

Aperture-Priority

Does it deserve to be so popular?

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The sophisticated camera you use offers several exposure modes to suit a wide variety of circumstances. These include shutter-priority, program, aperture-priority, manual, bulb, and perhaps some with descriptive names, such as the sports or wildflower mode. Most serious photographers primarily use a combination of the first four listed above. In my informal surveys, and from what I read in books and magazines, it appears aperture-priority may be the most popular exposure program among serious photographers. But, does aperture-priority deserve such tremendous popularity?

Clearly, any exposure mode can achieve super results in the hands of a photographer that really understands what they are doing and pays constant attention to detail. There is no wrong answer, but, there likely is a “more logical” answer. I strive to shoot pleasing images consistently, easily, precisely, and quickly. I do wish to emphasize precision and speed together. Precise exposures are necessary to capture high-quality images. Often it must be done quickly because subjects come and go rapidly. Even if the subject is a landscape, spectacular light can be fleeting and disappear in literally a few seconds. Being able to work quickly to capture fine images is crucial at times.

Metering Patterns

Before discussing metering modes, let’s choose the metering pattern. Your camera may offer three or four of them. The common ones include matrix (called multi-segmented by some and “Evaluative” by Canon), spot, and center-weighted averaging. The center-weighted averaging meter measures light primarily in the center of the image, but does consider the edges a bit, and makes an exposure suggestion. Spot metering measures light from only a small portion of the image, sometimes only 2% to 3%. When I shot slide from 1972 to 2003, spot-metering was my favorite metering pattern by far. Today, there is little need for spot-metering. Matrix or multi-segmented metering is a very sophisticated metering pattern that considers all portions of the image. It tends to be the most accurate metering pattern (it gets you close in more situations, but not necessarily optimum) if you use any automatic metering mode (program) or semi-automatic mode such as aperture-priority or shutter-priority. Where spot-metering was once my favorite, I no longer use it because I have the histogram and highlight alert to guide me (and so do you) in determining a superb digital exposure. Therefore, matrix metering is highly recommended. Indeed, most skilled nature photographers preach the use of matrix metering for nearly all digital photography. I agree with this advice and never use spot-metering any more.



Figure 1 - Matrix metering is a useful choice for photographing the bull elk in Jasper National Park. Everything is close to middle-tonality or just a little brighter - light tan fur and grass - so perhaps a little + EV is needed to expose to the right.

Program Metering

This metering mode sets both the f/stop and the shutter speed automatically. It takes into consideration the focal length being used and other factors to provide a suitable result much of the time. This is a fully automatic mode because it does everything for you. However, you can adjust the f/stop and shutter speed exposure combination the camera sets, providing some control to you. One problem with program metering is it doesn't know you are (hopefully) shooting on a tripod, bean bag, or other stable shooting platform. It thinks you are hand-holding. This means it may select a shutter speed much faster than you really need for capturing a sharp image, resulting in less depth-of-field as a result, or perhaps a higher and noisier ISO than necessary.

Aperture-Priority

This is probably the most popular metering mode among serious photographers. Aperture-priority does exactly what it sounds like it should do. You choose the aperture and the camera varies the shutter speed to suit various photo situations. The aperture doesn't change because the camera gives priority to the aperture you manually set, and the shutter speed changes automatically to produce a standard exposure. Although this exposure mode is usually called an automatic mode, it really is semi-automatic. You manually set the aperture you wish to use, then the camera automatically sets the shutter speed to provide you with a standard exposure, unless the EC (exposure compensation) is set. Aperture-priority lets the photographer set the depth-of-field they prefer via the f/stop. For example, in landscape

photography, getting both the foreground and the background sharp is desirable. Therefore, the photographer sets f/16 to f/22 to capture plenty of depth-of-field. Then the camera adjusts the shutter speed to arrive at the recommended exposure. This “recommended” exposure may be excellent or not, depending on some variables such as subject reflectance and contrast in the light. If the exposure isn’t what you are looking for, then use the Exposure Compensation control (EC) for natural light, (not the Flash Exposure Compensation control (FEC), and adjust it to get a fine exposure. Normally, an excellent exposure for a RAW image is one where the rightmost data is just touching the right wall of the histogram. If shooting JPEGs, then you often want to approach, but not touch the right wall of the histogram. Note: as of 2015, I have been setting the exposure to produce the first flashing highlights in the Canon Raw files I shoot. Flashing highlights and the histogram that appear in the camera are both based on a small built-in JPEG in the Raw file. The camera processes the JPEG per default parameters, or those you may have adjusted with camera choices. Invariably this internal camera processing produces subsequent histograms and highlight alerts that suggest overexposed highlights before they are overexposed.

