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CHAPTER 1

ELEMENTS OF LIGHT

Understanding the Three Elements of Exposure

Dealing with Color Temperature

Setting White Balance

Using Contrast to Create Mood

Working with the Quality of Light

In some ways, photography is analogous to cooking: a certain temperature for a certain amount of time. So how is that like photography? If you substitute light for temperature, you have your answer. In this chapter, I tell you how light affects your camera and images.

UNDERSTANDING THE THREE ELEMENTS OF EXPOSURE

Exposure is the balance of the amount of light allowed to fall on the photographic medium (digital sensor, film, glass plate, and so on). I use the word *balance* because you use many things to capture the correct exposure. You use three variables to create your exposure:

- **ISO.** The light sensitivity of the film or digital sensor.
- **Aperture.** A moving diaphragm within the lens that controls the amount of light passing through the lens and into the camera. F-stops are the numeric designations referring to the size of the aperture.
- **Shutter.** A mechanical device that opens and closes very quickly, letting light into the camera and in contact with the digital sensor (or film). The length of time the shutter is open is known as *shutter speed*.

Each incremental change in the exposure of any of these three things is measured in f-stops. A 1 stop difference in any of these three things either halves or doubles the amount of light for the exposure. For example, if you change your ISO from 100 to 200, you have increased your sensitivity 1 stop. If you adjust your shutter speed from 1/125 to 1/250, that is a 1 stop difference as well. Changing your aperture from f/8 to f/11 is also a change of 1 stop.

Read on to learn about these three aspects of exposure in greater detail and discover how changing things 1 stop or more affects your photographs.

ISO

ISO (International Organization for Standardization) is a body that sets international and commercial standards. In digital photography, the ISO is the measure of the digital sensor's light sensitivity. Digital sensitivity correlates to film speed in traditional cameras. Digital cameras can have ISO settings from 50 through 3200. The standard ISO settings that you use most of the time are 100, 200, and 400. A lower number and sensitivity, 50 to 200, requires more light and, thus, is called slow, but an ISO that is larger, 400 to 1600, needs less light, can shoot the same scene with a faster exposure, and is considered a faster ISO. Adjusting the ISO higher increases the sensitivity when subjects are in lower light situations like shade, as in 1-1.

With each 1 f-stop change higher in the ISO, you effectively double the sensitivity of the film or digital sensor. As you raise the ISO sensitivity each stop, 100 to 200 to 400, the sensor becomes more light-sensitive, and you need less light to get your exposure.

The lower the number, the *less* light sensitive the digital sensor is. Less light sensitivity means that you need *more* light to achieve the correct exposure. At the lower ISOs, 50 and 100, you achieve the highest image quality in both film and digital. For example, assuming that the amount of light does not change, if you go from 100 to 200, you need to either use 1 f-stop smaller of an aperture or 1 f-stop faster of a shutter speed. As you use faster films or turn the ISO up on your digital camera, you increase its light sensitivity, but you also see increases in *grain* in film and *noise* in your digital photos.

1-1

ABOUT THIS PHOTO

Because this Bald Eagle was in deep shade, I set the ISO to 200, so that the digital sensor captured enough light on this beautiful bird. 1/90 sec. at f/2.8, using a Nikon 80-200mm f/2.8 zoom lens.

x-ref

See Chapter 2 for a detailed explanation of grain and noise.

Even though you need less light to achieve the correct exposure, higher ISOs increase digital noise and decrease contrast. As the light level begins to drop, or as the speed of the action increases, you can increase your ISO to stop the action and avoid blurring the image.

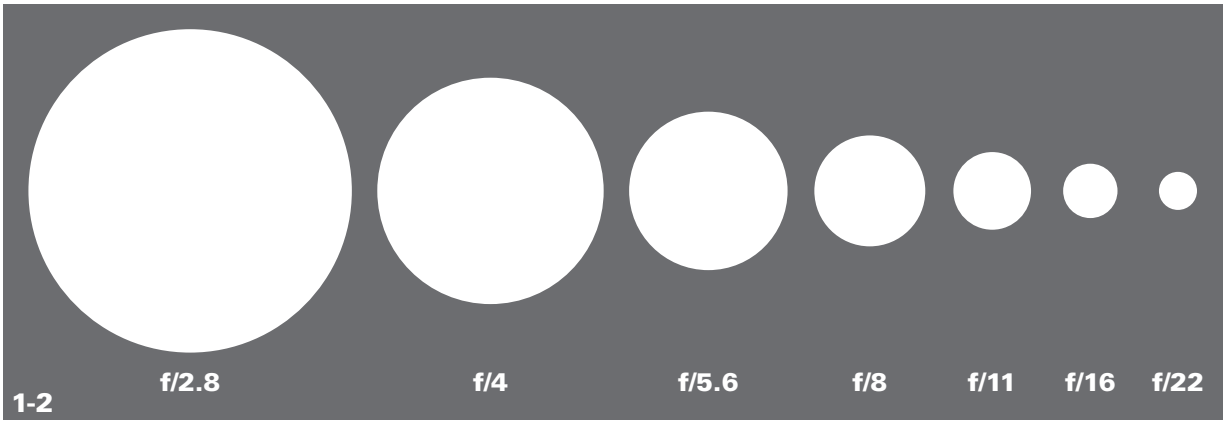
With the high quality of digital sensors and film today, going to 200 or as high as 400 only increases the noise and grain minimally, but I still recommend using the lowest possible ISO for the situation at hand.

