

Devizes Camera Club

Software Basics

Taking a picture with a digital camera is increasingly only part of the image-making process, and much can be changed, and improved, by software editing. There are many software applications available for this, the most well known of which is Photoshop in its many guises. This write up provides further information to go with the 'Software Basics' presentation/demonstration given on 18th February 2014, which used Lightroom 5 and Photoshop Elements 11 to illustrate the main effects possible in post-processing.

1. Global Adjustments - affecting the whole picture

1.1 White Balance. The usual aim in the final picture is to render whites and grey tones as neutral, with no significant colour casts. If whites or greys in the picture do not appear as neutral tones, or if the overall appearance is too cool (blue cast) or warm (orange cast), the software provides the means to correct this. Note that the monitor itself may introduce a colour cast, and it is important to eliminate this with profiling before spending a lot of time getting the colours right in each individual picture.

To correct a picture with a colour cast :

- in Lightroom, go to the top of the Basic panel. Then do one of the following :
 - use the 'eye-dropper' tool to select a neutral tone to set the white balance for the whole picture
 - if the picture was shot in RAW, use one of the presets such as Daylight or Tungsten, tweaking the Temp and Tint sliders as necessary
 - if the picture has no neutral tones and is a JPEG or TIFF, use the Temp and Tint sliders to judge the balance visually.
- in Elements, open the picture in the RAW convertor (even if it is JPEG or TIFF), where the same options exist. [Tip : To open a JPEG or TIFF in the RAW convertor, use File>Open As and specify 'Camera Raw' in the 'Open As' pull down menu.] In the Elements editor, there is also an option under Enhance>Adjust Colour>Remove Colour Cast, but this only offers an eye-dropper tool without any opportunity to adjust further, and hence is not recommended.

1.2 Exposure. As well as ensuring the overall picture is not too bright or too dark (depending on the effect required), adjustments may also be required which affect only parts of the tonal range (such as highlights or shadows), or just individual colours. The effects of these various tools can overlap and hence there are many ways to achieve the same result.

The main tools for adjusting the overall picture are :

- in Lightroom :
 - Assess the histogram for a pictorial view of the overall exposure balance, and especially ensure there is no bunching on either the left side (underexposed) or right side (overexposed). Also turn on the clipping arrows (top left and right corners), which will show areas of blue if there are deep shadows with no detail present and red if there are burnt out highlights.
 - In the Basic Panel, use the 'Exposure' slider to lighten or darken all tones equally

- Also in the Basic Panel, use the Highlights slider to lighten or darken just the brightest tones (normally darkening the Highlights will greatly improve the sky in a Landscape). Similarly, use the Shadows slider to lighten or darken just the darkest tones (normally lightening the Shadows will restore detail to very dark areas)
- In the HSL/Colour/B&W Panel, there is a 'Luminance' section where individual colours can be made lighter or darker without affecting other colours. Thus for a Landscape, it is possible to brighten the orange/yellow/green colours (typical vegetation & rock tones) while darkening the blue (to improve the sky).
- Use the Tone Curve Panel if mid-tones need lifting, typically by brightening the Lights (mid-tone light tones) and darkening the Darks (mid-tone dark tones). The Tone Curve graph should normally become a gentle 'S' shape.
- In Elements :
 - The Elements Basic Panel is the same as that described for Lightroom. Hence open the file in the RAW Convertor (even if it is a JPEG or TIFF) and use the histogram and clipping arrows in the same way to assess overall exposure. Then use the Exposure, Highlights and Shadows sliders in the same way.
 - The Elements RAW convertor does not have the ability to lighten or darken individual colours, or to change the mid-range tones using Tone Curves. Instead, click 'Open Image' in the RAW convertor to take the picture into the Editor, and then use Enhance>Adjust Lighting>Levels. The Levels dialogue box presents a graph with 3 arrow sliders along the bottom. Use the middle slider to darken or lighten the mid-tones while leaving the highlights and shadows unaffected. Alternatively, use Enhance>Adjust Colour>Adjust Colour Curves, which allows separate adjustment of the mid-tone lights and mid-tone darks.

