Understanding Photography

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Lesson Three: Photo Sharpness and Exposure

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Now that we're starting to get some basic information under our belts, we're going to talk about three more camera features that will really affect how your photographs look. In this lesson, we'll be looking at the auto-focus and metering capabilities of modern cameras, and the different sizes of lenses that are available.

After this lesson, you'll again want to take your camera out and take some photographs. Look at the results and see what is happening. Look at what is in focus, and what is not. Are you able to get the objects you want in focus to come out sharp in your photographs? Are you able to work with your camera to improve the exposure of your photographs especially in difficult lighting situations? Remember to reread your camera's instruction manual to learn how to use the different settings available on your camera.

Let's Continue!

What We've Learned So Far

Two basic camera controls are used to create a photograph:

1. The aperture controls how much light strikes the media
2. The shutter controls how long the light strikes the media

Aperture Reminder

Smaller number = Larger aperture

Larger number = Smaller aperture

Shutter Speed

The length of time that the shutter is open to admit light into the camera

Aperture, shutter speed and ISO work together to create perfect exposure.
A change in any one of the three elements requires a change in at least one other element in order to maintain perfect exposure.

10 x 10 x 10 = 1000

Aperture Value	Shutter Speed Value	ISO Rating	Perfect Exposure

ISO Reminder

Smaller number = Slower, less sensitive to light

Larger number = Faster, more sensitive to light

Depth of Field Reminder

Larger aperture = Smaller depth of field

Smaller aperture = Greater depth of field

Expressing/Freezing Motion Reminder

Slower shutter speed = Expresses motion through blurring

Faster shutter speed = Freezes motion

Focusing

Taking a good photograph means making sure that the object of primary interest in the photograph is rendered clear and sharp. Assuming that your photos aren't blurry due to slow shutter speeds and camera shake, adjusting the sharpness and clarity of your photograph is accomplished by properly focusing the camera lens on the subject of primary interest.

Most modern cameras are capable of automatically focusing their lens during the picture taking process. This camera function is known as autofocus. Higher end cameras may also have the ability to focus the camera manually for times when autofocus cannot do the job, such as in very low light situations. Low end cameras and disposable cameras may have fixed focus lenses that do not require focusing.

How your particular camera focuses depends upon the make and model. This lesson will discuss various types of autofocus and how to best make them work. In order to apply these concepts to your camera, you may need to take another look at your instruction manual to see how your particular camera works.

How Autofocus Works

All autofocus cameras sense patterns of light and dark and the changes in color. This information is used by the camera to determine the location of objects and compute their distance from the camera. The camera then adjusts the lens to bring the objects it thinks it sees into focus. Some cameras can also detect motion and will identify moving objects and continually adjust the lens to keep them in focus until the photograph is taken.

Remember, however, that the camera doesn't really know what it is being pointed at. In actual use, the camera may select something other than what you want it to focus on. As the photographer, you need to learn how to control your camera's autofocus so that you can capture images the way you want.

The next two pages demonstrate the most common autofocus types available. Every manufacturer has its own variations, but basically they will fit one of these basic types or have some of the options outlined.

Types of Autofocus

There are many types of autofocus. The most common are listed below. Review your camera's manual to determine which types are available to you.

Single Area Autofocus - The camera focuses on whatever object it detects in the center of the viewfinder or screen. This is the most common type of autofocus.

This example of a point and shoot camera viewfinder shows no indication of the area that the camera uses to autofocus. If there are no marked autofocus areas, the camera typically uses the center of the viewfinder as the autofocus point. There are no other options. Check the instruction manual to determine how to focus the camera properly.

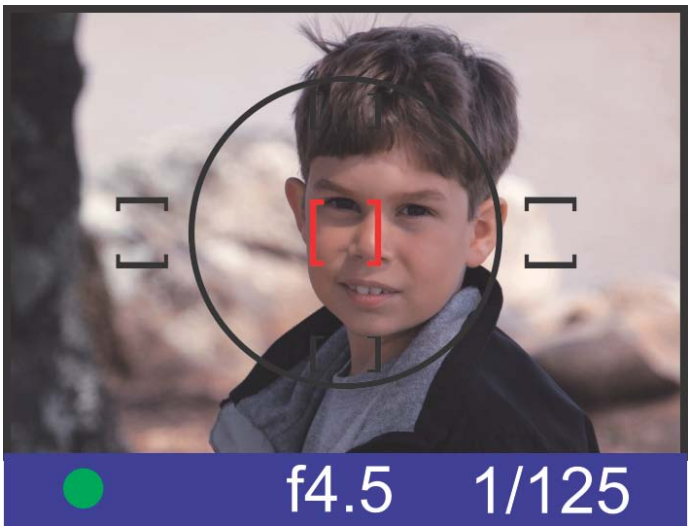
The green dot in the viewfinder is an example of a focus indicator. It may change color and the camera may beep to indicate that autofocus has been achieved.