If the highest image quality is achieved at ISO 100, why wouldn't you just use that setting all the time? This is where the other factors in exposure, such as grain and noise, start to weigh in.

THE APERTURE

The lens aperture is a moving diaphragm within the barrel of the lens; it determines how much light passes through the lens and into the camera. The designation for each step in the aperture is called the *f-stop*. A smaller f-stop or f number means that the actual opening of the aperture is larger, and the higher numbered f-stops designate smaller apertures, letting in less light. The f number is the ratio of focal length to effective aperture diameter. The relative size of the changing aperture and corresponding f-stops are shown in 1-2.

Your lenses' f-stops were traditionally changed by a ring around the outside of the lens that would change the diameter of the diaphragm. On today's cameras, especially digital cameras, the f-stop is usually changed with a turn of the thumb wheel or forefinger dial. The diaphragm's diameter changes in the same manner as it always did; it is now controlled electronically rather than manually. In 1-3 you can see the aperture blades moving in and out.



1-2

ABOUT THIS FIGURE *Each aperture decreases in full 1 f-stop increments. The corresponding f-stops get higher in number. Notice each aperture opening is half as large as the preceding, letting in half as much light.*

1-3

ABOUT THIS PHOTO *This series of photos shows the aperture blades and how they open and close. From the left, f/1.8, f/8, and f/22.*

Besides determining the amount of light that passes through to the camera, the aperture has one very important function and photographic effect. The size of the aperture determines the *depth of field* for the photograph. The easiest way to describe depth of field is as the amount of a photograph that is in focus. A smaller f-stop and larger aperture, such as 2.8, has less depth of field than a larger f-stop and smaller aperture, such as f/22, which has more depth of field. Using smaller apertures creates larger depths of field; images with greater depth of field have more sharpness from the front to the back. Smaller apertures and larger depths of field are used more for subjects like landscapes, when you want to see sharpness in an entire scene, than for portraits, when you focus on just the subject of an image.

It isn't as complicated as it seems. An easy way to remember this is to think "the higher the f-stop numbers, the higher the depth of field" and "the lower the numbers, the lower the depth of field." So at f/22 nearly everything in the photograph is sharp and in focus, but at f/2.8, only the subject is in focus, and the background and foreground are blurry. Your eyes work the same way. In the middle of the day, nearly everything that you see is in focus because the aperture of your iris is effectively *stopped down* and its aperture is very small, but when you are driving at night in low light, it takes a moment to change your focus from the road to the speedometer because your irises are dilated, giving you less depth of field.

How does depth of field really affect your photographs? In 1-4, you can see shallow depth of field as the microphone is sharp and in focus, the saxophone is slightly out of focus, and the trumpet player is totally out of focus, but still discernable.

ABOUT THIS PHOTO
The shallow depth of field of the f/2.8 lens puts importance on the microphone, and as the other parts of the image fall more out of focus, it gives the photo a layered effect. Tamron 28-105mm lens f/2.8 at 1/125 sec. at f/2.8.

1-4

When placing a foreground subject in front of a deep landscape scene, you need substantial depth of field to maintain sharpness throughout the photograph as seen in 1-5. As you get more comfortable with your camera and lenses, visualizing depth of field becomes second nature.

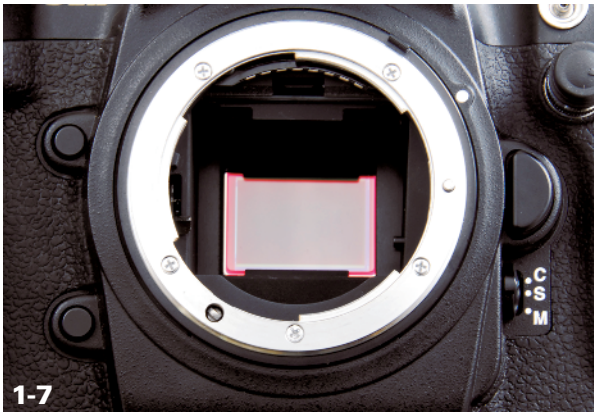
THE SHUTTER

Stopping action or avoiding blurry subjects is generally a desired quality of a photograph. Choosing an appropriate shutter speed greatly determines your success in achieving this. In most cases, a camera's shutter consists of small thin pieces of metal that move very quickly, opening and closing. Two types of shutters exist, focal plane shutters and leaf shutters. A focal plane shutter is found in most digital single lens reflex (dSLR) cameras and is located right in front of the digital sensor, just behind the lens. As you can see in 1-6 and 1-7, the shutter is closed, and then open revealing the sensor. The horizontal blades of the shutter rise and fall rapidly to expose the sensor to light. Your camera's shutter opens and closes just in front of the digital sensor, allowing light in for only as much time as needed to create the exposure. In digital point-and-shoot cameras, the lens is built into the body of the camera, and the shutter is built into the lens. These shutters are

