DSLR Cameras

Just the Basics Please

Other Places to Learn

- YouTube
- Books
- Camera manual
  - Good to look up details about items
- Remember that nothing takes the place of practice!

Focus on the Basics (1/2)

- Viewfinder and live view
- Lenses, wide, normal and telephoto
  - Prime and zoom, and aperture (F-stop)
- Shutter speed and Aperture
- Exposure types
  - S(**Tv**), A(**Av**), M, and P (**Canon**)
- ISO
  - Manual and auto

Focus on the Basics (2/2)

- Focus areas and modes
  - Auto area, spot, and facial recognition
- Shutter release modes
  - Single and multiple
- White balance
  - Presets and auto
- File types
  - Raw and jpg

Two DSLR Types

Mirror

- Look through lens and pentaprism
- Mirror flips up and shutter opens to expose sensor

Mirrorless

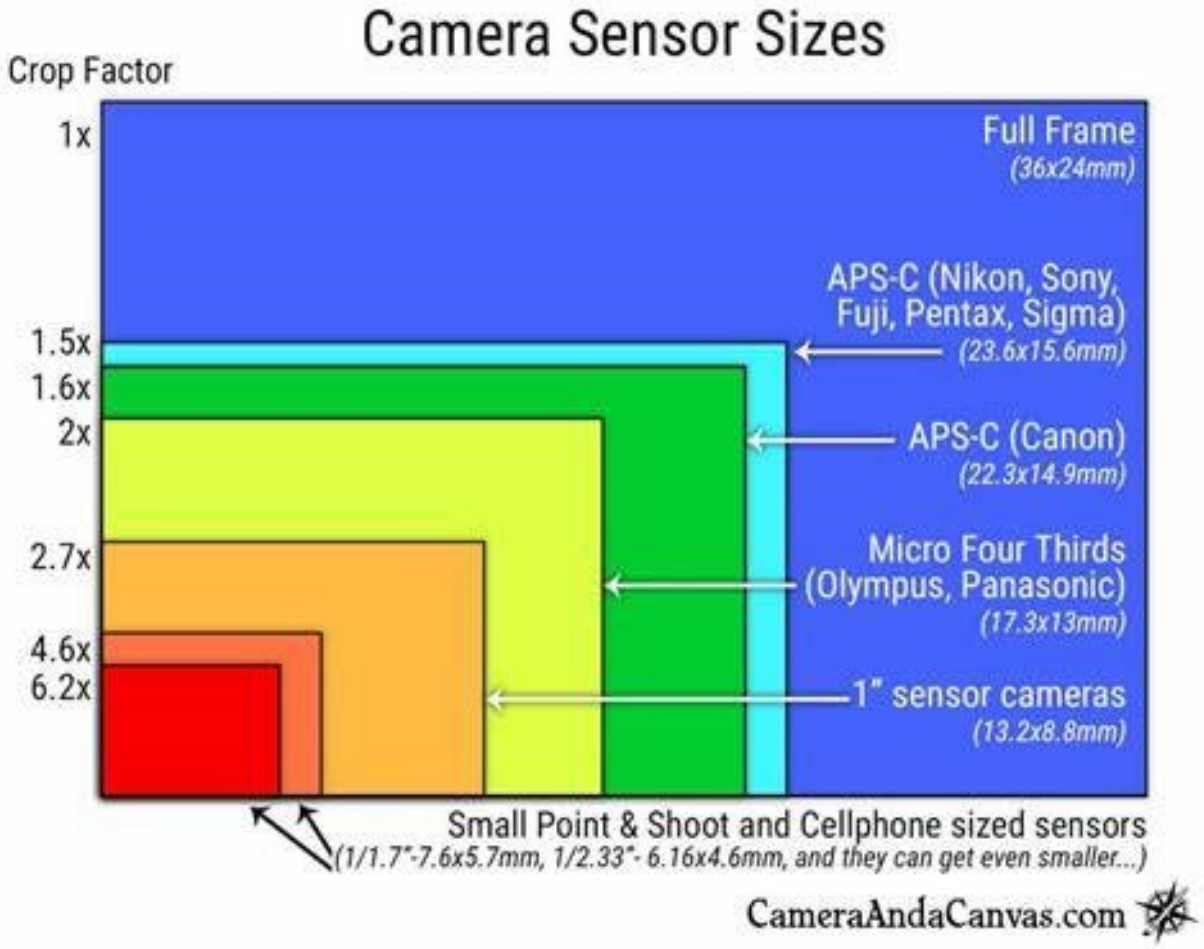
- Finder has a tiny lcd display
- The sensor is always exposed, some have shutter

DSLR Three Main Sensor Sizes

- Full frame 24x36 mm, same as 35mm film
- APS-C, 18x24, lower cost, smaller lenses
  - Nikon and Canon APS-C not quite same size
  - Probably the most common DSLR size
- Micro 4/3, Fuji, Olympus and others
  - Smaller than APS-C

Cell Phone Sensors

- Different aspect ratios may crop images so the full sensor size isn't always used
  - Shoot pictures with your phone and look at the pixel counts
    - My Samsung S23 has maximum pixel count at 4:3 aspect ratio

