If they’re missing, click left in the corners to reveal them. Then, press the “j” key to show clipped areas.

Base image

There is loss of detail in the highlights and the shadows.

Base image

There is loss of detail in the highlights and the shadows.

Highlights

Everything should be black. White or coloured areas show clipping.

Option or alt + hold the right slider at 255.

Or press “j”, depending on the version.

Base image

There is loss of detail in the highlights and the shadows.

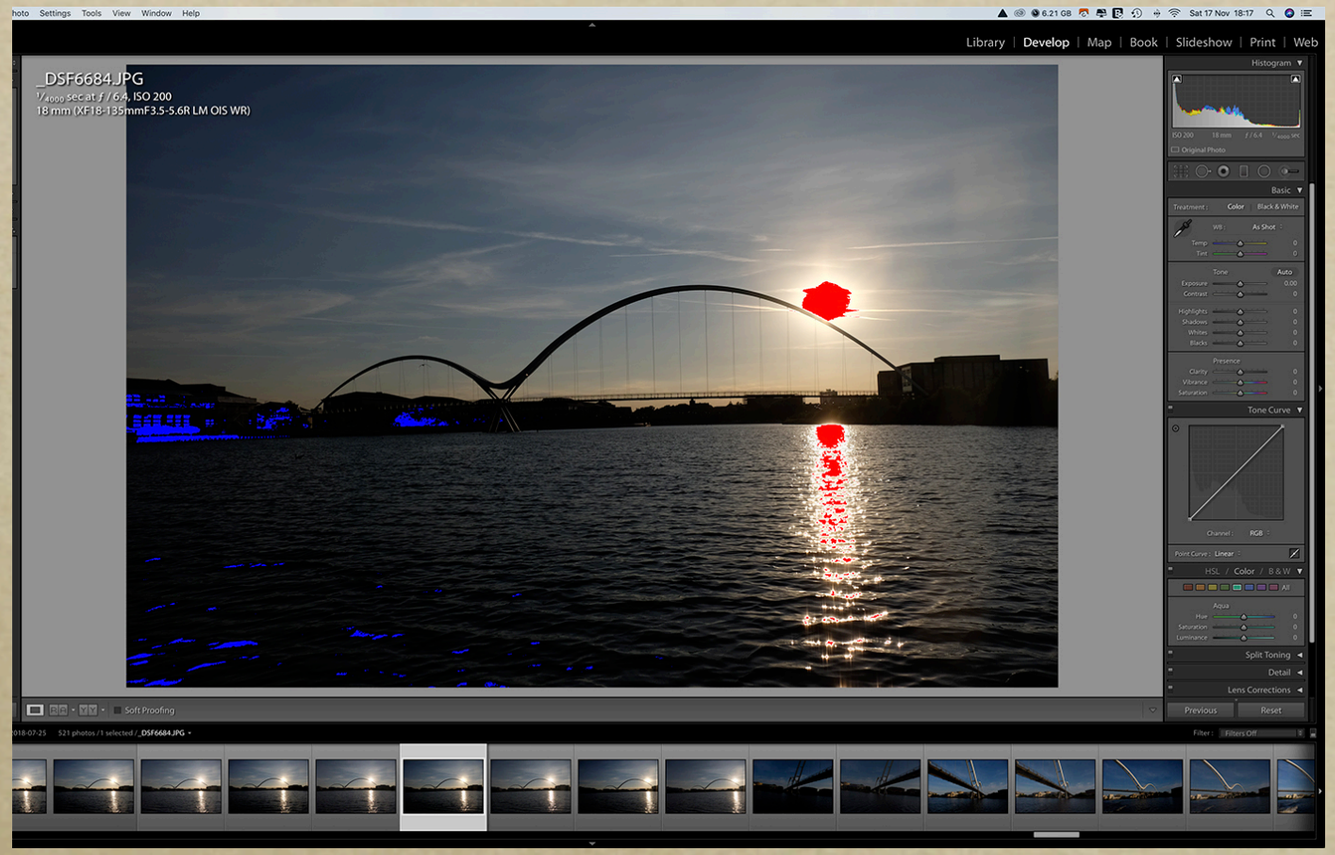
Shadows

Everything should be white. Coloured or black areas show clipping.

Option or alt + hold the left slider at 0.

Or press “j”, depending on the version.