ABOUT THIS PHOTO *With sharp focus from the rocks in the foreground to the mountains at the back, this photo maintains substantial depth of field, even at f/9.5 at ISO 200.*

ABOUT THESE PHOTOS *Figure 1-6 shows the digital sensor ready to have its electrons excited by the light; figure 1-7 shows the mirror in place. The light reflects into the viewfinder until the exposure happens. The shutter is behind the mirror.*

1-6



1-7

called *leaf shutters*, and they work much like the aperture in that the blades progressively dilate to the circular opening of the lens.

Shutter speed is changed with a turn of the shutter speed dial. This is different in many cameras: With some, it is a dial turned by the forefinger; on others the thumb wheel; and some cameras enable you to select which dial is the shutter speed dial. With each full change of the shutter dial, the shutter is open for twice as much, or half as much time. For example, if your camera is set at ISO 100, the f-stop at f/11, and shutter to 1/125, and you want to stop the action, changing the shutter to 1/250 reduces blurring, but it also makes the image 1 stop darker. To maintain the same exposure, you also have to change your f-stop to f/8 or change the ISO to 200.

Shutter speeds can be faster than 1/10,000 of a second or as slow as many hours, but in most real-world photography, the shutter is open for just a fraction of a second. For example, a standard daylight exposure might be 1/125 of a second at f/11 using ISO 100. Using a faster shutter speed stops motion, and a slower one can induce blur, and each has its place. In Table 1-1, you can see the stopping ability of many shutter speeds.

Just like the analogy at the beginning of this chapter, exposure is similar to the instructions in a recipe; the aperture controls the amount of light, which is like the thermostat on the oven, and the shutter speed is like the cooking time, so f/8 at 1/250 is similar to 350 degrees for 35 minutes.

Table 1-1

Shutter Speeds and What They Do

Shutter Speed	*Effect*
1/4000 to 1/2000	Stop a hummingbird's wings
1/1000 to 1/500	Freeze a human running and most athletes
1/250 to 1/60	Stop most daily movement and stop most blur from holding the camera
1/30 to 1/8	Blur motion (Camera should be on a tripod.)
1/2 to many seconds	Capture scenes in dim lighting, such as pre-dawn (Camera must be on sturdy tripod.)

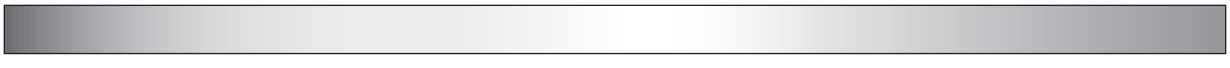
DEALING WITH COLOR TEMPERATURE

What the eyes see and what the camera sees are often quite different. Sunlight has a different *color temperature* than shade, which has a different color temperature than regular light bulbs, fluorescent light, or flash. Your brain automatically changes your irises to let the needed amount of light in so you can see; your brain also interprets the color of the light so that what you see looks normal. Color temperature and *white balance* are integrally linked. In this section, you learn what color temperature is and how changing the white balance in your camera affects your photographs.

LEARNING ABOUT KELVIN

The color of light is measured in Kelvin (K), named after the nineteenth century physicist William Thomson, 1st Baron Kelvin. The Kelvin unit is based on energy absolutes; therefore, 0K is the temperature at which all energy is lost. To put this in perspective, 0K is the equivalent of –459.69°F. In the light spectrum, 5500K is white; higher color temperatures are blue and are cooler in appearance; and lower temperature colors, like yellow, orange, and red are warmer in appearance. This is opposite of how color is normally thought of, with reds being warmer. In Kelvin, reds have a cooler temperature than blues.

Every color can be put into the classifications of warm, neutral, and cool, whether it is paint on a house or car, fabric on clothing, or part of the earth and seas. The color of the light source corresponds to those same colors as shown in Table 1-2. Images can be all manner of warm, cool, or neutral, or they can be elements of all three as is seen in 1-9.



1-8

ABOUT THIS FIGURE *The progression of the color temperature scale.*

Table 1-2

Light Sources and Corresponding Color Temperatures

Light Source	*Color Temperatures*
Candle light/matches	1500K to 1900K
Incandescent bulbs	2500K to 3000K
Sunrise/sunset	3000K to 3500K
Photofloods/studio tungsten bulbs	3400K
Daylight (midday)	5000K to 5500K
Flash/strobe	5500K
Cloudy day/shade	6500K to 7500K

ABOUT THIS PHOTO
With the yellow colors of the leaves, the blue color of the blue sky, and the neutral of the snow-covered peaks, it is easy to see the differences in color temperatures. 1/500 sec. at f/11 at ISO 200.

1-9

SEEING THE COLOR

Your eyes and brain automatically interpret the colors and energies of these different light sources so that what you see appears normal. For example, if you are outdoors on an overcast day, the color temperature of the light is around 7000K, and when you come inside to a room that is lit by incandescent lights, the light is around 3000K. Your eyes and brain adjust so that you see clearly in both instances.