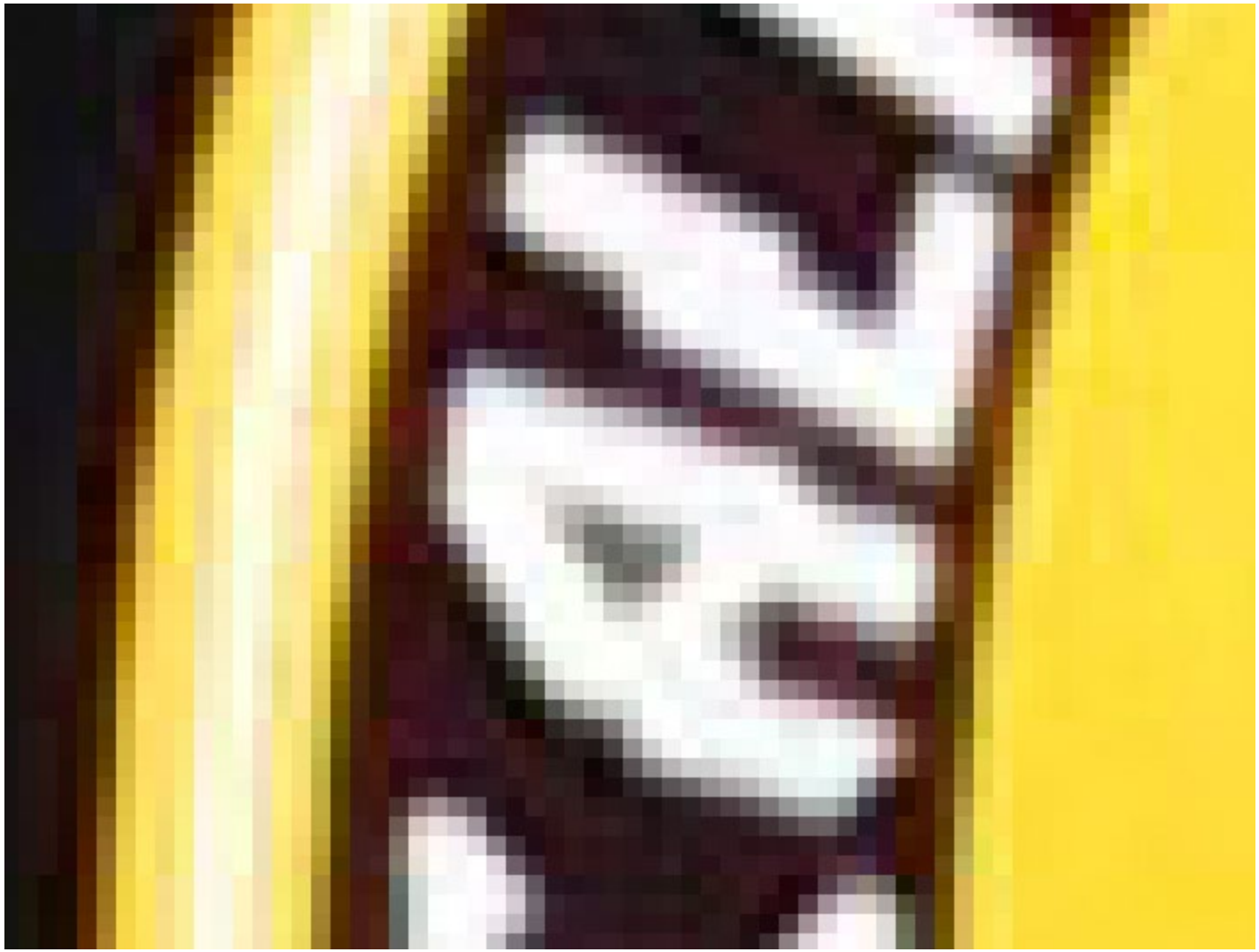

Camera Sensor Sizes
Crop Factor
1x
1.5x
1.6x
2x
2.7x
4.6x
6.2x
Full Frame
(36x24mm)
APS-C (Nikon, Sony, Fuji, Pentax, Sigma)
(23.6x15.6mm)
APS-C (Canon)
(22.3x14.9mm)
Micro Four Thirds (Olympus, Panasonic)
(17.3x13mm)
1" sensor cameras
(13.2x8.8mm)
Small Point & Shoot and Cellphone sized sensors
(1/1.7"-7.6x5.7mm, 1/2.33"- 6.16x4.6mm, and they can get even smaller...)
CameraAndaCanvas.com

Crop Factor

- This is a multiplier to compare focal length of a lens when used with a non-full-frame sensor
- E.G. a 50mm lens on a 1.5 crop factor (for example: Nikon DX) sensor acts like a 75mm lens on a full-frame sensor camera
  - This is useful to compare lenses to 35mm film

Pixels

A quick look at the world of little picture elements



Notice each block (pixel) has one color and brightness.

You just have to make them small enough so you can’t see them.

Pixels

- An image is made of little picture elements
- Each one has color and brightness, really just 3 different color brightness's
- If they are small enough you can’t see each individual element
- How many you need depends on how far your eye is away from them

MegaPixels Needed?

- Many monitors about 2MP (1600x1200)
  - I use 2560x1600 which is 4MP
- Images look fine (lens quality important!)
- Camera manufacturer marketers wanted a number to show quality, bigger is better!
- 8 MP is enough unless extreme crop
  - Billboards are 15 ppi and about 2MP

Memory Cards

Hey! Where are my images stored?

