Erasmus+

O-CITY PROJECT

Erasmus+	Project funded by: **Erasmus+ / Key Action 2 - Cooperation for innovation and the exchange of good practices, Knowledge Alliances.**

1. Lesson Content

Lesson 3 Topic Photography

Diaphragm, Shutter Speed, Sensitivity or ISO

In this lesson, we will learn how to use three new elements of the camera to correctly disseminate the values of the heritage element.

The ISO setting is one of three elements used to control exposure; the other two are aperture and shutter speed.

1. the diaphragm

1. the shutter speed

2. the sensitivity

Source: GarrettHughes

Depending on the decisions you make when configuring the aperture, the speed of shutter and ISO you will get one exposure or another. Aperture and speed directly affect the amount of light reaching the sensor:

- If you close the aperture, you reduce the size of the diaphragm through which the light on the lens, so the amount of light reaching the sensor is less.
- If you open the aperture, more light reaches the sensor.

Co-funded by the Erasmus+ programme of the European Union

- If the speed is faster (you reduce the exposure time), the amount of light that reaches the sensor is less.
- If the speed is slower (you increase the exposure time), more light reaches the sensor.

Changing the aperture, the ISO and the Shutter speed are affected as well. So to choose the right Aperture for your shot means to take into consideration the whole exposure triangle. For example: if you lower your f number a lot of light would be lost, so for the lighting to get back to normal you will have to increase you ISO sensitivity. On the other hand, if you lower your f number, you have more light entering your lense so your shutter speed or ISO should be readjusted in order to retrive your light sensitivity. If you open the diaphragm (f low), the amount of light entering the sensor will be greater, so the shutter speed must be higher (shorter exposure time of the photograph). Therefore, if you close the diaphragm (f high), you will have to lower the shutter speed to have a longer exposure time and for the necessary amount of light to enter the sensor.

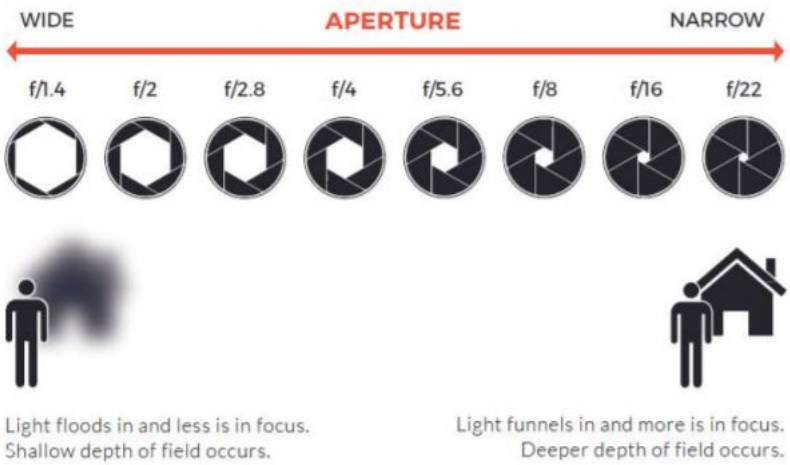
At the same time, the higher the ISO value, the more sensitive the sensor is to light. In other words, the more capacity the sensor has to capture that light. The lower the ISO, less ability of the sensor to capture light. Therefore, aperture, speed and ISO give you full control over the amount of light captured by the sensor and total control over the exposure of your photographs. You increase the exposure using large apertures, slow speeds (long exposures) and high ISO. On the contrary, you decrease the exposure with openings small, fast speeds (short exposure times) and low ISO.

DIAPHRAGM

The diaphragm is a part of the objective that limits the light entering the camera. The openness of the diaphragm is what is called the diaphragm opening and it is set to the f value, which stands for Focal Length. It opens or closes to allow light to enter as needed.

If we select a low f value, it means that we have opened the diaphragm and shorten the depth of field to obtain a selective focus of the planes again.