DON'T OPEN YOUR SHUTTER NEEDLESSLY! Because of the nature of dSLR cameras and the electrical charge that powers the sensor, the sensor is extremely susceptible to dust. When small pieces of dust come into contact with a digital sensor, they create fuzzy dark spots on the image. Often these spots cannot be seen until the image is full screen on your camera monitor. Keep your lenses or caps on your camera at all times. Try to change lenses as quickly and carefully as possible. If your sensor becomes dirty, follow the manufacturer's recommendations on cleaning. It is difficult and expensive to repair a damaged sensor; I speak from experience.

The camera is affected by light temperature and energy changes. Photographs taken with different light sources and temperatures look very different. Training yourself to notice the differences in light makes it easier for you to create images in various lights.

The biggest differences in color temperature may not be the easiest to see, such as the difference between a cloudy day and a sunny day. One of the easiest ways to see light differences is to look at your subject in shade and then in sunlight. A fascinating time to see differences in lighting color is at night in a well-lit downtown area. Streetlights, car headlights, neon signs, and the lights from inside windows demonstrate a range of lighting situations, such as in 1-10.

note

Because the camera sees all the different colors, you can create images that use the different colors of light to accentuate your photographs. You also can make changes in your camera settings to balance the light back to neutral or bring out the warmer or cooler tones in a photograph.

1-10

ABOUT THIS PHOTO

Each of the buildings has different colored interior lights. The streetlights are magenta-orange. Especially interesting are the lights on the foreground sidewalk: one is nearly white, the next amber, and the third green. 1/6 second, f/5.6, ISO 100.

Generally, warmer (which have a lower color temperature) appearing lights look more pleasing in photographs, whether in a landscape or a portrait. This is one of the reasons that you can look to sunrise and sunset as the best times to create photographs. Using the light of a sunset or sunrise helps to change a snapshot into a great photograph.

FLUORESCENT BULBS

Fluorescent bulbs and tubes are one of the best and worst light sources known to man. Fluorescents are extremely energy efficient and are cool to the touch. They cast broad, even light in a workspace. Photographically, though, fluorescents are a challenge. The color that they cast has a greenish tone, and in many cases is unflattering and unpleasant.

The light from fluorescent bulbs is inconsistent and changes over the course of their life spans. The differences are the result of different manufacturers, various batches, and even different bulb wattages. These differences can affect your photographs.

In recent years, fluorescents have made great strides with their color balance getting ever more neutral. With the advent of all the new compact fluorescents that replace regular household light bulbs, the color problem has gotten much better. Digital photography has also helped to solve some of these problems, either in the camera or on the computer. It is now easier to balance many of these different colors back to neutral.

SETTING WHITE BALANCE

The white balance function of the camera optimizes the color of a scene so that it records as the photographer wishes. The white balance of the camera works to balance the color temperature of the scene to make sure that the colors that are recorded by the camera are the same as you see them.

Effectively matching the color balance of a scene to the white balance of the camera allows a photographer to save immeasurable time in front of the computer and in some cases enhances or perfects an image. Color casts are most easily seen on a white subject, like a wedding dress, so the adjustments are made to make "whites" look white.

HOW WHITE BALANCE AFFECTS COLOR TEMPERATURE

Sunlight and manmade light have different color temperatures that are seen by the camera in unique ways. As the color temperature goes up and the light in the scene becomes more bluish, to maintain the white balance, orange must be added. In a scene that is lit by very orange tungsten bulbs, a very warmly colored scene, blue must be added to create the proper color balance, and a scene that is primarily lit by fluorescents, which have a green cast, needs magenta. The white balance function effectively filters the light through the camera's software to correct for the imbalance in color temperature and shifts that color temperature so that the white in the scene is white on the picture. The light is filtered with the complementary color of the light color to balance the light color and change any color casts back to neutral. Figure 1-11 shows the complementary colors in very basic terms. Green balances magenta; red balances cyan; and blue balances yellow.

note

In film photography, color balance can be done with colored filters. The filters are manually added in front of either the lens of the camera, the light source, the enlarging lens, or even different film types specific to the light source. With digital, photographers now use the white balance function of their cameras to maintain the correct colors from different light sources.

ABOUT THIS FIGURE *Colors relate to each other. Looking at the colors opposite each other shows which colors balance with the others to create white.*

All digital cameras can change their white balance. The Auto White Balance (AWB) function can accurately get the correct white balance in most cases. Because human eyes automatically white balance the color temperature of the light, it is often hard to see these colors. To maintain control and consistency in your photographs, you might want to stay away from the automatic settings and set your own white balance. To do that, just look at the white balance icons on the camera and match them to the visible light source.

The Auto White Balance can be fooled by both color casts or overwhelming amounts of a single color in an image. The AWB can change every image if more or fewer colors are introduced into the scene. Setting the white balance according to the light source makes every shot the same. There is more discussion on setting the white balance coming up later in this chapter.

