

Basic camera controls and effects (Managing light - EXPOSURE).

CAMERAS vary in the functions and features available to manage light, but all DSLRs/Bridge cameras will have the same set of common controls, some many more variations. I'm concentrating on the common controls here.

The Camera controls the amount of light reaching the sensor/film through APERTURE size and SHUTTER speed.

The **APERTURE** controls the 'window' area that allows light in whilst SHUTTER speed controls the time that 'window area' is left open for the light to hit the sensor/film.

Aperture is measured from around f2.8 (or lower) to f22 depending on the lens used and Camera. Rather confusingly, the larger the aperture number the smaller the Aperture so f22 for example is a small aperture and will let less light in than f2.8.

'OPENING UP' or making larger means setting your Aperture number smaller

Shutter speed is measured in seconds or fractions of e.g. from 60 seconds to 1/4000th depending on the Camera (not lens specific).

Note - "Shutter speed" and "exposure time" refer to the same concept, where a faster shutter speed means a shorter exposure time.

The slower the Shutter (the longer the curtains are left open) e.g. 60 seconds, the longer the Aperture stays open, allowing more light in.

The two (aperture and Shutter) work in conjunction to give you the EXPOSURE required (plus ISO).

There are other settings that can have an impact on EXPOSURE e.g. ISO speed (sensitivity of the sensor/film).

FILTERS (attached to lens) will also affect EXPOSURE by blocking some of the light entering the camera. *NOTE – This is ND, Polarising and Graduated filters. Coloured filters will affect the light entering but are designed to manage Colour rather than light.*

EXPOSURE

Most Cameras allow you to select an area of your composed image (or all) to 'sense' the light available within the selected subject. This could be a 'spot' in the image or a wider area and it can be centre balanced or otherwise. This is the area that will be used to measure your optimum exposure.

How you decide is down to you, the image and your intended interpretation of the image and can have a significant effect on the final image.

Having selected the area to be used to determine exposure, you need to decide HOW you will control the exposure of the image (or part of).

Cameras have a number of options depending on the make/model.

These will invariably include – MANUAL, AUTO (Various varieties), APERTURE PRIORITY and SHUTTER PRIORITY.

Which you use will depend on your preferences and the subject matter being photographed.

MANUAL – This is the setting to use if you want to take full control over the exposure by making your own settings for APERTURE AND SHUTTER.

Essential in very difficult lighting conditions e.g. very dark or very high contrast.

NOTE – the 'B' (Bulb) setting would be used for extra long shutter times, outside the range of your Camera's exposure controls – As per Manual except the shutter is controlled by you manually opening/closing it (use a tripod & shutter release cable to avoid movement).

AUTO (AE) – Auto exposure ... The Camera will determine what APERTURE AND SHUTTER (& ISO) to use based on the Exposure area selected (& the type of Auto) i.e. Point and shoot (assuming you use auto focus).

Useful if you need to take a quick picture or can't be bothered to 'set' the camera yourself.

APERTURE PRIORITY – You control the APERTURE to use and the Camera will automatically set the SHUTTER speed depending on its light reading of the scene.

Good if you want to control depth of field in your image or create specific lighting effects, but be Aware of the effect of changes on the Shutter speed.

SHUTTER PRIORITY – You control the SHUTTER SPEED and the Camera automatically determines the Aperture to use depending on it's light reading of the scene.

Good if you need to control the shutter speed to freeze the action or blur it. Be aware of the effect on the Aperture setting.



Manual, Centre metered 1/400th @f2.8



Manual, Spot metered 1/1000th @ f2.8



App priority, centre metered 1/320th @ f2.8



App priority, spot metered 1/640th @ f2.8



IA (full auto), 1/200th @ f3.5

(NOTE – IA has taken all control of exposure – I cannot change app/shutter/ISO. With IA)

Note some small differences in the centre metered and IA images but not great compared with the Spot metered, because the spot was on the ornament, exposing for that specifically rather than that and the surrounding area).

When to use Large or small aperture?

