Introduction to camera usage

A camera in its barest form is simply a light tight container that utilizes a lens with iris, a shutter that has variable speeds, and contains a sensitive piece of media, either film or a digital sensor.

Many of today's latest cameras share similar features. The core features that are present are also present on most cameras, new or old. Almost every camera has three variables of control that are used to create a proper exposure. Those three variables are **Aperture**, **Shutter Speed**, and **ISO**. The aperture is the measurement of the iris inside of the lens. The shutter speed refers to the amount of time the shutter remains open during the exposure. The ISO refers to the sensitivity level of the film or digital sensor. All three of these items use standard units of measure. Every one of these units of measure are divided into '**stops**.' One stop is equal to a whole unit measurement of **Light Value**.

The universal manual controls of most cameras

Aperture units are measured in **f-stops**. The common whole units available on cameras are: f1.0, 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22, 32. Each number is one stop brighter or darker than the one next to it. Think of an aperture inside a lens like the pupil in your eye. It grows or shrinks based on the amount of light that is in front of the camera in order to balance the exposure.

Shutter Speed units are measured in seconds. Common shutter speeds are 1 second, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000. Each number is one stop faster or slower than the next to it.

ISO refers to the international standard for the sensitivity of the photographic medium. In years past, the same units were called ASA in the United States while Europe used a different DIN system. Common whole ISO units of measure are 6, 12, 25, 50, 100, 200, 400, 800, 1600, 3200, 6400. Cameras perform best with the least grain or digital noise in the photos at their lowest ISO setting. Ideally, you would always shoot at the lowest ISO value possible, but ISO sometimes must be increased in order to keep the proper exposure level, such as when indoors, or photographing in the evening.

A combination of these three numbers creates what is known as an **Exposure Value**. Furthermore, a unit of measure called **Light Value** is broken up in one stop increments. Light value is based off of an ISO value of 100. Common units of Light value are 0, 1, through 19, 20. A **Light Value of 0** represents the combination of **f1.0 at 1 second for ISO 100**. Each of these three variables can be changed in your camera to create different effects on the photo, but keep the same balanced light exposure.

If your camera's light meter tells you that your correct exposure is **1/250th second at f8 for ISO 100**, you can calculate your Exposure Value. The exposure value happens to be **14**. Knowing this, you can adjust any of the three variables on your camera to make the same exact balance exposure. The reason for changing these settings might be to control depth of field or control motion in order to take creative control of your

photograph. You might wish to open your aperture to f2.8. Doing so requires you to speed up the shutter or lower the ISO in order to make the same exposure. A reading of **f2.8 happens to be three stops faster than f8**. Therefore you may wish to adjust your shutter speed accordingly to get a new combination of **1/2000th second at f2.8 for ISO 100**. By doing this, you've decreased your depth of field and have made the creative decision to do so. By understanding the relationship of Aperture, Shutter Speed, and ISO, you were able to do so without affecting the exposure balance.

Depth of field refers to the deepness or shallowness of the background in regard to the focused subject in your photograph. Your Aperture (combined with the focal length of your lens) controls the depth of field. **Larger apertures such as f2.8 will have a much shallower depth of field than tighter apertures such as f16**. You may wish to use a shallow depth of field when making portraits of people or you want the subject to stand out against the background. Conversely, if you are shooting a landscape, you may want every aspect of the photo to be in sharp focus.

Motion can be controlled with your shutter speed. Fast shutter speeds will freeze motion and slow shutter speeds allow motion to show up in the form of blur. You may wish to control your shutter speed if you are photographing sports and want to stop the action or you wish to purposely blur your subject for a creative effect. Sometimes getting a fast shutter speed requires you to open up your aperture or increase the ISO of your film or sensor. The compromise may be necessary if a sharp photo is important.