Shutter-Priority

This may be the most popular exposure mode for sports photographers because shutter speed is usually far more important than depth-of-field for most of their images. They either want to freeze motion or use a slower shutter speed to emphasize motion. Many nature photographers rarely use shutter-priority, to the detriment of their images. Shutter-priority is often enormously useful to wildlife photographers because capturing action and obtaining sharp images with long lenses is often shutter speed critical. As the name suggests, the photographer chooses the desired shutter speed and the aperture changes as the light varies. The shutter speed is locked and the aperture fluctuates. Once again, this is really a semi-automatic exposure mode as the shutter speed is first manually set by the photographer, and then the camera automatically chooses the aperture to produce a standard exposure. And once again the exposure can be automatically adjusted with the (EC) exposure compensation. For example, if the camera sets f/8 when the photographer has already set the shutter speed to 1/1000 second, changing the camera’s EC from 0 to +1 will force the camera to open-up the aperture to f/5.6.



Figure 2 - Shutter-priority is effective for this black-tailed prairie dog at Theodore Roosevelt National Park. Once the proper EV adjustment is made, shutter priority maintains the fast shutter speed needed with my 800mm lens.

Problems with Automatic and Semi-Automatic Exposure Modes

As already mentioned, all of these exposure modes create exposure problems that you need to know about. Knowledge is power, so let's explore them.

1. The Light through the Viewfinder Problem

Depth-of-field is limited in macro photography due to high magnification. As magnification increases, depth-of-field decreases. Setting aperture-priority seems sensible because the f/stop is critical for obtaining adequate depth-of-field. Perhaps that is why so many landscape and macro photographers use aperture-priority. It makes perfect sense—doesn't it? Using aperture-priority does seem rational at first. However, it creates exposure problems that make it far less useful. Macro photography usually requires the use of special "macro or micro" lenses that lose light when you focus closer. Light-absorbing polarizing filters are frequently used in landscape photography. Both of these factors tend to increase the "stray light through the viewfinder" problem. When using any automatic exposure mode, the camera monitors the light and automatically adjusts the exposure for the light the meter "sees". In other words, aperture-priority does give priority to the aperture and the shutter speed adjusts without any input from you. This means if the amount of light that is reflected from the subject and passes through the lens is relatively weak, and plenty of available light is present above the uncovered viewfinder, this light enters the viewfinder and the exposure meter measures it, too. This problem seems to be only significant when your eye isn't looking through the viewfinder which is typical when you are shooting on a tripod. Perhaps your camera offers a switch to cover up the viewfinder or a plastic cover (that you can never find) that can be attached to the viewfinder to seal it. Maybe there is even a short, usually obscure, sentence in your camera manual mentioning this problem.

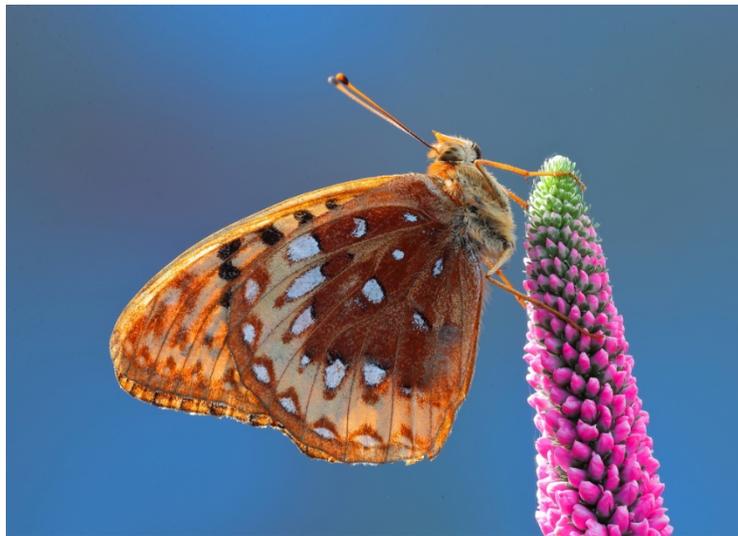


Figure 3 - To avoid the light through the viewfinder that is especially prevalent in close-up photography, always use manual exposure. Then you don't have to cover the viewfinder! This is a great-spangled fritillary.

For example, in my Canon 5D Mark III manual on page 185, it says, "When you use the self-timer or shoot bulb exposures and do not look through the viewfinder, stray light entering the viewfinder can

cause the image to come out dark. To prevent this, use the eyepiece cover attached to the camera strap.”

I have long ago lost the eyepiece cover which was inconvenient to attach to the camera’s viewfinder anyway and I don’t use camera straps so I don’t have a convenient place to carry the cover. So that method of circumventing the problem is worthless to me.

