Digital Workflow Tutorial - Part 1

There are many articles on the internet about workflow and digital photography and for some reason, many of them feel they need to start off with a physics lecture. As much as possible, I will leave the physics out and simply try to advise you on how to improve your workflow.

To start with, there are two formats of file type available from most SLR type cameras.
I am going to assume that you are taking your pictures RAW mode and very shortly will add a work flow for JPEG images here.

RAW files from a camera are like the equivalent of digital film. The camera has done minimal processing on them, so no colour temperature adjustments or sharpening has been applied.
In short, this allows us to change these settings later. We can fine tune these settings with greater precision when looking at them on a large screen (assuming the screen is good enough quality).
There are a few instances where it is better to take images in JPEG, I'll discuss that in the JPEG section.

When we import our images to the PC, there are a number of things we need to do:

After we sort through the images and delete the bad ones, we may need to adjust:

(1) The White Balance/Colour Temperature of the Image
(2) The Exposure
(3) The noise reduction

This is covered in Part 1 of this tutorial.

When we are happy with these, we convert our image to JPEG (or TIF) and in Photoshop or a similar program we will:

(4) Remove any blemishes
(5) Correct the levels
(6) Adjust the white point or black point (in some cases)
(7) Increase Contrast
(8) Adjust colour if necessary
(9) Apply some sharpening

I will discuss these steps individually now and where appropriate give examples. For some things like colour correction, the more practice you get, the better you get at it. Some of the Photoshop will be difficult but I will also give easy alternative methods.

Lastly, I would encourage people to develop and use Photoshop Actions and Droplets to speed this whole process up. I will provide examples and give sample action files you can use.

(1) The White Balance or also known as Colour Temperature of the Image

This is the setting on the camera where you select between AWB (auto white balance), clouds, sunshine, lights etc.. Colours can appear different under different lighting conditions. Correcting for this is known as correcting the white balance.

If you choose the cloudy setting when the sun is shining, the picture will look too yellowy. Choosing the white balance tells the camera where to put the zero point if you like. Setting it incorrectly is like measuring the length of something when you don't start at the beginning of the ruler. Luckily for us, if we are shooting in RAW format we can change this later. This is good because the lighting conditions can change very quickly (sun going behind a cloud) and we can't expect to get it bang-on every time.

> **Notes on White Balance**
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> When we look at a white object in different lighting conditions, our brain makes the necessary adjustments to tell us that this is white. The camera needs to be told this too, e.g. when you set AWB (auto) or sunshine, this is what you are setting. This adjustment attempts to make our whites white, but when we correct our white level we will also make our colours more accurate.
>
> Notes on Colour Temperature
>
> If you heat an object it will glow and the colour of this glow, measured in degrees Kelvin, has been equated to colour temperature in digital photography. So White Balance and Colour Temperature are the same things looked at in slightly different ways.

Often the camera will do a pretty good job of setting the white balance but when we choose the wrong settings, the image may turn out like the left and right images in Figure 1. When an image has the wrong white balance, it may appear yellowish or have a strong blue cast. In some instances, a small bit of additional warmth can add to an image, but too much and the image will look very unnatural.

Moth taken with White Balance on Cloudy, When It Should Have Been On Sunny. The result is too yellow

Moth With White Balance Corrected, Using The Colour Temperature Setting

Moth With Colour Temperature Set Too Low. The Image Has A Blue Cast

How to adjust White Balance on the PC

There are several ways to set the white balance:

(a) Choose Correct Preset. Often just setting the correct preset i.e. Cloudy or Incandescent Light can be enough to restore an image from incorrect settings. For example, suppose we set the camera to Sunny when taking the photograph, but actually it was cloudy on the day. Restoring the Raw file to the Cloudy setting may correct the image.

(b) The best way to set Colour Temperature for an image is to use the "Temperature" or "K" adjustment. On choosing this, we are presented with a slider that allows us to increase/decrease a number called the Colour Temperature (K).

Remember that the objective is to adjust the image to make it appear correct or pleasing. In general we want our whites to be white. Move the slider left until you see the image become too blue, then increase it until you see it becomes too yellow. Now you need to find the point in between where the colours lookthe most natural and are representative of what we saw.

(c) Use the Dropper Tool. You can set the white point by selecting the Dropper tool and clicking on a white section of the image. In this case, be sure that that the object that you are calling white (or Neutral) is truly white , otherwise the image will have a colour cast.

Picture taken "As Shoot". Clearly there is a blue cast

Using the dropper tool, I select a piece of the table cloth that I know to be white. Unfortunately, the image is still too Yellow.

After using the Dropper Tool and seeing the results, I have made minor adjustments by reducing the Colour Temperature slightly.

Get used to setting the White Balance using the temperature method, as it is the most precise method. When doing this for the first time, there is no harm in looking at the results the other methods produce, i.e. try the Eye Dropper. This may help you visualise the final result better before trying the Colour Temperature tool.