Co-funded by the Erasmus+ programme of the European Union



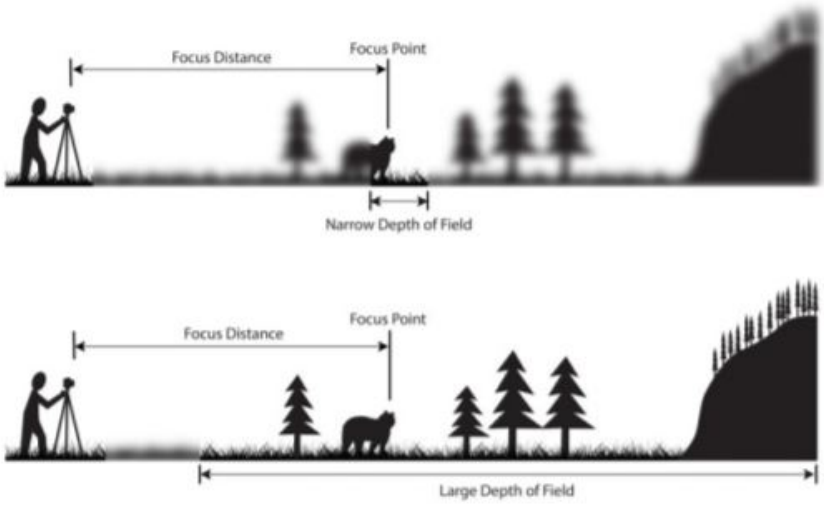
Source: CityAcademy

Aperture is part of the exposure triangle. The Aperture controls what is called Depth of Field. Next figure shows the relation between both: the larger the aperture the smaller the depth of field, so you get the brigthest picture but almost nothing is in focus.

The Depth of Field is the distance around a focus point that is sharp. It's the distance from the nearest object in focus to the furthest object in focus within your frame. When changing the objectives or the focus point, we will be constantly changing the depth of field. The wider the aperture, the shallower the Depth of Field. That means that not much area around the focus point will be sharp; and the smaller the aperture the larger depth of field, so a lot of distance around the focus point is sharp.

Co-funded by the Erasmus+ programme of the European Union

Source: PhotographyLife



Source: PhotographyLife

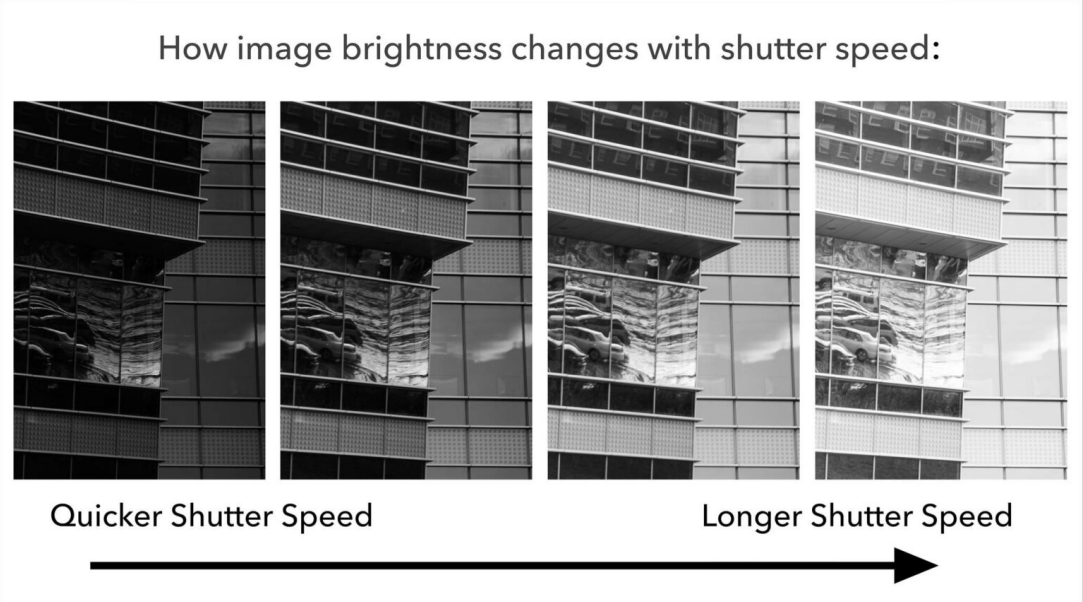
Co-funded by the Erasmus+ programme of the European Union

SHUTTER SPEED

The shutter is a curtain that opens at the time of shooting and limits the time that the light beam penetrates the camera and reaches the digital sensor. The time that the light is reaching the digital sensor is what is called exposure time.

