

The Exposure Triangle

 Great Barr Photographic Society

Level
Beginner

A GBPS Tutorial
By Gary Hurdman
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Front Page: Fred Archer – GBPS Member

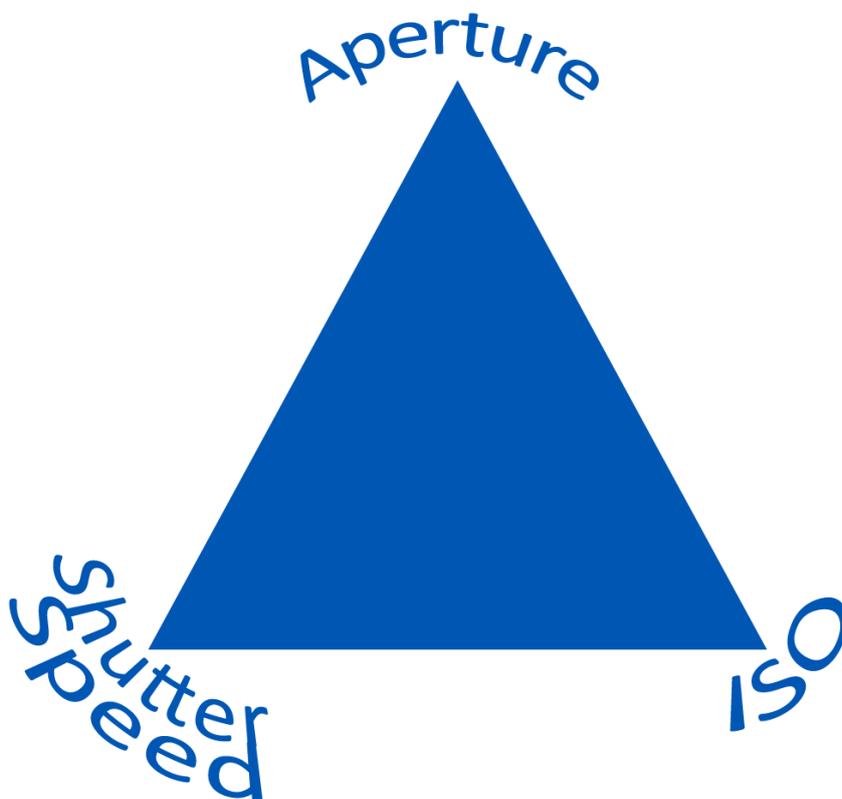
Page 6: Waterfall images – Lynn McIlhone – GBPS Member

All Other Images By Gary Hurdman – GBPS Member

Introduction

So here is a basic tutorial on what your camera settings do, and how you can use them. For this tutorial, we will skip over white balance. In simple terms, white balance configures the camera to the lighting available to you at the time. For instance, you get a slightly different light from artificial lighting than you do from daylight and this difference will give your pictures a colour cast unless you tell the camera what type of light you're using. The good news is, your camera isn't too bad at working it out itself, so for this tutorial, leave your white balance on "Auto".

What we are going to talk about now are the elements of the exposure triangle and how these elements can be used by a photographer to create the image they want. A sports photographer might want to pan with the action, keeping his subject sharp while blurring the background with motion. A portrait photographer might want the eyes of their subject to be pin sharp, while blurring out a distracting background. At the end of this tutorial, you'll know how the exposure triangle can be used to do this and just as importantly, how to set your camera to get the picture you want.



The Exposure Triangle

ISO

In the olden days, when the world was black and white (sometime before 1992 according to my kids), when you bought film for your camera it came in different speeds. They were rated in ISO (International Standards Organisation) from 50 up to 64000 and beyond. The higher the number, the faster the speed.

What do we mean by this? Well, if you took a picture in daylight, and to correctly expose that picture took $1/60^{\text{th}}$ of a second with ISO 100 film, With ISO 200, the exposure would be for $1/125^{\text{th}}$ of a second (closest exposure to $1/120^{\text{th}}$). With ISO 400 film, that exposure would be $1/250^{\text{th}}$ of a second. To double the speed of the film, you double the ISO number.

If you want the shutter speed to remain the same, you can alter your aperture, but more of that later.

Your sensor on your digital camera has the same, adjustable light sensitivity. It is rated in exactly the same way as film using ISO.