This example of a point and shoot camera viewfinder that shows the area that the camera uses to autofocus. If you want a particular object to be in focus, you must make sure that it is inside of the marked area at the time the camera focuses. Once focused, you can use the focus lock technique (see later in this lesson or your camera's instruction manual) to move the object off center but still have it remain in focus.

This viewfinder also uses a focus indicator.

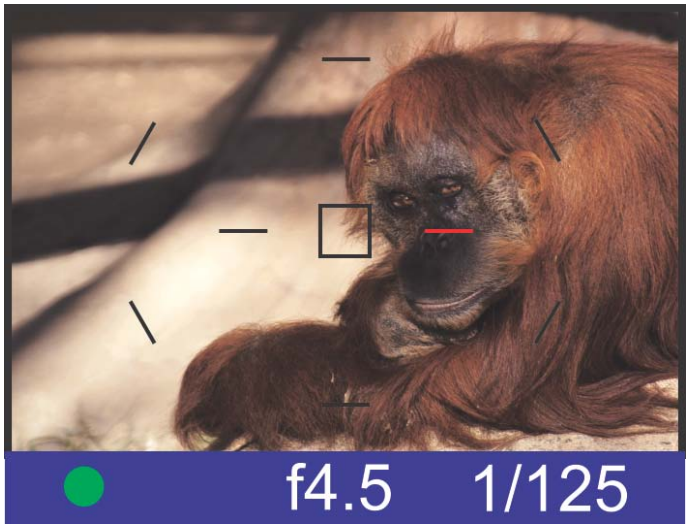
Types of Autofocus - Continued

Multi-Zone Autofocus - The camera has multiple autofocus points. It examines the scene in the viewfinder or screen and attempts to select the most likely object to focus on. This type of autofocus can be very helpful, but is the most prone to selecting something that you don't want as the central item of focus. Most multi-zone autofocus systems also allow the user to turn off automatic selection. The user can then select any one of the autofocus points manually and, in some instances, lock the camera into using a selected autofocus point all of the time.



This example of an entry level single lens reflex (SLR) interchangeable lens camera viewfinder. This focusing system has a center point surrounded by points above and below it and to each side. The points are designed to respond vertically and horizontally and to track the motion of objects as they move across the scene.

The viewfinder may have a focus indicator at the bottom, but the autofocus point the camera or the user selects for focus changes color to indicate it is in use.



This example of a more advanced SLR viewfinder has nine autofocus points. As with the entry level SLR the focus points can be selected automatically or manually. The additional autofocus points help the camera to better track moving objects in the scene and anticipate more complex scene composition.

The selected autofocus point changes color to indicate it is in use. There may or may not be another indicator to tell the user that focus has been achieved.

Autofocus Modes

Continuous Autofocus - The camera can detect moving objects and can continually adjust the lens to keep an object in focus as it moves through the scene. Continuous autofocus is typically only available on cameras with multi-zone autofocus systems. If it works well, this autofocus type can be very helpful in photographing sports, animals, and other moving objects.

Macro Autofocus - The focusing system is capable of focusing on objects that are very close to the camera lens. Many point and shoot cameras have this built in. (Macro mode is usually represented by a little flower icon.) Cameras with interchangeable lenses usually require the use of a lens designed for macro focusing or the addition of accessories to enable a standard lens to focus more closely.

