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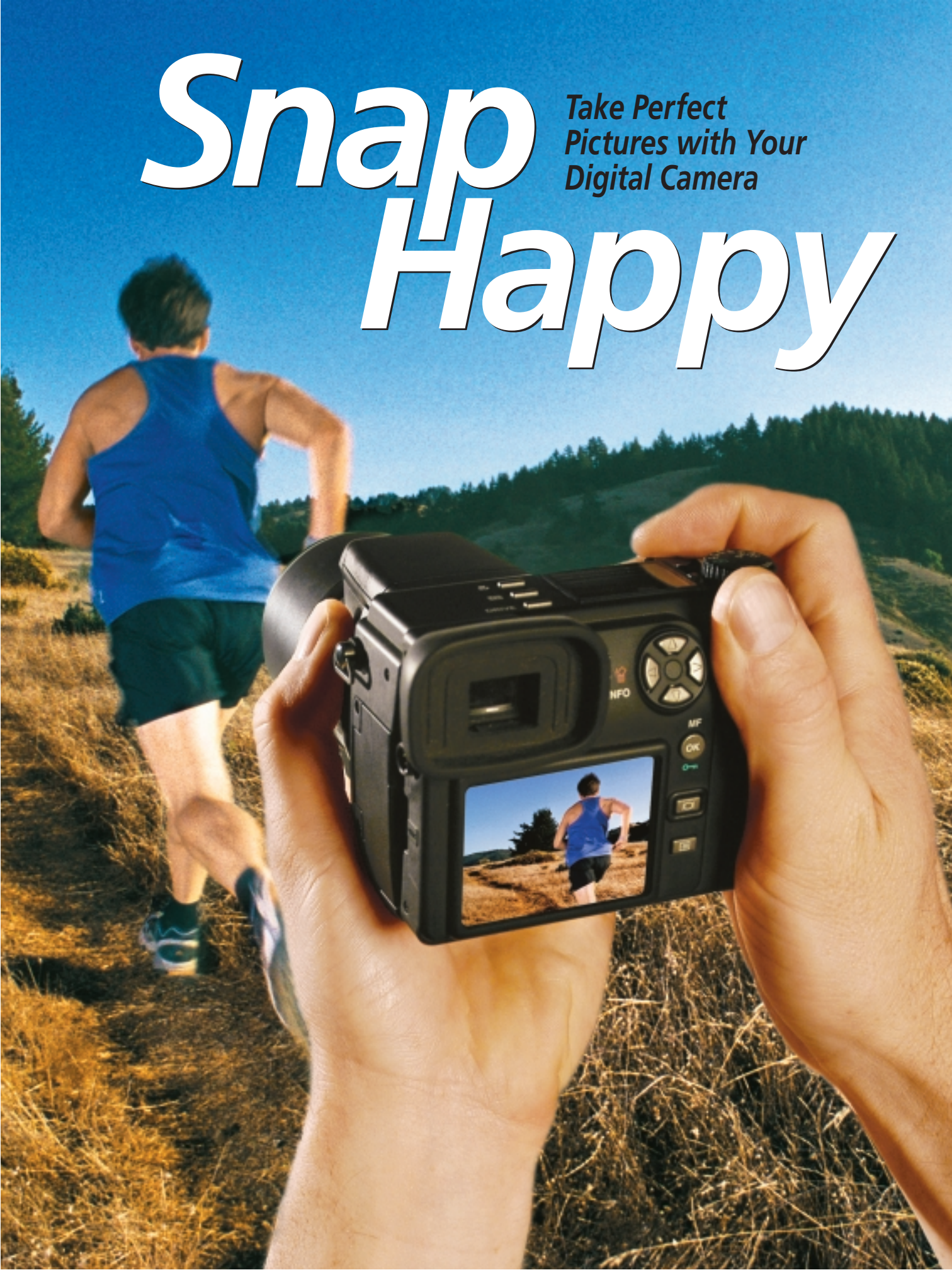
Our Guide to Taking Better Digital Photographs, page 86

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With their instant feedback, reusable media, and excellent image quality, today's digital cameras offer great advantages over their film counterparts. What's more, most digital cameras provide intelligent auto modes that do much of the difficult photographic work for you. But as sophisticated as they are, even the best auto modes can't get it right every time. If you're constantly struggling to fix images that are too dark, washed out, or just not the shot you were hoping to

capture, you're probably not taking advantage of everything your digital camera offers. To get the best pictures possible, you'll need to make some smart choices about your camera's settings.

