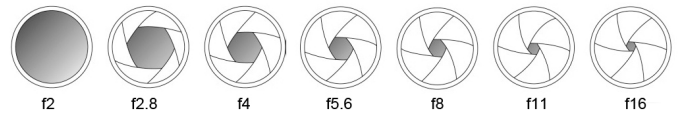


Practical Nature Photography: Cameras and Light / Lecture Notes

Light – Getting the right exposure — a photo that’s not too bright, not too dark, but just right — depends on four factors:

- **Ambient Light** – The light available out there to expose your subject. You have little control over ambient light short of choosing when during the day you shoot or by using your camera’s flash.
- **Shutter Speed** – The length of time the camera’s shutter remains open to expose and capture the image. In most situations, it’s a fraction of a second ($1/60^{\text{th}}$, $1/250^{\text{th}}$, $1/2000^{\text{th}}$, etc.) but often expressed on the camera as a whole number: 60, 250, 2000, etc. In order to stop fast action (sports, birds, grandkids) for a photo that’s not blurry, you need a fast shutter, in the range of $1/250^{\text{th}}$ of a second or faster (More on this below in the item called Shutter Speed and Motion). Also note that it’s hard to avoid a blurry image from *your own* movement if your shutter speed is slower than $1/30^{\text{th}}$ of a second. In genuine macrophotography, which magnifies your own movements, you’ll need much faster shutter speeds — at least $1/250^{\text{th}}$ for macro lenses (or twice the focal length) and at least $1/100^{\text{th}}$ for most point-and-shoots.

- **Aperture** – This is the lens opening (or f-stop). It’s essentially the relative diameter of the hole through which light travels to your camera’s sensor (or to film in the “olden days”). Examples of f-stop values, from wide open to a pin-hole, are 2.0, 2.8, 4, 5.6, 8, 11, 16 and 22.



The smaller the number, the wider the lens opening. In darker situations you’ll use a wider lens opening (lower f-stop number) to allow more light travel to your camera’s sensor. More on this later under Depth of Field.

- **ISO** – This is a measure of your camera’s sensitivity to light. Its scale runs roughly like this: 100, 200, 400, 800, 1000, 2000 and higher. (The AUTO setting lets your camera decide the ISO.) ISO is equivalent to film speed, or ASA, in the days of film. For standard shooting set your ISO in the range of 100-200 for the best quality. When ambient light is low you can help your camera “see in the dark” by choosing higher ISOs. These higher ISO settings (above 400) can help you get a photo indoors with no flash, in dark woods, at dawn or dusk or in other low-light situations. It’s amazing, like giving your camera night-vision goggles. But you can’t get something for nothing: the tradeoff at high ISO settings is graininess in your image — or noise — in exchange for this greater sensitivity to light.

Shutter Speed and Motion – Photographing motion generally requires a faster shutter (a smaller fraction of a second). A slow shutter speed creates motion blur (which is different than being out of focus). If you’re taking photos of sports or dogs or birds in AUTO mode, odds are they will be blurry (motion blur) because the camera often selects a shutter speed that’s *too slow* to freeze the action. So, in order to control your shutter speed, take your camera out of AUTO mode and into **shutter priority** mode (S or Tv on the dial if your camera has a dial) and *choose your own shutter speed* (like we used to do with film cameras). When you do so, the camera then chooses the proper corresponding lens opening (f-stop) in order to get you a properly exposed shot. If your camera doesn’t have shutter priority mode (most cameras without a dial on top don’t shoot in shutter priority mode) then increase your ISO setting; your camera will mostly likely respond with faster shutter speeds. Or choose one of your camera’s **Scene Modes** (such as “Sports” or “Kids and Pets”) to freeze the action. These action scene modes force your camera to choose a faster shutter. To give you a sense of all this, here are a few scenarios and the *approximate* suitable shutter speeds necessary to freeze action:

- Still life - $1/60^{\text{th}}$
- People at a dinner party - $1/100^{\text{th}}$
- People moving at a picnic - $1/150^{\text{th}}$ and faster
- Ballroom dancers, joggers - $1/250^{\text{th}}$ and faster
- Hand-held Macro - SLRs: $1/250^{\text{th}}$ and faster / Point-and-Shoots: $1/100^{\text{th}}$ and faster
- Soccer, football, basketball - $1/400^{\text{th}}$ and faster
- Birds at the feeder and dogs playing - $1/400^{\text{th}}$ and faster
- Race cars or birds in flight - $1/800^{\text{th}}$ or faster, sometimes much faster

Aperture and Depth of Field – Remember that aperture (f-stop) is the size of the lens opening through which light passes when you open the shutter for that fraction of a second. So why not use a wide open f-stop to allow the most light and the quickest shutter? Lens opening has an attribute called *depth of field*. Depth of field is the range of space—near to far—that will be in focus in your image. A wide open lens (in the range of f2 to f4 on point-and-shoots) shortens the depth of field, particularly in close-up photography; in this range of f-stops it’s likely that portions of the butterfly on your flower will be out of focus. To get more of it in focus, choose a smaller lens opening, which means a higher f-stop number (such as f8 or f16). Again, get out of AUTO mode and into **aperture priority mode** (A or Av on the dial) so that you yourself select the f-stop; the camera then selects the proper shutter speed for the right exposure. Depth of field is an issue in macro (close-up) photography. For landscapes and general photography, it’s not as critical — you can get away with wider lens openings and the resulting shorter depths of field. Sometimes you prefer a short depth of field because it produces a blurry background, a nice effect for portrait shots.