Tripods come in handy when you need to hold the camera still in order to get a sharp photo. Long exposures for landscape photos at dawn and dusk, sports, wildlife, or indoor photography may require a tripod. The general **rule of thumb** is that **your shutter speed needs to be 1/X of a second or faster in order for you to hand-hold your camera and still get a sharp photo. X being the focal length of your camera lens**. If you have a 50mm camera lens, you should be able to hand-hold your camera at speeds faster than 1/50th second. Any speeds slower than that may require a tripod or some means of stabilizing the camera.

Tips for camera usage

Staged shutter buttons are shutter buttons that have three stages. Not being pressed, half pressed to auto focus the camera, and fully pressed to take the photo. This is a core concept people using digital cameras must understand. Many people make the mistake of holding the shutter button down all the way without allowing the camera time to auto focus properly. This may result in blurry photos.

White Balance is used to adjust for color temperature. In the film days, people may have used colored filters or special film based on where they were taking photos. The white balance on a digital camera allows the camera to correct the color temperature to more closely match what the human eye is seeing in the same setting. Indoors with incandescent lights, the color temperature is warmer and more orange. Fluorescent lights may cast a green hue. A sunny day may have a cool and high color temperature that is more blue. Our eyes adjust for this automatically, but the camera must be set so that it can adjust as well. Automatic white balance is a

good compromise at all times. Manually adjusting white balance can result in better looking photos, however. Some cameras allow a custom white balance to be set using an 18% gray card. This is an advanced concept, but can result in the best white balance setting for any scene.

EV +/- adjustment is available on most modern cameras to compensate for flaws in the camera's own automatic light metering. We discussed Exposure Value in terms of Aperture/Shutter/ISO, but the EV +/- setting on your camera is a setting where you force the camera to purposely over or underexpose a shot based on the reading from its own light meter. Many cameras require initial and/or occasional tweaking of this value in order to get the best exposures.
Sometimes if clouds in a sunny sky are too white and washed out, you may need to underexpose and set the EV compensation to -0.3 or more. Conversely, if your indoor photos are too dark, you may need to force the camera's EV setting to +0.3. Typically this adjustment is not drastically changed to either end of the range.

Camera light metering modes available typically include center, matrix, and spot. **Center weighted metering** will read the light in the center of your photo frame. This is a good setting for portraits of single persons. **Matrix or dynamic metering** will look at all aspects of the whole frame of your photo and try to make an educated guess as to the exposure. Many cameras have preset data that would tell the camera you were shooting a photo of dark mountains with a bright sky or a portrait of your friend with the ocean behind them. It is the best all around metering mode for automatic shooting. **Spot metering** is for tricky lighting situations. If you have a dark subject that you want to expose and purposely wash out the background, you can use spot metering and point the spot meter at your subject. Conversely, this would work to darken your shot for a bright subject like a light bulb, or the moon.

Shooting in various modes such as auto vs. manual modes is a personal decision. Sometimes full automatic mode is the most convenient. Many cameras have preset scene modes such as sports, macro, night, etc... These modes may also be convenient. There is typically a photo quality or exposure tradeoff when using these modes versus using a full or partially manual mode. Aperture and Shutter priority modes are also very useful when you are concerned with controlling either depth of field or motion. Full manual mode allows you control over the Aperture, Shutter, and ISO and would be recommended only for people who understood the relation of the three.

Automatic ISO is a common feature in many new cameras. The ISO setting will adjust to prevent blurry photos when lighting is not optimal. Many people can detect the result as an increase in digital noise. It is a compromise that is a decision left to the photographer. Manually controlling the ISO means control over the digital noise levels. Using a low ISO in low light may require a tripod or some method of holding the camera steady, however.

Many cameras have various **photo quality settings** such as raw, fine, normal, etc... If image quality is paramount, a RAW mode is necessary. Fine mode will typically record to a compressed .jpg file format. The compromise is file size and storage requirements on your computer. RAW formats are more flexible when

processing the images with software and can be thought of as 'digital negatives.' Jpg files may degrade when edited more readily.

