

Basic Photography Primer for film and digital users By Mike Longhurst FRPS

How a Camera Works

- This information is essential to make progress in photography beyond a basic point-and-shoot level and to solve many point-andshoot problems with digital cameras
- It is as relevant to users of digital cameras as to users of any conventional film cameras. Even if we can't control exposure ourselves, or don't want to, it is necessary to understand what the camera is doing and why
- For cameras with auto only exposure, you may still be able to take creative shots, but you will need to understand the limitations of your equipment
- Digital cameras are designed to mimic the things that film cameras do, especially the shutter speed and aperture controls described here*
- The three fundamental variables of any photography are: how much light is allowed through the lens, for how long and how fast the film or digital sensor reacts to the light

*Special digital points in blue

1.Film or Sensor Speed

- Every film or digital sensor has a speed at which it reacts to light. This
 is expressed as its sensitivity and rated by an ISO or ASA number
- For practical purposes, the slowest reacting is ISO 50 and the fastest is about ISO 1600, made by most manufacturers. 400 is about as fast as you will ever need
- Whereas film cameras are stuck with the speed of the film you put in, digis can be altered from shot to shot
- Your choice of speed is conditioned by the shooting conditions, or creative effect required:
 - Low light or moving subjects, choose faster (400+)
 - Landscape or normal daylight choose slower (50 100)
 - Faster films are more grainy, and have lower colour saturation, but are also more forgiving of exposure errors, ie they have greater exposure latitude
 - Quality falls off badly with slide film over 200, but under 200 they have little latitude, this means exposure has to be dead on
 - For digital cameras the "noise" or speckling increases with the ISO number
 - Easy answer: stick to 100 wherever possible or 200 with print film

Pushing the film

- You don't need to know this, but while we're talking film, be aware you can rate films faster than the ISO number on the box
- This means you tell the camera it is using a 1000 film when it is only 400. It will take pictures in lower light, but you must tell the processors, or it will be hopelessly under exposed
- It can save you if you accidentally expose a film at the wrong speed when setting manually
- Pushing reduces colour saturation and can increase grain, but there are limits before quality is impaired
- Pulling (ie under-rating film) is not a good idea and has no real purpose for beginners
- When you turn up the sensitivity of a digi, you are in effect "pushing" the sensor and a grainier or more speckled result will be obtained. This will affect dark areas and skies most noticeably

How does the camera know what speed the film is?

- In the case of most modern cameras, automatic sensors read the black panels on the film cassette you put in. This is called DX coding
- There is usually a manual override if you want to change it, but for beginners, just leave it alone
- If you own an older camera, you must remember to set the right film speed. There is usually a dial on top
- Old cameras are often a stop or so out in metering, which is difficult to correct. Just set the film speed to a higher speed, eg ISO 200 for a 100 film will correct a camera that over exposes by one stop
- A digi will come with a default speed set and you can alter it in one of the menus

2. f stops and apertures

- Ok, so the film is in the camera and you take a shot. If you are in fully automatic mode the camera does it all for you. So why would you need to know what it is doing?
- Because the camera is programmed to shoot things one way and as you improve, you will want to take control to achieve more creative results
- It is always good to learn to use a manual camera, because it makes you realise when not to let the camera do it
- The business of letting light in and registering it on a sensor or negative is essentially the same for film or digital

What the camera does

- To get the right amount of light onto the film, the camera juggles two variables, or you have to do it manually:
 - A) The Shutter Speed: how long the shutter is open to let light in
 - B) The Aperture: how wide the hole is to let the light in
 - There is a direct relationship between one and the other (reciprocity)
 - If you leave the shutter open for twice as long then you have to make the aperture half the size
- Every shutter "stop" is expressed as a fraction of a second, from say 1/8th to 1/1000th or more. Every **stop** represents a half of the time of the one before
- Every aperture "stop" is expressed in f numbers, which are more complicated, but still represent a halving of the aperture size and therefore of the amount of light that can get in
- Remember that the "bigger then number the smaller the aperture", so on a lens with a maximum aperture of f2.8, 2.8 means as far open as it will go.
- Typically lenses will go through stops: 2.8, 3.5, 5.6, 8, 11, 16, 22, 32

What the camera does

- Some film cameras and most digital cameras have a set of "scene modes", where the right balance between shutter and aperture is set for you
- These usually cover close-up (macro), landscapes, portraits, night (fireworks), sports and back-lit