WHAT DO THE WHITE BALANCE ICONS MEAN?

Learning how to use the items in the White Balance menu properly helps your photography immensely. Table 1-3 shows icons and their functions — while these may not be exactly what you see on your camera, these icons tend to be similar from camera to camera.

Table 1-3

White Balance Menu Options

Setting	*Function*
A/AWB	Auto white balance
(light bulb icon)	Tungsten white balance
(fluorescent tube icon)	Fluorescent white balance
(sun icon)	Standard daylight white balance
(lightning bolt)	Electronic flash white balance
(cloud icon)	Cloudy white balance
(shaded house icon)	Shade white balance

The icons are fairly self-explanatory. For example, the cloud setting is appropriate if your subject is underneath hazy or overcast skies or other situations. When shooting a children's program, most spotlights and stage lights are tungsten, and the best setting for this situation would be the light bulb icon white balance setting. In the case of a concert, colored gels are often used instead.

HOW DOES CHANGING THE WHITE BALANCE AFFECT THE IMAGE?

In simple terms, changing the white balance warms up or cools down the basic color tones of the image to ensure that the whites are white (instead of dull grey or peachy pinks). Because warmer tones are generally more pleasing to the eye, you get the most benefit by making sure that your white balance is properly set in a cloudy or shady situation.

As you can see in 1-12, the image of this woman is taken on a bright sunny day, but her face is almost completely in shadow. With the white balance set to daylight, the picture is just fine, although because her face is in shadow, her skin appears to be slightly bluish. In 1-13 with the white balance set to shade, the image really starts to pop as her skin warms up nicely, and the sunlight hitting her hair becomes far more golden and lustrous.


1-12


1-13

ABOUT THESE PHOTOS *Figure 1-12 was taken with the white balance set to daylight; figure 1-13 to shade. Notice the shallow depth of field separating the subject from the background. ISO 100 at 1/90 sec. at f/6.3.*

tip

Do some testing. A thumbnail image might not look the same when it is enlarged on your computer screen. Changing white balance makes huge differences to the final image, but those changes are not always accurately expressed on the small LCD screen on the back of your camera. Take some time to learn what the different white balances do in different situations and check final products on your computer screen as well as the viewer.

USING FLASH

When using strobe flash, you also need to have the proper white balance. With the color temperature of strobe being similar color temperature to daylight, setting the white balance to flash is very important. When photographing people with a strobe, you are usually introducing a different, slightly cooler color into a scene, and the proper flash white balance helps to make sure that skin tones stay neutral.

Most manufacturers' dedicated on-camera flash units actually transmit color temperature data to the camera. Using Auto White Balance when using a strobe is also a good option because the color temperature of a strobe is variable according to the output of the flash.

To change the amount of light that an on-camera flash puts out, the light actually fires for a variable amount of time. This amount of time is called the *flash duration* and the more light is needed, the longer the flash duration. However, even the longest flash duration is still a very short period of time, about 1/200 of a second.

USING AUTO WHITE BALANCE

Like most things automatic, Auto White Balance can adequately select the correct white balance for most scenes. When you are uncertain as to how to set your white balance manually, AWB is a great starting point. However, two common problems are encountered with AWB:

- **AWB can be fooled**
- **AWB might not produce the image that was envisioned by the photographer**

The fact that the Auto White Balance can be tricked is a problem caused by color cast. The AWB works by measuring the overall color of the entire scene and determining what the ambient light temperature is. If the scene has a predominant color, or a color cast, that might be enough for the AWB to be fooled into thinking that the color temperature is different than it really is. In a scene such as 1-14, the overall blue cast of the water could easily trick the AWB, telling the camera that the entire scene is lit with a blue light, adding warm tones such as red and yellow, which could make the water look dull and grey.

CHANGING THE WHITE BALANCE IN THE COMPUTER

Although changing the white balance when the photograph is taken seems simple and obvious, white balance is often overlooked. But, unlike exposure or focus, white balance is easily correctable after the image gets to the computer. Fine tuning the white balance in your image might be the difference between a snapshot and a great photograph.

Digital cameras are usually quite capable of achieving proper white balance. However, it is common for photographers to use some version of Photoshop or other image editing software to manipulate white balance.

ABOUT THIS PHOTO
Using a 12-24mm f/4 lens, the entire wide scene is filled with blue, which has the potential to throw the white balance off. The exposure here was 1/125 sec. at f/4 using ISO 800.

When a digital file is captured in RAW format, the image must be *converted* before it can be tweaked in any image editing software. Because all of the data is available in RAW format, it is relatively simple to just select the correct white balance in the RAW converter that comes with Photoshop Elements. You can also fine tune the white balance using a slider tool that adjusts for warmer or cooler images.

If your camera doesn't shoot RAW, or if you have chosen not to shoot RAW, the image is likely already a JPEG file. You can correct the white balance by choosing Enhance ➪ Adjust Color and then choosing from these options: Remove Color Cast, Adjust Color for Skin Tones, or Color Variations as seen in 1-15. Each of these options in Photoshop Elements can adequately correct for incorrect white balance. (You see other options here, but they aren't specifically for fixing the white balance.)