1.3 Contrast. Adding contrast will add impact to a picture by darkening the dark areas and lightening the light areas (which therefore overlaps with some of the techniques described above to adjust Exposure, particularly the Tone Curve section in Lightroom). Adding contrast also increases overall apparent sharpness, because of the way image Sharpening works - see section 1.5 below. Note that when adding contrast, a little goes a long way, and usually a small amount will improve the picture whereas too much will create a very unnatural effect (unless that is what you want).

Contrast is controlled in the Basic Panel of both Lightroom and the Elements RAW convertor :

- The Contrast slider will increase or decrease contrast across the entire tonal range, darkening shadows as well as mid-tone darks and lightening highlights as well as mid-tone lights. It is therefore a very crude method of increasing contrast.
- The Clarity slider will increase or decrease contrast only across the mid-tones, leaving Highlights and Shadows unaffected. It therefore gives a much more natural effect while still adding the impact which draws the viewers attention.

1.4 Saturation. Saturation controls how strong or muted the colours in the picture are, and can also be used to add impact to the picture. As with contrast, a little goes a long way so while a small increase may enhance the picture, too much will create an unnatural, garish effect.

Saturation controls are available in the Basic Panel of both Lightroom and the Elements RAW convertor :

- The Saturation slider will increase or decrease saturation in all colours by the same amount
- The Vibrance slider will increase or decrease saturation in colours which are muted without further saturating colours which are already well saturated.

Additionally Lightroom has the ability to increase or decrease the saturation of individual colours, with a series of sliders within the HSL/Colour/B&W Panel. These can be used in conjunction with the Luminance sliders in the same panel to achieve a natural looking effect. For instance, the blue in a sky can be darkened in the Luminance part of the panel, or made more saturated in the Saturation part of the panel, but the best result is often to use a small amount of both (eg try -30 Luminance and +30 Saturation).

1.5 Sharpening. Sharpening works by increasing contrast along edge lines in a picture, so the darker pixel on one side of the line is made darker and the lighter pixel on the other side of the line is made lighter - hence the similarity with the way contrast works. This works well on an already sharp image, but cannot rescue one that is blurred/out of focus from the outset. Even on a sharp image, it is important not to over-sharpen, which will produce a very grainy result, with halos and other artefacts in out of focus areas of the picture.

In Lightroom and the RAW convertor of Elements, the Sharpening controls are found in the Details panel. There are 4 control sliders, which are used as follows :

- Amount : Controls the degree of sharpening being applied
- Radius : This specifies how thick a line must be before it is sharpened (a Radius of 1 = 1 pixel)
- Detail : Tries to limit the extent to which halos are created along sharpened lines
- Masking : If the picture also contains areas of smooth tone which do not require sharpening, masking specifies which areas will not be sharpened. Tip - if you hold the Alt key down (on a PC) and then slide the Masking control, the picture will change into a visual representation of which areas will be sharpened (white) and which will not be sharpened (black).

The Elements Editor also contains the 'Unsharp Mask' tool which is arguably a more heavy duty way of sharpening a picture. (Note - Unsharp Mask is a term used by print darkroom workers in the days of film.) Unsharp Mask in Elements is found in Enhance>Unsharp Mask, and has 3 control sliders :

- Amount : As with the RAW convertor, controls the degree of sharpening being applied, but will sharpen up to 500% rather than the 150% maximum in the RAW convertor
- Radius : Also the same as the RAW convertor version, specifying the minimum width of a line to be sharpened
- Threshold : Specifies how different in tone the pixels must be for a line to be sharpened, and thus, counter-intuitively, a Threshold of 1 will give more sharpening than a Threshold of 5.