1. Large aperture (f2.8) lets in most light so useful for low light situations.
2. Large aperture leads to a faster shutter speed as it is letting in more light, so useful for fast moving subjects.
 - a. Large aperture gives a smaller depth of field, throwing the foreground and background out of focus. (show gorillas 511 & 512)
NOTE – distance from the subject will have an impact on the dof also, the closer the object the smaller the dof. The span of the dof is heavily dependent on the lens used, with longer lenses and Macro having generally more shallow dof than a wider angle lens.



1/60th @ f16



1/2000th @ f2.8

3. Small aperture (f22) can create interesting wanted and unwanted lighting effects. If you want to get 'stars' as opposed to 'halos' around your night lights, use a small aperture, but you will need a tripod as shutter speed is slow



10 secs @ f14



2 secs @ f5.6

4. Smaller aperture(f11-22) is favoured for Landscape photography because it gives a greater DoF (more of the scene is in focus).

Each Aperture setting doubles the available light from f/22 to f/1.4 onwards.

Aperture Setting	Relative Light	Example Shutter Speed
f/22	1X	16 seconds
f/16	2X	8 seconds
f/11	4X	4 seconds
f/8.0	8X	2 seconds
f/5.6	16X	1 second
f/4.0	32X	1/2 second
f/2.8	64X	1/4 second
f/2.0	128X	1/8 second
f/1.4	256X	1/15 second

The above aperture and shutter speed combinations all result in the same exposure.

NOTE – each lens is different meaning a set aperture of say 2.8 on one lens may allow a different amount of light to enter the camera to another lens at f/2.8 (esp if different focal lengths).

When to use fast or slow Shutter speed?

1. Slow shutter speeds are often used -
 - a) When the light is very limited and there is no option.
 - b) When you want to create a blur of moving subjects.
 - c) When you want to create a creamy white ‘surf’ or milky surface on water scenes.
 - d) When you want ‘streaks of light’ in night scenes involving moving lights.
2. Fast shutter speeds are often used -
 - a) When there is little choice due to the extreme brightness of the subject.
 - b) When you want to freeze the action in moving subjects.

Shutter Speed	Typical Examples
1 - 30+ seconds	Specialty night and low-light photos on a tripod
2 - 1/2 second	To add a silky look to flowing water Landscape photos on a tripod for enhanced depth of field
1/2 to 1/30 second	To add motion blur to the background of a moving subject Carefully taken hand-held photos with stabilization
1/50 - 1/100 second	Typical hand-held photos without substantial zoom
1/250 - 1/500 second	To freeze everyday sports/action subject movement Hand-held photos with substantial zoom (telephoto lens)

1/1000 - 1/4000 second To freeze extremely fast, up-close subject motion

ISO –

ISO settings don't control the light entering the camera. It adjusts the sensitivity of the sensor (or film in olden days), making it more sensitive to the light made available by the aperture/shutter settings.

The lower the ISO (nowadays usually 100) the less sensitive the Sensor. However that setting is the 'norm' setting and will generally give the best quality of picture (minimum noise).

However there are times when there is not enough (or too much) light available to capture the image at the aperture and shutter speed you want. In these cases increasing/decreasing the ISO may enable you to capture that image.

By increasing the ISO you enable the camera sensor to register more detail in dark areas (effectively increasing exposure). However there is a trade-off –

1. The sensor becomes more sensitive to all light, so there is a risk of 'blowing out' (over exposing) the light areas.
2. The increased sensitivity creates more 'noise' (speckles) in the image.
It is possible to remove some (or all) of that noise through software (post processing), but all Noise reduction tools will 'soften' the image to some extent in removing noise.



ISO 160 250th @f2.8



ISO 800 1250th @ f2.8



ISO 1600 2000th @ f2.8



ISO 3200 3200th @ f3.2

The 'Exposure triangle' gives a graphic of the three 'exposure' control elements –



EXPOSURE COMPENSATION –

Sometimes the conditions are such that the Camera simply can't capture the image as you want with normal exposure settings. This is generally the case when there is very strong contrast between the subject and background/foreground for example Snow scenes or taking subjects against bright sky.

Modern cameras give options to enable you to 'compensate' for such difficult situations by effectively OVER or UNDER exposing the picture the camera would otherwise have taken.

Show Red Kite pics? For ISO and talk around issues re ISO, exposur comp, shutter & aperture settings.

READING/Tutorials-

<http://www.cambridgeincolour.com/tutorials/camera-exposure.htm>