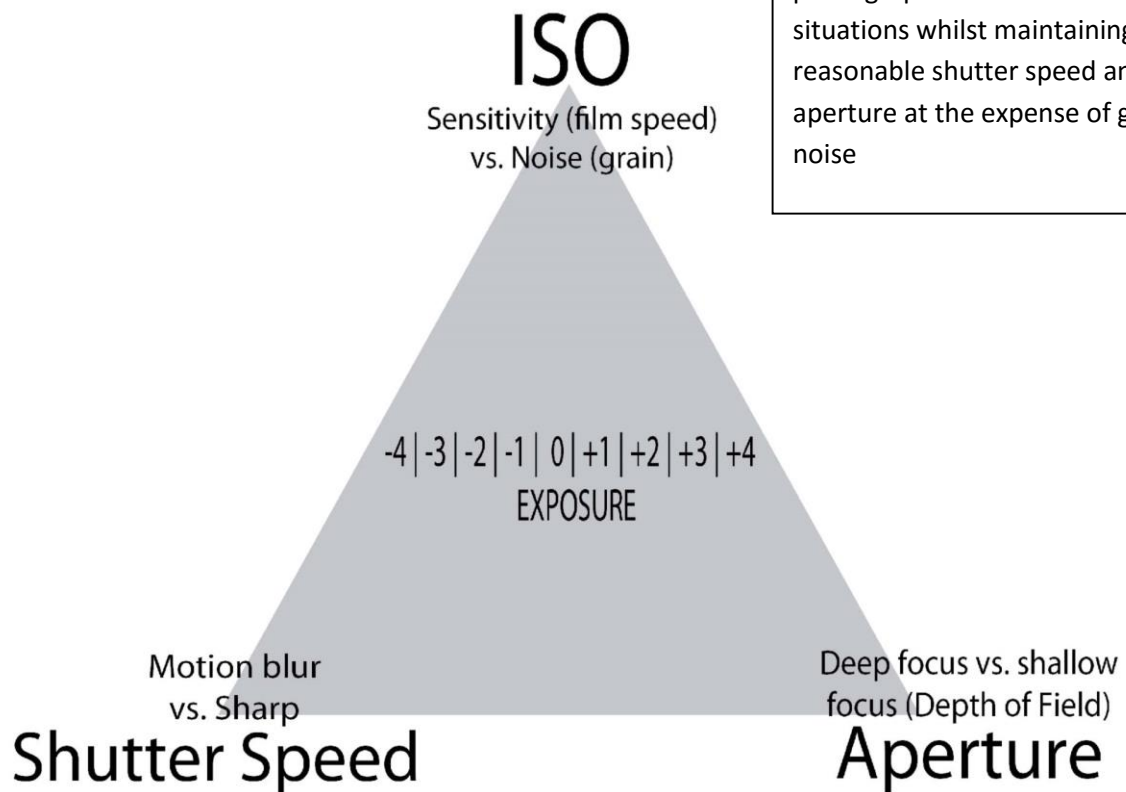


Kick the Auto Habit

Start driving your camera

The exposure triangle



Increasing the ISO will allow photographs to be taken in darker situations whilst maintaining reasonable shutter speed and aperture at the expense of greater noise

High shutter speeds 1/1000 and above for example will allow action to be frozen e.g. racing cars driving towards or away from the camera

Wide apertures will give a very shallow depth of field (or focus). Small apertures will give greater depth of field (front to back in focus)

All three settings (ISO, shutter speed and aperture) have an effect on the photograph, and taking the same scene using different ISO values, shutter speed and aperture will give a different look and feel to the picture, it is upto the photographer to decide what end result is required.

The following pages and hopefully the workshop this evening will give you an insight into how to work the camera in order to have more control over the end result.

Camera Modes

Most digital cameras have many different modes

- Auto
- Portrait
- Landscape
- Sport
- Fireworks
- Snow mode
- Night
- Macro

But how do these control the camera? – Different manufacturers may have their own interpretation of each of these modes.

Now let's look at what else we have

- Aperture Priority – A / Av
- Shutter Priority – S / Tv
- Programme - P
- Manual - M



Aperture Priority

Aperture priority, often abbreviated to A or Av (for Aperture value) on a camera mode dial, is a setting that allows the user to choose a specific aperture value while the camera selects a shutter speed to match. The camera will ensure proper exposure.

The main purpose of using aperture-priority mode is to control the depth of field. Aperture priority is useful in landscape photography, where a narrow aperture is necessary if objects in foreground, middle distance, and background are all to be rendered crisply, while shutter speed is often immaterial. It also finds use in portrait photography, where a wide aperture is desired to throw the background out of focus and make it less distracting.