ABOUT THIS FIGURE *This image shows the path needed to correct color casts or white balance in Photoshop Elements.*

RAW OR JPEG

Whether you use a Nikon, Canon, Leica, Panasonic, Sony, or another brand of camera, the question of whether you should use RAW or JPEG files often comes up. RAW files are the proprietary files of each camera manufacturer, and they contain *all* of the data of the image photographed. JPEG (labeled as .jpg) stands for Joint Photographic Experts Group, which is the name of the committee that wrote the standard. JPEGs are compressed image files and are considered *lossy* in that they get rid of some of the image data, according to specific parameters when they are compressed and use advanced algorithms to decompress or open them.

Every camera generates a RAW file when it initially creates the image, but if the JPEG file is the only file format selected or if the camera does not have a RAW setting, the RAW file is discarded after the camera converts the RAW file into a JPEG. Numerous advantages exist to using a RAW file. Because they are large and uncompressed, RAW files create high-quality images. The RAW file can be manipulated with a computer to enhance exposure, color, white balance, sharpness, tint, and precision. Many of these changes go beyond what can be done by the camera's software.

Unfortunately, RAW files take up large amounts of memory. Because they are so big, they might take a longer time to write to the memory card, preventing you from taking multiple pictures in quick succession. RAW files also take up a lot of space, not only on your memory card, but also on your hard drive. A RAW file can take up two to three times as much space as a high-resolution/low-compression JPEG. Keep in mind that some image processing software may not be able to accommodate RAW files.

If you do use JPEG, save them as a TIF right away and do any editing in the TIF file — TIFs are *lossless*, meaning they do not lose data with each subsequent save.

RAW versus JPEG has recently become a controversial issue among photographers. Some argue that with the quality of digital cameras and software today, only JPEGs are necessary, and others believe the RAW file creates the best possible image. Ultimately, it is up to each photographer to do his own research and testing and determine what is best for his images.

USING CONTRAST TO CREATE MOOD

Contrast is paramount in creating drama, mood, and emotion in a photograph. An image that has high contrast generally has a lot of blacks and whites or darks and lights, and an image lower in contrast has more shades of grey or middle tone color. Both exposure and light quality affect the contrast in the image.

Softer light, such as the light of an overcast day, creates a lower contrast image, such as in 1-16.

CONTRAST RANGE

The ratio between the darkness of shadows and the white of the highlights is known as the *contrast range*. The human eye has a huge dynamic contrast range and can see the difference between brightly lit areas and areas that have deep shadows. Conversely, the digital sensor has a narrow range of contrast, and if the difference between light and dark is too great, the variation cannot be recorded correctly in the image.

1-16

ABOUT THIS PHOTO *The directionless light on the girl makes for very soft contrast. The changes in tone are subtle and dreamlike. 1/80 sec. at f/8 at ISO 100.*

For those used to shooting images on film, the contrast range of digital images is similar to the contrast range of slide film. This is particularly the same when it comes to highlights and overexposure, as digital has no tolerance for overexposure, although it can take several f/stops of underexposure, and slide film would largely be ruined.

Even with simple direct sunlight, if the sunlight subject is exposed correctly, the sunny area looks perfect, and the parts of the image that are shadowed become entirely black, as in 1-17. If the exposure is set to see detail in the shadow, the bright sunlight areas become too light and washed out.

WORKING WITH CONTRAST

Take stock of where the light and shadows are in your scene. If the foreground of your image is in shadow and the background is sunlit, no matter how good the meter in your camera is, the foreground will be too dark, and the background too light. One of the easiest ways to avoid this is to get everything into or everything out of the light. If the background is in sunlight, get the foreground in sun, and if the background is in shadow, move the subject into shadow, changing the exposure as needed.

A photograph of a person might have the same problem — a lot of light coming from the side or above, casting harsh, unattractive shadows across the face or into the eyes. Have the subject move her face so that it is more evenly in sun or shade to create a better photograph. Although these are basic solutions to difficult situations, they can help you build a better understanding of dealing with contrast.

Because the meter in your camera is going to average the highs and lows in a high contrast scene, dealing with the contrast range becomes second nature the more you begin to really see what the light is doing.

When you are working with unfiltered sunlight, the images you create are almost always high in contrast. The difference between the light that hits the subject and the shadows created is very large. It is also possible to use a reflector or a flash to increase the light on a dark subject, which better balances the contrast of the scene.