When shooting a photograph, you may be tempted to think, "This is good enough; I can always correct it later in Photoshop." But no matter how skilled you are at image editing, it's wise to start with the best image you can capture.

In this article, we'll take an in-depth look at your digital camera's controls and show you how to get great photos—even in some notoriously challenging situations.

Balancing Quality and Size

One of the first things you should do when preparing to shoot is pick resolution and compression settings. In truth, you probably won't change these settings very often, but since they directly affect the quality of your images and how many shots you can take, it's important to understand the trade-offs involved with each.

Your digital camera's resolution setting (expressed in width and height) determines the number of pixels the camera uses to capture an image. Images with higher resolutions show more detail, but they also consume more space—so your camera's storage card can't hold as many of them.

The compression setting affects the overall quality of your image. All digital cameras compress images before storing them. Low compression rates result in larger files and better-looking images. The more you compress an image, the more its quality degrades. (Confusingly, some cam-

eras express compression in terms of image quality—for example, good, better, and best. In these cases, higher settings actually result in lower compression rates.)

Storage is becoming increasingly inexpensive, so you can avoid compromising image quality simply by buying more storage cards. This way, you can leave your camera's settings at the highest resolution with the least compression.

But if you're running out of room and want to squeeze in a few more images, you'll need to adjust the camera's settings. If you plan on printing your images, it's best to set the resolution as high as possible and increase the compression. This may introduce some compression artifacts, but these won't degrade print quality as much as a low resolution will (see "Balancing Act").

If your destination is e-mail, video, or the Web, image size isn't much of a concern.

Balancing Act

Although a high compression setting will let you fit more images on a storage card, it will also degrade your images and increase the number of compression artifacts—square, blotchy patches of color.



Where Was That Again?

Almost every digital camera has a unique interface and organization scheme for its settings and controls. If you're not sure where to find some of the features we mention, consult your camera's manual. If the documentation has gone the way of lone socks and spare keys, don't worry. Most companies offer downloadable PDF versions of camera manuals on their Web sites.

Here are some commonly used icons to look for when you're searching through your camera's menus and options:

White Balance



Sunlight/Outdoor



Cloudy



Incandescent/Indoor



Fluorescent

Program Modes



Portrait



Twilight/Low Light



Landscape



Sports

Set the compression to the best quality (lowest amount of compression) and decrease the resolution. In most cases, you can set the resolution as low as 640 by 480. (For more on compression and resolution, see "Size Matters: Preparing Your Photos for Web or Print.")

Finding the Right White

Our camera's outdoor white-balance setting (right) produces a much warmer image than its auto white balance (left).

Seeing the Light

Developing a keen eye for light quality is an essential part of getting great shots. Each time you prepare to shoot in a new location, you need to make some quick decisions about the available light. How bright is it? What's the source? The answers will help you choose the correct ISO (light sensitivity) and white-balance settings for your images.

ISO Different types of film have different characteristics. Some film is formulated for indoor shooting while some is for outdoor use; other film, due to its increased sensitivity to light, is best suited to shooting in low light.

You can also adjust your digital camera for different types of light. But unlike film cameras, which carry only one type of film at a time, digital cameras can be adjusted on a shot-by-shot basis, so you don't have to commit to a particular type of light sensitivity for all your shots.

Light sensitivity is measured using a scale called ISO. Many digital cameras provide a choice of ISO values—usually 100, 200, and 400. As the ISO value increases, the digital camera becomes more light-sensitive. But high ISO values, like high compression, have drawbacks—they produce noisier images.

In general, a camera's auto-ISO feature will yield good results. But if you want to shoot in a low-light situation where a flash is not appropriate—for example, at a theatrical performance—then you'll want to consider cranking up the ISO.

White Balance You should pay attention not only to the amount of light but also to the light source. Different kinds of light have different color qualities. Photographers refer to these differences as *color temperature*. For example, sunlight, which tends to be blue, has a different color temperature than incandescent light, which tends more toward yellow.

