

Basic digital photography

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This evening's topics

- We'll go over a few simple tips for digital photographers.
- We'll spend a fair amount of time learning the basics of photography and how to use your camera beyond the basic full automatic mode.
- We'll review digital camera functions including exposure, white-balance, the histogram, auto-focus, and a little bit about image composition.
- A 5 minute depth-of-field video and an exposure demonstration.

Before we begin, few simple tips:

- **If you don't have a camera manual download a copy from the manufacturer's website. Rather than just reading the manual from cover to cover try reading a section at a time and practice that topic using your camera.**
- **Purchase a spare battery and a spare Flash card for your camera.**
- **Check out the items that came with your camera such as software and cables. These items don't cost extra money and are often very useful.**
- **If you have a digital SLR, consider purchasing a UV filter for each of your lenses. This helps to protect your lenses from scratches and external elements such as sand, dust and birthday cake.**
- **If you enjoy taking pictures of flowers, insects, or landscapes consider the purchase of a tripod. A tripod is essential for close-up, landscape and low-light photography.**
- **For DSLR users – make sure you know how to adjust your camera viewfinder's diopter setting. This is very important.**
- **Make sure you know how to adjust your LCD screen's brightness.**

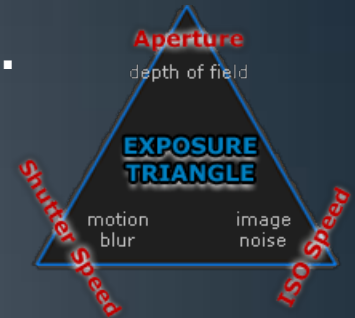
Digital camera modes

- **Digital cameras typically have several picture taking modes. Manufacturers may have differing names but most support the following:**
 - **Full Automatic** – This is typically the mode that novice shooters will use. No decisions are required of the user. Just point, shoot and take what you get.
 - **Program Automatic** – Similar to Full Automatic but lets you control some of the parameters such as ISO, flash on/off etc.
 - **Aperture Priority** – Allows you to set the aperture while the camera computes the shutter speed based on the required scene exposure.
 - **Shutter Priority** – Allows you to set the shutter speed while the camera computes the lens aperture based on the required scene exposure.
 - **Manual Mode** – Allows full manual control of shutter speed and aperture.
 - **Scene Modes** – Setting a scene mode is used to give the camera's computer information about the scene such as Landscape, Portrait etc. This allows the camera to optimize shutter speed and aperture settings.

Exposure explained

- Probably the most important thing to know regarding your digital camera is the concept of exposure. Basically, exposure is the amount of light collected by your camera's sensor during a single picture.

- Too much exposure will result in a washed out picture.
- Not enough exposure will result in pictures that are too dark.



- All digital cameras have 3 ways to adjust exposure:

- Shutter speed: Faster shutter speeds allow less light to reach the sensor but are better for action shots. Typical shutter speeds are 1/15, 1/30, 1/60, 1/125, 1/250 1/500 second etc.
- Aperture: This refers to the size of the lens opening at the time of shutter release. Smaller numbers mean a larger opening allowing more light to enter the sensor. Typical apertures are f2.0, f2.8, f4.0, f5.6, f8, f11 etc. The tradeoff for a larger aperture is less depth of field.
- ISO : Higher ISO numbers mean greater sensitivity to light. Typical ISO values are 100, 200, 400, 800, 1600 etc. The tradeoff for higher sensitivity is increased noise in your picture.

Equivalent exposure

- There is no single, perfect exposure setting for a given scene. The sensor can be exposed to the same amount of total light for many different combinations of shutter speed and aperture.
- An equivalent exposure is one that relies on the same amount of light for the proper exposure but juggles the aperture, ISO and shutter speed settings to yield different image effects.
- Shutter speed: Notice how shutter speeds are arranged in powers of 2 such as 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 sec.
- Aperture: While it's not quite as obvious, apertures are also arranged in powers of 2 such as f1.4, f2, f2.8, f4.0, f5.6, f8, f11, f16, f22 etc.
- Given the above fact, for a given exposure we can create an equivalent exposure by manipulating shutter speed and aperture. For example:
 - 1/60sec and f4.0 is equivalent to 1/120sec and f2.8
 - 1/250sec and f8 is equivalent to 1/125sec and f11.

Equivalent exposure cont.