Shutter speed is responsible for two particular things: changing the brightness of your photo and creating dramatic effects by either freezing action or blurring motion. Shutter speed is the length of time the camera shutter is open, exposing light onto the camera sensor. Essentially, it's how long your camera spends taking a photo. This has a few important effects on how your images will appear. When you use a long shutter speed (also known as a "slow" shutter speed), you end up exposing your sensor for a significant period of time. The first big effect of it is motion blur. If your shutter speed is long, moving subjects in your photo will appear blurred along the direction of motion. Shutter speeds are typically measured in fractions of a second when they are under a second. For example, 1/4 means a quarter of a second, while 1/250 means one-two-hundred-and-fiftieth of a second.

The other important effect of shutter speed is on exposure, which relates to the brightness of an image. If you use a long shutter speed, your camera sensor gathers a lot of light, and the resulting photo will be quite bright. By using a quick shutter speed, your camera sensor is only exposed to a small fraction of light, resulting in a darker photo.

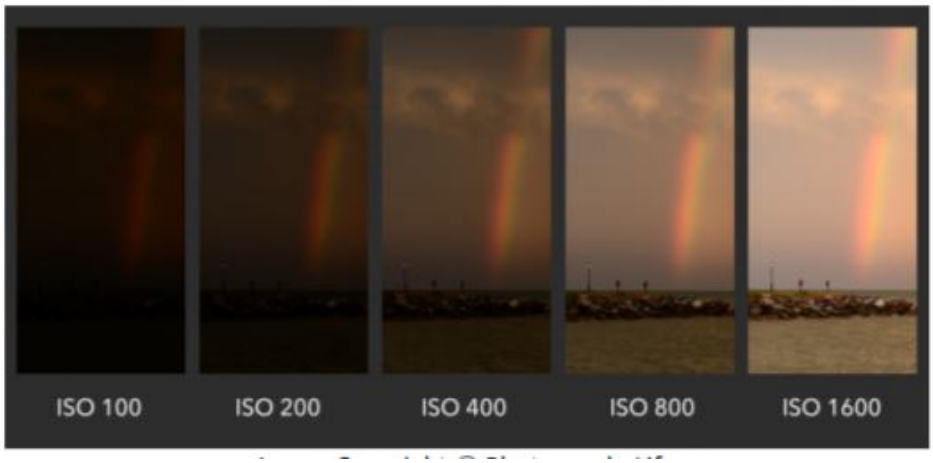


Source: PhotographyLife. https://photographylife.com/what-is-shutter-speed-in-photography

Co-funded by the Erasmus+ programme of the European Union

SENSITIVITY or ISO

For digital photography, ISO refers to the sensitivity—the signal gain—of the camera's sensor. Basically, ISO is a camera setting that allows you to brighten or darken your shots. As you get higher ISO numbers it progressively brightens your images. That's why ISO is a great tool to use, especially in dark environments, and allows you to be more flexible in shaping your shots through your choice in aperture and shutter speed. Camera sensors can work at different sensitivities. In this way, at greater sensitivity, they can capture more light. Sensitivity is one more parameter that you can set on your camera in every photo you shoot.



Source: PhotographyLife

You can get better results if you use the manual mode of your camera instead of the auto mode. In auto mode your camera takes the key decisions and although the result may be good, sometimes it can be frustrating. You have to change your ISO quickly in case you need to adjust it manually when shooting in low light conditions without tripod or flash.

Every camera sensor has a sensitivity range to deal with the amount of ligth coming in. The setting ISO adjusts how responsive your camera sensor is to ligth. So, when we adjust a low ISO value, the sensor is less responsitive to ligth and it requires more ligth to create a well-exposed photograph. During the daytime, you usually should use low ISO values because there is a lot of ligth and you want that light to have a nice soft touch to your sensor. However, in low-light conditions (shade, sunlight fading, dark areas, …), you should use higher ISO values to allow your camera sensor to accept more light.

Co-funded by the Erasmus+ programme of the European Union

Even in dim or dark environments, you still might be able to use a low ISO. For example, if you use lights to light your scene and open your aperture as much as necessary to let more light get into your camera.

High ISO has consequences. If your ISO value is too high, you'll get noise (a lot of grain in the image) and this can make them unusable. Due to the noise problems, brightening a photo only via ISO is always a compromise, you should also take into account shutter speed and aperture. In fact, you should really only raise it when absolutely nessesary, meaning when you can't change your exposure with shutter speed or aperture.

Finally

We must consider the automatic values in mobile phones, the resolution of the cameras, the zoom and the effects of filters that can be applied to provide more contrast to the image.

Conclusions

The exposure triangle helps us present an image of heritage that is not underexposed or overexposed.

Co-funded by the Erasmus+ programme of the European Union