Digital Exposure Techniques

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Topics

What is exposure and how is it controlled?
Ways of measuring exposure
Advanced techniques

What is Exposure?

The amount of light reaching the camera sensor

Too little light Under exposed Correct Exposure

Too much light Over exposed







How is it controlled?

- Aperture the amount of light allowed through the lens
- Shutter speed the time the light is allowed through
- Sensitivity (ISO) the amount of light needed by the sensor

Aperture



Shutter Speed

Longer

Shorter

Shows Motion

Freezes Motion

Shutter Speed

Sensitivity (ISO)



Putting it together

- If an image appears underexposed we can correct it by:
 - Enlarging the aperture (letting more light in)
 - Increasing the time the shutter is open (letting the light in for longer)
 - Increasing the sensitivity (producing a brighter image for the same amount of light)
- If an image is correctly exposed and we want to increase the shutter speed, then we must compensate by:
 - Enlarging the aperture
 - Increasing the sensitivity

Measuring Exposure

- Simple metering averages the whole image to mid-grey.
- So a dark scene (lots of black) may come out as too light (averaged to grey)
- A light scene may come out too dark
- Need to compensate for this
- Method depends on camera (physical dial, dial on screen, menu)
- Rule of thumb compensate by 2/3 1 stop.

Compensation

Standard





Compensation

Standard







Measuring Exposure

- Simple metering averages the whole image to mid-grey.
- So an image of an object with a dark background may come out too light
- One with a light background may come out too dark
- Change the metering mode
 - Evaluative
 - Partial
 - Spot

Metering Modes

Evaluative







Spot

Metering Modes

Both spot metering



How can I check the exposure?

EXPLAINED HOW TO READ A HISTOGRAM

A camera's histogram is an accurate guide to exposure, as it illustrates the range of tones, or brightness levels, present in an image. You should review the histogram each time you take a picture, so that you can assess if you need to make any exposure adjustments.



The horizontal axis of the graph represents the brightness level, from darkest on the left to brightest on the right. The vertical axis shows how many pixels in the picture are at that brightness level

How can I check the exposure?







www.better-digital-photo-tips.com

Advanced techniques

- What is correct exposure?
- Common strategies include:
 - (1) exposing "to the right,"
 - (2) slight under-exposure
 - ► (3) correct (standard) exposure.



Characteristics of digital photos

Progressively darker tones have correspondingly higher image noise:

 $\leftarrow \text{More Noise} \qquad \text{Less Noise} \rightarrow$

Characteristics of digital photos

Progressively brighter tones are unrecordable beyond a certain intensity, causing textures to turn solid white ("clipped highlights"), or individual colour channels to saturate:

Characteristics of digital photos

Incomplete use of a camera's dynamic range reduces the number of recorded tones, and this problem is compounded by the fact that cameras capture disproportionately fewer dark tones compared to how we see with our eyes:



Expose to the Right

Strategy: Aim to expose the image so that its histogram shifts as far to the right as possible without clipping the highlights, even if this results in over-exposure. A negative exposure compensation is later applied (during RAW development) to get the image back to a standard exposure.





Using the "Expose to the Right" Strategy

Expose to the Right

- Advantages:
- Maximizes the number of tones recorded.

Note: many recent digital SLR cameras have RAW files which record tones with 14-bit precision, so this is less of a factor than it used to be. It is highly unlikely that a RAW image will have insufficient tones (and become posterized) as long as it isn't grossly underexposed.

- Minimizes image noise because lighter (and therefore less noisy) tones get darkened after exposure compensation is applied. The total reduction in noise will depend on how much the photo is able to be over-exposed without clipping.
- Disadvantages
- Has a high risk of clipping the highlights, especially in the individual colour channels (which can lead to unrealistic colour shifts).
- Requires more light than normal, and potentially a higher ISO speed (which could mitigate any reduction in image noise from ETTR).
- Makes judging/pruning photos more difficult since subjects will likely appear overexposed (until exposure compensation is applied in post-processing).
- May require several shots (followed by histogram inspection) in order to position the histogram as intended. One also needs to look at the colour histogram in order to avoid clipping in any of the individual colour channels.

Expose to the right

Clipping in individual channels





Slight under-exposure

Strategy: Aim to slightly under-expose the image by using a negative exposure compensation (perhaps about -1/3 to -1/2 stops) in the camera itself. A positive exposure compensation is later applied (during RAW development) to get the image back to a standard exposure.



Slight under-exposure

Advantages:

- Safeguards against blown highlights and clipped colour channels.
- Requires less light than normal, potentially enabling a lower ISO speed (which would offset any increase in image noise).

Disadvantages:

- Increases image noise because darker (and therefore noisier) tones get brightened after exposure compensation is applied.
- Images will likely appear darker than intended when viewing them in the camera.
- Fewer discrete tones are captured by the camera.

'Correct' exposure in camera

Strategy: Aim to achieve a final exposure in the camera without any need for exposure compensation during post-processing. However, there isn't always a "correct" exposure for every scene, since this also depends on your artistic intent (particularly for night and low-light photos).

Advantages

- Images will likely have the intended brightness straight from the camera. This makes post-processing much simpler and also allows one to more easily judge "keepers" when viewing them on the camera.
- Doesn't require that you capture your images using the RAW file format.

Disadvantages:

Still risks clipping the highlights or individual colour channels when capturing very high contrast (or colourful) scenes, especially if the camera's metering mistakenly over-exposes a little.

Other techniques

- Auto Exposure Bracketing (AEB). Most cameras have an option to automatically capture both an under and over-exposed alternative, just after the first "standard" exposure. These can provide useful backups, but occupy more storage space.
- High Dynamic Range. This is a powerful new technique which has the potential to provide virtually limitless dynamic range — without ever clipping the highlights