- **Why is equivalent exposure important???**
- **For instance, there are times when a shallow depth of field is important so we may want to set a wider aperture such as f2.8.**
- **There may be other times when for the same scene as above shutter speed is a priority so we would want to set a high shutter speed such as 1/1000sec.**
- **Equivalent exposure is what allows us the freedom to choose aperture or shutter speed as a priority and allow the camera to compute the other variable needed for proper exposure.**
- **Bear in mind that one other factor, ISO, is another variable in equivalent exposure. Higher ISO values will produce faster shutter speeds but the tradeoff is typically increased noise in your photos.**
- **Regarding ISO – each digital camera model has an optimal range of ISO values for best image quality. It is best to learn your camera's optimal ISO range which typically is not it's full ISO range.**

Depth of field

- Depth of field refers to *how deep an area that appears sharp both in front of, and behind a focused subject.*



Shallow DOF: The background appears blurred.



Deep DOF: The background appears clear.

- Depth of field is a function of lens focal length, aperture and subject distance. Wider lens apertures (f2.8 etc.) decrease depth of field and smaller apertures (f16 etc.) increase depth of field. Closer subject distance will decrease depth of field and longer focal length lenses tend to decrease depth of field.

Depth of field video

Exposure metering

- **Metering refers specifically to how the camera calculates exposure for a given scene.**
- **Most digital cameras offer several options for metering a scene. Nikon offers matrix metering, average metering and spot metering. Canon offers evaluative metering, average and spot metering. Both are similar and most other brands offer the same options.**
- **Matrix or evaluative metering tries to analyze the entire scene and predict proper exposure. This is typically the default metering and usually works pretty well but can be fooled by difficult lighting situations.**
- **Average metering meters off the central 8-15% of the frame. This usually works pretty well for situations where the subject has different lighting than the background.**
- **Spot metering uses the central 1.5-3% of the frame. This works well when you really want to isolate the exposure value within a small section of the frame such as a person's face.**

Exposure compensation



- There are times when your photographs are either underexposed (too dark) or overexposed (too light or white). However, there is a way to manually change the exposure to compensate for the image being darker or lighter than desired.
- Exposure compensation allows you to override the camera's internal exposure meter setting.
- On both Nikon and Canon digital camera's, the exposure compensation button looks like a plus and minus sign (+/-).
- When is exposure compensation useful?
 - If you take an image and it looks to be too dark or too light when examining it's histogram or viewing it in your LCD screen. Be sure your LCD screen has been adjusted for proper intensity.

A word on blurry images and lens shake

- Consider this simple rule when taking a photo – To avoid a potentially blurry or fuzzy photo make sure your shutter speed is in the vicinity of $1/(\text{focal length})$. For instance, if shooting at a focal length of 100mm you should make sure your shutter speed is equal to or greater than $1/100\text{sec}$.
- Building on the above, assume I have a zoom lens mounted to my DSLR that has a zoom range of 18-250mm. I need to be aware of both my selected focal length and shutter speed. Make a point to glance at your shutter speed in the viewfinder. Here's some examples:
 - Zoom lens set to 50mm. Current shutter speed indicates $1/100$ sec. Since $1/100$ sec. is faster than $1/50$ sec., this should be fine.
 - Zoom lens set to 250mm. Current shutter speed indicates $1/100$ sec. Potential blurry shot because the shutter speed is lower than $1/250$ sec. Hold the camera real steady, or if possible increase the ISO setting by a factor of 2.
- As you can see from above, shooting towards the telephoto end of the range requires ever faster shutter speeds to avoid blurry or fuzzy photos. For example, shooting a bird with a 400mm lens requires at the minimum a shutter speed of $1/500^{\text{th}}$ sec.

Exposure demo

How to properly hold your camera

- What one thing ruins more pictures than anything else? The blur that results from camera shake or an out-of-focus image. Holding the camera correctly can help prevent that blur.
- Blur is caused by the movement of either the subject or the camera. Subject movement is something we really can't control, although adjusting the shutter speed can give us some control over how subject movement is captured.
- Hold the camera's handgrip in your right hand and cradle the camera body or lens with your left. Keep your elbows propped lightly against your torso for support.
- Use your left hand to cradle the lens, so that it's helping to support the weight of the camera.
- If it's windy or your shutter speed's getting slow (1/100 or lower) try to find something to lean your body against, like a tree or a pole.
- When you're ready to take the picture, press the shutter release button halfway to focus. When focus is complete, the selected focus point or points will be briefly highlighted.

How to hold your camera, cont.



