

Exposure

The term "exposure" refers to exposing the film in the camera to light. Proper exposure occurs when the correct amount of light is focused on the film for a set amount of time. The three main camera functions that contribute to exposure are shutter speed, focus, and aperture. Most cameras, whether analog or digital, will automatically control all three for correct exposure. Certain compact and digital cameras offer some manual control, and all SLR's offer the photographer the option of complete manual control over exposure settings.

Shutter Speed

Shutter speed refers to the time the shutter remains open to expose the film to light from the lens. By today's standards, the pioneering days of photography produced film that was not very sensitive to light. Exposure times were unavoidably long, lasting up to a few minutes even in daylight. Some modern films are extremely sensitive to light, offering the photographer great latitude in composing a shot. Even so, we do not usually use the fastest film possible, because films with lower ISO ratings are better suited to bright light and offer sharper images.

The shutter speeds on today's cameras range from 30 seconds up to 1/3000 second, with some SLR models offering even higher speeds. The higher shutter speeds are generally used in bright conditions, or if you want to freeze the action in a motion shot. Slower shutter speeds are necessary in low light conditions, or if you wish to emphasize motion by having an object blur by the frame. Exposure times of several seconds or even longer is possible if the "B" setting on the camera's shutter control is used. This allows the photographer to capture interesting shots in low light conditions, such as the blur of a car's lights on a dark street, or tracking the path of stars in the night sky.

For lower shutter speeds it is best to use a tripod to avoid unwanted blur caused by camera shake.

Flash photography requires a fixed shutter speed, usually 1/60 or 1/125 second, with some fuller-featured SLRs operating at 1/250 second. This ensures proper synchronization between the light of the flash and the opening of the shutter. If your camera offers adjustable shutter speed (as with an SLR), the value is usually marked in red.

Focus

All compact and digital cameras and most SLR's employ some form of autofocus. The focusing process is usually accomplished by electronically comparing two views of the same scene, using mirrors. The lens is shifted until the two views match in contrast and pattern, which means the

image is in focus. Autofocus relieves the photographer of focusing manually, and is especially useful when taking quick, spur of the moment photographs.

Most autofocus systems do a good job of bringing the scene into focus, but they are not foolproof. If the shot involves a predominant object that is not the primary subject of interest, they can focus on that object instead of the true subject of interest. This can occur when the subject you wish to focus on is not in the center of the frame, or if another object is closer to the camera. To correct this, some cameras allow you to focus on the subject while it is in the center of the frame, lock focus, and then frame the shot as desired. This maintains the focus setting until after the picture is taken.

SLR cameras have the option of manual focus, so the photographer can focus on any part of the frame without the risk of a miss-focus by the autofocus system. There are usually focussing aids built into the camera to help the user focus. These can include a prism ring (which shimmers when the scene is out of focus), a split circle inside the ring (which shows objects out of alignment when not in focus), or directional arrows (which light to tell the user which way to turn the lens for focussing).

Aperture

The aperture acts like the iris of the eye, opening or closing to let in more or less light. As such, it has control over two aspects of the photographs appearance. First, the change in the amount of light entering the lens alters the exposure. Second, changing the size of the aperture affects the depth of field; the distance, in front of or behind the subject, in which objects remain in focus.

For SLR cameras, a ring on the lens lets you adjust the aperture. The aperture value, or "f-stop," is expressed as a fraction of the focal length of the lens. The lens focal length is expressed in millimeters, with 50mm being the focal length of a standard lens. Focal lengths above 50mm are considered telephoto, with the most common lenses offering a variable zoom between 85 and 200mm. Lenses of 300mm and beyond are available. Values less than 50mm are considered wide angle, with 28 and 35mm being the most common.

The aperture ring of a typical 50mm lens has the following values etched onto it: 1.4, 2.0, 2.8, 4, 5.6, 8, 11, 16, and 22. Each marked aperture is referred to as a 'stop,' and since aperture stops are measured as a fraction of the focal length, these stops are called f-stops. Because the settings are fractions, f/2.0 is $\frac{1}{2}$, f/4.0 is $\frac{1}{4}$, etc. Therefore, as the numbers on the scale increase, the aperture is reduced. A 50mm lens set at f/2.0 will have an aperture diameter of 25mm, while at f/5.6 will have a diameter of approximately 9mm. Each 'increase' in the number scale of the aperture ring reduces the amount of light entering the lens by half.

Depth of Field

Adjusting the aperture also has the benefit of altering the depth of field, or the range of distance that objects remain in focus. Reducing the aperture (allowing less light to strike the film) will lengthen the depth of field. Increasing the aperture (allowing more light to strike the film) will shorten the depth of field.

The depth of field is also affected by the focal distance and the focal length of the lens. When the lens is focused on a subject that is far away (at least several metres), the depth of field will increase. Using a lens with a shorter focal length will have the same effect. Conversely, photographing a subject nearby and using a lens with a longer focal length will shorten the depth of field.

Using a wide-angle lens in bright sunlight (aperture is small), the area in focus may extend from just a few inches in front of the lens to the horizon. At its closest focus, in low light levels (aperture is large), a telephoto lens may be in focus through only half an inch or less.

The ability to adjust the depth of field is useful for many types of photography. Outdoor portraits, for example, benefit from a short depth of field. With the subject in focus and the background out of focus, distractions are de-emphasized, with the subject given greater importance. For other photographs, you may wish the entire scene to be in focus.