A keen eye for light quality is an essential part of getting great shots. How bright is it? What's the light source? The answers to these questions will help you choose the best settings.



Size Matters: Preparing Your Photos for Web or Print

Before you can share images with others, whether through print, e-mail, or the Web, you'll probably need to resize them. You can do this in just about any image editor—for example, Adobe Photoshop or, if you don't have \$609 to spend, its more economical sibling, the \$99 Photoshop Elements (800/833-6687, www.adobe.com).

You can resize an image by adjusting its pixel dimensions, its resolution, or both. Pixel dimensions are the width and height of an image, as measured in pixels. The pixel dimensions of a typical 2-megapixel image are 1,600 by 1,200.

Resolution is a measure of how closely those pixels are spaced. At 72 pixels per inch (ppi), a 1,600-by-1,200 image will measure 22 by 16 inches. At 300 ppi, it'll measure 5 by 4 inches, because those same pixels are packed closer together.

Resizing for the Web

If your images are destined for the Web or e-mail, 1,600 by 1,200 pixels is too big. After all, the average computer screen is only 1,024 by 768 pixels. You'll probably want to knock the image down to around 400 by 300 pixels and 72 ppi (the resolution of most monitors).

To discard some pixels in Photoshop Elements, a process called *resampling* or *downsampling*, open the Image Size dialog box (Image: Resize: Image Size). Make sure the Resample Image option is selected. Enter the pixel dimension you want in the Width or Height field (see "Slimming Your Photos"). The Resolution field should be set to 72 ppi.

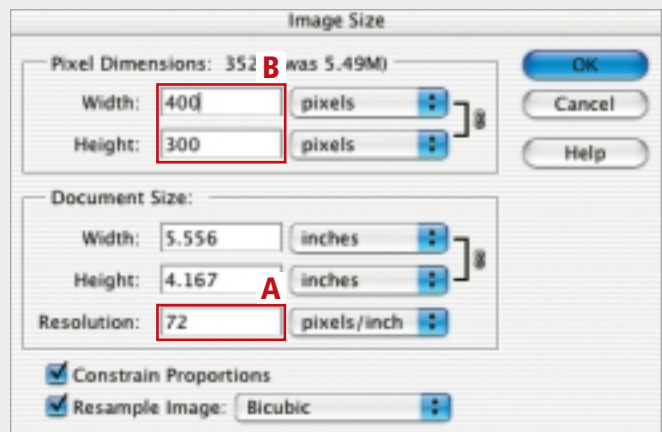
Although making an image smaller means that fine detail will be lost, downsampling doesn't usually degrade quality. In fact, your image might even get a little sharper.

Resizing for Print

If your final destination is print, you'll need to make a few additional decisions. First you must choose a resolution. Though your printer may claim that it prints 1,440 dpi or more, your images don't need such a high resolution, because your printer uses several different colored dots to re-create the color of each pixel in your image. In other words, there is not a direct 1:1 correspondence between those 1,440 printer dots and the pixels on your computer screen.

For the typical desktop ink-jet printer, 240 ppi is the highest resolution you need. If you plan to send your photo to an online printing service after editing it, check the service's Web site for resolution recommendations. In many cases, 300 ppi will suffice. To adjust your resolution for printing, deselect the Resample Image option and enter a new number into the Resolution field. Elements will adjust the document's size to match the resolution you entered. At 240 ppi, a 1,600-by-1,200 image measures 6.6 by 5 inches.

But what if you want to print a smaller image—one, say, 5 inches wide? As in the earlier example, you'll need to downsample. But instead of entering new pixel dimensions, simply enter your desired document size. Again, make sure



Slimming Your Photos To shrink a photo for displaying on the Web or inclusion in an e-mail message, set the resolution to 72 ppi **A** and enter the new pixel dimensions **B**.

that the Resample Image option is selected. Elements will then automatically calculate the appropriate pixel dimensions.

Note that unlike a 35mm film camera, which uses a 3:2 aspect ratio for its images, most digital cameras use a 4:3 aspect ratio. As a result, a digital image that's 5 inches wide is actually 3.75 inches high, not the standard 3.5 inches. To print digital images in traditional film sizes, first set your resolution as we've described and then crop your images to the appropriate size.