Depth of Field (DOF) is that amount of your shot that will be in focus. Large depth of field means that most of your image will be in focus whether it's close to your camera or far away (like the picture to the left where both the foreground and background are largely in focus – taken with an aperture of f/22).

Aperture has a big impact upon depth of field. Large aperture (remember it's a smaller number) will decrease depth of field while small aperture (larger numbers) will give you larger depth of field.

Remember that small numbers mean small DOF and large numbers mean large DOF.

In addition, aperture priority mode allows the photographer to force the camera to operate the lens at its optimum apertures within its aperture range for a given focal length of the lens. Commonly, lenses provide greatest resolving power with relatively medium-sized apertures.

If exposure compensation is used, the camera will adjust the shutter speed - a positive exposure compensation will give a slower shutter speed and a negative compensation will give a faster shutter speed.

Shutter Priority

Shutter Priority works in a similar way to the aperture priority mode except that the photographer sets the shutter speed and the camera selects the aperture. As the range of possible apertures the camera has to select from is usually a lot less than the range of shutter speeds (especially on compact cameras), there is a greater chance of the photographer picking a shutter speed for which the camera is unable to select an aperture. Therefore it is not a mode that we would normally use.

The argument in favour of shutter priority mode is that, when shooting sports photography you can select a high speed shutter to freeze the action. We would argue that this is even easier in aperture priority mode as you just open up the aperture to its widest (lowest f number) and the camera will select the highest shutter speed it can to ensure correct exposure.

For example if you want to photograph a racing car but want to completely freeze it so there is no motion blur you would choose a fast shutter speed (say at 1/2000) and the camera would take into consideration how much light there was available and set an appropriate aperture. If instead you wanted to photograph the car but have some motion blur to illustrate how fast the car is moving you might like to choose a slower shutter speed (1/125) and the camera would choose a smaller aperture as a result.

Programme

Program mode has the camera calculate both shutter speed and aperture (given a manually or automatically selected ISO). Higher-end cameras offer partial manual control to shift away from the automatically calculated values (increasing aperture and decreasing shutter time or conversely). The difference between Programme mode and Full Auto mode is that in programme mode, only the exposure is automatic, while other camera settings (e.g., shooting mode, exposure compensation, flash) can be set manually; in Full Auto mode everything is automatic.

With some cameras, there is the option to vary the shutter / aperture settings in programme mode, with each pairing of aperture and shutter speed giving the same exposure.

Manual Exposure

The photographer is able to select both the aperture and the shutter speed, thereby having complete control over the exposure. The camera does not set anything that affects the exposure, therefore exposure compensation has no effect in manual mode. Of course if you want to increase the exposure by one stop, you just select a slower shutter speed or a bigger aperture. Unlike the other modes mentioned in this section, the camera won't compensate for a change made by the photographer by altering something else.

A useful feature of nearly all cameras is that the exposure meter still functions in an advisory capacity. It will usually represent as a pointer on a bar in the viewfinder or on screen whether the shutter speed/aperture that you have selected will over or under expose the image when compared to its own readings, and by how much.

Although it is tempting to always use one of the auto or semi automatic modes, it is worthwhile spending some time shooting in manual mode and getting a feel for apertures and shutter speeds. It really doesn't take that long for it all to become second nature.

The extremes of brightness that one encounters in the natural world are not that varied. For this reason there is the so-called *Sunny 16* rule. This says that on the brightest day normally encountered the proper exposure is roughly the reciprocal of the film speed at f/16. Thus, if you are shooting ISO 200 film then the exposure will be 1/250 second @ f/16. This is the same whether you're in Auckland or Amsterdam, mid-summer or mid-winter.

From the extremes of a sunny day outdoors down to typical indoor room lighting covers a range of about 10 stops. With the exception of seldom encountered situations like fireworks, cityscapes and moonlight scenes these 10 stops encompass every lighting situation you are ever likely to encounter. Only on the ski slopes or at the beach will you need to stop down one more stop beyond Sunny 16 because of reflections off the snow and sand.

So, that being the case, why is exposure so difficult? Most people should have no problem in recognizing 10 different light levels, shouldn't they?

Unfortunately (or fortunately, depending on your point of view), the human eye and brain have a superb autoexposure mechanism built in. This means that once your eyes have adjusted to the current lighting situation, and without clues as to what is causing the light level encountered, it is almost impossible to tell how bright things are on a relative basis. As long as the light level lies somewhere within that 10 stop range for most people it all appears the same.