Most Common Memory Cards

- SD – secure digital
- Micro SD

  - SDHC <= 32GB
  - SDXC >32GB
  - Class is the speed (at least 10)
- XQD (Cfexpress Type B)

Get the Correct Card

- An acquaintance of mine was about to return a recently purchased used camera because it wouldn't format the 64GB SDXC card
- It was an older model that only supported SDHC, so the maximum size was 32GB
- Those cards only appear to be identical

Viewing the Image

I spy with my little eye!

Viewing the Image

Viewfinder

- Must hold at eye-level
- Good for bright light and action

Liveview – back display

- Can zoom for precise focus
- Good for tripod and other angles
- Best for macro
- Often has touch focus

Turning Liveview on

- Often a button or switch, but sometimes a menu entry

Lenses

Wide, normal, telephoto, fisheye, oh my!

And what is this F-stop or aperture thing about?

Lens Properties

- Important
  - **Focal Length or range for zooms**
  - **F-Stop, maximum or range for zooms**
- Other things
  - Manual/automatic focus
  - Resolution, contrast, and distortion (quality)
  - Filter diameter
  - VR/IS to reduce hand-held shaking


85mm 1.8G

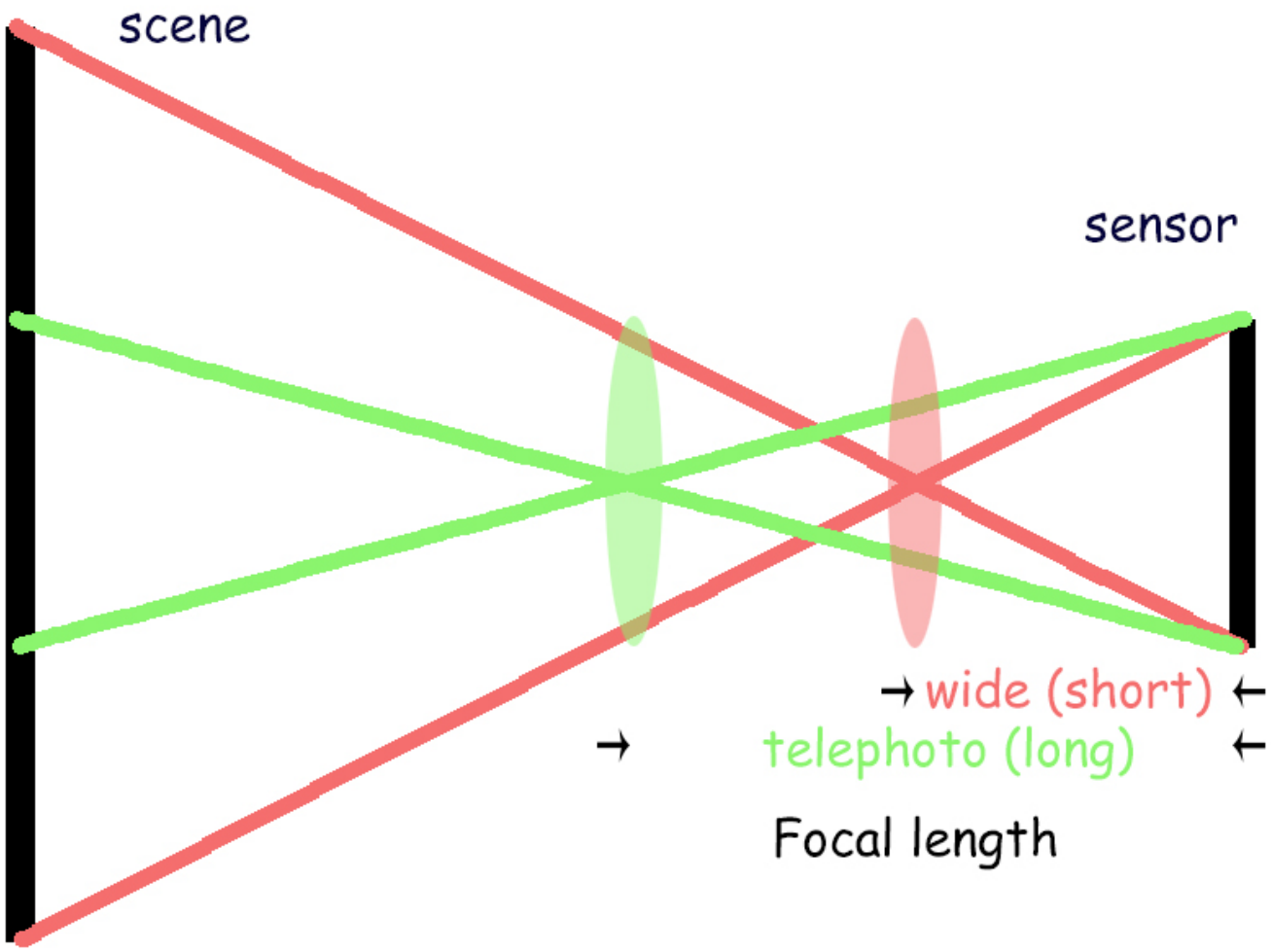

70
50
35
28
Nikon
ft 50 15
m 10 3
ED
AF-S NIKKOR 28-300mm 1:3.5-5.6G
VR


Nikon
SWM VR ED IF Aspherical ø77
MADE IN THAILAND
US56080113

Lens Focal Length

- Focal length
  - **Normal** is diagonal of squared sensor
  - **Telephoto** is longer than normal
  - **Wide Angle** is shorter than normal
- Full frame Normal is ~50mm
  - Diagonal length of a 36mm square
- APS-C is about ~35mm
  - Diagonal length of a 24mm square

