Camera Control for Beginning Photographers

By Russ Lewis

The most important thing to keep in mind is this: always pay attention to the light. There are four things about light you need to be aware of: quality, color, intensity and direction.

Quality involves things like diffusion or directness. If you're shooting in fog, you're shooting in diffuse light. If you're shooting in direct sunlight, watch out: the contrast is going to be very high. You might want to find a subject under the trees where the contrast comes closer to the range of brightnesses your sensor can handle. Why is a very high brightness range a problem? Well, if the brightest spots (highs) in your picture are too bright, they'll be what photographers call "blown out." In other words, they'll lose all detail, and there will be no way to get the detail back. If the darkest areas are too dark, detail in those areas will be lost too.

Pay attention to the direction of the light. If the main light source is behind your subject (backlight) you may end up subduing the subject to near unintelligibility because the light source will dominate the scene. On the other hand, front light, shining directly onto the subject has a tendency to flatten things and eliminate detail.

With film the color of light often was a problem. With the cameras we have nowadays, color is less a problem than it once was. Most of our current cameras can read the color of the ambient light and adjust the exposure. Still, it doesn't hurt to understand that the color of light varies greatly. Color is measured in degrees Kelvin. Here are the colors of the light you're likely to encounter. They range from very red to very blue:

Candle flame – 1800 degrees K
Incandescent lighting (tungsten) – 3000 degrees K
White fluorescent lighting - 4000 degrees K
Clear day - outdoors - 5500 degrees K
Cloudy day - outdoors - 6500 degrees K
Outdoors in shadows, clear day - 7500 degrees K

Intensity of the light and depth of field are the main things you can keep under control with camera adjustments. The automatic setting on most modern cameras usually will give you a combination of aperture, shutter speed and ISO that will

result in a proper exposure. But what the camera doesn't know are things like: Do you want the background to be soft (out of focus) or sharp? Do you want to stop the action of the flying bird, or do you want to show enough blur to indicate wing movement? Are you planning to make a wall-sized print so that you need the resolution a very low ISO can give you?

Aperture probably is the hardest setting to understand. The problem with aperture is that we have to talk in f stops. I stepped onto my porch and shot the attached picture of a dead tree near the river. I had the camera set on aperture priority, which is what my camera almost always is set on, because aperture is what gives me control over depth of field – the distance over which my picture will be sharp. I used f/8.0, which keeps the whole thing, foreground and background adequately in focus. I let the camera decide what shutter speed and ISO to use, and it gave me a shutter speed of 1/160 second, and an ISO of 100.

What does f/8.0 mean? Well, "f" is the focal length of the lens, and the result of the arithmetic is the diameter of the hole in the lens. I used a zoom lens, and in this case the focal length was 52mm. So the arithmetic goes: 52/8 = 6.5. In other words, the diameter of the hole in the lens was 6.5mm. Okay, now that you understand the arithmetic you can forget about it, because what you're really interested in is the "8" in f/8.0, and the term "stop." The f-stops in a camera represent changes in the amount of light the lens will let through to the sensor. Each step up the scale cuts the light in half. Each step down the scale doubles the light hitting the sensor. Here are the standard f-stops you're most likely to encounter: f/1.4, f/2.0, f/2.8, f/4.0, f/5.6, f/8.0, f/11, f/16, f/22, f/32. Why isn't the next stop up from f/2.0 (half the exposure) f/4.0? Pi is involved since we're talking about the diameter of a circle, and with Pi's inclusion you cut the light hitting the sensor in half if you go from f/2,0 to f/2.8.

All clear? No? Well, the important thing to remember is that if you want to double the light hitting the sensor you go to the next smaller number in the f-stop range. If you want to cut the light hitting the sensor in half you go to the next larger number.

Doubling and halving the light hitting the sensor sounds pretty drastic, but the sensor's reaction to a change in the light is approximately logarithmic, so it's not as drastic as it sounds.