With both types of sharpening, it is suggested that the Amount slider is moved to its maximum, which produces a very false, over-sharpened picture, and then move the slider slowly to the left until it reaches a point where the picture looks natural.

1.6 Noise Reduction. Noise in a picture is usually caused by using a high ISO, or by increasing the exposure on an under-exposed picture. Some cameras are more prone to noise, with compact cameras with small sensors being more prone than DSLRs. Noise manifests itself as either an overall speckled appearance (Luminance Noise) or blotches of colour in shadow areas (Colour Noise). Noise reduction for both types involves blending pixels in the noisy area to produce a smooth tone, but this is at the expense of sharpening. Hence sharpening and noise reduction involve some degree of compromise.

To assist the compromise process, the Noise Reduction controls can be found adjacent to the Sharpening controls on the Details panel in Lightroom and the Elements RAW convertor :

- Separate sliders labelled 'Luminance' and 'Colour' each control the amount of noise reduction being applied to Luminance and Colour noise respectively. Eliminate any Colour noise first by moving that slider just far enough for colour noise to disappear. Then move the Luminance slider to a point which is an acceptable compromise between smooth areas appearing grainy while retaining detail and texture in detailed areas.
- Both Luminance and Colour noise reduction controls have their own 'Detail' sliders which is intended to preserve detail where it exists, though the effects are quite small.

1.7 : Lens Corrections and Perspective Controls. Lens design involves compromises, especially on long-ranging zoom lenses, and most will exhibit some form of pincushion or barrel distortion which bend lines that should be straight. Digital sensors are also prone to light fall-off towards the corners, much more so than film. Colour fringing, especially along the boundary between a dark area and a light area (eg a dark hill seen against a bright sky), can also be a problem.

In Lightroom, these can be corrected reasonably well, using controls in the Lens Corrections panel. Lightroom has a built in set of profiles for popular lenses, and in the Profile part of the panel, simply tick the 'Enable Profile Corrections' box to apply the lens profile to the picture. If your lens does not have a profile, there are Distortion and Vignetting sliders which can be used manually. Under the Colour part of the panel, tick the 'Remove Chromatic Aberration' box to automatically clear any fringing problem, and if this fails, then use the Purple Hue/Green Hue sliders.

A second type of Perspective problem occurs particularly when the camera is pointed up or down relative to the subject of the picture, creating what is usually known as 'Converging Verticals'. This can make high structures (eg church spires) appear to be falling over backwards, as well as making parallel lines converge or diverge. In Lightroom, these can be at least partially corrected in the Manual part of the Lens Corrections panel, using the slider labelled 'Vertical'. (Many other types of Perspective problem can also be tackled by this group of sliders).

A similar facility to correct Converging Verticals and other Perspective problems exists in the Editor part of Elements, under Filter>Correct Camera Distortion.

1.8 : Cropping and Straightening. The standard picture formats of 3:2 or 4:3 do not suit every subject or composition, nor are they suitable for all output formats. Cropping is therefore used to create whatever format best suits the picture. Additionally, the

camera may not have been perfectly level when the picture was taken, producing a sloping horizon or tilted verticals.

- In Lightroom, these are corrected using the dashed rectangle icon immediately below the histogram (the leftmost of the row of icons below the histogram). The ratio of height to width can be set to any of a number of presets, or can be set to Custom by unlocking the padlock symbol and dragging each side of the picture to the required position. Sloping horizons are corrected by clicking on the Angle icon, and then drawing a line on the picture which should be either horizontal or vertical.
- In the Elements RAW convertor, Crop and Straighten icons can be found in the row of icons along the top of the picture, and work in much the same way as Lightroom. The Elements editor also has Crop and Straighten icons (in the Expert view), though the Straighten is limited to horizontal straightening, and any white space has to be cropped off as a separate operation.

1.9 : Vignetting. Most pictures will benefit from a slight darkening of the edges and corners, to draw the viewers attention to the main subject of the picture and tone down any distracting highlights.