This is why light meters, whether built-in or handheld, are such vital tools. But before exploring light meters and how best to use them it's worthwhile to have in ones mind a firm idea of what "proper" exposure settings are for the ten light levels normally encountered. This way you're not a blind slave to the meter.

Let's assume an F stop of f/8 and a ISO (film speed) of 200. Here's what these 10 light levels are and the shutter speed that would be needed.

- A Sunny day outdoors —1/1000 sec
- A hazy bright day — 1/500 sec
- A bright cloudy day without shadows —1/250 sec
- An overcast day, or open shade on a sunny day —1/125 sec
- A heavily overcast day —1/60 sec
- Deep shade. The woods on an bright overcast day —1/30 sec

- Just before a thunderstorm or late on a heavily overcast day — 1/15 sec
- A brightly lit store interior — 1/8th sec
- A well lit stage or sports arena — 1/4th sec
- A well lit home interior — 1/2 sec

Of course you would vary the F stop and shutter speed combinations to whatever would be most appropriate. In the case of a home interior, for example, instead of 1/2 second at f/8 you might choose 1/15 sec at f/2.8. The point is though that these 10 brightness levels represent 95% of the conditions under which we all do our shooting.

Using spot metering with manual exposure allows you to choose which part of the scene is to be at the optimum exposure, and to check that the brightest and darkest areas are still within the range of the sensor. For any particular scene, there will generally be more than one correct exposure, and by using manual exposure you can have a greater degree of control.

ISO

Also known as film speed or sensitivity of the digital camera sensor. The lower the number the less the sensitivity and conversely, the higher the number, the greater the sensitivity.

Typically ISO 100 or 200 is accepted as the normal rating, but most cameras allow adjustment down to ISO 50, and up to as high as 6400 (although some now go up to 204800)

The downside of using high ISO values is increasing noise

The scale is the same for both film and digital. Here is a quick rundown of some ISO values you may see:

- ISO25 is very insensitive, requiring very bright light.
- ISO50 is twice as sensitive but still requires very bright light.
- ISO100 is the mainstream default for both film and digital. It is used mainly in bright daylight or a comparable level of brightness.
- ISO200 is the next whole increment in sensitivity. It is billed as an “all-around” film. Outdoors, this might be used around dusk and dawn.
- ISO400 is the next whole stop. It can capture images in relatively low light, particularly indoors or during twilight hours.
- ISO800 is for nighttime photos with limited light.
- ISO1600 is for use in dark environments.
- ISO3200 and beyond are for use in very dark environments.

Now lets try some examples

- Set white balance to fluorescent.

Firstly - ISO

- Set the camera in manual mode, aperture of f5.6 and shutter speed of 1/60, and ISO 200
- Take a photograph – check the rear display
- Increase the ISO to 400, 800, 1600, 3200, 6400, 12800 etc
- Low ISO's will be under exposed, high ISO's will be over exposed, best exposure should be nearer the middle.
- Note the ISO which gives the best exposure.

Now let's try changing the aperture.

Using manual mode first.

- Set the ISO to 6400 (or the highest value on your camera)
- Set aperture of f5.6 and shutter speed of 1/60
- Open up the aperture, one step at a time (normally 1/3 or ½ stop) taking a photograph at each setting
- Note that the picture start to become brighter.
- Reset aperture to f5.6
- Close down the aperture one stop at a time (refer to front page for apertures to use), take a photograph each time.
- Note that the pictures are getting darker.

Now use aperture priority mode

- Check / set ISO to 6400 (or the highest value on your camera)
- Set camera to Aperture priority mode
- Set aperture to f5.6, note shutter speed, take a photograph
- Vary aperture noting shutter speed and take photographs.
- Check rear screen – all exposures should look the same

Trying shutter speeds next.

Using manual mode first.

- Check / set the ISO to 6400 (or the highest value on your camera)
- Set shutter speed of 1/60 and aperture of f5.6
- Decrease shutter speed 1 stop at a time
- Note that the pictures start to become brighter.
- Reset shutter speed to 1/60
- Increase shutter speed one stop at a time, take a photograph each time.
- Note that the pictures are getting darker.

Now use shutter priority mode

- Check / set ISO to 6400 (or the highest value on your camera)
- Set camera to shutter priority mode
- Set shutter speed to 1/60, note aperture, take a photograph
- Vary shutter speeds noting apertures and take photographs.
- Check rear screen – all exposures should look the same

Sunny 16 Rule

The basic rule is, "On a sunny day set aperture to f/16 and shutter speed to the [reciprocal of the] ISO setting for a subject in direct sunlight. For example:

- On a sunny day and with ISO 100 film / setting in the camera, one sets the aperture to f/16 and the shutter speed to 1/100 or 1/125 second (on some cameras 1/125 second is the available setting nearest to 1/100 second).
- On a sunny day with ISO 200 film / setting and aperture at f/16, set shutter speed to 1/200 or 1/250.
- On a sunny day with ISO 400 film / setting and aperture at f/16, set shutter speed to 1/400 or 1/500.