If you want to go bigger, to print at 7.5 by 10 inches, for example (you can't go to a full 8 by 10 inches because of the camera's 4:3 aspect ratio), you have two options. With the Resample Image option selected, enter the new document dimensions, and let Elements *interpolate* (make up new pixels) to create the larger document. This process is called *upsampling*. The downside is that this may create new artifacts and aberrations in the image. Most notably, diagonal lines can become jagged, or *aliased*.

The second option is to *deselect* the Resample Image option and then enter new document dimensions. This spreads out the original 1,600 by 1,200 pixels over a 7.5-by-10-inch image. In the process, the resolution will drop to 160 ppi.

So which is the better option? In this case, it's probably better to upsample. Photoshop's resampling algorithms are very good and aren't likely to introduce too many artifacts after such a small resizing. Printing at a lower resolution, though, will result in a marked softening of the image.

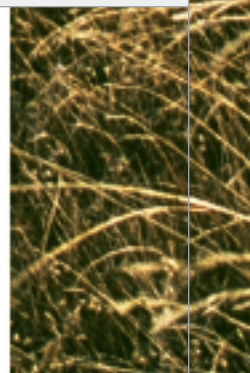
It's important to note that resampling—either up or down—can have a profound effect on an image's sharpness. Downsampling results in a sharper image, and upsampling produces softer images. For this reason, it's a good idea to perform any necessary resizing *before* you apply sharpening filters.

Your eyes can adjust to changes in color temperature, so colors look the same no matter what kind of light you're in. However, your digital camera doesn't fare as well. To render color accurately, a digital camera has to know what kind of light you're shooting in so it can compensate—this process is called *white balancing*.

Most cameras come with an automatic-white-balance feature that adjusts the camera for the current lighting. But this feature can sometimes get confused, particularly if you're shooting a scene that features a

single dominant color or includes different types of light (sunlight streaming into a room lit with fluorescent light, for example).

In these situations, you'll need to adjust the white balance. Most cameras include white-balance presets for all of the normal types of light: daylight, daylight with clouds, incandescent, and fluorescent (see "Finding the Right White"). If your camera's automatic-white-balance feature is unreliable, you may want to switch to one of the preprogrammed modes whenever you change lighting situations.



Flash Photography: Beyond the Basics

Everybody knows what the camera's built-in flash is for, right? It goes off automatically when there's not enough light. And everybody knows how ornery and feeble these flashes can be. If you're too close to your subject, the flash blows out the picture, turning your best friend into a ghost. If you're farther than about eight feet away, the flash is too weak to do anything useful at all.

No matter what kind of camera you have, you'll take your best pictures if you decide when to use the flash, instead of letting the camera decide. Believe it or not, the camera's automatic flash is wrong about half the time.

Fill Flash

If you set the flash to auto when you shoot outdoors, the camera will conclude, more often than not, that there's plenty of light in the frame, and it



A Helping Hand When left in auto flash mode (left), the camera reads the background, the lawn, the reflections—everything except the person in the foreground. As a result, your subject is underexposed and too dark. Forcing the flash (right) solves the problem nicely.

won't bother to fire the flash. But it's not smart enough to determine whether the person you're photographing is, in fact, in shadow (see "A Helping Hand"). As a result, you'll be left with an underexposed subject against a brightly lit background.

The solution in this situation is to *force* the flash on. Provided you're close enough to the subject, the flash will provide enough fill light to balance the subject's exposure with that of the surrounding background. So how do you take your flash out of auto mode? Most cameras offer a couple of different flash settings. Cycle through your camera's flash modes until you get to the forced-flash icon (usually a single lightning bolt). Stand within eight feet of the subject so you can get enough flash for a proper exposure.

This kind of fill flash will dramatically improve your outdoor portraits. It will eliminate the silhouette effect when your subject is standing in front of a bright background, and it creates a flattering frontal light that softens smile lines and wrinkles and puts a nice twinkle in the subject's eyes.