Focal length affects field of view



Lens Classifications

- Prime – Single Focal Length
- Zoom (optical) – Range of Focal Lengths
- Normal
- Wide
- Fish-Eye (super-wide but distorted)
- Telephoto
- Macro/Micro (for close-ups)
- Portrait
- Specialty Lenses (example: shift/tilt)

Digital Zoom

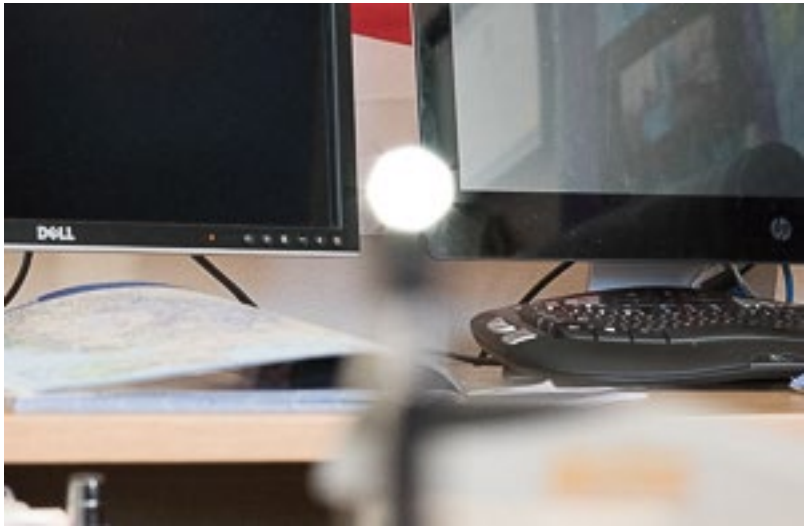
- Marketing trick
  - Amazing zoom range to tout as a feature
  - Expands pixels, lowers details
  - Disable if your camera has this “feature”

Telephoto Compression

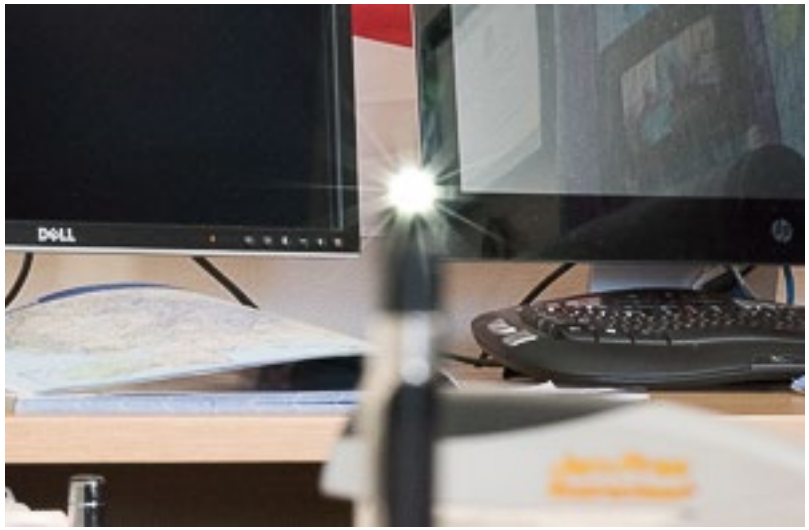
Wide angle, front flowers pop

Bokeh

Notice how it is changed by the F-Stop. Smaller F-Stops often give a star like effect. This is usually more noticeable on shorter focal lengths.



F5



F14

Smooth Round Bokeh (small F number, large aperture)

Lens Resolution

- Lens quality can affect image detail as much or more than the number of megapixels
  - Really good lenses resolve >18 Mpixels
    - Cost well over $1000
- Image quality largely determined by lens quality today, we have plenty of Mpixels, better than 35mm film
- 5MP with a good lens makes a better image than 10MP with a poor lens
- Spend your money on good glass!

Focal Length Effects

- Long (telephoto) lenses
  - Get you closer to the subject
  - More sensitive to shake
  - Compress perspective
  - Have short depth of field
- Short (wide angle) lenses do the opposite