Stuff about shutter speeds

- Camera shake ruins more pictures than any other cause....unless it is intentional for creative reasons!
- To prevent this, if you have a film camera or digi with manual override, you need to set a speed of about 125th / sec and to prevent movement of people walking or slow cars you need at least 250th
- To freeze all movement, even of fast cars, you need at least 1000th
- With a zoom lens at say 200mm, you need a faster shutter speed to freeze movement. This is because all movement is magnified
- The slowest most people can hand-hold safely is about 30th sec
- Below that you really need a tripod. Landscape photographers always use a tripod
- To create movement in a pic, choose a speed of maybe 20th and pan with the moving object to blur the background
- Always try a few speeds to see which works best

Stuff about apertures

- The aperture you choose determines the amount of the scene that is in focus (depth of field)
- In a pic with things near to the camera and far away you need to decide whether you want all in focus or just the main subject
- The more open the aperture, the less is in focus, so at f2.8 you get very shallow depth
- This varies according to the length of the lens as well, so the depth of field is much greater with a wide angle like 28mm and far less beyond 135mm. At 400mm it is very shallow and you might have a dog's eyes in focus and its whiskers out of focus, or "soft"
- So if you want huge depth, as with a landscape, you need to set f22 or more and use a slower shutter speed to compensate
- For people, you usually want shallow depth and a faster shutter speed to prevent movement, so set a smaller f number like 5.6 or 3.5
- You can use "differential focus" to add creativity, with the background intentionally very soft. It is very modern to have foreground items soft
- Digital cameras tend to give much greater depth of focus at all apertures, so wide open is less of a problem

But be aware of sharpness

- If sharpness is what you really need, lenses peak in sharpness at about f11
- When wide open the image is not quite as sharp
- This does not matter with most portraits, because slight softness flatters the skin

Night photography

- For low light you need a long exposure, so you need to be aware of "reciprocity failure" when the aperture / shutter speed relationship breaks down
- This happens with shutter speeds longer than about 1sec and means 20 secs does not let in twice the light of 10 secs. You need more like 30secs
- When shooting in low light always use a sturdy tripod and close the aperture up (eg f11 or more) to give you better depth of focus
- And always try different exposure lengths. Don't trust even the best camera to get it right over 1sec

So what do automatic cameras do?

- They usually use a "programme" system to adjust the speed and aperture at the same time
- On a simple compact or digi this will be very basic, and is just designed to keep the shutter over about 90th / sec for as long as possible as the light level goes down, to minimise camera shake
- It will hold the shutter between 125th and 250th to maximise the aperture, therefore giving you depth of field
- On modern SLR cameras (single lens reflex) there is a range of programme options to tell the camera to optimise shutter speed for action, or depth of field for landscapes
- Frankly once you know why you need these options, you might as well do it yourself and switch to Aperture or Shutter priority

Aperture and Shutter priority

- These are the options that appeared on cameras long before autofocus
- The most important is AP, because with this you are deciding the depth of field you need and the camera will set the shutter speed that matches
- So you set the camera to say f11 and the camera does the rest
- Just watch the shutter speed indicator though in case it gets dangerously slow, or on very bright days needs a higher shutter speed than you have

White balance

- This is really a digital-only subject, but you can buy different films for daylight and tungsten light
- This is necessary because the colour temperature of the light casts a yellow tone if it is too low, or blue if it is too high. Strip lighting will come out yellow, even if it looks OK to your eyes
- Digis have an automatic setting which should solve most problems, but if you find some results coming out too yellow, consult your manual and learn to adjust it

Common auto exposure mistakes

- Most mistakes occur because a camera is not like your eye. Your eye has a brain behind it to let you see detail in a bright sky at the same time as in a darker foreground
- In effect your brain is exposing differently for the sky and for the ground and even with multi-zone metering on modern cameras, this is impossible
- A camera has just one stab at it and is limited by the exposure latitude of the film, which in the case of slide film is only about two stops from very dark to burned out white (negative film is far more forgiving and so is digital)
- This means that if there is a two stop difference between a dark area and a light one, you will get either black or white instead of detail. The only way to solve this is to look for something you want to be right and set the exposure for that
- Exposure meters are optimised for Caucasian skin, which is 18% grey, so aim at skin or green things like grass, which is similar
- Never meter off a white or black area