ABOUT THIS PHOTO *An exposure of 1/125 sec. at f/8 at ISO 100 was perfect to record the light hitting the red rocks, but the contrast was too high to do anything but make the tree into a shadow.*

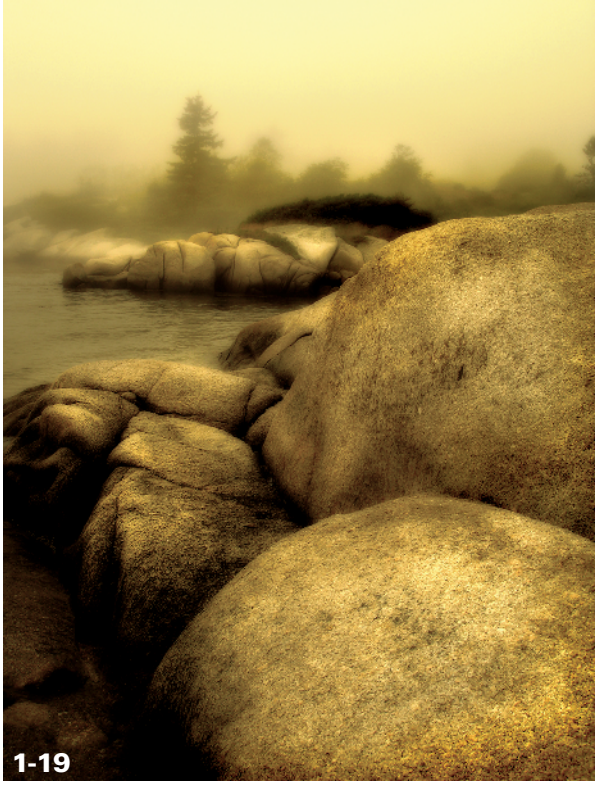
1-17

HIGH AND LOW CONTRAST

High contrast images tend to be bolder, stronger, dynamic, and dramatic; low contrast images appear softer, moodier, and subtle. This is not always the case and often the difference between high and low contrast is as simple as a quarter turn of a face or to wait for a few minutes for a cloud. Neither high contrast nor low contrast is better than the other, and either can make for exciting, beautiful photographs. A very high contrast image is shown in 1-18, as the light and the dark areas of the image come together at the hard line of the shadows. A low contrast image uses an easier transition between the light and shadow, and the tones of grey are more remarkable than bright highlights and dark shadows as seen in 1-19.

ABOUT THIS PHOTO
On a clear day, the sun is a very hard, direct light, and it can create very high contrast in a photograph. The exposure was set at ISO 200, 1/90 sec. at f/9.5.


1-18


1-19

ABOUT THIS PHOTO *On a foggy day, a wide range of contrast exists throughout the grey tones but no whites and no hard lined shadows are seen. ISO 200 at 1/250 sec. at f/5.6.*

WORKING WITH THE QUALITY OF LIGHT

Light quality is something that is hard to define, yet easy to see. Light quality has to do with contrast and color, but also with texture. These elements work along with the angle and direction of the light to create light quality.

DEFINING DIFFERENT KINDS OF LIGHT

A single, bare light bulb is a small light source. Even a frosted, soft light bulb casts severe shadows. This is why you put shades on your light bulbs. The lampshades cover and soften the harshest light of the bulb and direct the light toward the ceiling and the floor, making the light more useful. Light that goes up, lights the ceiling and brightens the whole room as in 1-20. Light that goes down is useful for reading, and light going through the shade is nice and soft and fills in the shadows. Soft light can also be called *diffused light* because most light sources can

be diffused to make them softer—sunlight can be diffused by clouds just like a light bulb's light can be diffused by a lampshade.

Even though the sun is a huge light source, because it is so far away, it is still a point of light. The smaller and farther away a light source is to the subject, the *harder* the light appears. The larger and closer the light source is, the *softer* the light gets. Harder and softer are in some ways related to contrast.

The direction of the light to the subject also is a factor of light quality. From landscapes to portraits, light coming from the side, called *sidelight* or *crosslight*, is optimal in many situations. The effect of the highlights and shadows created by the sidelight is that texture is created in the image, whether on a mountainside or someone's face.

Even though the sun is a hard light source, when it is low in the horizon, either in the morning or evening, it is a great light source for photographs for two reasons: when it is low, the sun can create the most sidelight, and because the light has to go through significantly more atmosphere, the light is filtered and becomes much softer and warmer in tone. As can be seen in 1-21, the light has a nice warm tone to it; the shadows across her face are pleasing and help to define the shape of her face. The sun is extremely low on the horizon, nearly at sunset. If this photograph had been taken just one hour earlier, the light would have been too harsh, and those soft shadows would have been totally black.

1-20

ABOUT THIS PHOTO
The soft light of a couple of standard floor lamps allow the light to wrap around the different textures and fabrics in the girl's outfit. ISO 400 at 1/60 sec. at f/4.

ABOUT THIS PHOTO *The light is much warmer and softer closer to dusk, making the shadows softer. By setting the white balance to shade, it further warms the scene. 80-200mm f/2.8 lens with an exposure of ISO 100 at 1/90 sec. at f/5.6.*

HARD LIGHT

Hard light works with many types of images, but is especially complementary with high contrast and bold colors. Hard light almost always makes the viewer think that the scene is shot in bright daylight. Hard light can evoke drama and strength in an image, but it can also be harsh and hot looking, such as light from a camera flash or midday sunshine.

Hard light is great light for mountains, beaches, and the city, making those scenes beautiful and bright, like days full of life. In 1-22, the texture of the trees is accentuated by the hard light.