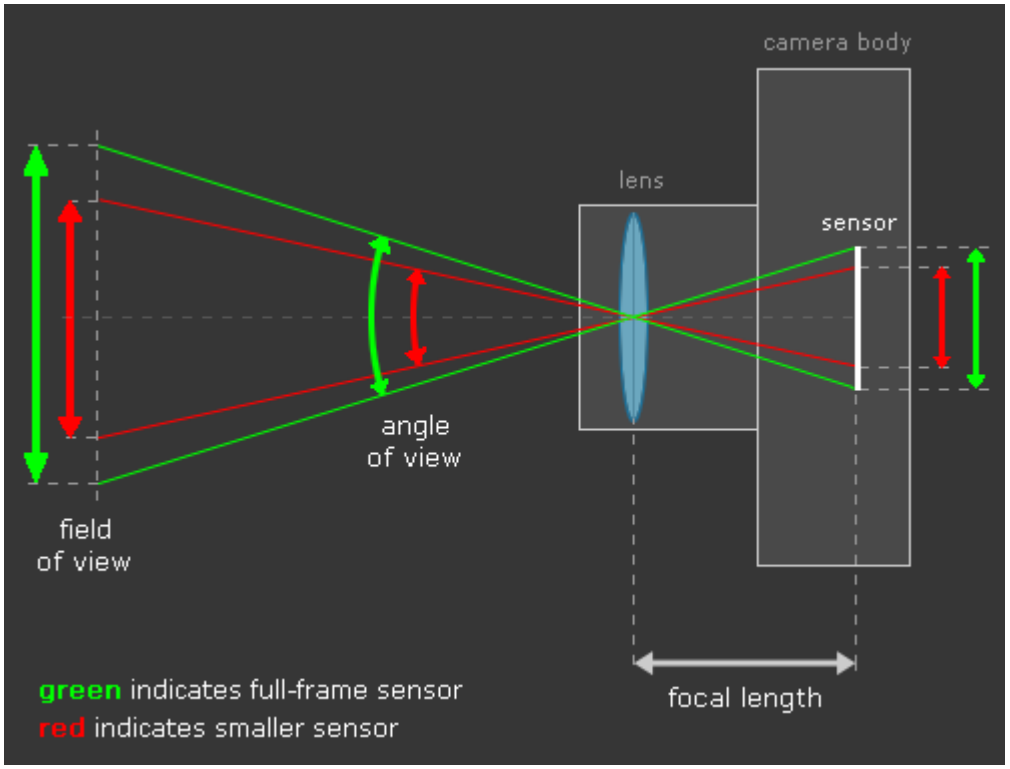
Wide vs Telephoto

300mm

28mm

Tilted Wide Tilts Angles

Smaller sensors make lenses act longer



This effect makes a 35mm on APS-C act like a 50mm on a Full-frame, and a 50 act like a 75 etc. This is known as the crop factor. It is 1.5 for Nikon and 1.6 for Canon.

Choosing a Lens Length

	Wide Angle (short)	Normal	Telephoto (long)
Perspective	Spreads things apart	Normal	Makes things appear closer
Depth of Field	Deep (long)	Normal	Shallow
Shake sensitivity	Low	Normal	High, tripod
Size	Short and wider	Normal	Long and often heavy
Vertical lines	Tend to tilt and curve	Normal	Tend to stay straight

Lenses for Different Sensors

- Lens designations
  - Nikon uses FX and DX for full and smaller
    - You can use FX and DX on all bodies, but DX images will be cropped on FX bodies
  - Canon uses EF and EF-S
    - You can use EF on EF-S body but not the reverse

Aperture or F-Stop

How much distance do you want to be sharp?

Lens Aperture

- F-Stop
  - “Hole” size through lens
  - Bigger allows more light
  - Ratio (Focal_length/hole) is F-Stop number
    - Allows F numbers to always indicate light amount
  - Maximum aperture is printed on the lens
    - It may depend on the zoom setting

Aperture Effects

- Depth of Field
  - The range of distance that looks “sharp”
  - Larger F-Stop numbers make this longer
    - Note: diffraction effect makes less sharp >~F11
  - Longer focal lengths make it shorter
- Bokeh
  - What out of focus highlights look like
    - Halos, stars, donuts, weird shapes…