If you don’t cover the viewfinder when your eye isn’t blocking it, you may suffer from underexposure problems. If the meter measures the light passing through both the lens and the viewfinder, it assumes a certain amount of light is present and sets the exposure. Of course, when you shoot the image, the mirror flips up and blocks off the viewfinder, causing underexposure because none of that light strikes the photosites of the sensor. Of course, you wouldn’t want it to anyway as light through the viewfinder isn’t focused. Solving the problem is simple enough. Every time you shoot an image on the tripod when your eye isn’t blocking the viewfinder, use the plastic viewfinder cover or flip the switch to seal it off with a built-in viewfinder curtain if your camera provides it. Shoot the image, check the histogram to see if any exposure compensation is needed, and shoot again if it is. Once you capture a super exposure, uncover the viewfinder and start again with another image. If you don’t have a switch or cover to shield the viewfinder, then hold your hand in front of the viewfinder to block the light, don’t touch the camera to prevent jarring it, and shoot the image. Of course, you have to remember to flip the switch or use your hand to block the viewfinder every time. In a photo rich environment, this means you must do this same tedious “block the viewfinder” nonsense hundreds of times. Surely you don’t want to work that way! It is terribly inefficient and truly a dreadful way to photograph. If you instead use manual exposure, then you don’t have to worry about this problem.

Oddly enough, the light through the viewfinder problem is largely omitted in the vast majority of instructional photography books and magazine articles. I read a lot, and outside of camera manuals, I have only seen one reference to it. Then the author dismisses the problem because he doesn’t see where it happens very often. Of course, this author did primarily hand-held street photography and studio flash photography, both places where his eye is blocking the viewfinder or the dim ambient light in the studio room is irrelevant compared to the output from the flash. I find light passing into the viewfinder is a serious problem in my landscape and macro photography most of the time.

The light through the viewfinder problem occurs most often when you are doing macro photography and using polarizers in landscape photography or using teleconverters. Most macro devices and lenses tend to reduce the amount of light passing through the lens. Polarizers, of course, absorb about two stops of light. If you are shooting into a dark area and relatively bright available light is present above the uncovered viewfinder, the meter will likely let this light influence it and underexpose the image. To see the problem, run this simple test. Put a polarizer on any lens and point the lens down at a shaded area. Make sure the camera is in bright sun. With the camera set to program, aperture-priority, or shutter-priority, notice the exposure the camera sets. Now cover the viewfinder with your hand and see if the camera changes the exposure. If you are using aperture-priority and the camera shows f/16 at 1/60 second with the viewfinder uncovered, but changes the shutter speed to 1/15 second when you cover the viewfinder, the camera is underexposing the image when the viewfinder is uncovered by two stops of light. The reason the camera selects 1/60 second is due to the stray light passing into the open viewfinder. However, the light through the viewfinder problem seldom happens if you are photographing in the shade and shooting toward a more brightly illuminated area.

Just for fun, I set up a worst case scenario to see how bad the light through the viewfinder problem could be. I took a Canon 100mm macro and focused it out to life-size (1x) magnification. I put a polarizer on the lens and 50mm of extension tubes behind the lens and then added a 2x teleconverter. I pointed the lens at dark wood in the shade while bright sun was shining on the uncovered viewfinder. I managed to get the aperture-priority exposure mode to underexpose the image by several stops this way. To be fair, both program and shutter-priority have the same problem, but not manual exposure. With manual exposure, you could look through the viewfinder and use the exposure scale inside the viewfinder to arrive at a starting point. Shoot the image, check the histogram, adjust the exposure as need be, and shoot a fine exposure. The viewfinder does not need to be covered when you are shooting good exposures. The exposure scale indicator will react to the light penetrating the viewfinder, but since you are using manual exposure, the camera cannot automatically change the aperture or shutter speed without your permission. Do make sure you don't have auto ISO set (more later about this) when you do this, though.

2. The Zooming Problem

The vast majority of photographers primarily use zoom lenses today. That's a good choice. Modern zoom lenses easily produce high-quality sharp images with plenty of contrast and color saturation while offering the convenience of letting you change the focal length easily and quickly. However, changing the image by zooming in on the subject or zooming out greatly affects the exposure, even though the available light hasn't changed at all.

For example, I love photographing and going up to Two Top Mountain near West Yellowstone when conditions are perfect for the "ghost" trees that are encased in snow at the peak. I snowmobile to Two Top Mountain on the first sunny day because I want sun and blue sky to isolate the ghostly white trees against this sky background. A clear night at Yellowstone during February means it is cold, well into negative territory. However, I start slowly and plan to arrive at the peak of Two Top Mountain around 9:00 a.m. when the temperature has risen to a "balmy" zero degrees—hopefully. By now the morning sun is about as bright as it will get and that will remain true for several hours, unless clouds move in.



Figure 4 - Zooming the lens can drastically change the exposure when using any exposure mode except manual. If you zoom the lens to be less tight, and the meter "sees" more dark water, the meter will add light to the exposure and the whitest water is overexposed.