Manual Focusing

Most advanced cameras, even point and shoot models, have a manual focus mode. On a digital SLR, manual focus is achieved by moving a switch to manual focus mode and then turning a focus ring on the lens. Manual focus on point and shoot cameras, if available, differs from model to model. Some advanced models have focus rings on the lens like an SLR. Other models require the user to press function buttons similar to their zoom control. However it is achieved, manual focus is an important option to have when your camera's autofocus is unable to correctly focus on the subject you desire. In most cases this will occur for the following reasons:

- There is not enough light for the autofocus mechanism to work correctly.
- There is an obstruction between you and the object of focus like a chain link fence, glass, or bars.
- The scene you are photographing has many objects and/or a very complicated layout.
- The scene you are photographing does not have enough contrast for the autofocus to identify an object.
- The scene you are photographing has highly reflective objects.

Solving Focus Problems

For most photographs, your camera's autofocus may work perfectly fine. In those instances where it is not, here are some things to try:

- Use your camera's focus lock function to make sure the object you want is in focus regardless of its position in the scene. If your camera has multi-zone autofocus, switch to the center autofocus point before trying focus lock. (see below)
- If the lighting is too dim for the autofocus mechanism, add more light by turning on room lights, changing location, or by deploying your camera's flash. Some cameras have a light that flashes to assist the autofocus mechanism in low light. Others use the onboard flash as a focus assist.
- If your camera has a continuous autofocus mode that can't seem to focus, switch it back to its regular single autofocus mode.
- Switch to manual focus if your camera has the capability.
- Make sure any blurriness isn't caused by camera shake.

Focus Lock or Focus and Recompose

Pretty much all modern autofocus cameras use a halfway press of the shutter button to focus and a full press to take the photograph. Pressing the shutter button halfway down and holding it will cause the camera to focus and then lock that focus until the shutter button is released. This functionality allows the user to compose photographs where the primary object of focus is not in the center of the photograph. To accomplish this, aim the camera at the object you wish to be in focus. Make sure it is in the center of the viewfinder and press the shutter button halfway down. Once the camera has focused, recompose your scene without letting up on the shutter button. When you have the scene the way you want it, fully press the shutter button to take the photograph.

Darth Vader is not in focus because the camera focused on the shrub in the background.

The camera was reoriented and the autofocus point was placed over Darth Vader.

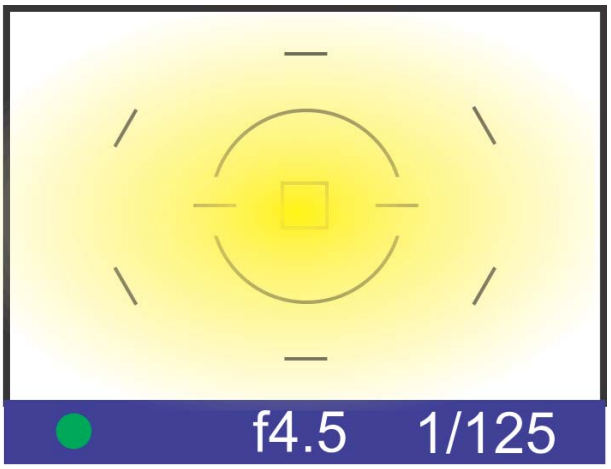
With the focus locked, the scene was recomposed and the photo taken.

The Camera's Light Meter

As mentioned in lesson one, all modern camera's incorporate a built-in light meter that reads the light entering the camera. The meter measures the light reflected off of objects and tells the camera's computer or assists the user in setting what it thinks is the proper exposure for a given situation. As promised, now we're going to discuss the different types of metering available in cameras and how they can help you make adjustments for various lighting conditions.

The following viewfinder simulations outline the most common metering setups and modes available to modern cameras.

Metering Types and Modes



Center-Weighted

Center-Weighted

This is probably the most common metering method available, and one of the only ones available for a long time.

Center-weighted metering averages the light over the entire photographic scene but places emphasis on the reflective values in the center area.

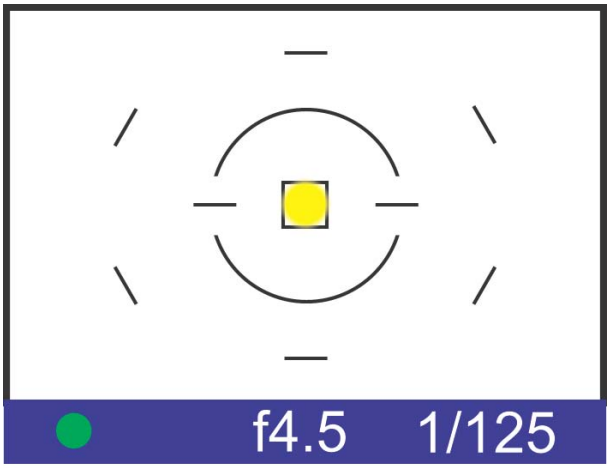
This is a good mode for general scenes especially when the main subject fills the screen. It does not work well on scenes where there is a lot of sky or other bright area off center.