Digital versus optical zoom is a common setting on today's cameras. Optical zoom refers to any time the lenses in the cameras physically move in order to zoom in and out. Digital zoom occurs when the camera internally processes the image electronically to boost its size. For this reason, many people turn off their digital zoom because image quality can degrade. The same 'digital zooming' can be achieved on a computer using software to increase the size of a photo. Digital zoom is more of a convenience feature than a quality feature.

Most current cameras have **various flash settings** such as full flash, automatic flash, and special flash settings. Automatic flash is the best compromise. Some cameras allow you to step the flash power up or down in EV +/- settings just like the regular exposure. A full flash typically washes out your subject and can lead to long recharge times to ready the flash for the next photo.

Many of today's **fixed lens cameras contain built-in optical flaws**. Zoom lenses are a convenience compromise and will perform better or worse at various focal length settings. These flaws may present themselves as barrel distortion at wide angles, pincushion distortion at telephoto, or purple fringing at the edge of transitions between bright and dark areas in a photo such as tree branches against the sunny sky. Understanding where your camera performs its best and worst can help you choose your shots and zoom decisions.

Megapixels and sensor size are misunderstood by many consumers. Most people assume that more megapixels is always an indicator of a better camera or a better quality image. The truth is that the digital sensor size is more responsible for image quality. **Most small pocket cameras have a digital sensor about the size of the top of a pencil eraser, or 1/4" squared**. At about the 5 megapixel range, a sensor this small is saturated with digital information.

Adding more megapixels to a sensor this size only leads to make your file size and image size larger without much increase in quality. That is why many older, 5 megapixel cameras can produce just as good of 8x10 image print as today's 12 megapixel cameras. Most digital SLR cameras use a much larger sensor. A typical **DSLR camera has a sensor about the size of a postage stamp, or 1" squared**. This explains why a 6 megapixel DSLR camera can easily outperform a 12 megapixel pocket camera. There is much more room for digital data to be spread around the larger digital sensor. There are currently some premium DSLR cameras that feature **a 'full frame' digital sensor. This means that the digital sensor is the same size as a frame of 35mm film, or 36x24mm (about 1.5" squared.)** Cameras with 20 megapixels and a full frame sensor are capable of large poster sized prints with no loss in image quality.

Sadly, price is usually the number one indicator of camera quality rather than the confusing specifications on the side of the box.

Many people are **in the market for lenses for their DSLR cameras** and the numbers can be confusing. The most important number is the focal length, which refers to how wide or long the lens range will be. A 15mm lens will

be very wide and a 300mm lens will be very long like a telescope. Maximum aperture is the other number listed on a lens. This refers to the widest the iris inside will open to allow in light. Typically, more expensive lenses have better optical design and a faster the maximum aperture. A lens with the numbers 90mm f2.8 has a focal length of 90mm and will open up as fast as f2.8. Lenses can be cheap or very expensive. It's best to read reviews about lenses because favorable specifications on paper sometimes don't equate to good real world results. Very fast lenses are exponentially more expensive than slower ones. It may be favorable to your budget to use cheaper, slower lenses and use a tripod, for example.

Links of interest

Wikipedia

http://en.wikipedia.org/wiki/Exposure_value

http://en.wikipedia.org/wiki/F-number

http://en.wikipedia.org/wiki/Shutter_speed

http://en.wikipedia.org/wiki/Film_speed

http://en.wikipedia.org/wiki/Depth_of_field

http://en.wikipedia.org/wiki/Panning_(camera)

A reference of various tips and techniques for the beginning digital photographer:

http://www.shortcourses.com/

Some useful information about cameras, exposure controls, as well as tips and techniques in Photoshop.

http://www.cambridgeincolour.com/tutorials.htm

Google is a great teacher. Chances are if you want to learn to take better wildlife photography photos, all you need to do is search for the subject and there will be several websites relaying the information.