Rim Lighting

Once you've experimented with fill flash, try this technique that pros use to create striking portraits: Position the subject with her back to the sun (preferably when it's high above the horizon and not shining directly into your camera lens). Set your camera to forced flash. If the sun is shining into the lens, block it with your hand or a lens shade. The sun creates a *rim light* around the subject's hair (see "Capturing Rim Lighting"). You'll also notice that her eyes are more relaxed and open. In one swift move, you've made your subject more comfortable and improved your chances for a dramatic portrait.

Take a few pictures and review your work on screen. The forced flash should create a nice fill light. If your model is too bright, move back a few steps and try again. If she's too dark, move a little closer. (If your camera accepts filters, try a softening filter for rim-lighting shots. It can reduce facial wrinkles and create a nice glow around the subject's head.)

When it works, rim lighting creates portraits that you'll be very proud of. It's not the right technique for every situation, but sometimes it produces jaw-dropping results.

Tips from the Pros Some digital cameras offer a manual white-balance control. If you have this feature and want a truly accurate white balance, get a piece of white paper and place it in your shot. (Don't hold the paper

directly in front of the camera. It needs to be illuminated by the light in your scene.) Zoom in on the paper so that it fills a large portion of the image, and activate the manual white-balance feature. The camera will examine the white paper and calibrate itself for the current lighting. As with the white-balance presets, if you change to a different lighting situation, you'll need to take a new white-balance measurement.

Another advanced feature that can come in handy—if your camera offers it—is white-balance bracketing, which automatically shoots the same image multiple times using a variety of slightly altered white-balance settings. This feature is useful if you're particularly unsure about the lighting, or if color accuracy is extremely important.

Getting the Perfect Exposure

Once you've selected appropriate ISO and white-balance settings, you're ready to frame your shot. The most important consideration here is good exposure.

At the simplest level, your camera's exposure controls ensure that there's enough light to yield a good image

TIP

THE TWO-STEP

When you take a picture, don't immediately press the shutter button all the way down. An automatic camera isn't designed to work that way. Instead, press the shutter halfway down, and wait for the camera to signal that everything's OK (usually with a light or beep). When you press the shutter halfway, the camera focuses, meters, and calculates white balance before giving you the all clear. Then you can press the button the rest of the way. (If your camera always measures focus from the center of the image, point the camera at your subject, press the shutter halfway down, and *then* reframe your shot. This ensures that the subject is sharp no matter where it appears in the frame.)

If you just press the button all the way down, the camera must take all of these measurements and then take the shot. This will cause a lag, which can be long enough for you to miss the moment you were hoping to capture.

Indoor Flash

Another challenging flash situation is indoor photography. Over the years, you've probably seen plenty of indoor flash photos that have a pitch-black background and an overexposed, practically nuked subject. This is because the light from a typical digital camera's flash reaches only about eight to ten feet. But you can make certain adjustments to prevent the room's background from falling into a black hole.

Manual Adjustments If your camera has a manual mode that allows you to dictate both the aperture (f-stop) and shutter speed, try this combination as a starting point for flash photography indoors: set your film speed to 100, the aperture to f5.6, and the shutter speed to $\frac{1}{15}$ of a second. Turn on the forced-flash mode. (*Don't* use the red-eye reduction feature.)



Capturing Rim Lighting Remember being told to have the sun at your back when taking a picture? That's not always the best advice for portraits. In fact, you may want the sun on the model's back to create a rim-light effect.

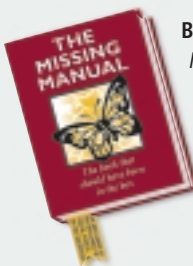
Hold the camera as steady as possible. (At these slow shutter speeds, your shots are more vulnerable to camera shake. Your flash will help freeze everything in its range—but the background, not illuminated by the flash, may blur if the camera isn't steady.) As you review the shots, you'll see that they look much different than what you're accustomed to. Specifically, the camera captures more of the room's ambience and background detail.