White Balance

- **White balance (WB) is the process of removing unrealistic color casts, so that objects which appear white in person are rendered white in your photo. An incorrect WB can create unsightly blue, orange, or even green color casts, which are unrealistic and particularly damaging to portraits.**
- **Normally, you would set your camera to “Auto White Balance”. This usually does a pretty good job of rendering colors properly.**
- **There are times when the camera doesn’t do a good job removing color casts, particularly in fluorescent or incandescent lighting conditions. Setting your camera to the appropriate white balance setting often does a better job of removing the color cast.**
- **Typical manual settings are tungsten, daylight, fluorescent, cloudy, shade and custom WB.**
- **Custom white balance typically does the best job but it’s important to know when to use it.**

The image histogram

- **Understanding image histograms is another important concept to become familiar with when working with pictures from a digital camera.**
- **A histogram can tell you whether or not your image has been properly exposed, whether the lighting is harsh or flat, and what adjustments will work best.**
- **The best way to understand a camera histogram is to show some examples. The following pages attempt to do just that.**

The histogram cont.

Understanding Digital Camera Histograms: Tones and Contrast - Mozilla Firefox

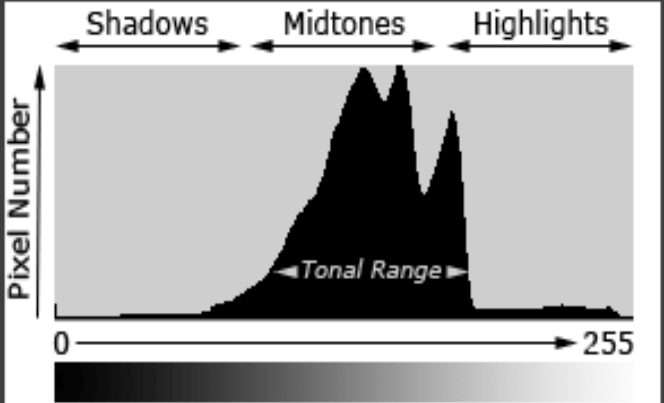
File Edit View History Bookmarks Tools Help

http://www.cambridgeincolour.com/tutorials

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Understanding Digital Camera Hist... ae Color Temperature and Color Correction i...

Each pixel in an image has a color which has been produced by some combination of the primary colors red, green, and blue (RGB). Each of these colors can have a brightness value ranging from 0 to 255 for a digital image with a bit depth of 8-bits. A RGB histogram results when the computer scans through each of these RGB brightness values and counts how many are at each level from 0 through 255. Other types of histograms exist, although all will have the same basic layout as the histogram example shown below.



Shadows Midtones Highlights

Pixel Number

Tonal Range

0 255

Done

The histogram cont.

Understanding Digital Camera Histograms: Tones and Contrast - Mozilla Firefox

File Edit View History Bookmarks Tools Help


http://www.cambridgeincolour.com/tutorials/histograms1

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Understanding Digital Camera Hist... ae Color Temperature and Color Correction i...


HIGH AND LOW KEY IMAGES

Although most cameras will produce midtone-centric histograms when in an automatic exposure mode, the distribution of peaks within a histogram also depends on the tonal range of the subject matter. Images where most of the tones occur in the shadows are called "low key," whereas with "high key" images most of the tones are in the highlights.

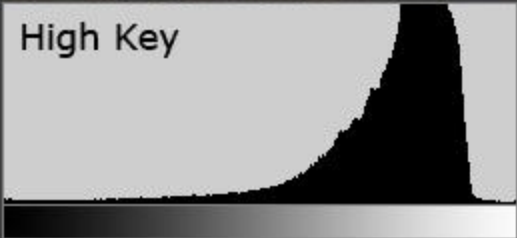


Low Key





High Key



Done

Digital camera autofocus

Understanding Autofocus and Image Sharpness - Mozilla Firefox

http://www.usa.canon.com/content/Rebel_lessons/lesson_15.html

Canon Digital Learning Center @ photoworkshop.com

AF Backgrounder

The Digital Rebel's seven-point, wide-area AF system helps ensure sharp shots in most situations.



Before getting into how to utilize the focusing systems in the Digital Rebel, and the situations in which you need to take control, please refer to the lesson, **Focus on Auto Focusing (Lesson 4)**. In that lesson you'll read about the camera's different AF modes – One Shot AF, Predictive AI Servo AF, AI Focus AF and Manual Focus. . . and how they can help you get great shots.



AF works best in sunny scenes with lots of detail.


intro 1 2 3 4 5 6 7 8 9 10 11 12 close

Done

Digital camera autofocus

Understanding Autofocus and Image Sharpness - Mozilla Firefox

http://www.usa.canon.com/content/Rebel_lessons/lesson_15.html




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Low Contrast Situations


In low contrast scenes (cloudless sky, solid-color wall, misty/foggy scenes), it's often faster to focus manually – on the main subject using your old standby focusing system. . . your eye!

Simply flip the switch on your lens to M and turn the focusing ring until the subject is in focus visually through the viewfinder.

If you press the shutter button halfway down while focusing manually on a scene with detail and contrast, the active focusing point and the focus confirmation indicator in the viewfinder light up when focus is achieved.