Many photographers prefer to use aperture-priority for landscape images because depth-of-field is crucial. But, when photographing any subject that is primarily made up of all light tones, or all dark tones, zooming the lens to change the composition while using an automatic exposure mode causes plenty of exposure problems. Imagine photographing the snow-encased trees where the white snow fills 75% of the image and blue sky occupies the remaining 25%. The odds are, if you are using matrix metering and aperture-priority, the camera will automatically underexpose the image because it tries to average all of the brightness levels the meter “sees”. To average out the exposure to a middle 18% gray, the camera must reduce the exposure. Your camera maker knows subjects that are primarily light or dark cause exposure problems, so they give you an exposure compensation control that lets you darken, or in this case, lighten the exposure. For sake of argument, let’s say setting the exposure compensation to +1 stop properly exposes the image. Now the right-most histogram data which represents the brightest highlights in the snow is snuggled up to the right wall of the histogram and the highlight alert isn’t showing any “blinkies,” or perhaps just a few. Now you and your future viewers are happy you have determined the optimum exposure. However, what happens if you zoom the lens to make the “ghost trees” less dominate in the image? Perhaps the trees now fill only 50% of the image and the sky fills 50%, too. What happens to the aperture-priority determined exposure? Now that the meter “sees” more dark blue sky tones and less white, the camera increases the exposure a bit by slowing the shutter speed down. If the camera does this, what happens to the white highlights? The ambient light from the sun has remained the same, but a lighter exposure will overexpose the brightest patches of white snow for sure and maybe quite a bit more. Once again, this is easily corrected with the exposure compensation control, but it does take time. It is possible on many cameras to lock the exposure for a period of time. My camera offers an AE lock button that locks the exposure for a whopping 6 seconds, making this feature useless most of the time. There isn’t nearly enough time to zoom the lens, recompose by adjusting the tripod head, and then tripping the shutter. So the AE lock button doesn’t help. However, if you continue to press the AE lock button in, you can lock the exposure for as long as you want to. But, you don’t want to be touching the camera when shooting landscapes on a tripod to avoid jarring the camera during the exposure.

Once again, manual metering is best. I use Canon cameras, but other camera makes offer similar methods. I set f/16 to achieve plenty of depth-of-field without suffering too much diffraction that happens at smaller apertures and causes a loss of sharpness. While looking through the viewfinder, I manually set the shutter speed until the exposure indicator in the viewfinder aligns to the +1 position on the scale. I shoot a quick shot to get the histogram and activate the highlight alert. I immediately look at the right-most data and adjust the shutter speed a bit more (if necessary) until the right-most data touches the right wall of the histogram. When I arrive at the optimum exposure, I carefully compose and focus the image on the tripod and shoot away. If the amount of available light created by the bright sun doesn’t change, I continue to enjoy accurate exposures no matter what percentage of the image is occupied by white and blue tones. Let me repeat that statement slightly differently. Once the exposure is determined manually for one composition, the exposure will remain optimum for all other compositions as long as the ambient light level doesn’t change, and you don’t do anything to the optical path, such as add a light-absorbing polarizer. Naturally, I monitor the histogram and now primarily use the highlight alert every few shots as I shoot. It really is an efficient and high quality way to work.

Things have been changing in photography at a furious pace. Today, I would not use f/16 with manual exposure to photograph the snow ghost trees. Instead, I would still use manual exposure, but use f/8 because it is a super-sharp aperture and focus stack my way through the trees! I would combine all the images in the set with Helicon Focus.

3. Changing the Size of the Subject in the Image

Of course, it is easy to change the size of the subject in the image, even with a prime 500mm lens. Suppose you are photographing a white morph red-footed booby in the Galapagos Islands. If the white booby is surrounded by dark green leaves and it occupies only 33% of the image, some of the white feathers may be overexposed. With aperture-priority and the aperture set to $f/11$, the preponderance of dark tones in the green leaves might make the camera give too much light. Therefore, with the exposure compensation dial set to zero, shoot a quick shot and check the histogram. If there is a little overexposure, set some minus compensation, perhaps $-2/3$ stop. Let's say this produces the optimum exposure. With that image captured, you move closer to the bird with the 500mm lens and fill the image with 70%, instead of 33%, mostly white bird and the rest is darker green leaves. Now the meter "sees" more light tones. The meter automatically reduces the exposure still more and now the image is seriously underexposed. If you had been using manual exposure, once the optimum exposure is set, you maintain it no matter what percentage of light tones make up the image, assuming of course the available light is constant and you haven't added anything to the optical path that reduces the light such as an extension tube, polarizer, or teleconverter.



Figure 5 - An ideal exposure for this creek near Autrain Falls. Filling the image with more water or less is no problem for manual exposure, but would force you to steadily change the EV with any auto exposure mode.

4. When the Subject Changes its Size before your Eyes!

Is it possible to have a subject change its size from shot to shot? Most don't, but waves certainly do! Early in my digital career (2004), I tried using aperture-priority for photographing a wave crashing into the orange rocks along the shoreline of Pictured Rocks National Lakeshore. Setting $f/16$ for depth-of-field, I used $+1/3$ exposure compensation to expose to the right without clipping on the right side of the histogram. This worked perfectly when the wave filled one-third of the image. However, when a more spectacular wave hit the rock and filled two-thirds of the image, the picture became seriously underexposed. I quickly realized the error of my ways and returned to manual exposure. Once the optimum exposure is set manually, it did not matter how much of the image is occupied by the white wave.

