Why Shoot Raw?

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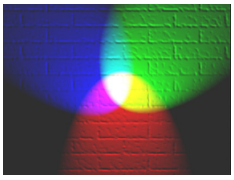
Introduction - Raw

- All digital cameras use a raw format for the image data collected by the camera's sensor.
- Digital cameras convert the raw data to a "cooked" or processed JPEG format before writing to film card.
- Most better cameras allow you to write the image to the film card in its raw format, JPEG format, or both.
- The raw file has more information that can produce higher quality pictures but needs processing outside the camera.
- Why shoot raw?
  - Short answer: More flexibility! More control in post processing your photos. Better quality in your photos.
  - But there's a cost! Takes a little more time to process the files.

RGB Model

- RGB (Red, Green, Blue) color model https://en.wikipedia.org/wiki/RGB_color_model
- Colors are made by adding different amounts of red, green and blue.
- Used in TVs, video and digital cameras, computer displays, video games, cell phones, and other devices.



- Other color models, e.g., CMYB (Cyan, Magenta, Yellow, Black) is used in printers. https://en.wikipedia.org/wiki/CMYK_color_model

JPEG File Format

- JPEG is a standard file format used in all digital cameras.
- Each pixel (picture element) has three values for RGB.
- In JPEG, the values go from 0 to 255. Uses 8 bits per value. (0, 0, 0) is black; (255, 0, 0) is red; (0, 255, 0) is green; (0, 0, 255) is blue; and (255, 255, 255) is white. For a total of 256x256x256 or 16,777,216 possible colors.
- When the three values are equal, it's a shade of gray (includes black and white). Therefore, 256 shades of gray.
- JPEG format processes white balance, contrast, sharpness, saturation, etc. inside the camera before storing on film card.
- JPEG file format compresses the camera's raw data and, in the process, loses information, i.e., quality.

Raw File Format

- A raw file format uses more bits for the color values (color depth) instead of 8 bits for 256 values.
- Current digital cameras use 12 to 16 bits per color value. E.g., my Canon 80D uses 14 bits for raw files or 16,384 values for each of red, green, and blue. (2^{14} = 16,384). Also, 16,384 shades of gray.
- My camera's raw files have 16,384 x 16,384 x 16,384 or about 4.4 trillion possible colors!
- That's the source of the flexibility! More subtle colors.
- More adjustments of exposure, white balance, details in shadows, brightness, etc. are allowed in post processing.

Downside of Using Raw Files

- Raw files are non-standard! Each vender is different! Even cameras from the same vendor use different raw formats!
- You are required to use special software to handle raw files. I use Lightroom 6.
- Raw files are larger to store. On my Canon 80D a typical raw file is 35-40 MBytes while a JPEG file is 8-15 Mbytes.
- Before you can share an image, you must use software to convert the raw file to JPEG. I use Lightroom.
- Cameras create raw files that are dull in appearance. You need to fine tune the contrast, sharpness, etc. to bring the image back to what you saw. I use Lightroom.