In Lightroom, there is a 'Post Crop Vignetting' section in the Effects panel. 'Post-Crop' means that the Vignette will not be destroyed or partially destroyed if the picture is cropped after the vignette is applied. The Vignetting section has a choice of 'Styles', in which 'Highlight Priority' preserves the relative tonal range, 'Colour Priority' preserves the accuracy of colours, and 'Paint Overlay' creates a grey screen in the vignетted area. Highlight Priority is therefore recommended. There are then 5 sliders controlling the amount (darkness) of the vignette, its size and shape, the amount of feathering, and whether highlights are to be boosted. Tip - set the feathering to 0 so you can set the size and shape of the vignette accurately. Also keep the Highlight slider at zero, because this defeats the object of removing bright objects from the edge of the picture.

Elements has a less capable version of Vignetting in the Filter>Correct Camera Distortion tool, limited to setting the Amount and the Size of the vignette, and doesn't change if you decide to crop the picture at a later point.

2. Selective Adjustments - affecting specific parts of the picture

2.1 Selective as well as Global. Many of the adjustments described above to improve the whole picture can also be used on selected elements within the picture, either to draw extra attention to them or to stop them competing for attention with the main subject of the picture. Colour balance, exposure including highlight & shadow adjustment, contrast, saturation, sharpening and noise reduction can all be applied locally.

Lightroom provides a brush tool, a graduated filter tool, and (new to Lightroom 5) a radial filter tool which can be used over parts of the picture as required :

- The Brush tool is the rightmost icon in the row of icons immediately below the histogram, looking like a ball with a handle, and with a dotted circle around the ball. Click on this to pull down a set of sliders which control the differing effects. The brush can be varied in size (use the mouse scroll wheel on a PC system), and the amount of feathering can be varied. Flow refers to the speed with which the effect is built up, and a low Flow is recommended (typically around 10) so that the effect is

built up gradually and seamlessly by multiple brush strokes over the same area. The amount of each effect can be changed at any time in the process, which makes the adjustment process dynamic.

- The Graduated Filter tool is the rectangular icon in the middle of the row of icons below the histogram.
 - Click on this to pull down the same set of effects sliders as with the Brush tool.
 - You can then simulate a Graduated Filter on the camera by clicking at the top of the picture, and then dragging the mouse down to below the horizon level. The Filter has 3 parallel lines - the first will be where the mouse dragging started, there will be a middle one which in our example would typically be lined up with the horizon, and a lower one where the mouse dragging stopped. Being a graduated effect, the full effect (eg decreasing the exposure to darken a sky) will be applied between the top and middle line, and then an increasing smaller effect between the middle and bottom lines, so that by the time the bottom line is reached, the effect is nil.
 - If you want a 'Hard Grad' effect (ie very small transition area between full and nil effect, click the Filter just above the horizon and drag it to just below (holding the Shift Key down to keep the line horizontal if necessary).
 - Graduated Filter effects are not limited to horizontal zones in the picture, and can be started anywhere and pulled in any direction - eg if a bright light source out of shot has made one side of the picture brighter than it should be.
- The Radial Filter Tool is the Circular icon next between the Brush Tool and Grad Filter Tool and allows a circular or oval area to be selected and then the usual set of effects to be applied. Counter-intuitively, it works as a vignette, so the effect is applied outside of the selected area. However, by ticking the 'Invert Mask' box, the situation is reversed and effects can be applied to the selected area. This effect is an easier method of applying an effect compared to the Brush Tool so long as the area to be selected is a symmetrical circle or oval (or roughly so, for example being used to highlight a patch of sunlight on a hillside in a landscape).
- Finally, mention should be made of presets in the pull down list of Effects, which work well with the Brush and Radial Filter tools. Iris Enhance, Soften Skin and Teeth Whitening are all just different combinations of Exposure, Clarity and Saturation, and provide good starting points for enhancing portraits, although individual pictures may require slightly different settings.