Sunset, MT



Camera viewfinder overlay showing focus points and status indicators (60, 4.0, 4).

intro 1 2 3 4 5 6 7 8 9 10 11 12 close

Done

Digital camera autofocus

Understanding Autofocus and Image Sharpness - Mozilla Firefox

http://www.usa.canon.com/content/Rebel_lessons/lesson_15.html



Canon Digital Learning Center @ photoworkshop.com

Get the Background Subject in Focus

Here's another situation where I recommend manual focus: when objects (grass, branches, fences, bars and wires) are in front of your subject.

In situations like this, if you simply let auto focus take over, the foreground elements may be in focus and the main subject in the background may be out of focus – or at least not as sharp as the foreground elements.





Sunset, Provincetown, MA

intro 1 2 3 4 5 6 7 8 9 10 11 12 close

Done

Image composition

- **Composition - why is it important? What are the "Rules" and can they be broken? What makes a pleasing composition?**
- **Try to avoid placing the main subject in the center of the image.**
- **The Rule of Thirds – As far back in time as ancient Greece, they realized that placing the main subject on one of the intersecting points of a 3 X 3 grid led to a more pleasing image composition.**
- **Simplicity - Keep the scene limited to only what you want the viewer to see (that is, keeping any unnecessary elements out which may be distracting from the subject).**



The Rule of Thirds

Image Composition, cont.

- **Format: Horizontal or Vertical** - which is going to give the "most" visual impact to the viewer? Is the subject standing up, leaning forward or on the move in one direction or another?
- **Leading lines** – Use leading lines to lead the viewer into the main area of interest in the photo.

Example of simplification and leading lines



Original photo



Image cropped for simplification

Image composition, cont.

- Some examples of the rule of thirds:



Image Composition - rule of thirds



Image Composition - rule of thirds, leading lines



Image Composition - rule of thirds, diagonals



Image Composition, leading lines



Image Composition, cont.

- Try to avoid placing a horizon through the middle of the photograph. It does work sometimes, but most often it is best to place it in either the upper third or lower third of the photograph.



Original photo



Image cropped to move horizon and follow the rule of 3rds

Image Composition, cont.

- Landscape photography is often improved by placing a foreground object into the scene. See the next few examples.



Waterfall with slow shutter speed



Flowers placed in foreground adds interest

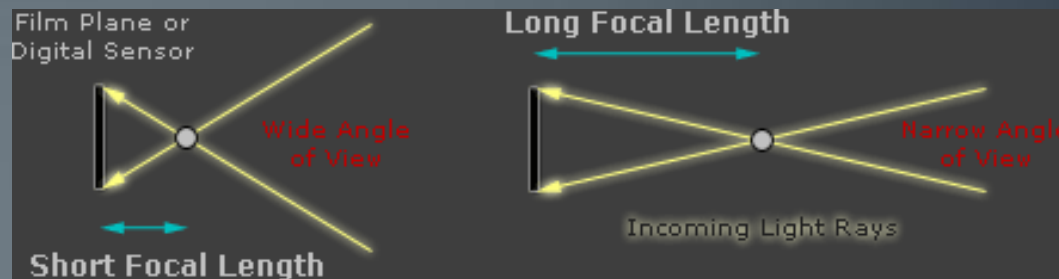
Breaking the rules is Ok, too

A centered horizon is typically not recommended but I think it works for this image.



Lenses and focal length

- **Focal length:** The focal length of a lens determines its angle of view, and thus also how much the subject will be magnified for a given photographic position. Wide angle lenses have small focal lengths, while telephoto lenses have larger corresponding focal lengths.



- For a 35mm camera, a wide-angle lens would be in the range of 15-35mm, give-or-take. A wide angle lens is useful indoors, where your distance to subject is limited or outdoors for sweeping landscape views.
- A mid-range lens would be in the range of 50-200mm. A mid-range lens is useful for portraiture or action shots.
- A telephoto lens would be in the range of 200mm and beyond. These are great for birds, sports and wildlife but are typically very large, costly and heavy.

Some useful web links

- Excellent lessons for Canon shooters:
 - http://www.usa.canon.com/content/Rebel_lessons/
- Excellent lessons for Nikon shooters:
 - http://www.nikondigitutor.com/index_eng.html
- Olympus Learn Center website:
 - http://www.olympusamerica.com/cpg_section/oima_learn_center.asp
- Samsung camera support page:
 - <http://www.samsung.com/us/consumer/photography/digital-cameras/index.idx?pagetype=type>
- Excellent website dedicated to general photography knowledge:
 - <http://www.cambridgeincolour.com/>
- Excellent photography videos:
 - <http://www.adorama.com/alc/category/AdoramaTV>