Spot

This metering method meters the reflected light only in the center part of the scene, usually in an area defined by markings in the viewfinder.

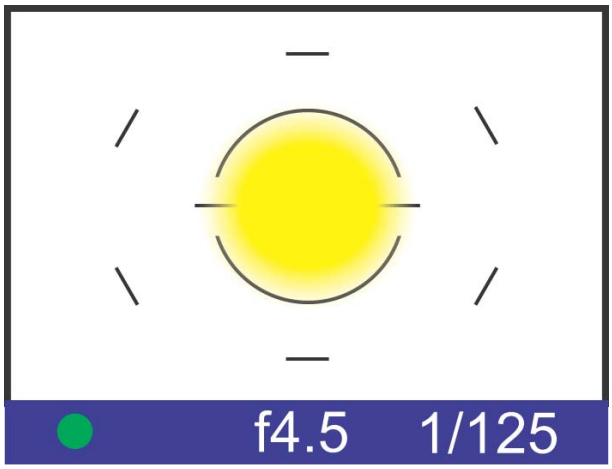
True spot metering measures only about 1% to about 4% of the image.

Spot metering provides precise metering of a specific object in your scene. This is very useful when there are big differences in brightness between scene elements or when taking macro photographs.



Spot

Metering Types and Modes - continued



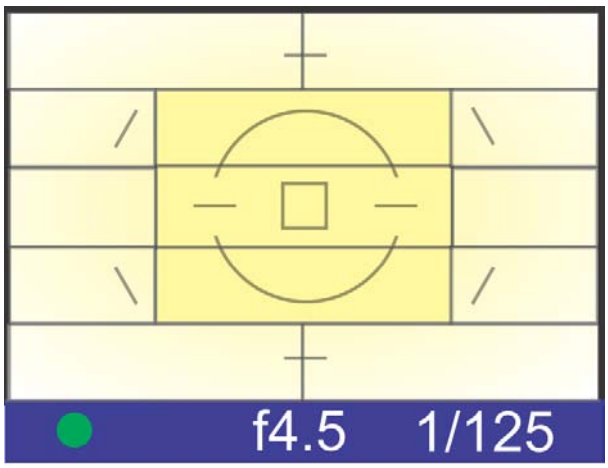
Partial

Partial

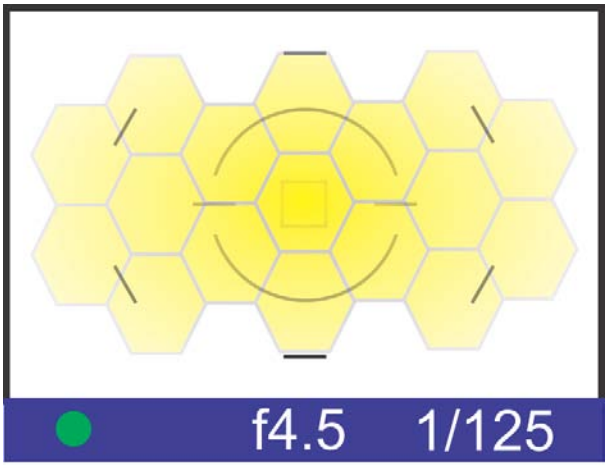
This metering method is like spot metering in that it meters the reflected light only in the center part of the scene. The metered area is also usually in defined by markings in the viewfinder.

Partial metering measures about 15% to about 10% of the image.

Partial metering provides metering of a specific objects in your scene but is not as precise as spot metering.



Multi-Zone/Matrix



Multi-Zone/Matrix

Multi-Zone/Multi-Point/Matrix

Multi-zone metering is the most sophisticated metering type. Most SLRs have some form of multi-zone metering. It calculates exposure by reading reflected light from multiple metering segments and comparing them. It may even take into account which autofocus point is used, the size of the main subject, distance and overall lighting. It is often programmed to compare the lighting with a database of lighting situations to help it determine the proper exposure.