And that's it. With experience you can complete this step in 10 seconds (What am I doing for the other 9!).

(2) Correcting the Exposure

One of the really good benefits of digital photography and shooting in RAW format, is the ability to adjust the brightness of an image after we take the photograph and before we create our final JPEG image.

This means that if we overexpose or underexpose an image, we may correct a certain amount of this later with software on the computer (within reason).

This is really useful for several reasons. Not only can we micro-adjust our exposure, but we can create a second darker (or lighter for that matter) image and combine the two, in order to preserve shadow (or highlight) detail. A full example of this is given later.

It should be stressed that this is not a full exposure adjustment tool and you really need to get the exposure right when taking the image (See Exposure tutorial).
Adjusting the brightness (or exposure) slider up and down, shifts the entire colour range up and down.
If you watch the histogram while you adjust the image, you will see the entire histogram graph move left and right.
Although certain images will lend themselves to adjustment more than others, you should be wary of image degradation. If the changes are too drastic, the image quality will deteriorate.

Be aware that when you increase the exposure slider and brighten an image, noise may become visible in the shadows that was not previously visible. This is a trade off you will have to make, however it is possible to reduce this noise.

One final comment on the Exposure/Brightness slider and black and white images. When producing Black and White images, there is nothing worse than a 'flat' (very little contrast) image. You will find that when you select Monochrome as the image type, you will need to adjust the brightness and contrast of an otherwise perfectly balanced colour image.
This topic requires a section of its own, but for now you can take it that you will need to adjust the brightness/exposure slider, in order to compensate for the negative (compression) effects that we introduce when adjusting the contrast. There will be more on this subject later in the section on black and white.

(3) Noise Reduction

By now everybody should be clear that at high ISO levels, 'Noise' can be a problem. So why use high ISO?
Often we need to set a high ISO in order to reduce possible blurring from camera shake and (see Exposure tutorial if you are not sure of this).

There are several programs to reduce noise and it must be remembered that when reducing noise, there are always trade-offs. I will briefly consider Luminance noise reduction and Chrominance noise reduction. Forget the complicated definitions. Chrominance noise means colour noise. Luminance noise is the non colour e.g. brightness noise. (Anyone familiar with lab colour will be familiar with these separations).

Some very simple rules.

Reducing luminance has the effect of blurring the image. Use it sparingly, if at all, and only when absolutely necessary.

Reducing chrominance has far less consequences. If you reduce chrominance noise too much, a slight colour bleeding can occur, so always enlarge the image to 100% view and check colour transitions.

An example might help. In low a low light photograph I would be happy to set the chrominance noise slider to 30% or [6 of 20 if the slider goes to 20] and feel safe that no bleeding of colours will occur. In a very noisy image, you may need much higher values, like 80% (16 out of 20).

Notes on Noise

Noise and the Bucket analogy. Why do we get noise? A simple analogy may help. At the lowest ISO, the amount of charge to set a pixel to particular colour, will be the full voltage range of the sensor. Imagine this is a bucket of paint. Bucket full = pixel saturated or fully charged. If I increase my ISO to say double (1 stop), the level that I now consider to be full is only half the bucket and so the background noise (tiny spurious voltages on the device) are now proportionally much larger in relation to the full bucket. Continuing on to the highest ISO, we now set our "bucket full" level to be a very low level in the bucket and the noise is now proportionally significant when compared to the full level. This manifests itself in the image as noise.

A quick example to ensure that we are talking about the same thing and that we have a good understanding of what to look for or what noise looks like. Note that I have left the images large, so you can actually what I am talking about.

In this example I have zoomed right into the image in order to see the noise we are talking about. I have also applied some very rough sharpening, in order to highlight the noise. The Three-toed woodpecker was taken at an ISO of 3200 on a Canon Eos 1DIII (currently the maximum on this camera but already exceeded by later models).

With No Noise Reduction Applied:

Three-toed Woodpecker in poor light
This image has no noise reduction applied

Zooming into the feathers we see the noise.
The noisy pixels are the red and green pixels

With Chrominance Noise Applied

Setting noise slider to 50% [or 5 out of 10]

*Three-toed Woodpecker with Chrominance
Noise reduction applied*

*Zooming into the feathers we see the Chrominance
noise has been removed. However the Luminance noise remains*

Luminance Noise Applied

Setting noise slider to 40% [or 4 out of 10]

Final Image of Three-toed Woodpecker

Most of the noise has now gone but Luminance noise reduction has removed some of the feather detail

Question: So what should I set my ISO to begin with? I would start at 200 and then adjust depending on lighting conditions and the image I was trying to get. See Exposure tutorial

One final remark before we move onto the next section. It is also possible at this point, to correct for lens aberrations using programs like "DX0 optics" and Canon's DPP. However, I will not discuss that here as it is an advanced topic so I'll get to that topic later.

Part 1 Summary

(1) Set White Balance to get our whites white
(2) Adjust the Exposure slider to fine tune brightness
(3) Apply noise reduction sparingly