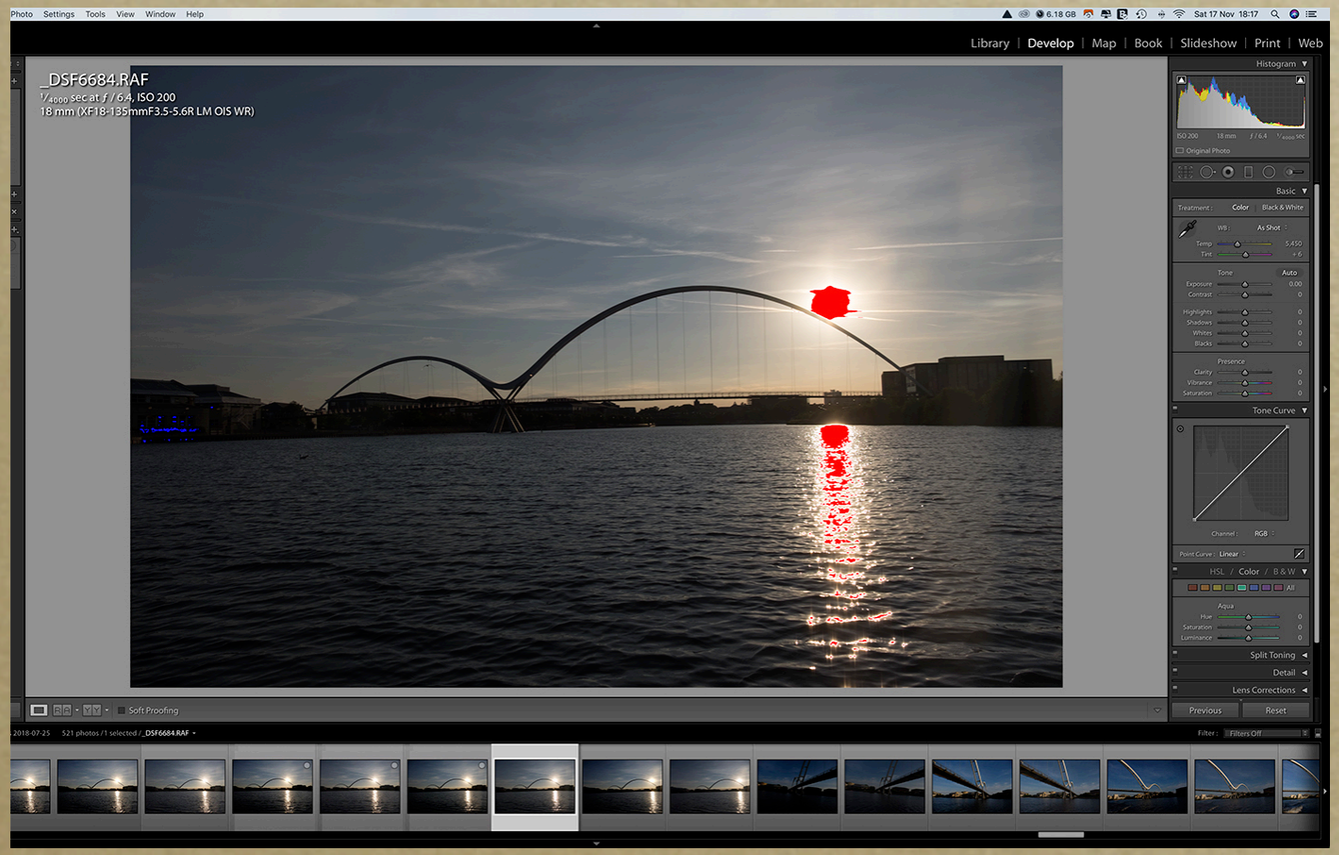
Now we can compare a jpeg and a raw image from the same exposure, both in Lightroom.



Jpeg

Blown out highlights show red.

Solid black shadows show blue.



Raw

The red areas are smaller.

There’s no clipping in the shadows.

Photoshop works in a very similar way.

So, what’s so good about raw files ?

If you want to preserve the finest detail and the full range of tones, raw files are the way to go.

But you will have to work on your images to get the best out of them.

As I usually record both file types I can use jpegs for family pictures and for sending over the net but for competition pictures I always use raw.

What do you use ?

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