3. About lenses

- Most people use zooms these days and quality has improved to the point where the only reason to use a fixed focal length (prime lens) is for a faster aperture of say f1.8 or f2.8 which zooms only offer at huge cost
- Remember that the longer your lens, the more light it is going to need, therefore the slower the shutter speed you can set. 1000mm sounds great, but you won't be able to hand hold anything over about 200mm-300mm, except on days with very bright sun, or with a faster ISO number set to keep the shutter speed up
- Very long zooms like 28-200mm or 80-400mm do sacrifice optical quality, especially at the long end and around the edges
- Macro lenses are very useful in isolating a flower or smaller. Be aware that they usually offer very shallow depth of field and often need a tripod
- Many zooms and most digis have a macro facility even if it does not get down as far as 1 to 1. As an alternative you can use magnifying filters or macro extension rings that just move the lens out a bit

4. About autofocus

- AF is a great invention and excellent for candid shots or action photography
- Beyond that it can be a menace, because it makes mistakes in film or digi, focusing on the wrong thing that just happens to be in the middle
- With people or animals, be sure the camera focuses on the eyes, not the nose and make sure it doesn't miss altogether and focus on a tree in the distance
- You normally have a means to aim at what you want to focus on and hold it while you re-compose the shot
- Some cameras offer multiple focus points. These assume what you want to be sharp is nearest to the camera, which is not always so. It is often best to turn this feature off and just ask it to focus in the middle ring
- Others allow you to select which of the focus points you want to use
- The best thing about shooting manually is that it makes you slow down and think about composition

5. Built-in flash

- A film or digi camera with built-in flash can be useful, but the results are often disappointing
- The flash usually has a range of no more than about 3-4 metres and that is indoors, with walls and ceiling reflecting the flash back to the subject
- Outside or in large or very dark rooms, flash is dissipated and underexposure will result
- For best results outdoors in relatively low light, turn the flash off if the camera allows you to
- This will force it to set its widest aperture and slowest shutter speed, so hold the camera very still
- In cases where there is strong light behind the subject, eg in front of a window, forcing the flash to fire ("fill-in") will usually result in a better exposure and avoid silhouetting
- Red-eye reduction mode makes the flash go off several times to close the irises of the eyes, but it can also make people close their eyes

6. Filters

- Some people never use them, but they can be very useful
- Firstly, you should have a circular UV or Skylight filter on every lens to protect it from scratches and to deal with any unwanted UV light that can interfere with the image, but smaller compact cameras don't allow it
- The most popular system is the Cokin square filter type, where you fit a holder onto the lens and slip filters in when you need them. You get a catalogue when you buy a Cokin holder
- Here are what the most popular do:
 - **Polariser** cut diffused light and intensify colours. Can make the image look sharper. BUT you lose one stop of aperture
 - Grey or neutral density graduated an ND grad is great for bright skies, which can make the ground go very dark. They are almost essential for sunrises or sunsets, where you want to see some ground detail
 - **Blue grad** can put colour into a blank sky
 - **Warm-up** use early in the day to remove cold tones and blue tinge
 - **Diffuser** use to create a nice soft image
 - **Red, Orange, Yellow** for B/W only
 - Don't waste time with most of the silly effects...they don't impress anyone anymore

7. Elementary composition

- The "Rule of Thirds" is good to remember: compose a picture so that what you want the eye to rest on is not in the centre, but a third of the way from the edge or top
- Look for diagonals; things that use a diagonal line through the pic for impact
- Decide what you want the eye to rest on, or the way you want it to go
- Look at the background and make sure it is not messy
- Don't have things part in and out of the frame if you can help it
- Don't have distracting light areas at the side where they catch the eye
- Look for litter in the foreground and remove it
- Give moving things space to move into. If you crop too close, you kill the movement
- Decide whether you want people in or out and wait as long as it takes to get it right

8. What to shoot and when

- You can shoot literally anything, but judges are looking for what you did that turned it into a picture ("the seeing eye")
- Set subject competitions are vital for beginners to give you ideas
- Best times of day are early and late, when the sun is low and shapes are better defined. Worst is when the sun is high overhead and there is a lot of diffused light bouncing around
- Look for sun after rain for beautiful light. In poorer light look for macro shots or candids
- Don't just shoot other people's art, unless you can put a twist on it with great technique
- You can't learn without burning film. Use slide film and buy it mail order or go digital and make it a lot cheaper