Slow-Synchro Flash If your camera doesn't have a manual mode, all is not lost. Almost all consumer models have a nighttime or slow-



A Little Ambience, Please Tired of having your flash subjects lost in a black hole of darkness? Try using what photographers call "slow-synchro flash." Set your camera's shutter speed and aperture manually to control the exposure of the background. The camera's flash will ensure that the subjects are exposed properly.

synchro mode, often indicated by a crescent-moon icon or stars over a mountain. This mode is for shooting portraits at twilight, but you can also use it indoors to open up the background (see "A Little Ambience, Please"). Granted, you don't have as much control with this setting as you do with a manual mode, but you might be pleasantly surprised by the results.—DERRICK STORY



By the Book This is an excerpt from *iPhoto: The Missing Manual* (O'Reilly/Pogue Press, 2002), by Derrick Story, David Pogue, and Joseph Schorr. Derrick Story is also the author of *Digital Photography Pocket Guide* (O'Reilly, 2002), a complete guide to the ins and outs of digital cameras—including tips for shooting in just about every situation you may come across (www.oreilly.com/catalog/digphotogp).

but not so much light that your image washes out. It does this by balancing its shutter speed (the amount of time the shutter stays open) with its aperture (the size of the lens' opening). Your camera's auto-exposure mode can produce good results for most scenes, but for difficult shots such as quick motion, or specialty shots such as soft backgrounds, you'll often get better results if you take over some of the controls. When used correctly, your camera's exposure controls can provide tremendous creative possibility.

Light Metering No matter what your photographic goals are, the key to getting properly exposed images lies in your camera's light meter. When you press the shutter button down halfway, the camera runs through a list of tasks: it calculates an appropriate focus, selects a white balance, and uses the light meter to measure the amount of light in your scene and determine an appropriate shutter speed and aperture.

However, your meter doesn't necessarily choose a shutter speed and aperture that will yield the *best* image—just one that is neither too bright nor too dark. Your camera's light meter always assumes that it's

pointed at something that is 18 percent gray, because generally, a scene reflects 18 percent of the light that strikes it. While this assumption is often right, you may need to tweak the camera's exposure settings to get the best results (for tips, see "True Colors: Compensating for Automatic Exposure").

How a camera meters an image can dramatically affect the accuracy of the exposure. Today, many cameras offer metering options: usually matrix, center weight, and spot. Matrix metering divides your scene into a grid, meters each cell, and then calculates an exposure based on all of that metering. Center-weight metering takes the same approach but prioritizes the center cells (where your subject most likely is). Spot metering measures just a narrow portion of the center of the image.

So which meter should you choose? Because of its big-picture approach, matrix metering is the best option for most situations. If there's a marked difference in lighting between the background and the subject in the center of a scene—a person standing in front of a window, for example—center-weight metering is a better option.



TIP

BETTER PORTRAITS

One of the best ways to bring more focus to a subject is to choose an exposure that yields a shallow depth of field. Unfortunately, depth of field is partly a function of focal length, and most small digital cameras have extremely short focal lengths—so you can't get depth of field that's as shallow as what you'd get from a camera with long lenses. Here, we used our camera's portrait mode to soften the background. You could also use the aperture-priority mode to choose a low f-stop (wide aperture). Then the camera automatically chooses an appropriate shutter speed. If you're not satisfied with the degree of softness in the background, increase the distance between it and the subject.



Choose spot metering if you're in a difficult lighting situation and want to make sure that a specific element in your scene—regardless of its position in the frame—is well lit. For example, if a scene includes patches of bright light and shade but the subject is off to the side, you can use spot metering to meter the subject and then reframe the shot before pressing the shutter button completely.

Fine-Tuning Exposure Once the light meter lands on an exposure, you can choose to either shoot with that exposure or, if you think the shot requires it, adjust the calculated shutter speed or aperture to better serve your photographic intent.

For any given light-meter reading, there are many different exposure combinations that result in the same amount of light hitting the camera's sensor. For example, doubling the aperture of a given exposure while keeping the shutter open half as long results in an exposure equivalent to the original. This interrelationship is called *reciprocity* and makes it possible to use different combinations of shutter speed and aperture values to achieve very different results from the same shot.

By altering shutter speed, you can control the camera's ability to freeze motion. Slow shutter speeds render moving images with lots of blur; fast shutter speeds freeze even the fastest action.

By altering the camera's aperture, you can control the image's depth of field, the measure of which distances are in focus. Aperture is measured in *f-stops*. Because it uses a *smaller* aperture, a high f-stop setting stops more light, thus producing a deep depth of field in which the entire image is in focus.