There are some side effects, generally, the faster the ISO setting the more grain (or noise) you add to your image. However, modern sensors are able to retain great quality of images even at a very high ISO setting so probably less to worry about than the old film days. Additionally, image editing software is very good at removing unwanted noise.

Aperture



Above: A wide aperture gives a narrow depth of field

The aperture is an adjustable sized hole that lets light into the camera. This isn't the same as your shutter. In simple terms, the smaller the hole, the less light you let into the camera. The larger the hole, more light hits your sensor. Your aperture is measure in f-stops. (for example, f1.8 or f11) This is where it gets a little interesting in terms of understanding your settings, the smaller the number, the larger the hole. So f1.8 is wide open letting in lots of light and f22 is very small



Above: A narrow aperture gives a greater depth of field

and lets in much less light. Consequently, using the same ISO

under the same light, your shutter speed will be much longer using f22 over f1.8

But your aperture offers more than just a method of balancing your exposure. Your aperture controls the depth of field within your image. That is to say, that it controls how far back into your image sharp focus remains. A large aperture of f1.8 will have a very shallow depth of field. In a portrait, if you focus on your subjects eyes, the focussing will fall off very quickly and your subjects ears will be slightly out of focus and the background really out of focus. The same picture taken with an aperture of f16 will retain the whole person in focus and most likely the background. The former might be better for family portrait, the latter for a portrait where you want to capture the person in their environment, at work or in their hobby perhaps.

IGNORE IF YOU LIKE!

You don't *need* to know this, so skip if you like.

Why fstop? Why not measure the size of the aperture in mm, like the focal length of a lens? Well, your fstop is actually a divider of the focal length of your lens. So f1.8 on a 50mm lens give you an aperture of 27.78mm (50/1.8). On a 105mm lens, the size of aperture at f1.8 is 58.33mm (or would be if such a large aperture was available/affordable on a 105mm lens). So now you know why the larger the focal length of the lens you are using, the narrower (or slower) the maximum aperture is. It's simply not possible to get a hole big enough for the dimension of your camera!

Shutter Speed



Above: A fast Shutter Speed freezes the action but looks a little static.

While your aperture will change how much light hits the sensor, your shutter speed will say how long it hits for. It's measure in seconds (or fractions of).

You can use shutter speed to get the exposure you want, or prioritise it to produce an image of a certain quality. Imagine you're at a horse race. You've took a load of pictures of horse as they ran past by panning your camera with the action. They look great, you have a nice sharp horse and you can pick out the leaves on the bushes behind. Your technique is brilliant. But the more you examine the images in the LCD screen on the back of your camera,

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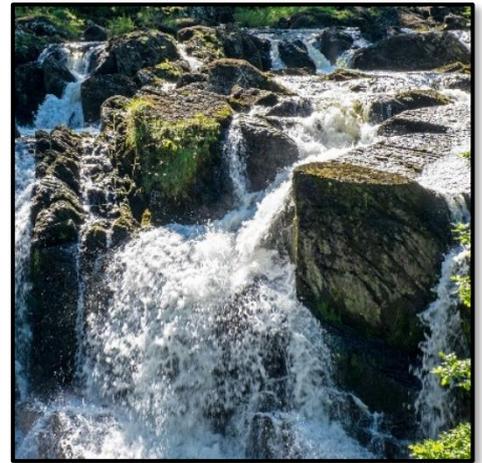


Above: Panning with a slower shutter speed keeps your subject sharper but introduces a feeling of movement.

the more you think that the images lack something. The horses look placed there, like they've jumped up and weren't moving at all. So you chose a slower shutter speed and try again. You look at the picture again and a big smile creeps across your face. Your horse and jockey is nice and sharp for the most part, the hooves look a little blurry with movement and the bushes are a complete blur. This time, you can see the movement in the still image. Just what you were after!

Using The Triangle

So, you're taking a picture of a waterfall and at ISO 50 using aperture f16 you have a shutter speed of 1/60. It's a nice sunny day! Your image looks great, the droplets of water from the water splashing up are clearly visible. The white water, crashing over the rocks has texture and contrast, lots of it! You like your picture.



Above: A fast shutter speed freezes the action.

