Issue 17 – March 2017

The Image – Monthly NEWSLETTER

The Abertawe Photographic Society –
Based near the heart of Swansea, Abertawe Photographic Society is an established, friendly and welcoming club, who's members both amateur and professional all share a common interest, in all aspects of photography.

Whether you are a complete beginner or a seasoned snapper, interested in digital techniques or 35mm film, there is a warm welcome by a likeminded group of people sharing in the search for the perfect image.

By sharing, not only our enthusiasm but also our skills, techniques and knowledge, we all grow as a club and by trying new things we all get the opportunity to stretch our boundaries. All members are encouraged to take part in club events.

The Society meets every Tuesday at:
Greenhill Community Centre
Chapel Street, Dyfatty,
Swansea.SA1 1NB.

This Month's Events: March

7th Pix2exe – How are you getting on?

7th Hand-In for 2nd Monthly Comp.

14th Editing Images

21st Second Monthly Competition

28th Studio Evening

Please note that one of these Club Nights may have to be postponed due to Work at the Centre.

UNDERSTANDING CAMERA LENSES

Introduction -

When I first started to look into writing this article I could see immense depth of detail that I could write about, too much detail in fact. Being a relative beginner in photography by dilemma was decoded all this lens jargon and decided what to include. Some of you more experienced in photography will understand this dilemma of mine and excuse me if I have not included something of relative importance, anyway, here we go!

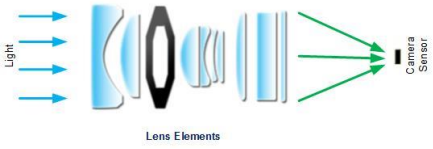
The lens is probably the most important part of your camera, and we sometimes take for granted, preferring to concentrate more on the exposure settings of the camera. Therefore, getting to know your camera lens will assist you in greater control of your images and those exposure settings.

You also need to ensure that you choose the right lens for the type of photography you want to perform; this can become a complicated and expensive choice, and ultimately may affect the image quality. Therefore it may be necessary to understand how a lens works, the type of lens you need for the photography of your choice, e.g. focal length, perspective, prime or zoom and the optimum aperture or f-number at a cost that is right for you.

Lens Elements

Except for the simplest, cameras contain lenses which comprise of several elements that make up the lens itself. Each of these elements directs the path of light rays to recreate the image as accurately as possible on the digital sensor. The goal is to minimize aberrations, while still utilizing the fewest and least expensive elements. *(Aberration-Optical: A characteristic that deviates from the normal type Oxford English Dictionary)*

A typical series of lens elements is depicted here:

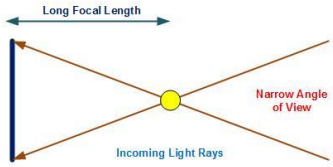


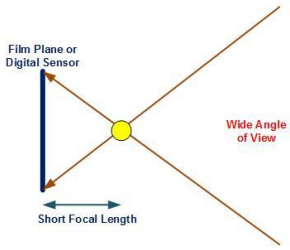
Optical aberrations occur when points in the image do not translate back onto single points after passing through the lens — causing image blurring, reduced contrast or misalignment of colours (chromatic aberration). Lenses may also suffer from uneven, radially decreasing image brightness (vignetting) or distortion. Now I don't know about you, but that's all a bit technical, so I won't delve any further into it.

Effective Focal Length & Angle of View

The focal length of a lens and its angle of view go hand-in-hand. Thus a Wide-angle lens has a shorter Focal-length, whilst a Telephoto Lens has a long Focal-length.

Many will say that focal length also determines the perspective of an image, but strictly speaking, perspective only changes with one's location relative to their subject. If you try to fill the frame with the same subject using a wide angle and telephoto lens, then perspective does indeed change, because you are forced to move closer or further away from the subject. For these scenarios only, the wide angle lens exaggerates or stretches perspective, whereas the telephoto lens compresses or flattens perspective. I have tried to depict this in the drawings below:





Please note that the position where light rays cross may not be equal to the focal length, as I have shown above, but is instead roughly proportional to this distance, please don't ask me to explain that further!

The following table provides an overview of what focal lengths are required to be considered a wide angle or telephoto lens, as well as showing the lens typical uses. **Please note that focal lengths listed are just rough ranges, and actual uses may vary quite considerably; many use telephoto lenses in distant landscapes to compress perspective, for example.*

Lens Focal Length*	Terminology	Typical Photography
< 21mm	Extreme Wide Angle	Architecture
21-35mm	Wide Angle	Landscape
35-70 mm	Normal	Street & Documentary
70-135mmTable	Medium Telephoto	Portraiture
135-300+	Telephoto	Sport, Bird & Wildlife

Lens Selection Chart

Because different brands of DSLRs have different sensor sizes then the focal length will vary as shown in the chart below:

Other considerations when choosing a lens are:

- Telephoto lens or a Macro lens these are more prone to camera shake. Whereas
- Wide-Angle lenses, by design, are more resistant to flare
- Medium and Telephoto generally produce better optical quality for value.

The final consideration is that It is more about the angle of view in relation to the capture size than the actual focal length of the lens and so that 50mm lens is actually a wide angle lens on an APS-C.

