Understand Camera Technology and Take Better Pictures

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The fundamental technology behind the camera has not changed since they were first invented. Removing artistic composition from the equation, a good photograph requires that the subject be in focus and that the exposure is correct. The principals of exposure have never changed, correct exposure requires a specific amount of light to fall on the "film."

There are three components that combine to create the exposure. The aperture or the "hole" in the lens that lets light through, the shutter speed – how long the hole is open and 3) the sensitivity (ISO) of the film – how much light is needed. To create any given exposure you can have multiple combinations of the three elements as long as they provide the same result. For example if perfect exposure is obtained with a specific aperture open for 1/30th of a second, doubling the aperture setting (letting in twice as much light) only needs half the time i.e. 1/60th. The table below shows examples using different combinations that lead to the same result. Note I have used illustrative numbers not true photographic values to keep the math simple.

Aperture	Speed	Sensitivity	A x S x S
8	15	100	12000
4	30	100	12000
2	60	100	12000
2	30	200	12000
2	15	400	12000
1	15	800	12000

The actual values used for aperture are known as f-stops. Each full stop halves/doubles the amount of light let through. The exact range of values available will depend on your lens, typical values might be f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22. Speed is expressed in seconds or fractions of a second and again as you double/half each value you change the exposure by one stop. Sensitivity is expressed as an ISO value with 100 as the typical base, each doubling of the ISO makes it twice as sensitive or needing half the amount of light. What do these different attributes do?

Aperture affects the depth of field or the depth of the area that will be in good focus. Large apertures have small DOF, great for those portraits where you want to blur the background. Landscapes usually need a very large DOF so everything is in focus (small aperture).

Speed is all about the ability to capture motion. For still life any shutter speed will work, even 5 minutes (with a tripod) would be fine as the subject doesn't move. To capture your child and freeze them in sharp focus at a sporting event will require a shutter speed of at least 1/500s.

Sensitivity lets you change how the film or sensor reacts to light, low ISOs need more light and high ISOs less. As we will see changing the ISO lets you take better shots in specific situations.

On a nice sunny day in perfectly lit conditions your camera will probably take great shots in its default auto mode. In less than perfect conditions or when you are looking for a specific result taking control of the exposure settings will allow you to get the best shots.

Even on a bright day when shooting indoors there is rarely enough light for standard auto exposures. The shutter speed will need to be much slower than you can hand hold without introducing shake or blur. Setting the ISO to 800 instead of 100 means you can now shoot 3 stops faster e.g. 1/60s instead of 1/8s. Great when you can't use a flash, say in an art gallery or museum.

If you want to take an outdoor portrait but the background is unattractive and would distract from the subject the auto setting would typically have a smaller aperture (due to the bright sunlight) and render the ugly background in focus. Set your camera to "aperture priority" mode (typically Av on the dial) and set the aperture as wide as you can (lower number e.g. 2.8). Focus on the eyes and hit the shutter button. Zooming in can also help to decrease the DOF. Setup right you will have a nice sharp portrait with a blurred background.

Understanding the fundamental technology of your camera, lets you take control when needed and get the results you want, not the ones the camera wants to give you - Happy shooting