Further reading on line

There are many resources on line which can give more detailed information, including

Quite a useful entirely free ebook on photography
<http://www.creativephotobook.co.uk/content.html>

Useful website with articles to suit all levels, mainly free, with some paid for content
<http://photo.tutsplus.com/>

A bit more advanced, but some useful tutorials and articles
<http://www.cambridgeincolour.com/>

Exposure Values Table

		FILM SPEED (ISO/ASA NUMBER)							APERTURE OF LENS (f/STOP)												
		ISO 25	ISO 50	ISO 100	ISO 200	ISO 400	ISO 800	ISO 1600	ISO 3200	f/1.4	f/2.0	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22	f/32		
EV NUMBERS	1	0	-1	-2	-3	-4	-5	-6	4	8	15	30	---	---	---	---	---	---	---	SHUTTER SPEEDS (sec)	
	2	1	0	-1	-2	-3	-4	-5	2	4	8	15	30	---	---	---	---	---	---		
	3	2	1	0	-1	-2	-3	-4	1	2	4	8	15	30	---	---	---	---	---		
	4	3	2	1	0	-1	-2	-3	1/2	1	2	4	8	15	30	---	---	---	---		
	5	4	3	2	1	0	-1	-2	1/4	1/2	1	2	4	8	15	30	---	---	---		
	6	5	4	3	2	1	0	-1	1/8	1/4	1/2	1	2	4	8	15	30	---	---		
	7	6	5	4	3	2	1	0	1/15	1/8	1/4	1/2	1	2	4	8	15	30	---		
	8	7	6	5	4	3	2	1	1/30	1/15	1/8	1/4	1/2	1	2	4	8	15	---		
	9	8	7	6	5	4	3	2	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	---		
	10	9	8	7	6	5	4	3	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	---		
	11	10	9	8	7	6	5	4	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	---		
	12	11	10	9	8	7	6	5	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	---		
	13	12	11	10	9	8	7	6	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	---		
	14	13	12	11	10	9	8	7	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	---		
	15	14	13	12	11	10	9	8	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	---		
	16	15	14	13	12	11	10	9	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	---		
	17	16	15	14	13	12	11	10	---	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	---		
	18	17	16	15	14	13	12	11	---	---	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	---		
	19	18	17	16	15	14	13	12	---	---	---	1/8000	1/4000	1/2000	1/1000	1/500	1/250	1/125	---		
	20	19	18	17	16	15	14	13	---	---	---	---	1/8000	1/4000	1/2000	1/1000	1/500	1/250	---		
	21	20	19	18	17	16	15	14	---	---	---	---	---	1/8000	1/4000	1/2000	1/1000	1/500	---		
	22	21	20	19	18	17	16	15	---	---	---	---	---	---	1/8000	1/4000	1/2000	1/1000	---		
	23	22	21	20	19	18	17	16	---	---	---	---	---	---	---	1/8000	1/4000	1/2000	---		

LV Value	Exposure Value	Subject
18	+3	- Bright reflections
17	+2	- White or very light colored/toned subject in bright sunlight
16	+1	
15	0	- Subject is medium colored/toned in bright sunlight (SUNNY 16)
14	-1	- Slightly overcast
13	-2	- Overcast
12	-3	- Heavy overcast
11	-4	- Sunset - Open shade
10	-5	- Landscapes just after sunset or before sunrise
9	-6	- Landscapes 10 minutes after sunset/before sunrise - Neon and lighted signs at night - Stage shows with bright lighting
8	-7	- Times Square at night - Store windows at night - Fires at night - Stadium lighting - Interior with sunlight coming through window - Interior with many florescent lights
7	-8	- Bright street at night - Stage shows with average lighting - Daytime interior with skylight
6	-9	- Fairs and amusement parks at night - Daytime interior with windows & no direct sunlight
5	-10	- Night interior with bright lighting
4	-11	- Floodlighted buildings, monuments, fountains - Holiday lighting at night (indoor or outdoor) - Night interior with average lighting - Candle-lighted close-ups
3	-12	- Street at night
2	-13	
1	-14	
0	-15	- Dim interior
-1	-16	
-2	-17	
-3	-18	- Rural landscape illuminated by a full moon
-4	-19	
-5	-20	
-6	-21	- Rural landscape illuminated by starlight