Because of the inherent contrast of hard light, it casts deep shadows and bright sparkling highlights. These things can trick the meter of the camera; too much of those deep shadows causes the meter to tell the camera to overexpose the image, keeping detail in the shadow. Having bright highlights, such as sunlight reflecting off water, causes the meter to underexpose; this could make your scene so dark that the subject might become a silhouette. As discussed earlier in this chapter, make sure that you meter correctly in hard light because overexposure can easily wash out the entire image, while the meter was just trying to keep it average.

To get the right exposure for your subject, point the camera directly at something of medium tone in the image to get the exposure and then recompose to include the deep shadows or highlights.

SOFT LIGHT

Soft light occurs when the light is more diffused: a hazy, cloudy, or overcast day; in the shade; or when the strobe is bounced. Soft light can come from large light sources such as a *softbox* attached to a strobe or window from the shade side of a building. Soft light often works better for people photos, and soft light can give photos more of a moody look because it can be more subtle than hard light. Soft light wraps around shapes and can appear to have less contrast in photographs.

x-ref

More on softboxes and other equipment in Chapter 5.

ABOUT THIS PHOTO

The peeling bark and differences between black and bright branches make this photograph great for hard light. 20-35mm f/2.8 lens, ISO 200, 1/40 sec. at f/11.

In many cases, a mix of soft and hard light sources is used in an image. It is common to affect light quality with reflectors, placing the subject in a soft light situation and leaving the rest of the scene to hard light. This might happen when shooting in open shade with a sunlit background.

The light in 1-23 is soft, yet it still has bold lines and nice contrast. The white of the aspen trees and the color of the leaves all over make this a perfect candidate for soft light. In harder light, this image would be almost impossible to manage with the huge contrast range between the white trees and the dark underbrush.

note

Sunlight that reaches the Earth has been scattered by all the particles in the air. That is why you can use a polarizing filter to darken skies — the polarizing filter gets all the scattered light going in the same direction as it comes into the camera.

COLOR IN THE LIGHT

The colors of light that are produced by the sun vary widely throughout the course of the day as the light passes through different levels of atmospheric density. For example, at midday, the sun is higher in the sky and the light rays go through less atmosphere than at dusk when the light travels through a thicker layer of atmosphere to reach our eyes, which causes what is called *Rayleigh scattering*. And, not to get too scientific, it basically has to do with the wavelengths of various colors and how the particles in the atmosphere affect them.

In the morning and the evening, the light is diffused and scattered and less of the blue wavelengths reach our eyes, which is called the *Rayleigh effect*, allowing your eyes to see more red light. Thus the warmer tones in color at sunrise and sunset.

ABOUT THIS PHOTO *Shooting a forest scene is great with diffused light because it shows the entire scene. Hard light would cast shadows or leave bright sunlit areas that would be out of the exposure range. ISO 200, 1 sec., f/11.*

1-23

Photographers often call the light that happens right around sunrise and sunset the golden hour. The light at this time is full of much more color, with light that can have hints of pink, orange, red, magenta, and gold. The light quality at this time is really fantastic and is different every day. In the morning, the light might look a little softer and gentler; this is also the time that some of those pink tones show up. This is largely due to the cooler overnight temperatures and the tendency in the mornings to have a little bit of mist or fog in many situations. The evening light has a tendency to be a little harder, and the light definitely has more reddish and deeper colors.

The big bold sunsets happen when it is clear enough for the sun's last rays to shine through the atmosphere onto the underside of the clouds, but clouds are needed to capture that dramatic red light such as in 1-24.

1-24

ABOUT THIS PHOTO *This sunset was photographed with a 17-35mm f/2.8 lens at ISO 100, 1/30 sec. at f/9. The sun really lights up the bottoms of those clouds, creating great texture and color.*

Assignment

The Right Light (for You)

I covered a lot of ground quickly in this chapter to get you familiar with all the kinds of light that affect the color and contrast in your images. For this assignment, you get to pick the light for your subject. You can take a high- or low-contrast photo. You can take the picture indoors or outdoors, in full light or low light. It's up to you. The only instruction is to make note of all the elements that go into the photo that you choose to upload to photoworkshop.com. What kind of light are you dealing with? Do you need to adjust the white balance? What are your shutter speed, ISO, and aperture settings? Do you have to adjust any of them to accommodate the amount of light? When you upload the photo, share with everyone all that you can about how you took your image.

I really like working with light as a reflection. So, to complete this assignment, I decided to photograph the graphic shape of the St. Louis Arch. It becomes totally different when you get a different angle and use the light and shadow to maximize the color. In this case, the Arch is in its own shadow, so it is blue, and the sky on this bright sunny day is also blue. The sun behind the arch gives a glow that separates the subject from the background. Using a wide angle lens on a compact digital camera, the exposure was ISO 200 at 1/640 second at f/7.1 with the exposure compensation set to –1/3 to really get the blue nice and rich in color.

Remember to visit www.pwassignments.com when you complete this assignment and share your favorite photo! It's a community of enthusiastic photographers and a great place to view what other readers have created. You can also post comments and read other encouraging suggestions and feedback.