Elements does not have any selection capability within its RAW convertor, but there are extensive selection tools in the main editor. The Rectangular Marquee tool allows selection of square/rectangular and round/oval shapes, the Lasso tool enables free form selection around a shape, and the Quick Selection tool selects an area based on similar tone. Once selected, a wide range of Lighting and Colour Adjustments are possible from the Enhance pull-down menu.

2.2 Red Eye Removal. One specific selective tool common to many software packages is removal of Red Eye, which is produced when a portrait is illuminated with a flash which is too close to the lens axis (especially on compact cameras).

Lightroom achieves this with the Red Eye Correction icon in the row below the histogram (2 concentric circles, the inner one being dark). Place the target by one corner of the eye and drag until it covers the entire iris, release the mouse button and any red in that area will become black.

Elements has separate tools, one in the RAW Converter and one in the main Editor. The RAW converter has an icon in the row above the picture and works in the same way as the Lightroom tool. Alternatively in the main editor, go to Enhance>Auto Red Eye Fix, which automatically identifies red eyes and changes the red to black.

2.3 Dust Spot Removal. This is a special use of the Healing Brush tool, which replaces the selected pixels with matching tone and colour from adjacent pixels. It therefore works very well in areas of even tone such as sky.

In Lightroom, the Spot Removal tool is second left in the row of icons below the Histogram (circle with short arrow). Select the icon, make sure it is on Heal and not Clone, size the brush to cover the dust spot or other aberration, and click. The dust spot in the selected area will appear to vanish.

In Elements, go into the Editor and click on the Spot Healing brush tool. Select a soft edged brush and either Proximity Match or Content Aware, match the brush size to the dust spot and click. The dust spot will disappear.

2.4 Cloning and Healing. Cloning and Healing are ways of replacing unwanted elements in a picture with other parts of the picture. Vapour trails in the sky, footprints on a beach, cables or unwanted people in a Landscape are all examples of unwanted features to be replaced. Cloning is the usual method of replacing areas with detail and uneven tone eg grass, pebbles, bushes etc, whereas Healing is more effective in areas of smooth tone such as skies. For both techniques, it is important that it is invisible in the final picture. Thus Cloning must avoid creating repeating patterns by taking small pieces from different parts of the picture to create a unique area of picture. Healing must accurately and seamlessly blend with the surrounding smooth tone.

Lightroom 5 is the first version to enable Cloning and Healing of anything other than a round shape, and it is still quite rudimentary. Select the same icon as the Dust Spot Removal tool, but this time drag the mouse across the area to be replaced. The result is reasonably effective on aberrations such as vapour trails against a blue sky, but on a detailed area, the repeating patterns are very obvious.

The Elements editor offers a better option with the Clone Stamp Tool and the Healing Brush Tool. For cloning, select the Clone Stamp Tool, select a hard edged brush if the area to be replaced has sharp detail, or a soft edged brush if it is generally blurred/out of focus. Then click 'Alt' to select another part of the picture which will be used to clone over the part of the picture to be replaced, and then paint over a part of the aberration. Redo this several times, taking small portions from different parts of the picture to avoid repeating patterns. For vapour trails and other aberrations on a smooth tone, use the Spot Healing Brush or Healing Brush. For the Spot Healing Brush, make a Brush stroke over the line to be replaced, but if this fails to work perfectly, use the Healing Brush in the same way as the Clone Stamp tool to select the adjacent pixels to be used.

3. Workflow - the sequence of making adjustments

3.1 RAW Convertor and Elements Editor

Elements (and also Photoshop CS) provides a 2 stage process for editing pictures :

- A RAW Convertor which does not change the original picture file, but instead creates a 'filter' through which the picture is displayed. This is often referred to as 'Non-Destructive Editing' since everything you do in the RAW Convertor is completely reversible. As noted at several points, you can edit a JPEG or TIFF file in the RAW convertor as well as those originally shot in RAW.
- An editor, which enables a further range of adjustments to be made which are not supported in the RAW Convertor.