Now, the idea of stops applies to shutter speed as well. If I go from a shutter speed of 1/160 second, at which I shot this picture, to 1/320 second, because the wind's blowing and I want to stop the moss from blurring, I'll have to open the aperture a stop. What would that new aperture be? Why, f/5.6 of course. We just learned about that. Suppose I realize 1/320 second isn't going to stop the blurring, and I decide I need to speed up one more stop? Yep, you got it: the next stop up in shutter speed is 1/640 second. And I'll have to open up to f/4.0.

Now I've got a different problem. It may be that f/4.0 won't give me the depth of field I want. Ah. . . but I have one more tool in my kit: ISO. I can increase the sensitivity of the sensor by increasing the ISO. So, if I keep my camera set at 1/640 second to take care of the blowing wind, I could leave the aperture at f/8 and change the ISO to – what? You got it: 400. I was at ISO 100 to start with, but I want two stops of extra sensitivity. A one stop increase in ISO would be ISO 200, and a two stop increase would be ISO 400. Simple, eh? See. I told you so.

This is all very important if you're doing stuff like formal portraits or perfume marketing shots for the Wall Street Journal, but I've found that if I walk the river with my camera on aperture priority, set at f/8.0, and let the camera choose both shutter speed and ISO, the vast majority of my shots work out just fine. On the other hand, recently I shot this picture of tiny flowers on the banks of the Palatlakaha river. To shoot the picture I flipped open the "live view" viewer on the back of my Nikon D750 and put the camera very close to the ground. It was obvious I wasn't going to have enough depth of field at f/8 to get what I was after, so I cranked the lens up to f/32, which gave me a shutter speed of 1/500 second, and an ISO of 8000. The result doesn't have nearly the resolution I'd have if I'd been able to shoot at ISO 100, but if you look at the picture you'll probably agree that it worked just fine. If I'd been

planning to make a 17 x 22 inch print of that picture I'd probably have a problem, but that's not what I shot it for.

Which leads me to this observation: Do what you have to do to get what you're after. You'll often end up sacrificing one thing for another more important thing. That's okay.

By now you've probably shot a picture similar to the tree I used as an example, and done some experimenting. You've discovered that when you're in aperture priority you can't just change the shutter speed in order to get rid of the blur when the moss blows in the wind. Golly! So what can you do? Well, how about if we go to shutter speed priority and set the shutter speed to 1/640th of a second, which is what we were after in the example? No sweat. There it is: 1/640 second. But now try to set the aperture to f/8. Oops. Doesn't work when you're in shutter speed priority.

To get the combination you're after you're going to have to go manual. Set the aperture at f/8 in aperture priority and see what shutter speed results. Actually, shutter speed is going to depend not only on your aperture but on your ISO setting as well. In our first session I assumed you have your ISO set to float: in other words, set so the camera can make its own decisions about ISO. That's the way my camera normally is set. But if I'm going to go full manual I need to set ISO to a fixed value. You can learn how to do this stuff by reading the book (maybe a PDF book) that came with your camera. Make sure the aperture, shutter speed, and ISO are the same as they were when you were in aperture priority. In our example they were: f/8.0, 1/160th second, ISO 100. Now you can change the shutter speed to 1/640th second and the camera won't make any decisions about aperture or ISO for you. Scary stuff, eh? To get back to the correct exposure you'll have to change the ISO from 100 to 400 yourself (remember: a two stop difference).

Actually, this isn't too scary. In film days we did this all the time. You'd read your light meter and make settings on the camera that *should* result in a correct exposure. But you never *knew* whether or not the exposure was correct until you put the film into a tank (by feel, in a darkroom or under a dark bag), developed it, washed it, dried it, made a contact sheet from the film so you'd have a tiny print of the picture, which you now could examine closely with your big magnifier. Nowadays you've got two things immediately at hand to tell you whether or not you screwed up: there's the viewer on the back of the camera, and there's the histogram. If you didn't know your camera has a histogram, look it up in the camera's manual. The histogram will tell you whether or not you've lost detail in

the highlights or the shadows, and unless you're doing street photography or shooting passing birds, you can change your aperture, shutter speed or ISO and re-shoot the picture. That's manual shooting. It's for *real* men (and women)!