Because different brand DSLRs have different sensor sizes then the focal length will vary. Here are some of the common lens sizes to visually help with the conversion:

	Angle of View (degrees)	35mm 'Full-Frame'	Canon x1.6 APS-C 'Crop'	Nikon x1.5 APS-C 'Crop'
Super Telephoto	2.1	600mm	375mm	400mm
Long Telephoto	4.3	300mm	187.5mm	200mm
Telephoto	9.5	135mm	84.3mm	90mm
Normal	39.6	50mm	31.3mm	33.3mm
Normal-Wide	54.4	35mm	21.8mm	23.3mm
Wide	65.5	28mm	17.5mm	18.7mm
Very Wide	73.7	24mm	15mm	16mm
Super Wide	84	20mm	12.5mm	13.3mm
Ultra-Wide	96.7	16mm	10mm	10.7mm

What is the Focal Length Rule?

A common rule of thumb for estimating how fast the exposure needs to be for a given focal length is the **one over focal length rule**. This states that for a 35 mm camera, the exposure time needs to be at least as fast as one over the focal length in seconds. In other words, when using a 200 mm focal length on a 35 mm camera, the exposure time needs to be at least 1/200 seconds, otherwise blurring may occur. **Remember** that this rule is just for rough guide; some may be able to hand hold a shot for much longer or shorter times.

Modern day DSLRs have built in stability, generally within the lens, and this can be considered when choosing the exposure time.

Zoom and Prime Lens

There are two main types of lenses, Zoom and Primary lens.

- A prime lens will have only one focal length (e.g. 50mm).
- A zoom lens will cover a range of focal lengths (e.g. 17-40mm).

Zoom lenses are convenient because you can quickly change focal lengths while looking through the viewfinder and you do not have to carry a camera bag full of lenses around. Most users of digital cameras can get by with one or two zoom lenses that cover the full range of focal lengths that they require.

However, what you should consider is how big of a range you want in a single zoom lens, too big of a minimum focal length can prevent you from photographing close-up shots especially where room is a restriction. A convenient size of Zoom lens is something like 24mm to 300mm.

The issue is often the quality of the glass in these lenses because the wider the range, the more elements the light has to travel through. If you are interested in one of these dynamic range lenses and want the best picture quality, it would be best to spend more money on a top-lens, particularly those with L glass included *(L stands for "Low Dispersion" - achieved by the UD lens elements found in these lenses)*.

Prime lenses have two main advantages: quality and speed.

By speed, refers to the widest aperture (f/stop) built into the lens. At a lower aperture (smaller number, wider opening), you can photograph in lower light and use a faster shutter speed that will stop action. This is why f/1.8 is a coveted aperture in lenses. Zoom lenses rarely get this fast and if they do, they are very expensive.

The prime lens is also much simpler in construction than a zoom lens because there are fewer glass elements inside the barrel and they do not need to move to adjust focal length. Less glass to travel through means that there is less chance for distortion and this often provides a much sharper and clearer photograph.

I hope this has helped you in understanding the intricacies and variance in camera lenses, and as I mentioned earlier, I may have omitted some areas, but the story of your camera lens is not as simple as we may take for granted.

Histograms

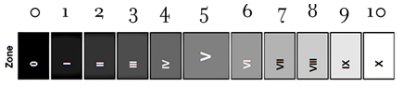
A Histogram is a graph that provides an instant guide to the contrast and exposure of a picture. My apologies if I have written this as too technical, but it may be worth understanding.

It basically maps the distribution of tones, from the darkest to the left to the brightest to the right. Technically speaking, the scale runs from 0 (solid black) to 255 (pure white). The height of the graph at any point represents the relative number of pixels in the image with that brightest level.

The overall shape of the histogram gives you an at-a-glance representation of the tonal range of the image and the presence of any clipping. ("Clipping" occurs when the dark parts of an image become pure black, or light parts become pure white, and as a result image detail is lost in these areas.) The overexposed picture top-left, and the underexposed bottom-right shows where Clipping has occurred, as you don't see any graphical features on the extreme left or right respectively

You can use tools, such as levels in Photoshop, Lightroom, etc., to adjust the shape of the histogram and thereby improve the contrast and exposure of the image.

The range from pure black to pure white has a number of what are called zones, which are gradual changes from pure black to pure white. Ansel Adams scaled these zones into ten, as depicted below in the mosaic. The zones where categorized as follows:



Zone 0	Solid, maximum black, 0, 0, 0, in RGB. No detail.
Zone I	Almost black, as in deep shadows, no discernible texture
Zone II	First hint of texture, in a shadow, Mysterious, only just visible.
Zone III	TEXTURED SHADOW. A key zone in many scenes and images, Texture and detail are clearly seen, such as folds and weave of a dark fabric.
Zone IV	Typical shadow value, as in dark foliage, buildings, landscapes, faces.
Zone V	MIDTONE. The pivotal value, Average, mid-grey, an 18%gray card, Dark skin, light foliage.
Zone VI	Average Caucasian skin, concrete in overcast light.
Zone VII	TEXTURED BRIGHTS. Pale skin, light-toned and brightly lit concrete. Yellows, pinks, and other obviously light colours.
Zone VIII	The last hint of texture, bright white.
Zone IX	Solid white, 255, 255, 255 in RGB. Acceptable for specular highlights only.

There is a technique of photography called Exposing to the right (often referred to as ETTR). It is a technique that you can use particularly when photographing landscapes. So what has this got to do with Histograms?

Well, the term 'expose to the right' refers to the histogram associated with an image. Typically, for a shot to be well exposed, we are taught to aim for an even spread of tones across the histogram, peaking in the middle, and tapering off at the edges. When 'exposing to the right', the idea is to push the peak of the histogram as far to the right hand side as possible, i.e. overexpose the image, without clipping any highlights. The resulting file, when processed back to the correct exposure, will contain more tonal information and less noise in the shadow areas, maximising your image quality.