Auto-ISO

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Auto-ISO is a setting that allows the camera to automatically adjust the sensor sensitivity for each photograph whenever there is insufficient light. Usually this isn't the default setting for the camera but when set up correctly this can give you more flexibility in exposure of your scenes while preserving image quality. When set up incorrectly, you may get excessive noise, maybe poor color rendition, and poor quality of enlargement.

Mechanics of Proper Exposure

Down to the basics: Proper exposure of a scene is obtained by adjusting the amount of light allowed through while the shutter is open, the amount of light coming through the iris of the lens (aperture), and how sensitive the sensor is to this light (ISO). These three things are dependent upon each other so there could be a large number of combinations that will give the right exposure. As a creative photographer, you alter each one to give the look that you want. Open up the aperture and make the shutter faster than you get the same exposure with less depth of field.

For this discussion, I'm talking about these modes: Program, Aperture, and Shutter Priority. The Auto or Green Mode is fully automatic and will override nearly all camera settings and basically makes the DSLR into an expensive point and shoot. This discussion will not apply to that mode but I'll touch on the disadvantage of the green mode near the end.

In photography, historically the ISO has been fixed throughout the roll of film whereas the aperture & shutter speed could be altered with each exposure based on the amount of light of the scene. Now with digital, all 3 can be altered with each frame in order to get proper exposure.

Here's some of the things to consider for exposure:

1. Shutter speed: consider if you want to prevent motion blur of the subject as well as prevent blur caused by low shutter speed.
2. Aperture: consider your need for a large or shallow depth of field based on your creative intent.
3. Sensor sensitivity: consider that a higher ISO setting will cause more noise than a lower setting. This is somewhat dependent upon the scene as noise shows up more in shadows, but generally speaking the rule is the higher ISO then the higher the noise level.

Why let the camera control the auto-ISO?

As you can see in the 3 points made above, the first 2 points affect your creative abilities with the camera whereas the last one dealing with sensor sensitivity generally just affects quality. So it makes sense to allow the last one to be automated as long as we put a limit on it to ensure that the photo will look good and enlarge well without problems.

Three reasons apply to my method of shooting with auto-ISO: (1) I get less bad exposures because auto-ISO can quickly compensate on the fly for low light or slower lenses and (2) On the average, my photos are made with a lower ISO than if I attempted to manually set it myself and this can allow for better photos and a bigger enlargement, and (3) I can sometimes use a much wider range of shutter speeds or aperture whenever I let the camera automatically run up the ISO to whatever maximum that I allow.

What is sensor noise?

Noise is the digital equivalent of grain, however digital noise has colors in it rather than being the monotone and relatively finer & even grain that you would get with, say, Fuji Neopan1600 film. Cameras have noise-reduction (NR) programs built into them however NR will cause loss of detail when the noise is removed and there will be a point when this is noticeable even though it is getting better and better. It is always best to use the lowest ISO possible while obtaining the shutter speed and aperture that you desire. Whereas film grain is sometimes used for artistic expressions, digital noise is most often just plain ugly.

What are you looking for when assessing the image for noise? There are 2 types of noise produced by digital cameras: chrominance noise and luminance noise. Luminance noise looks similar to film grain whereas chroma noise is basically color noise and is the ugly counterpart. If you shoot a variety of situations, you will get to know the ISO where chroma noise begins to look bad, either through excessive color noise itself or excessive noise reduction by the camera that will appear as smudging or smoothing of desired detail.

Here is an exaggerated example with chroma noise on the left and luminance noise on the right, so you can see that color or chroma noise is most often the limiting factor in ugliness and that luminance noise can most often be lived with up to a point because it is more film-like. (Note that this photo is an exaggerated example).

What ISO limit should you set?

As I said above, the main limiting factor to how how high you should set the auto-ISO limit is the noise level of your individual camera. Over the years, we've had continual improvement in high ISO performance but you still have to experiment with your camera

and you need to specify within the setup menu the highest allowed ISO based on which point that your image noise does not suit your eyes.