For general, day to day photography, if your camera has multi-zone metering, it is probably the mode to use. Practice with your camera will help you to understand in what situations this metering mode (or any other for that matter) does not perform well. Your camera's instruction manual may explain your camera's metering options more fully and explain situations in which to use its various modes.

Knowing what metering mode to use takes practice and a knowledge of your particular camera. We will practice this in lesson five when we start to put all of our knowledge together in some practical exercises.

Lenses

The lens is the camera component through which light enters the camera. The lens focuses the light, magnifies the image and directs it toward the camera's media.

The amount of magnification of a lens is basically determined by its focal length. The focal length is the distance between internal elements of the lens. Think of it as different length telescopes. The longer the telescope, the more magnification that it will provide.

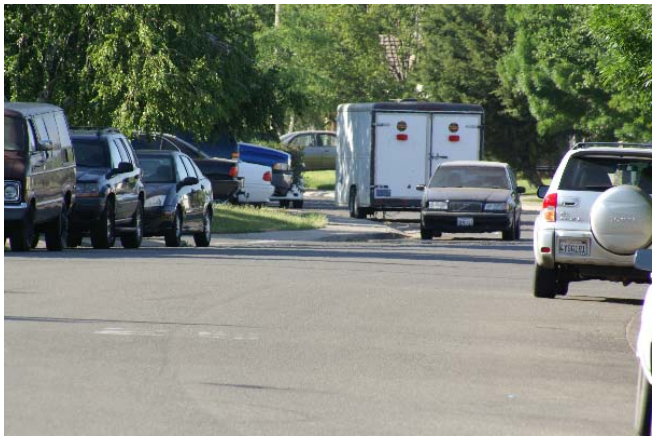
Lens focal length is expressed in millimeters. If you have a point and shoot camera with a built in zoom lens, your camera has multiple focal lengths all in one lens assembly. If you have an SLR with interchangeable lenses, you may have lenses of only one focal length (such as a 50mm or 135mm) or a zoom lens with multiple focal lengths (such as a 28-200mm). In the end, the view you see when using the lens is more important than the actual focal length. Repeated use of your camera will help you to determine what focal length works best for the photos that you are trying to take.

The image to the right was taken with a standard zoom lens set at **50mm**. It was shot from the exact same location. Notice the magnification and that you see less area in the scene.

The image to the right was taken with a telephoto zoom lens set at **400mm**. It was shot from the exact same location. The magnification is even more extreme and you see very little of the original scene.

These photos were taken from the same location using lenses set at different focal lengths. The image to the left was taken with a wide angle zoom set at **17mm**.

The image to the left was taken with a telephoto zoom lens set at **200mm**. It was shot from the exact same location. The magnification is more extreme and you see a lot less area in the scene.



A Word (or two) About Digital Zoom

If you have a point and shoot digital camera with a zoom lens, even an advanced one, you probably have a feature known as digital zoom. When using digital zoom, your camera is not actually changing the focal length of the lens. It is simply magnifying the center portion of the scene. This non-optical magnification process really degrades the quality of the resulting photograph.

I advise potential camera buyers to ignore any digital zoom specifications when shopping. If the camera has the ability to turn digital zoom off, I advise that also. The only time I would use the image-degrading digital zoom would be to capture that one time photograph that you would absolutely not be able to get any other way.

Optical Effects of Different Focal Length Lenses

You will find as you take photographs that different focal lengths have different optical effects. This is similar to the way that different apertures or shutter speeds affect your photographs.

Long focal length lenses have a shallower depth of field than shorter lenses. Longer lenses also tend to make objects look closer together depth-wise than they really are. This tends to flatten the perspective of the resulting photograph. You can end up with photos that look like the Eiffel Tower is growing out of the top of someone's head.

Taking photos of people close up with a wide angle lens (short focal length) can make their features look distorted and unnaturally large.

Take Photos!

Study what you have learned in lesson one and lesson two. Reread your camera manual and start taking photos. See what happens on your camera if you use the different settings that are available to you.

Next Lesson...

Exposure compensation

Fill flash

Composition