5. Focus Stacking

Focus stacking is a relatively new technique where a series of images can be shot at slightly different focused spots in the image. This “stack” of images is processed with focus stacking software—Photoshop, Zerene Stacker, Helicon Focus—and the images are combined into a single incredibly sharp image. Since the depth of field is being captured with the stack of images, there is no need to favor the use of small apertures such as $f/22$ or $f/32$. Using these small apertures is a key reason why so many use aperture-priority. Now that you can capture incredible depth of field at $f/8$ to $f/11$ —the sharpest apertures on your lens—there is little reason to stop way down anyway. Focus stacking software works best if the exposures from one image to the next do not change. Once again, manual exposure is the best way to go.



Figure 6 - Seven images were shot using $f/8$ and the focus distance was manually changed for each one. This "stack" of images was combined with Helicon Focus software. When focus stacking, keep the same exposure for each image in the stack. Manual exposure does this best.

6. The Flash Problem

Several years ago, the photo group I was leading was making portraits of the Masai people at their village. Unfortunately, the sun shined brightly when we arrived. When the group photographed the dark-skinned Masai people in the high-contrast sunlight, the shadows were unattractive and missing detail. Their ambient light exposure might have been $1/800$ second at $f/11$ and they used aperture-priority. I suggested they add a flash to the exposure by either adding a flash to the hot shoe or using the built-in pop-up flash to add light to the dense shadows in the faces. When they tried this, the portraits immediately became overexposed, even though they set their flash exposure compensation to -1.3 stops. Why the overexposure? Why did the weak fill-flash overexpose the faces? It didn't! The overexposure resulted from the use of aperture-priority. As soon as the camera detected a flash was in use, the camera automatically defaulted to the sync speed for the camera—perhaps $1/200$ or $1/250$ second—and the aperture remained the same because, of course, aperture-priority gives priority to the chosen aperture. The overexposure is from too much ambient light on the subject caused by the slower

shutter speed selected by the camera, not the flash. The difference between 1/800 second and 1/200 second shutter speed is two stops of light which means the natural light was now two stops too bright.

To solve this problem, you could use manual exposure and be sure to set the shutter speed to the sync speed for flash. You could use shutter-priority and again set the flash sync speed, or you could set the flash to “high-speed sync” which allows the flash to work properly at any shutter speed.



Figure 7 - Use manual exposure to keep the same ambient light exposure for Michigan's Scott falls. This is especially true when flash is also used to light the wall behind the waterfalls.

The Problem with Automation

Although I admit I am primarily picking on (okay not dazzled) by aperture-priority in this discussion, all fully automatic and semi-automatic exposure modes have the same problem, including shutter-priority and program. All of these exposure modes can automatically change the exposure without your permission. Manual exposure locks the exposure and does not let the camera change it. You have to do it by turning a dial to change the aperture and shutter speed.

7. Panoramics

This is another place where manual exposure is the preferred way to work. You don't want to shoot a pan where the exposure varies over two or more images and stitch them together later. Especially in a wide panorama, it is quite possible for an automatic exposure mode to change the exposure as you shoot the series as one side of the scene might have more light or dark tones than the other. This creates a sky where the exposure varies from one side to the other, which is difficult to correct with software. It is best to use manual exposure that correctly exposes the lightest object in the scene that you wish to preserve detail, and use this exposure for every image in the series.

8. Mixing Flash with Natural Light

I combine flash with natural light frequently. Sometimes I use flash as the fill light. At other times, I use flash as the main light and relegate natural light to fill light status. Using one or more flashes adds a bit of a “fuss factor” as there are more buttons to push, and I usually hold the flash with one hand. Then I use the other hand to trip the shutter. And I don’t have a third hand to cover the camera’s viewfinder when mounted on a tripod. Again, manual metering for the natural light is easily best when using flash. In the case of the flash, I normally use automatic flash and the dedicated flash Exposure Compensation Control (FEC) to achieve the flash output I am looking for. Lately, though, I have been using more manual flash for landscape images. (All of this will be fully described in the Outdoor Flash Photography book that will be published later this summer in 2017.)

In no way do I feel aperture-priority can’t be utilized. Sometimes I handhold my macro lens to chase wary subjects around. I use flash as the main light which helps to capture a sharp image with the short flash durations used. If the macro lens has image-stabilization, then turn it on. Since I am blocking the viewfinder with my face when shooting handheld, the light through the viewfinder problem goes away. I need depth of field in most close-up shooting, so I set aperture-priority and f/18. This allows the shutter speed to vary to accommodate various light conditions and equipment factors. In this case, combining image-stabilization, flash as the main light, and aperture-priority is certainly effective when there is no way to use a tripod.