Lightroom's 'Develop' module is a much more fully featured RAW Convertor (equivalent to the Photoshop CS RAW Convertor). However, it still lacks some adjustments which can only be made in the Elements (or Photoshop) Editor, and so needs to link to Elements or Photoshop for this part of the editing process. For this reason, there is a link mechanism within Lightroom accessed in Photo>Edit In, which provides a list of whatever other Elements or Photoshop applications are also available on the computer. Once editing in Elements/Photoshop is complete and the work saved, a new TIFF file is created alongside the original file in Lightroom.

The general rule for a good Workflow is to do as much as possible within the RAW Convertor (Elements or Lightroom) since everything is completely reversible and no amount of changes will degrade the image quality. Once this is done, open the file in the Elements editor to make whatever changes are not supported in the RAW Convertor.

3.2 Workflow within the RAW Convertor

Although Lightroom is a RAW Convertor which will not change the original picture, the following sequence of editing is suggested to minimise rework :

- Apply lens corrections (because this will lighten the corners and hence the tonal balance of the picture)
- Crop and straighten the picture as necessary
- Set the white balance
- Adjust overall Exposure and Highlights/Shadows
- Adjust Clarity (and Contrast if Clarity is not sufficient)
- Adjust individual colour luminance and saturation. Only if this is insufficient adjust the Vibrance and/or overall Saturation
- Make selective adjustments with the Brush/Grad Filter/Radial Filter tools
- Remove any red-eyes and dust spots
- Apply the Vignette
- Apply Sharpening and Noise Reduction
- Revisit as necessary

The Elements RAW Convertor is more basic, but most of the above steps can be followed. Those that cannot will have to be deferred until the image is opened in the Editor.

3.3 Workflow within the Elements editor

The most important point to note when using the editor is that unless you use Layers to make changes, the work you do now is not reversible (you can actually go back about 20 steps). Also, and again with the caveat about using Layers, you are changing the actual picture and each adjustment you make will degrade the image to a greater or lesser extent. Hence it is important to avoid rework where possible.

Typical adjustments which require the Elements editor are :

- Selective adjustments which are not supported in the Elements RAW Convertor
- Cloning and Healing
- Sharpening using the Unsharp Mask tool

Bear in mind that Sharpening and Noise Reduction are especially destructive, and should therefore be the final step in the editing workflow.

3.4 Saving and Output

3.4.1 Lightroom

Newcomers to Lightroom are often initially confused by the lack of a 'Save' button when they have finished work on an image. This is because the picture file itself is not changed and so there is nothing to save. The adjustments (for all pictures) are instead saved to the Lightroom Catalogue as they are made, and it is only when you close down Lightroom that you are prompted to 'Backup'. Since the Lightroom Catalogue contains all the adjustments for possibly many thousands of images representing work done over many years, Backups are vital.

To output a picture from Lightroom (eg to create a copy for projection), go to the Library module and click the 'Export' button. The Export dialogue box allows you to specify a file name, folder to export to, image size and file type (TIFF, JPEG etc)

3.4.2 Elements

For Elements users, pictures which were taken as RAW files must be saved from the Editor in one of TIFF, PSD or JPEG formats. TIFF and PSD will allow the picture to be saved complete with any Layers used in editing, and so are recommended if there is a possibility of editing the file again at some point in the future. Alternatively, save as a High Quality JPEG if further work is unlikely and space is an issue. Note that the saved TIFF, PSD or JPEG will be in addition to the original RAW file, and also there will be a small 'sidecar' file associated with the RAW file which contains the adjustments made in the RAW Convertor before opening into the Editor.

Resizing the file for output in Elements is made prior to saving by selecting Image>Resize>Image Size. Borders can be created in the adjacent Image>Resize>Canvas Size.

Dave Gray

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