Now, I'm glad you shot that picture – the one to find out how shutter speed changes the outcome. *That's* the most important thing. You've got to get out there with your camera and shoot and shoot and shoot. Try stuff, learn what works and what doesn't. You can read all about everything, but until you've actually done it you haven't really learned anything.

Eight years ago I wrote an essay on street photography that was published on Luminous Landscape. Here's one of the paragraphs from that article:

"So there are two things you need to learn to do: First, you need to practice composition to the point where it becomes intuitive. You don't have time to line up all those elements of geometry with, say, the rule of thirds. You have to see it whole in your viewfinder without stopping to analyze; to rely on your unconscious; to react instinctively. You also need to become so familiar with your camera that you don't have to think about it, any more than you have to think about shifting gears when you're driving a stick-shift car."

Actually, I'll go out on a limb and say that that advice applies to *any* photography.

When your camera is on automatic and you point it at a scene, the camera makes all the exposure calculations and decisions, and sets itself accordingly. If you're on aperture priority you set the aperture, but the camera sets the shutter speed, and if you've let ISO float, it sets the ISO. Same thing with shutter priority: you pick the shutter speed but the camera picks the aperture and possibly the ISO.

More often than not that's just dandy, but look at the picture of

the egret I've attached. The camera has an array of light-reading sensors that covers a substantial part of the picture sensor area. It's going to average out the readings from those sensors and try to achieve an overall exposure average of middle-gray. But the egret's bright white, and if the camera averages the bird's whiteness with the dark background the egret's going to be blown out. (Remember what "blown out" means? The egret's going to lose all its detail.)

Now, understand, there's nothing I can do with aperture, shutter speed, or ISO to change this situation. If I change one of them, the camera will change another. The camera's always going to do its thing with those three settings to get to middle-gray. But there's a solution to this problem. It's called "exposure compensation," and in most cameras it's a little button with [+/-] on it. You press the button and rotate a wheel in order to tell the camera to reduce or increase the overall exposure. On my Pen-F it's not a button. It's a dial on top of the camera, which I hate, because sometimes I bump it and don't notice I'm telling the camera to reduce or increase its exposure until it's too late. Using exposure compensation I reduced exposure on the egret one full stop, and that kept the whites in the bird within limits.

If you use exposure compensation on your camera, remember to reset it after the shot. It's something I occasionally forget to do. After a walk on the river I'll have a series of underexposures or overexposures and not be able to figure out why until I check exposure compensation. Fortunately, Photoshop and Camera Raw usually can overcome the problem.

Let's talk a little more about high ISO. Why not just set ISO to max (which I've set at 12,800 on my Nikon D750)? If I were to do that I'd be able to shoot in just about any kind of light anywhere, say a cave at night.

The answer is that your camera's sensor has a native ISO that's defined by the manufacturing process. That's the ISO where you'll get maximum detail. On some cameras you can set the ISO below the sensor's native ISO, and some people think that improves detail. It doesn't. My D750's native ISO is 100, and that's where I'll get maximum detail. It's also the level the camera always uses. When I increase ISO, all I'm doing is amplifying what the sensor reads, and as is the case with any amplification process, I'm adding noise. To see what noise looks like Google "digital noise."

Finally, let's talk about phone cameras. I don't know where various phone cameras are at the moment as far as letting you control aperture, shutter speed, and ISO, but

I’d be willing to bet it won’t be too long before you can control all three. Most of the time you don’t need to do that, and you can make some truly masterful photographs with a cell phone if conditions are right and you’re careful. But it doesn’t hurt to know the basics about exposure control.