9. Flash Only

Manual exposure is best when flash is the only light source that will illuminate the subject. Whether it is a chipmunk looking out of a hole in a log or the hummingbirds I photograph with four flashes at once, the camera must be set to manual exposure. If any automatic or semi-automatic exposure mode is used, the camera will try to expose the subject with natural light, even though the flashes are properly exposing the subject. In the case of hummingbirds that are photographed under the porch to keep the natural light dim to avoid ghosting, the camera will slow the shutter speed down too much if it is set to aperture-priority. If you used shutter-priority and set it to the sync speed for flash—perhaps 1/200 second—the aperture would open up far too much.



Figure 8 - Always use manual exposure any time flash is being used as the only light source. Four Canon 600EX-RT speedlights set to 1/32 power on manual are the only light source. Any auto metering mode would try to light the hummingbird with ambient light, and the bird would blur.

10. Stars

I love photographing landscapes against a sky full of stars. Once again, manual exposure is by far the best exposure mode to use. If you use any auto or semi-auto exposure mode, the stars will be wildly overexposed because the metering modes try to average out a lot of black areas in the night sky. If you could herd all of the stars in the image into a single corner of the image, you would have a bright area that could cause underexposure with auto exposure modes. However, most of the image remains mostly black which tends to overexpose the stars. Of course, I don't really meter with the manual exposure mode either. Exposing stars is a matter of knowing what exposure to set and it is quite predictable -- actually easy! I have a mission for you. Compose a night scene with a plenty of stars in the background. Set the exposure to ISO 3200, f/2.8, and 20 seconds and you will surely capture a starry night sky if there aren't too many clouds and light pollution from cities isn't a problem. Be sure to do this within plus or minus 5 days of the new moon night when light from the moon is minimal. Even exposing the full moon isn't a matter of metering. Use what is called the Mooney 11 rule. To capture a well-exposed image of the moon, set the exposure to $1/\text{ISO}$ at f/11 or any equivalent exposure settings. If using ISO 400, plugging 400 into the equation gives $1/400$ second at f/11 which is equivalent to $1/800$ at f/8, $1/1600$ at f/5.6, and $1/200$ at f/16.



Figure 9 – Never use any autoexposure mode when photographing stars or the moon to avoid overexposing either. With both the stars and the moon, set the known ideal exposure. Try ISO 3200 at f/2.8 at 20 seconds for the stars on a dark night. For the moon, try the $1/\text{ISO}$ at f/11 and go from there.

Unsharp Wildlife Images

I have been fortunate to lead about forty photo tours to East Africa. Many of the clients were aperture-priority shooters when they arrive. Since the wildlife photo opportunities in Kenya are often fast, incredible, and fleeting, automatic exposure modes are best. However, there is a huge problem with aperture-priority. Here's the problem. Clients start out in the afternoon using aperture-priority. They set ISO 200, f/8 and the camera selects the shutter speed which is, perhaps, $1/500$ second. This is plenty

of shutter speed for capturing sharp images on a bean bag with a 300/4 lens. F/8 gives adequate depth-of-field for single animals and the ISO 200 choice delivers good images with low noise. All is well for the first hour. Then the clouds roll in making the available light drop by three stops. The camera must give “priority” to the chosen f/8 aperture, forcing the shutter speed to change to 1/60 second. That shutter speed is a bit slow for a 300mm lens on a bean bag, even with image-stabilization turned on, but it is possible to continue to shoot sharp images if you have superb technique. However, as evening approaches, another two stops are lost. This forces the shutter speed to drop to 1/15 second. Then a leopard is suddenly spotted on a horizontal branch only 25 yards from the safari vehicle. Everyone shoots quickly to capture as many images as possible before the leopard leaps off of its perch and disappears. Everyone is elated as they quickly look at the well-exposed images on their camera monitor. Only when they edit their images on the computer do they notice nothing is sharp. They then realize they failed to capture any worthwhile images. Did they miss focus? No. They allowed the shutter speed to become too slow. You just aren’t going to get sharp images shooting a 300mm lens on a bean bag with 1/15 second at f/8. They needed more shutter speed. Unfortunately, most forget this simple fact and failed to open up the lens to the maximum aperture of f/4.0 to gain two shutter speeds. Had they also selected ISO 800, they would get two more shutter speeds for a gain of four shutter speeds. Had they done this, they could have been shooting at f/4.0, ISO 800, and a shutter speed of 1/250 second and their gorgeous leopard images would be sharp.