Depth of Field

F4

F8

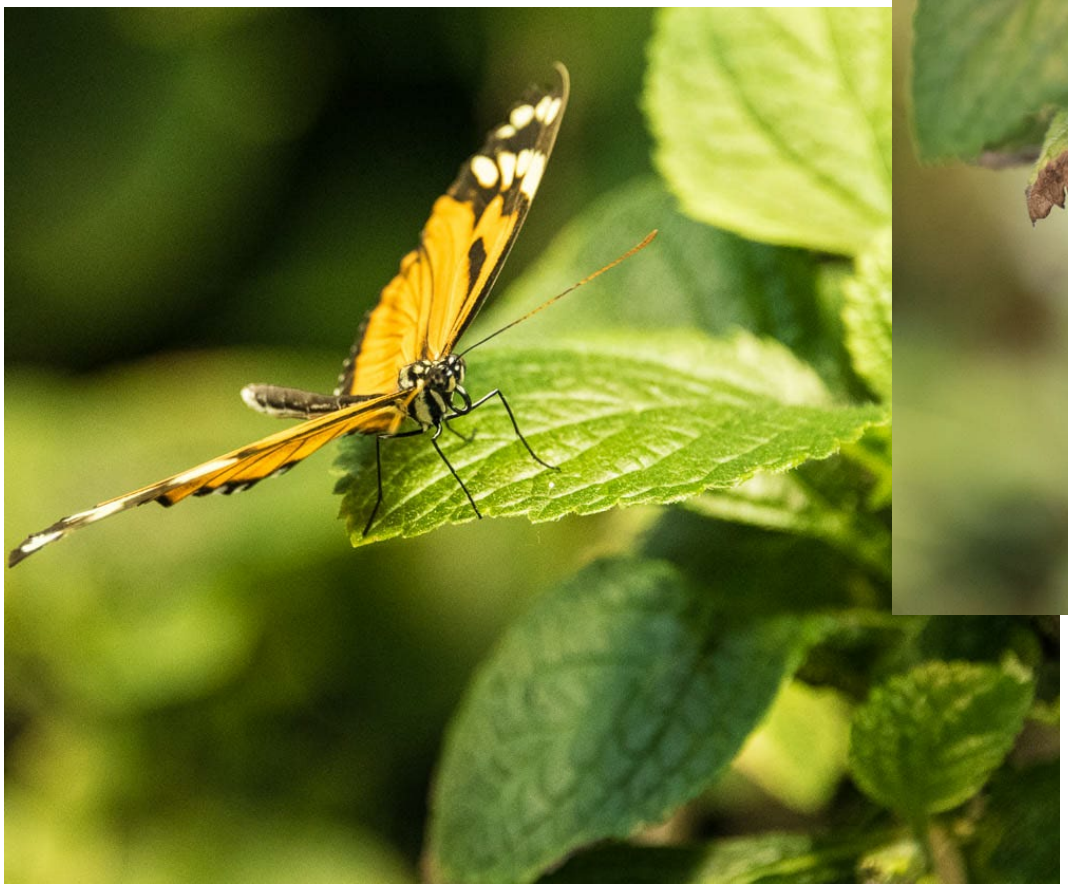
F22

Notice how blur increases both behind and in front of the focus plane. This is different than “portrait mode” on cell phones where anything other than the subject is blurred the same.

Why Shallow Depth of Field?

Notice how your eye goes to the sharp parts and tends to ignore the fuzzy parts

Depth of Field Isolation



Hyperfocal Distance

- Focus setting that allows everything from a close distance out to infinity to be in focus
- Longer for wider angle lenses, shorter for longer focal length lenses
- wikipedia.org/wiki/Hyperfocal_distance

Some Canons

- Select two points, camera will compute the F-Stop that will keep both of them sharp

How to Find DofF

- Use a phone app
- Use the preview button on your camera
  - Best in live view mode, harder to see in viewfinder

Depth of Field and Sensor Size

- Smaller sensors create more depth of field
- This is one reason why cell phones have very large depth of field while full frame cameras have less

Shutter Speed

How fast are you?

What is Shutter Speed?

- How long the light is registered on the sensor
- With a mechanical shutter it is how long the shutter allows light to hit the sensor

Two Kinds of Shutters

- Mechanical
  - Makes the shutter sound we all know
- Electronic
  - No noise, common on mirrorless and often when using Live View
  - Some mirrorless are now electronic only

Shutter Speed

- May be shown as an inverse number
  - 125 means 1/125 of a second
- Safe handholding rule of thumb
  - 1/focal length
    - 50mm lens – about 1/60
    - 135mm lens – about 1/125
  - IS/VR makes this better by at least 2 stops

Effect of Speed

Fast

- Allows less light, use when lighter
- Stops motion
- Easy to handhold

Slow

- Allows more light, use when darker
- Shows motion
- Steady hand or tripod








Shutter speeds from ¼ to 1/500 second. The fan was running at a constant speed!

1/2000

1/100

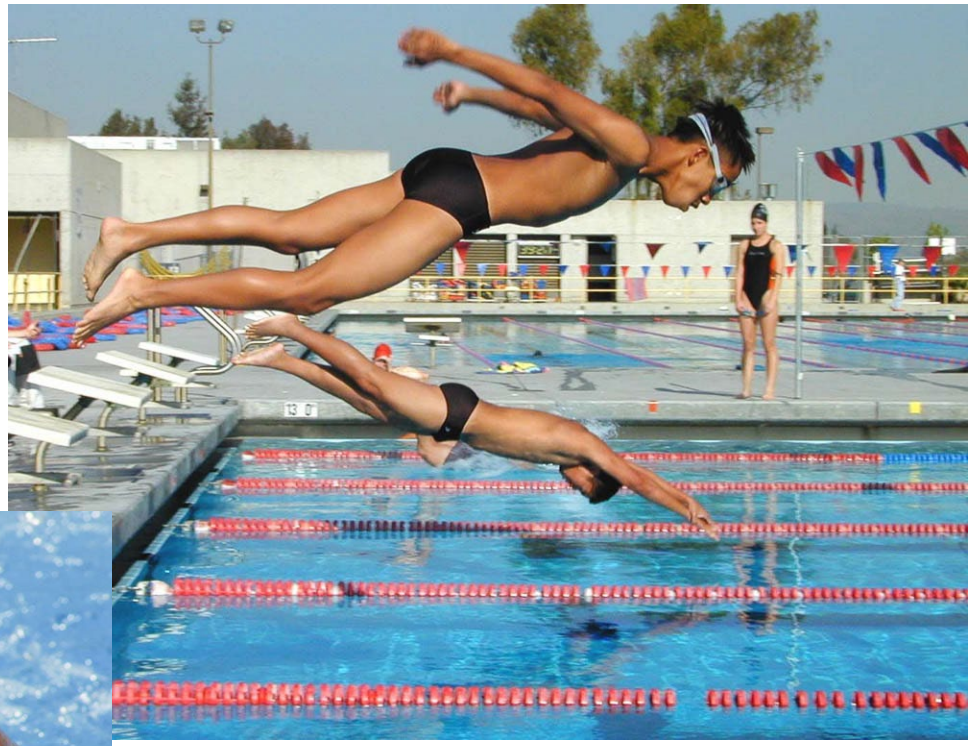
1/20

1/6

Handling Slow Shutter Speeds

- Wall
- Strap
- Stand/kneel
  - Avoid crossing legs, use both knees
- Stable hand positions
- Monopod/Tripod
- IS/VR lenses or mirror-less sensor shift