To create an image with shallow depth of field—for example, where only objects 6 to 12 feet away from the camera are in focus—use a very low f-stop setting. (But remember that because large apertures allow more light, you'll need to use a short shutter speed to get a good exposure.)

By controlling depth of field, you can blur out the background or foreground of the image to focus more attention on the subject (see "Better Portraits").

Using Exposure Modes Some digital cameras let you set both your shutter speed and aperture. But keeping track of these settings can be tedious. To make adjust-

If a scene includes patches of bright light and shade, use your camera's spot meter to meter your subject; then reframe the shot before pressing the shutter button completely.

Capturing the

Light To get great nighttime shots like this, you'll need a tripod or other stable surface. Use your camera's night mode (usually represented by a crescent-moon icon) or, if your camera offers priority modes, set the shutter speed to about four seconds. And be sure to turn off the flash.



True Colors: Compensating for Automatic Exposure

If your light meter always calculates an exposure that's appropriate for 18 percent gray, how can it accurately calculate an exposure for other colors? The answer is, it often can't.

Say you take a picture of a black statue. Since the light meter assumes that the statue is 18 percent gray, the exposure it calculates will reproduce the black carving as somewhat gray (see "Getting Back to Black"). Similarly, if you were to shoot something white—a field of snow, for example—the light meter would produce an exposure that rendered the snow as slightly gray, rather than truly white.

To restore the blacks and whites in the image, you sometimes need to make adjustments. You'll overexpose to make whites whiter, and underexpose to make blacks blacker. Almost all digital cameras provide exposure-compensation controls, which let you simply dial in an amount of over- or underexposure.

With these controls, you don't have to worry about an absolute shutter-speed or aperture value. Instead, you tell your camera to over- or underexpose by a maximum of two f-stops, usually moving in increments of $\frac{1}{3}$ of an f-stop.

The amount of exposure compensation you'll need varies, so it's best to bracket the shots by shooting multiple images with varying degrees of compensation. To make things easier, some cameras offer an autobracketing feature that shoots a series of images with different exposures whenever you press the shutter button.

Exposure compensation is not just for blacks and whites, though—the color tones in your image can also be changed. Just as white can be made more white by overexposing, bright colors will become brighter (less gray) by overexposing. In general, most colors will appear more saturated if you dial in a tiny bit of underexposure (usually $\frac{1}{3}$ of an f-stop will do).



Getting Back to Black With the automatic exposure (left), this black statue appears slightly gray, and background details (such as the columns) are washed out. To get a truer black (right), we underexposed the image by $\frac{1}{3}$ of an f-stop.

ing your exposure easier, most cameras offer specialized shooting modes for some common types of situations. Usually selectable from a dial on the outside of the camera or from a menu on the camera's LCD screen, these specialty modes let you specify the settings you care about (for example, shutter speed) and tell the camera to take care of the rest.

Although the number of modes varies from camera to camera, the most common are for portraits, landscapes, sports shots, and low-light images. Each mode features a different priority for the exposure settings. For example, if you set the camera to portrait mode, it automatically selects a wide aperture (and corresponding shutter speed) to reduce depth of field and create a blurry background behind the subject.

A landscape mode typically has a very small aperture, to increase depth of field, and often locks the focus on infinity. These settings ensure that the entire scene will be sharp.

Sports settings prioritize for faster shutter speeds to stop fast-moving action; sand-and-snow settings intentionally overexpose the image to render bright scene elements—such as fresh snow—as the right color.

If you're looking for even more fine-tuned control over your image's aperture or shutter-speed setting, check to see if your camera offers *priority modes*. Rather than choosing the general effect you want, as with exposure modes, priority modes let you select a specific f-stop or shutter speed and tell the camera to do the appropriate calculations for you. For example, shutter priority allows you to select a shutter speed and leaves the choice of aperture to the camera, while aperture priority does the opposite.

The Last Word

If there's one fundamental rule for improving your images, it would be to pay attention to light changes (white balance), overall brightness (ISO), and bright or dark colors in the scene that need to be over- or underexposed. If you keep your eyes open and learn to correctly use your camera's controls, you should be able to capture images that accurately depict your artistic vision.

BEN LONG is a freelance writer based in San Francisco and the author of *Complete Digital Photography*, second edition (Charles River Media, 2001).