So, get to know your cameras but a starting maximum limit of ISO 800 is a good choice. Canon cameras and the new Nikon CMOS sensors (D90, D300) usually behave well at ISO 1600. Full frame camera (Canon 5D, Nikon D700, Nikon D3) can go much higher but the 5D does not allow auto-ISO in the conventional fashion. Remember, this extreme limit will only be used when the camera absolutely has to. By default, it will always use the lowest ISO that it can get by with.

Other important auto-ISO settings

The other important setting is the increments or steps of the ISO increase that is allowed. In the old days of film, we commonly had ISO speeds that were in increments of 1 stop that doubles the sensitivity at each jump: ISO 100, 200, 400, 800, 1600. I earlier said that Auto-ISO will allow you, on the average, to use lower ISO for your shots and this occurs because you can set up the camera to automatically jump the ISO in increments of 1/3 stop, 1/2 stop, or 1 full stop.

So, in the setup menu, see if you can set your camera to change the ISO in increments of 1/3 stop so that you are giving the camera the freedom to make very small adjustments instead of requiring a huge jump. If you were to set the ISO yourself, you wouldn't be able to guesstimate these small increases and would more likely just set the ISO to 800 at a low light birthday party when in fact something like 560 may work fine for your given shutter speed and aperture.

Some manufacturers don't use logic in their menu system and you'll have to look around. For instance with one of my cameras, the ISO increment setting is under the Custom Settings>Metering & Exposure whereas the Auto-ISO setting is under the Setup Menu. So, you may have to poke around for awhile to get both of these set correctly.

Nikon has an additional setting where you specify the lowest shutter speed allowed before the auto-ISO kicks in and this is plain dumb but you'll have to play along with it. The program-line should determine when to raise the ISO based on the lens focal length but Nikon doesn't allow this. Use a wide angle 10mm then the shutter speed can be very low before camera shake will blur the image. Use a 300mm telephoto, then the shutter speed must be much higher to prevent blur from camera shake. Pentax has had this right since 2003. So with Nikon, you will have to set a reasonable minimum shutter speed such as 1/30th and then adjust it from time to time based on your style of shooting. For sports, for instance, you may want to boost the ISO at a higher shutter speed so you can eliminate motion-blur.

Lastly, I'll give my opinion about Auto or Green Mode. The Auto or Green Mode (or fully automatic mode) that is found in some cameras is a wonderful thing but can be a barrier to learning all the ins and outs of your camera because it takes full control over most all aspects of the camera. Green mode usually uses auto-ISO and in many if not most

cameras, it will ignore your upper limit and in extreme situations might use an ISO higher than what you think will look good. In addition, many cameras will automatically pop the flash in green mode during times that you really don't want it to and I often see people slapping it back down while mumbling to themselves. It will usually also override your metering method, changing center weighted to matrix metering for example. You may also be accustomed to using center focus all the time and then switch to green mode where it could change to some sort of automatic zone focusing and all of a sudden it misses a focus point and you don't trust auto-focus any more. The point is that a DSLR user should get to know their camera and this requires consistency in the use of the controls and the Auto Green mode may stifle your education. Don't confuse this Auto Green Mode with Program Mode because Program usually allows a quick & easy override at the moment of composing the photo.

When not to use auto-ISO?

Common sense dictates when not to use it. If the camera is on the tripod and you're shooting landscapes in dim light, then auto-ISO may not be needed. Everything is stationary and stabilized and you are after the lowest noise possible and can use long shutter speeds. If you are doing night exposures, auto-ISO is not desired because the point is to use long exposures with low noise. Studio portraiture work with lights and strobes would be another example when not to use it. In my shooting, I rarely turn it off because if there is enough light then the camera will default to the lowest ISO possible and usually the setting that I most worry with is the aperture and how it affects depth of field. If you shoot sports, you will worry more with shutter speed than I do. In either case, Auto-ISO will help us out by supporting the aperture or shutter speed that we are asking for.

Wrap-up

If this is new to you, I hope you've found some encouragement to dive into the setup menu and turn on the Auto-ISO while setting the proper limits. Hopefully, anyone using the Auto or Green Mode will be encouraged to change to the Program Mode where they can begin to take control of aspects of exposure. Setting up Auto-ISO is the first step in making the Program Mode into something flexible. The next step is learning EV compensation and program shift, both of which makes manual mode to not hardly be worth it. We can talk more on that later.