

F-stops and Shutter Speed

Aperture and shutter speed...how does it work?

This will give you some very basic information on how the aperture and shutter speed work together. The concept is fairly simple, however, as with everything, there are always some exceptions to the rules.

Aperture is the the f-stop - this is the opening in the camera's diaphragm that lets in the light; the setting you choose for this will tell the lens how much light to let in.

In the most simple terms, the higher the number for the f-stop, the less light is let in. To quote from one of my favourite instructors (Jodie Coston):

"When the aperture of a 200mm lens (focal length) is 50 mm (aperture opening) wide, your f-stop will be f/4, because the ratio of 200/50 equals four. If you "stop down" your aperture to half that size - 25 mm wide - your f-stop will be f/8. (Because its 200 divided by 25.) So the "f-number" gets larger as you let less light in."

f2.8 opens the iris to let in a lot of light, while f18 is a narrower opening and lets in much less light. Depending on the lens you are using and the camera, the "distance" between stops can differ quite a bit.

Most "kit lenses" (those that are sold as part of a package with many of the popular dslr models) only have a setting that might be f3.5 at it's widest. And though you might select that setting for lower light situations, you'll probably find that if you try to set a very highr shutter speed, the camera may not let you set the speed you want.

F-stops and shutter speeds work in conjunction with each other. The shutter speed is the setting that tells the camera how long to let the light hit the film (in the case of a digital camera it's the sensor, not film). A one second shutter speed will expose the image for a longer period of time than 1/60th of a second.

What you hope to achieve each time you shoot an image is a perfect exposure - one where the whites in the photo are white, but still contain detail (for instance a piece of white fabric with wrinkles should be white (not gray) but you should be able to see the details of the wrinkles), and where the dark areas in the photo are should be dark, not just black, but also show detail.

As a simple example of how these work together, take a photo using an fstop of f8 and a shutter speed of 1/125 of a second. (Note: these settings will be dependent on your lighting of course)

Now take the same photo using an fstop of f11 and a shutter speed of 1/125th. What happens to the photo? Without changing the shutter speed, changing the fstop to f11 will make the photo's exposure a darker.

Now change the shutter speed to 1/60th but keep the fstop at f11.

What happens? Most likely the image will have an exposure the same (or very close to the same) as the image you took at f8 and 1/125th.

While this is a fairly simplistic explanation of exposure and how it works, there is much more to how the camera's fstops and shutterspeeds work together, and of course the ISO setting will also have an effect on the image.

Depending on your focal distance, the changes in fstop will give you different depths of field and other changes in the

image.

Assignment

(Use of a tripod for this assignment would be best - choose an outdoor landscape to shoot this, and use an ISO of 100 if you have good light)

(1) Leave the aperture set at f8 and take series of photos using the following shutter speeds:

1/30
1/60
1/100
1/250
1/500

Note what happens with each change in shutter speed.

Follow the same exercise using a constant shutter speed of 1/125th and change only the fstops as follows:

f4.5
f8
f11
f16

(2) Set your camera on "auto" if you have that option and shoot the exact same scene. What settings did your camera select? Which of the images had the best exposure for the scene?

When you set your camera on auto, it will choose the fstop and shutter speed for you. Some cameras show this information in the viewfinder. Sometimes the auto setting can help you determine how to set your manual choices. Set the camera on auto and meter the scene (focus the camera and push the shutter button halfway down and note the settings the camera selected for the scene). Now take the photo and look at it...if you want a brighter photo set the camera to manual, set the shutter speed to what the camera chose on auto and set the fstop to allow slightly more light. If you want a darker photo, set the fstop to allow slightly less light.

As in all things the best learning tool is experience and practice.

For some really good tools and explanations on exposures, shutter speeds and f-stops (much better than I can provide for you) have a look at these websites:

<http://www.photonhead.com/simcam/>

<http://www.dofmaster.com/dofjs.html>

<http://www.dofmaster.com/custom.html>

<http://www.dofmaster.com/charts.html> (hyperfocal chart)

http://www.robert-barrett.com/photo/exposure_calculator.html

<http://www.fredparker.com/ultexp1.htm#EXPOSURE%20FACTOR%20RELATIONSHIP%20CHART%20B>

<http://www.dofmaster.com/hyperfocal.html>