Shutter-priority is a Better Answer

All of us, no matter how learned and experienced, can forget stuff, especially at critical times. An excellent tactic is to use the camera in a way where you don’t have to remember too much stuff. If you feel confident you can shoot consistently sharp images with a 300mm lens on a bean bag at 1/250 second, why not lock that shutter speed in? How do you do it? Easy! Set the camera to shutter-priority and set the shutter speed to 1/250 second. Now the camera maintains that shutter speed and the aperture varies with changing light conditions. In the above example, using ISO 200, the aperture would start out at f/11. If you really want to use f/8 depth-of-field, then increase the shutter speed to 1/500 second when the light is bright, or lower the ISO to ISO 100. However, let’s suppose you kept the shutter speed at 1/250 second. When the cloud cover rolls in and the light drops by three stops, the aperture changes from f/11 to f/4, the maximum aperture on the lens. As sunset approaches, the light drops another stop. Is there a problem? You bet! The images are now one stop underexposed because the lens cannot open up to f/2.8, since the maximum aperture is f/4.0. The images look dark on the camera’s LCD display and the rightmost data pulls away from the right wall of the histogram. If the available light drops another stop, everything gets worse as the exposure darkens. Of course, you might remember to lower the shutter speed to perhaps 1/125 second, and hopefully increase the ISO to ISO 800, but you have to remember to do that. Any of us can forget—especially when exciting things are happening quickly. Is there an automatic way to deal with dim light levels? You bet!

Auto ISO and Shutter-priority

This powerful technique is widely used by sports photographers, but remains largely unknown among the nature photography community. This sad fact has got to change, so learn it, use it, and share this tip! I know of no better way to handle the problem of photographing wildlife with long lenses under dimming light. It is incredibly effective and gets many tour members great leopard and other images during the Kenya photo safaris.



Figure 10 – The combination of auto ISO and shutter priority is effective for this sora rail in changeable light.

Here's how it works. Only when the available light dims, set your camera to shutter-priority and then set Auto ISO. Select the lowest shutter speed you can get by with for producing sharp images. With my Canon 500mm f/4.0 lens on a bean bag, I can do well with image stabilization turned on while using a shutter speed of 1/125 second. When the available light dims to a point where the lens needs to open up more than f/4.0, which is impossible of course with this lens, the camera then increases the ISO automatically to continue making a good exposure. As the light dims still further, the ISO continues to increase until it reaches the highest ISO choice offered by the camera. Although everyone admits there is more image noise when shooting at elevated ISOs, such as ISO 1600 and ISO 3200, isn't it better to capture sharp images that are a bit noisy rather than fuzzy images with little noise? This tactic works best at the end of the day since the light naturally dims toward sunset. At sunrise, I don't use it because the available light normally brightens rapidly.

The reason it is best not to use shutter-priority with Auto ISO all the time is the camera tends to select the fastest aperture on the lens most of the time to use the lowest ISO. Most are perfectly happy with the images captured by their cameras at ISO 400 and 800, so it makes no sense to needlessly give up depth-of-field because the camera selects ISO 100.



Figure 11 - Since this lion cub is quickly walking in and out of light with varying intensity, auto ISO and shutter priority nicely maintains the ideal exposure.

Finally—More Food for Thought

Three of us—John, Barbara, and Jason—spent a week photographing mountain goats and bighorn sheep on Mt. Evans, CO that lies about fifty miles west of Denver during late June. Metering was easy. The bighorns were about neutral reflectance and the goats were a dull white. You might think the goats need a lot of plus compensation to achieve the optimum exposure, but they did not. All of us used multi-segmented metering which is referred to as Evaluative metering by Canon and Color Matrix by Nikon. Although the mountain goats off-white fur does tend to cause the camera to underexpose, Evaluative metering also consider the predominant middle tone areas that surround the animals. Only a +1/3 stop exposure compensation was needed most of the time to produce an exposure where the rightmost data of the RGB histogram display touches the right wall of the histogram. At times, no compensation was needed, and backlight required a -1/3 stop exposure compensation.

All of us used different exposure modes with a twist to achieve splendid results. All of us are camera “geeks.” Everyone knows every button, dial, and menu option on their top-of-the-line cameras quite well. We tend to push the limits of our cameras and use exposure modes in unusual, but effective ways. Let’s describe how each of us did it. Read carefully because we use exposure modes in ways that, unfortunately, remain fairly unknown to most nature photographers who are missing out on some highly advantageous exposure strategies. You want to learn and employ these strategies in your own photography.

John’s System with the Canon 5D Mark III

Since I used an 800mm f/5.6 lens most of the time, shutter speed is critical for sharp images. Therefore, even though I shot on a tripod, I set the shutter-priority exposure mode and used 1/800 or 1/1000 second most of the time. The light was quite bright much of the time. Therefore, it wasn’t a problem

getting to those fast shutter speeds when using ISO 400 to 800. When the light dimmed, I set my camera to Auto ISO. With the camera set to a shutter speed of 1/800 second, once the light dims enough where the lens must open up to a faster f/stop than f/5.6, which is the fastest aperture on the 800mm lens, the camera automatically increases the ISO to maintain a suitable exposure with 1/800 second at f/5.6.