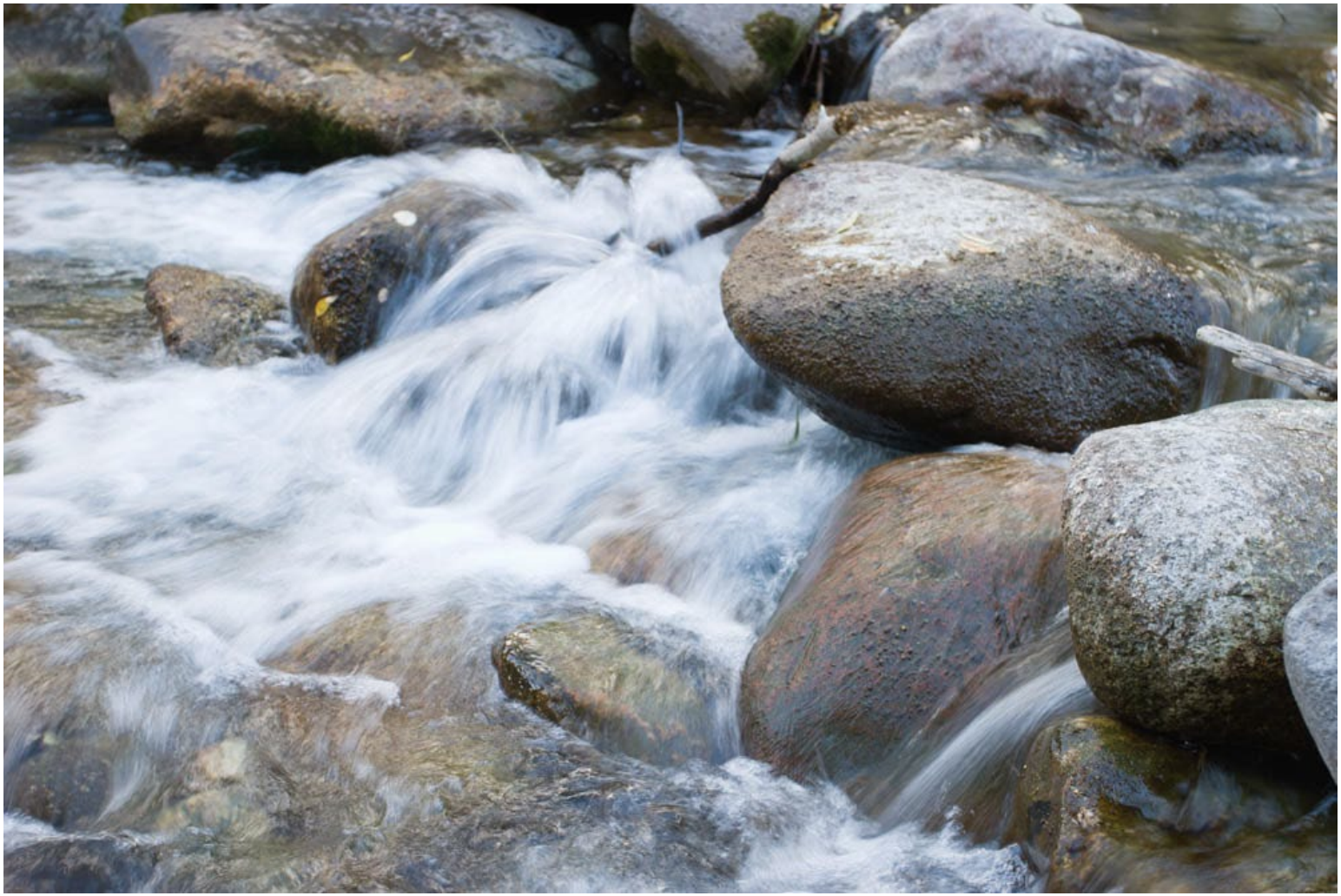
Freeze Motion



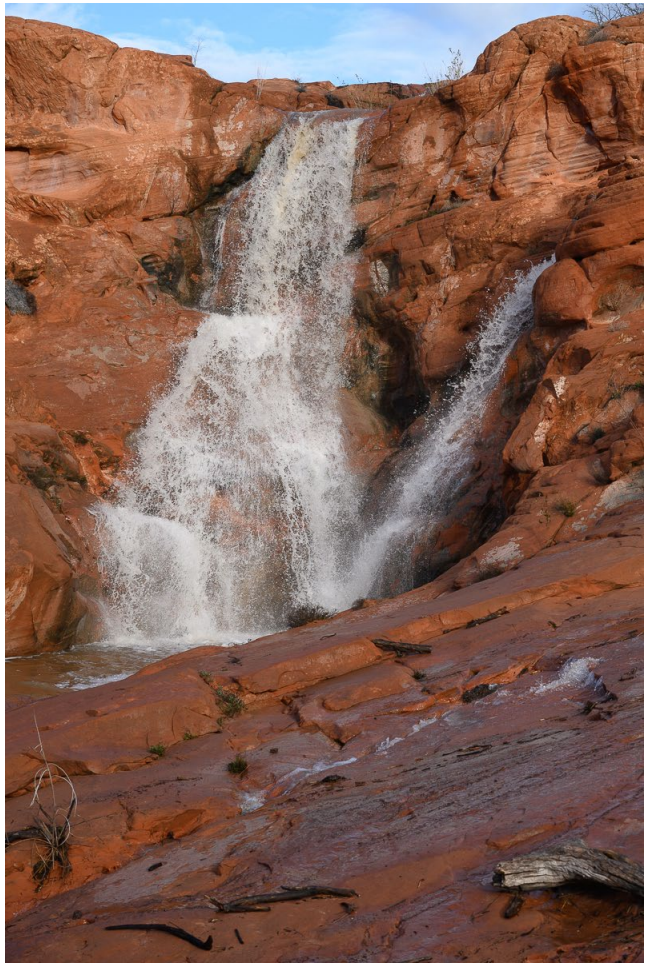
Fast shutter freezes the water while large aperture creates shallow depth of field to isolate subject and separate it from the background.