But you start to wonder about longer shutter speeds. So you adjust your shutter speed to 1 second. You take a picture and discover it's really overexposed. Your screen is pure white, not detail at all. It's because you're letting in too much light. You adjust your aperture to f2.8 and you get a nice exposure, but now your depth of field isn't as deep as you'd like. So you put your aperture back to f16 and adjust your ISO to ISO 64000.



Above: A slow shutter speed offers a dreamy look to the image.

Bingo! Your image is now perfectly exposed, you have the aperture you want and the movement in the waterfall has been caught on camera giving you a lovely, smooth milky look to the falls.

So when we talk about getting the correct exposure for your image, it also depends on the type of image you want. If a shallow depth of field is important, use a large aperture and set shutter and ISO to the lighting conditions. If freezing or blurring motion is important, you need a high or low shutter speed (respectively) and you set your ISO and aperture to lighting conditions in order to produce that image.

Your Camera Settings

Manual



The manual setting on your camera puts you in full control of the settings. You need to decide on an exposure through the camera meter or a separate light meter (or guess!) and set shutter speed, ISO and aperture. This can be useful in changeable or low light conditions where your camera's meter can be confused. For instance, if you set your camera to auto in a studio, your camera will take a reading when you press the shutter half way down. Then when you take the picture your studio flash will fire and the image will be overexposed. Setting to manual, setting your camera to the flash output will ensure you have the results you want. I find that I use this setting or Aperture Priority and seldom anything else. But more about that later.

Auto



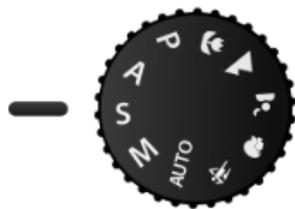
This gives the camera full control of your exposure. This is fine for a lot of photography but will select an average of everything. So you may not get the shutter speed you're looking for or the depth of field you want. But it's great for family snaps or if you need to whip your camera out quickly to catch something that surprised you. Not a lot to say about this, it's a compromise in your creative process but will get you the image. Does what it says on the tin.

Aperture Priority



This is a particular favourite setting of mine. In a lot of the pictures I take, what I care about most is the depth of field. With Aperture Priority, you set the aperture and the camera works out the shutter speed to get to the correct exposure. Brilliant for outdoor portraits, wildlife, street photography etc.

Shutter Priority



Can you guess? This setting allows you to set the shutter speed you want and let the camera balance the exposure by adjusting the aperture. This will allow you to set the shutter speed to freeze or blur the action in your photography. This setting can be useful for sports photography, creating light trails, photographing waterfalls etc.

Program



Most cameras have program modes for portraits, night time, backlit, macro, landscapes, sports etc. These will give you the sort of setting you're looking for. Generally, I hardly use these but some people find them useful.

Summary

Exposure and camera settings can seem a little scary to the novice photographer. Be assured that there's nothing scary. The camera meter will help you use ISO, Shutter Speed and Aperture to get the exposure where you need it to be. Start with one and adjust the others until you're correctly exposed. Imagine you're taking a portrait, you decide you want a shallow depth of field. You might start with your aperture set to f4. Use your camera meter to then get the correct shutter speed. If it ends up to slow, adjust the ISO.

The exposure triangle simply shows the relationship between our exposure elements. If you get an exposure of f8 at a shutter speed of 1/125 of a second at ISO 800 and decide you want a shallower depth of field. You decide to open up the aperture by two stops to f4. To keep the exposure correct you need either change the shutter speed, the ISO or both. So as more light is coming in through the aperture we could increase the shutter speed by the same two stops (halve the speed, then halve it again) to 1/500 of a second. Alternatively we could reduce the sensitivity of the sensor by adjusting the ISO by two stops (again, halve it and halve it again) to ISO 200. You may decide (unlikely in more scenarios) to do a bit of both and adjust them both by one stop.

Just remember that adjusting one will require an adjustment in at least one of the two others to keep your exposure.

Remember your Camera has tools to help you. While a photographer will usually want to be in full control and prefer to manually set up the camera, not all photo opportunities will give them the time to do that. In a situation where conditions are changing you might prefer to use Aperture or Shutter priority. So why worry about every setting when your camera will work it out for you. Use one of the priority modes to make life easy. There will be occasions where your camera will struggle (studio and low light to name a couple) but in the majority of cases you can let your camera do the maths and you can concentrate on taking great pictures.