I would have preferred to set my Canon 5D Mark III camera to lock in both the shutter speed and the aperture and let the ISO vary, but there is no provision for it that I know of that also provides exposure compensation. The camera does allow the user to set a minimum shutter speed of 1/250 second, but I felt that was too slow for an 800mm lens, though it would be suitable with the 300mm lens. Sadly, Canon does not offer minimum shutter speed choices of 1/500 or 1/1000 second with the 5D Mark III.

Barb's Method with the Nikon D4

She used an auto exposure mode, too. Well, sort of. She set her camera to the (M) manual exposure mode. She selected the shutter speed she wanted to use and the f/stop. Then she set Auto ISO which nicely maintains a standard exposure with her chosen shutter speed and f/stop. She could compensate the exposure with the exposure compensation control. For example, setting her camera to a +2/3 stop exposure compensation did increase the exposure by that amount. How can that be possible since the camera is set on manual? The camera cannot automatically adjust the shutter speed or the f/stop with manual exposure. But, it can vary the ISO to compensate the exposure. In this case, it boosts the ISO by two-thirds of a stop. Using her camera in this way allows her to lock in both the shutter speed and the f/stop at the same time.

Jason's Method with the Canon 1Dx

This camera allows the user to set a faster minimum shutter speed, such as the 1/500 of a second that he used most of the time with the Canon 200-400mm f/4.0 lens. Since he could lock in the minimum shutter speed to be used by the camera, he set his camera to aperture-priority and Auto ISO. Jason routinely set his camera to f/8 for more depth of field and the camera would not select a shutter speed slower than 1/500 of a second, but it could be faster if the light was bright enough. When the light dimmed, the camera increased the ISO to maintain the optimum exposure. And because he was using aperture-priority, there was no problem using the Exposure Compensation control to adjust his exposures. This system worked perfectly for Jason. It is too bad more cameras don't offer a wider choice of minimum shutter speed options. With the quality of higher ISOs that are now achieved with current cameras, all cameras should allow the shooter to set both the preferred aperture and shutter speed and let the ISO vary as needed and there should be a working Exposure Compensation control, too.

We hope you will explore other exposure modes. None of them are ideal for all situations. Each have their merits and drawbacks. Even if you continue to believe aperture-priority is the ideal exposure mode most of the time, please do consider other possibilities that I feel are far more effective.

Conclusion

Any exposure mode can be used to shoot splendid images. However, part of shooting superb images easily and quickly is to eliminate the "fuss factor" as much as possible. You may continue to choose to

use aperture-priority or program, but I really don't feel that is the best way to operate for the clear majority of photo situations. If it were, I would be using it. If a better technique comes along, I will adopt it, and probably write about it. Even if you decide to use the automatic modes most of the time, hopefully this article makes you aware of some of the pitfalls in doing so. I wish you great adventures and success in your photography

I admit I pounded on aperture-priority pretty hard in particular and the other auto exposure modes to a lesser degree in this discussion because I really want to highlight the troubles with them. The ongoing popularity of aperture-priority continues to remain a mystery to us. Never-the-less, there are some situations where aperture-priority does make sense. If you are a street photographer who plans to shoot hand-held with short lenses in rapidly changing light and depth-of-field is more important than shutter speed, aperture-priority might be your best bet. I know one professional sports photographer who wants to shoot wide-open to throw distracting backgrounds as far out-of-focus as possible. He also wants to use the fastest possible shutter speed at all times to stop action. Therefore, he prefers aperture-priority and sets his lens to the fastest aperture on the lens all of the time. Of course, if he used shutter-priority and Auto ISO, he would get a similar result most of the time with the added advantage of having the camera increase the ISO if the action was suddenly in very dim light. If you plan to shoot an HDR bracketing series automatically, the aperture must not vary, so it is effective to use aperture-priority to make the shutter speed vary. We do admit the biggest problem with manual exposure is it does not adjust for changing available light levels, something that all automatic exposure modes do quite easily. Normally changing light levels isn't a problem the way we shoot, but sometimes it is a problem. A second problem with manual exposure is so many photographers really don't understand the language of stops and don't have the numbers memorized! There is no perfect system for all situations! But, do yourself a favor if you are an aperture-priority fan, try some other exposure modes to give them a chance.

In the interest of full disclosure, among all of the exposure modes of aperture-priority, shutter-priority, manual, and bulb that was mentioned at the beginning of this article, here is what we are mainly using as of now.

Manual exposure-70%-we use this for nearly all of our close-up and landscape photography.

Shutter-priority-20%-we use this for wildlife photography

Shutter-priority with Auto ISO-10%-in dim light, we like this choice

Aperture-priority-we might possibly use this sometime

Bulb-we never use this anymore, though we commonly found it necessary with film cameras. What is the difference? The longest shutter speed on our film camera was one second. Now, all of our digital camera will meter down to a thirty second shutter speed, so there is little need for longer exposure times.

These figures vary considerably between Barbara's Nikon system and John's Canon system. If future cameras give us more control over minimum shutter speeds, then aperture-priority could easily be a more frequent choice for us.