

Before considering how a meter reads a complex scene containing many different light and dark reflected values would be metered, we will start with a very simple one: a white wall.

But first, why do we perceive the wall as white in the first place? When looking a room our brains will take in the entire scene and key off of the lightest and darkest objects. If we walk into a dimly lit room and see a dark leather sofa and a medium tone cloth chair against a lighter wall our brains will tell us, "Ah... the sofa must be black and the wall must be white." But remove the sofa, chair and all other tonal references and our brains will have a more difficult time deciding what tone the wall actually is. What tone it appears to be will be influenced by how much light is hitting it. If the room is very dark the wall will look dark. If the room is very bright it will look dark.

Meters assume a scene is a combination of light and dark reflective objects which combined will average together somewhere in the middle. A hand held meter has one sensing cell, but a DSLR camera like the 20D, 30D, 5D and 400D have discrete measurement 35 zones measured from the light in the viewfinder. Both types of meters average the reflected light, but in different ways. In a hand held meter the single sensing cell will average the reflected values it sees. The camera averages the reflected value of each of the separate zones mathematically.

When a multi-zone metering camera is pointed at the blank wall everything is the same in all the zones. It has no clue whether the wall is dark or light. It could be a light tone wall with very little light on it or a dark wall bathed in bright light. When multi-zone metering camera is pointed at a room containing a dark leather sofa and a medium tone cloth chair against a lighter wall it can analyze the differences between zones and determine which zone is the brightest, which is the darkest, and what the average reflectance is.

With a digital camera highlight exposure is critical. When a shot is overexposed detail in the highlights is lost. Since the zones in the center are generally more important than those on the edges the camera will try to bias the exposure to correctly expose the center. By comparing the light values in the most critical zones with all the others automatic camera meter can select an exposure which will overexpose areas it thinks are less critical.

Metering systems can also apply some program logic to make assumptions about the content of a scene and its relative importance. Consider two landscape photos with sky at the top. In the first the sky fills the upper 2/3 of the photo and the darker foreground 1/3. In the second the sky only fills the upper 1/3 and the darker foreground 2/3. Now based solely on how the photo is framed, odds are that in the first photo which is mostly sky it is most important, but in the second which is mostly foreground. An intelligent metering system can programmed to recognize when the metering zones fit these and many other typical scene "maps" and adjust the exposure accordingly. In the first shot of the big sky it will get the sky right and let the foreground go dark, and in the second it would let the sky blow out to preserve the detail in the larger foreground.

## Camera Metering Modes

Canon DSLR cameras allow the user to select one of several metering modes. Some modes

evaluate all the zones on the viewfinder and others only a very small spot in the middle. There is a simple rule-of-thumb to keep in mind when selecting a metering mode:

**The smaller the area the meter measures the smarter the photographer must be.**

When the camera is in the default **evaluative** mode it is using all 35 measurement zones and all the artificial intelligence Canon has programmed into it. And like it or not the sad truth is that today's cameras are smarter than we are. If we switch to **center-weighted**, **partial**, or **spot** we are switching off progressively more of the sensing zone and using less of the camera intelligence and must therefore rely on our experience to interpret what the metering is measuring.

## Selecting the mode for metering

I approach new equipment systematically and logically and examine the workflow of various operations before settling on what is the simplest. First I know that any camera metering system reading is either the camera's best guess at the overall exposure of the scene (e.g., evaluative) or a reading if a smaller area it will try to make that area middle gray in the photo. Odds are with evaluative I will need to override the camera's first guess about a scene half the time but once I do the rest of the shots in the same light will be well exposed. But when I use the other "more precise" metering modes I find myself needing to make more adjustments after evaluation the first shot under new lighting condition because the exposure of the smaller areas are only accurate if they are middle gray. So I leave my camera in evaluative mode all the time, let the camera take its "best shot" at exposure, then adjust from there based on what I see on the histogram.

## How exposure is controlled

The camera metering system reacts to the amount of light reflected from the scene in the viewfinder and computes the camera settings needed to make a nominally correct exposure. What is adjusted depends on the mode the camera is in:

**P:** Both the shutter speed and aperture may be adjusted.

**Av:** The aperture stays the same, the shutter speed is adjusted.

**Tv:** The shutter speed stay the same, the aperture is adjusted.

**M:** There are no automatic adjustments in M mode.

In P, Av, and Tv modes the camera exposure system will always aim to keep the exposure at the same level if we decide to change the variable which is under our control. In Av mode if we open the aperture the camera will increase the shutter speed to compensate, keeping the net exposure the same. In Tv mode altering the shutter speed will result in the camera changing the aperture to keep the exposure the same. In P mode the camera will pick the combination of

shutter and aperture Canon (who does the programming) thinks will work best for the overall light level.

In M mode the camera metering is not controlling the exposure, we are. As we manually adjust the aperture or shutter the effect of the adjustment is shown on the -2..-1..0..1..+2 exposure indicator in the viewfinder. When the needle is centered the camera metering system is simply indicating its "best guess" of what it thinks the exposure should be. It the same metering system used for Av and Tv, so using metering in M mode no more accurate.

## Exposure Compensation

The fact of life with camera metering is that it is NOT AUTOMATIC!!!! The camera guesses, but not actually knowing what is in the photo it sometimes guesses poorly. The more sophisticated the camera metering system is, the better the camera's initial guess will be. A \$5,000 EOS 1 pro body with more metering zones and more complex logic will do a better job than a \$600 300D. That's also a fact of life we just need to learn to deal with also.

If we shoot a bride in a big white dress using Av mode the camera will make the dress gray because it is programmed to average light and dark to gray. The fact there is more white than black skews the average. The camera sees more light than average bouncing back and says, "Lordy its bright out there! We must use less exposure!". The camera will also try to make a black cat in a coal bin gray also. In that case the camera will think more light is needed and open the lens (Tv) or slow the shutter (Av) for more exposure than an "average" mix of light and dark tones.

If the camera doesn't get the exposure right - something which is obvious from the camera histogram if one knows how to read it - we must second guess the camera based on what the scene contains and it needs to be reproduced. That second guess is input into the camera with Exposure Compensation for natural ambient.

As mentioned above, I think the odds of getting a correct exposure are better when using evaluate mode and composing normally because the camera evaluates the entire scene with high-level artificial intelligence. I let the camera take its best guess and then if the highlights are not exposed correctly it is very easy to see that via the playback histogram and know what is need in the way of adjustment to get a correct exposure.

Exposure Compensation (EC) in Tv or Av mode is like the buttons on a car steering wheel which are used to adjust the cruise control a bit faster or slower from its initial setting. If the histogram shows the test shot is off the scale to the right (overexposed) minus EC must be dialed it to correct it. If the histogram of the test shot shows a gap between white highlights and the right edge (underexposed) plus EC must be dialed it to correct it.

If using the camera in M mode there is no EC. As with Av typically set the aperture in M mode for desired Depth-Of-Field and use shutter speed adjustments replace it, especially when flash is used.