

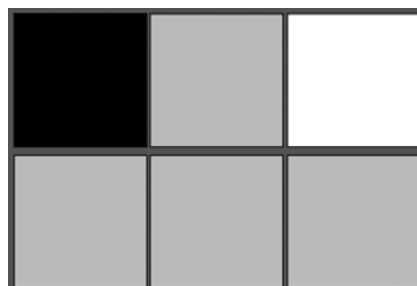
Light Metering, White Balance and Color Temperature

As has been explained **ISO** (Sensitivity of Image Sensor), **Aperture**, and **Shutter Speed** combine to create the proper exposure. But how on earth does the camera know what the “proper exposure” should be? In the past it was often the responsibility of the photographer to calculate the brightness of the light in the environment around him (or her). Now days however even the most entry level point and shoot cameras come equipped with a **Light Meter**.

THE LIGHT METER



The light meter “reads” the available light and this info is then used by the camera or photographer to adjust the cameras exposure setting accordingly. However magical it seems that the camera is capable of making these sorts of decisions, the machine is not conscious of what it is looking at. The camera (specifically the light meter) doesn’t understand that the photographer is taking a picture of a tree, a car, or person, all the light meter recognizes is the luminance (brightness) of the light present. A lot of times the light meter does a good job of creating a good exposure, but not always. The truth is light meters can’t even distinguish between black and white let alone recognize color or contrast. Light meters don’t see the world in black and white, they see in terms of average luminance. To them the world should be gray – 18% gray to be exact. Generally, 18% of the light that hits objects in any given scene is reflected off again. Amazingly the average of any given scene you point your camera at is close enough to 18% grey that a good exposure can be made using the light meter’s very narrow assumptions. Not always though. In scenes that are predominantly light toned such as a beach or snow the light meter’s reading will produce an underexposed (dark) image. And in a scene that is predominantly dark the meter reading will produce and over exposed (light) image.



METERING MODES

Most digital cameras offer at least a couple of metering mode options. The three most common modes are: **Matrix**, **Center Weighted**, and **Spot**. This allows you some flexibility achieve the best possible exposure in a variety of situations.

Matrix (also know as Multi-segment, Pattern, or Evaluative)

This is the most widely applicable mode – useful in most situations. Depending one the sophistication of your camera many variable are analyzed in this mode in order to decide on an exposure. Long story short however this metering mode divides the frame into a series of segments, from each of which a separate light reading is taken. All the info from the various segments is analyzed before an exposure setting is suggested.

Center Weighted

If you camera only has one mode this is it. Like matrix, this mode also breaks the frame into segments, but, when the camera analyzes the various meter readings, it puts an emphasis on the center area of the frame (usually about 60% to 75% metering decision). In this mode, the camera is assuming that you have framed the photograph with the subject in the center of the frame. Compositionally that is often not the best choice, and in many cases neither is this metering mode.

Spot

Spot metering is the exact opposite of matrix metering. Instead of taking readings from various points in the frame and averaging them together, spot metering takes only one reading from a very small point at the center of the frame. This mode comes in handy any time you think that the meter might be fooled and you choose to take a more active role in deciding the correct exposure setting. If you feel that a scene say is overly bright or dark, you can take spot reading from a neutral gray area to set the exposure for the entire scene.

WHITE BALANCE AND COLOR TEMPERATURE

For most of us the act of seeing is so fundamental to how we experience life that we often don't consider the incredible process taking place. Light varies in intensity (brightness) and color (hue). Pure light is white. "White" light can be broken down into a series of varying frequencies. Each frequency is perceived by ours eyes as a different color. Our eyes and brain are built to adjust to these color variances automatically and subconsciously. As a result we perceive the light as being vary consistent. In most environments however, there is one frequency (color) that is more abundant then others. White balance is used by cameras to mimic what our eyes do naturally for us. That is, shift color in order to give the appearance balanced, neutral scene.

Color Temperature

Color is often referred to as “hot” or “cold”. When an artist describes, say, reds and yellows, he or she often uses terms like warm or hot, and conversely, greens and blues are referred to as cool. Color temperature is measured in Kelvins (K). In terms of absolute temperature the reds and yellows we might describe as warm are actually at the cool end of the spectrum, about 1000K where as blue (with its cool visual association to water) has a color temperature of 10,000K found at the high end of the temperature scale. In photographic terms the Kelvin scale indicates the relative intensity of red light to blue light. White light is found at the center of the scale and is considered neutral.

1000K	Candlelight, firelight, oil lamps
2000K	Sunrise
2500K	Standard household light bulbs
3200-3400K	Tungsten photo lights: studio hot lights, photo floodlights
5000K	Typical daylight, electronic flash
5500K	Daylight-balanced films; electronic flash
6000K	Bright sunlight, clear skies
7000K	Slightly overcast skies
9000K	Open shade on a clear day
10,000K	Heavily overcast skies

White Balance Settings:

Auto white Balance: All digital cameras offer automatic white balance (AWB). With automatic white balance, the camera looks for the brightest point in the frame (which it assumes should be white), and adjusts the overall color balance accordingly. For example if the camera determines that the brightest point is yellow, in order to produce white the color of the scene is shifted towards the blue end of the spectrum (This is simplification of the process. Depending on which camera is being used, the process of determining the white balance may be considerably more complex).

White Balance Presets

There are a number of white balance presets that address the color temperature of specific shooting conditions. So of the most common include: **Daylight, Shade, Cloudy, Tungsten,** and **Fluorescent**. In most cases the auto white balance does a good job of adjusting the color in all of these conditions so, its not usually necessary to set the balance specifically (especially if you are inclined to forget to adjust the setting before you use the camera next). However an exception to that rule might be when shooting under tungsten lighting. Sometimes AWB settings don't adequately adjust the color temperature and your images will still have a yellowish tint. In this case, your camera might do a better job when set to the Tungsten preset.

Custom White Balance

Some of the more deluxe point and shoot models, and all "prosumer" and professional models give you an option to set the color balance manually. In this case you would fill the frame with a **white object** (sheet of paper), or a **neutral gray object** (also useful for setting the exposure) and set this as your white point. You could then recompose your shot and achieve an accurate color balance regardless of weather or not there is an easily distinguishable white point in the composition. Custom white balance is often used to, very specifically, set a "correct" (neutral) color balance. However it can be used as an artistic tool as well – to intentionally tint images. By taking a white balance reading from a colored object (rather than a white or neutral gray object), the camera is tricked into shifting the balance toward the opposite end of the spectrum from the colored object targeted. If you set your white point using a red tinted object, the resulting exposures will be tinted blue!