LIGHTING
PHOTO WORKSHOP

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About the Author

Chris Bucher is a freelance commercial photographer who has contributed to a number of award-winning projects in the dozen-plus years he's been creating beautiful, marketable images. Although a resident of Indiana, he began his career in Arizona and retains an affinity for the desert Southwest, where his fascination with natural light is fed by the harsh but striking landscapes. His commercial images have appeared in countless national and regional magazines. On his own time, Chris loves racing mountain bikes and serving the Humane Society as a foster parent. But his favorite pastime, bar none, is watching the interaction of light with his favorite subject, his wife, Jennifer.

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For my wife, Jennifer

Foreword

© Photo by Jay Maisel

After 10 years of helping photographers hone their skills on photoworkshop.com, I'm thrilled to present this new line of books in partnership with Wiley Publishing.

I believe that photography is for everyone, and books are a new extension of the site's commitment to providing an education in photography, where the quest for knowledge is fueled by inspiration. To take great images is a matter of learning some basic techniques and "finding your eye." I hope this book teaches you the basic skills you need to explore the kind of photography that excites you.

You may notice another unique approach we've taken with the Photo Workshop series: The learning experience does not stop with the books. I hope you complete the assignments at the end of each chapter and upload your best photos to photoworkshop.com to share with others and receive feedback. By participating, you can help build a new community of beginning photographers who inspire each other, share techniques, and foster innovation and creativity.

Robert Farber

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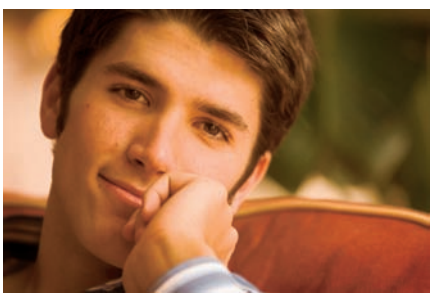
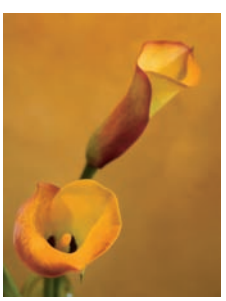
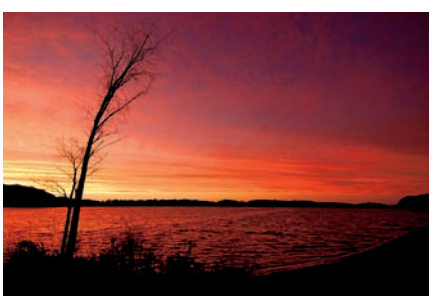
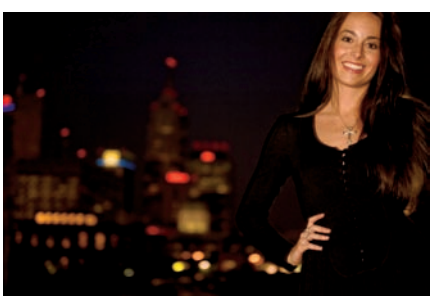








Introduction

To say that light is integral to photography is just scratching the surface. This book is just scratching the surface of all the angles and colors and direction that light can present to you in the viewfinder. As a photographer, you need light on the subject to create an image, but to create a great image, you need to get the best light you can on the subject.

Great light can come in many ways. Sometimes it just happens, and other times it takes time and patience to create or shape the light in your photographs. Take the time to wait for a few minutes to see whether the light changes, and savor the moments that you are shooting or waiting to shoot because you are not just seeing things through the camera, you are experiencing life happening before your eyes. Then you can take that slice of life home with you.

ABOUT THIS PHOTO *The backlight in this image is what creates the yellow glow as the sunlight passes through the fall Aspen leaves, and the lone pine creates a focus for the image. 1/160 sec. at f/9 at ISO 200.*

I hope that the images inspire you, if nothing more than to just take your camera with you or to keep it close to you for when the light is happening. Even more, I hope the images inspire you to try new things. Use the images here as guides and signposts so that you can recognize the things happening in your own images and better know how to capture the images that you see in your mind.

One of the goals that I had for this book was to show how it is possible to create better photographs with light that is there, no matter whether it is great light or not. This entails some testing and practice and trying new things, but that discovery is so exciting. When you begin to realize the skills that you are developing because you can better see and work with light, your photography becomes like second nature.

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.

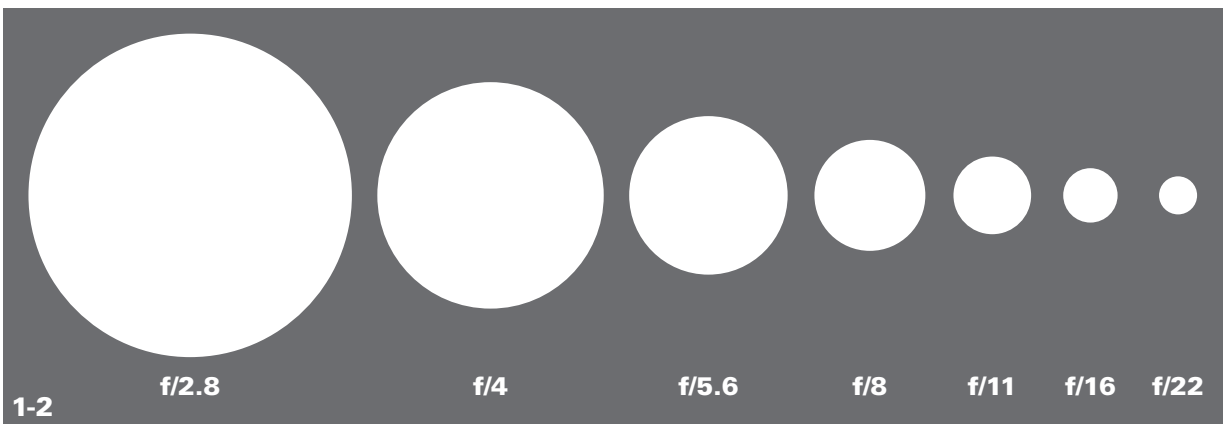
With the high quality of digital sensors and film today, going to 200 or as high as 400 only increases the noise and grain minimally, but I still recommend using the lowest possible ISO for the situation at hand.

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.



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.*

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.