

Understanding the Three Basic Elements of Photography (Aperture, Shutter, ISO)



BY [DIGITALREV](#) 23/09/2012

Depending on which way you look at it, it can be argued that photography has either not changed at all since its inception, or has changed more than a Chinese whisper shared between the cast of Glee.

On one hand, advancements in technology has seen camera's and equipment become both affordable and practical to the point that the average person can create professional images which would have been seen as impossible to the amateur photographer just 20 years ago.

On the other hand however, every camera can still be seen as essentially just a box with a hole in one end. Sure that hole is quite important (being essentially where the light comes through), and you still need the mechanics and means to record a photo but at its simplest, the basic elements to capture an image has not changed.

Exposure

Exposure is the basic element of any photograph taken and recorded. Essentially, it is exactly how it sounds, exposure is how much light your shot was exposed to, and this reflects on what is produced in your final image, be it on film, or more likely nowadays, digitally. Without light, obviously there is no picture. Think of exposure as your eye, if you are in a pitch black room with no light, you obviously can't see anything. When we are looking at something we are not actually seeing it directly, we are looking at the light reflecting and bouncing off the objects in front of us. The same can be said if there is too much light, think of when you wake up in the middle of the night and turn a bright light on, your eyes have not adjusted yet so to you it seems too bright and you can't focus. This is the same in photography, and why the most common critique of images is that they are either underexposed, (not enough light meaning an image is too dark), or overexposed, (too much light leading to an overly bright image)

Exposure is determined by three essential elements which we will look at individually here.

Aperture

Aperture is the setting which controls the size of the opening of light which comes through to the lens. Normally this is done by controlling the aperture blades which can be changed to allow the aperture to become smaller, in which less light is let through, or obviously larger where more light is allowed to pass through.

Aperture is measured in f-stops, for example f/2.0, f/2.8, f/4.0 etc. The smaller the f-stop number, the larger the lens opening, and therefore the more light a lens can let in. This is why the sharper lenses with lower f-stops are normally more expensive than a similar lens which cannot match the same aperture, as the more expensive lenses can cope with low light situations better. For this reason, when someone is talking about the maximum aperture, this normally means the lowest f-stop available.

The important thing to remember is that for every one stop the aperture is stepped down, the double the amount of light which will enter the sensor. The below picture shows the differing size of openings that an aperture will produce. This is of course provided you and the camera/lens follows the original aperture stops as shown below, as a lot of modern camera's now have half stops, f/4.5, f/7.1 etc. for a more precise aperture.

The aperture is also one of the most critical aspects of focusing. A large depth of field which is necessary when photographers want as much of the photograph in focus as possible, such as landscape photography, needs a minimum aperture as possible (high number). This allows objects in the foreground and background to be in focus. The opposite is obviously true of course, in that to achieve a shallow depth of field, where a particular point is in focus whereas the other parts of the image are blurred, a low f-stop should be used, (low number). This creates the beautiful bokeh we love, which adds dramatic effects to images where you want to highlight an object or subject, such as macro photography and portraiture shots. The fact you can post process this effect using Photoshop or a likewise software nowadays is unfortunate, but shows the popularity it has gained.

Shutter Speed

Shutter Speed is simply put, the amount of time that the camera lets the light coming in, stay exposed and become recorded. This can be changed quite easily and is measured in fractions, i.e. 1/60, 1/125. This number relates to the timing that the shutter is left open, for example 1/60 shutter speed will mean the shutter stays open for 1 sixtieth of a second.

Most camera's will have a larger range of varying shutter speeds for the user to work with, from Sonic the Hedgehog like speeds of 1/4000 which is great for capturing moving action such as wildlife or freezing sports events, to long exposures of sometimes over a minute long, perfect for landscape photography or low light photography with a tripod.

Motion blur can also be achieved by panning the camera to follow a subject, and the idea is that the camera will keep the focus relatively in focus because you are following it, but the background which will move relative to your camera will naturally blur. This is a common technique if you want to convey a sense of movement.

ISO

ISO is slightly less obvious as the above two as to what it is and what role it plays, but has just as much importance in determining correct exposure. ISO is normally measured from 100, 200, 400 etc., with a low a number as possible preferred.

This is because the higher ISO that is used, typically the more 'noise' you get on an image, where an image is not as sharp as in the lower ISO's. "So why don't we shoot all shots with a low ISO?" I hear you say. Well simply put, it's sometimes not possible, especially in difficult conditions such as low light. Increasing the ISO can allow you to get images you would not normally get, but at a cost, noise, if you want to just capture the scene and pin sharp focus is a secondary thought then increasing the ISO is an option. When you use a higher ISO, you are increasing the sensitivity of the image sensor, so now the sensor captures not just more light incoming, but also more surrounding noise which reduces clarity in your image.

Whether your image is usable or not at high ISO's depends on your equipment, obviously the more modern cameras such as the Canon 5D Mark 3 produces some excellent results even at high ISO's such as ISO 12,800. Compare that to my old point and shoot Sony N-1 where the shots taken even at ISO 800 were noisier than a Korean crowd watching a Gangnam Style concert.

Combining the three

Individually we have looked at the three elements that make up exposure, so it's important to realize that all three need to be in sync to get a 'good' exposure. The key in the end however, as the same with pretty much all aspects of learning photography, is that practice makes perfect. It's about learning the particular scene you want and then determining what settings are the best. For example for shooting a high speed sport event at night like American Football, you may need a high ISO as it is quite low light.

To freeze the quick burst of action a high shutter speed will need to be used (1/1000 is a good starting point). A slow shutter speed will lead to images coming out blurred. Aperture will likely be mid-range, as the lowest settings won't be able to let enough light in. The easiest way to play around with these settings is using the pre-set modes on your camera dial, pretty much every camera has these settings now.

There are specific modes to change just the aperture (Aperture-Priority mode) where you can adjust just one of the three elements, and the camera's brains will work out the other settings required to capture the image for you. So if you need to emphasize a long shutter speed, for example you want to take a shot of a

waterfall and want blurry, creamy water effect, and then adjust the dial to Shutter Priority to specify just the shutter speed and let the camera do the rest.

Obviously the best way to learn the correct balance is using full manual controls, and by looking at the viewfinder you can often see instant feedback to the changes you have made, i.e. increasing aperture (lower number) will see a lighter image reflected on the screen. All in all, pick up your camera and get shooting, it's the only real way to learn.