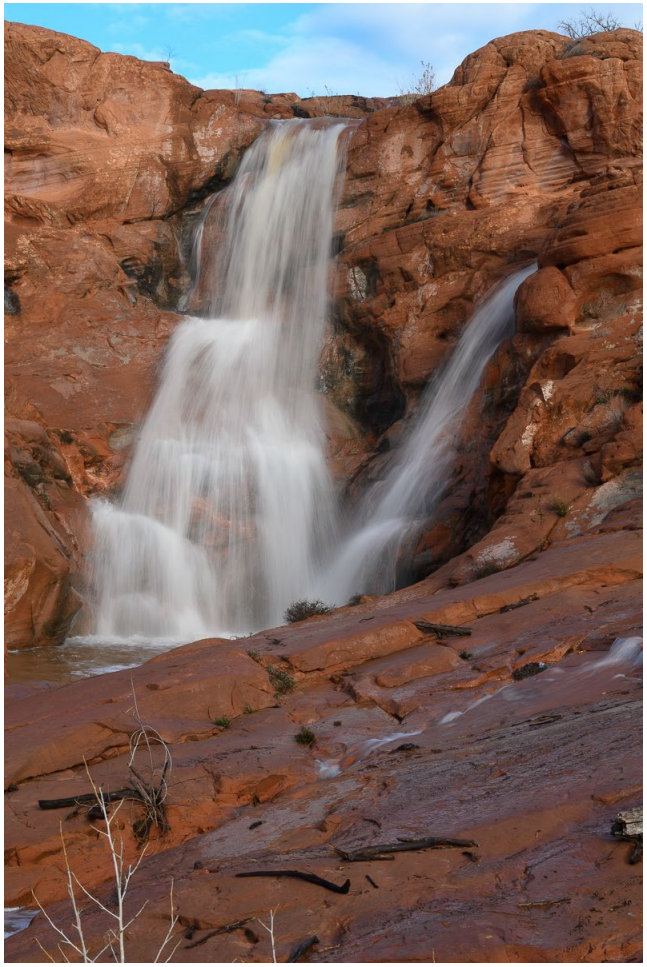
Imply Motion with Blur

Slow Shutter Shows Motion



Waterfalls, blur with slow shutter

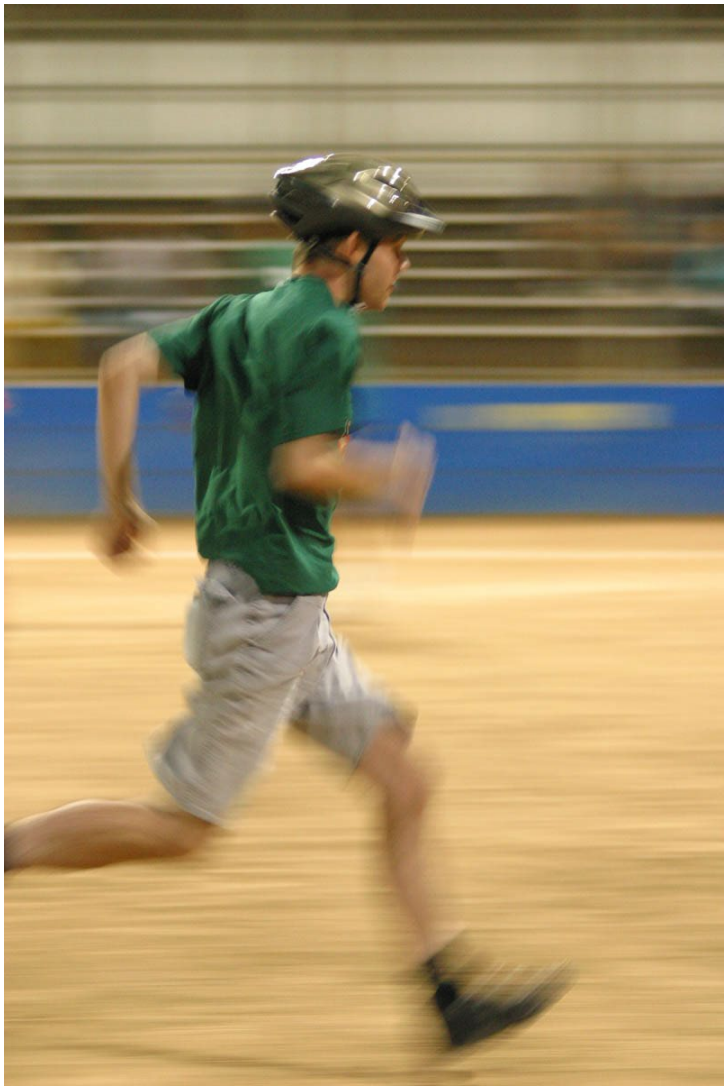




Sometimes less blur is better

Panning

Pan and Slow Shutter



ISO

How sensitive is the sensor?

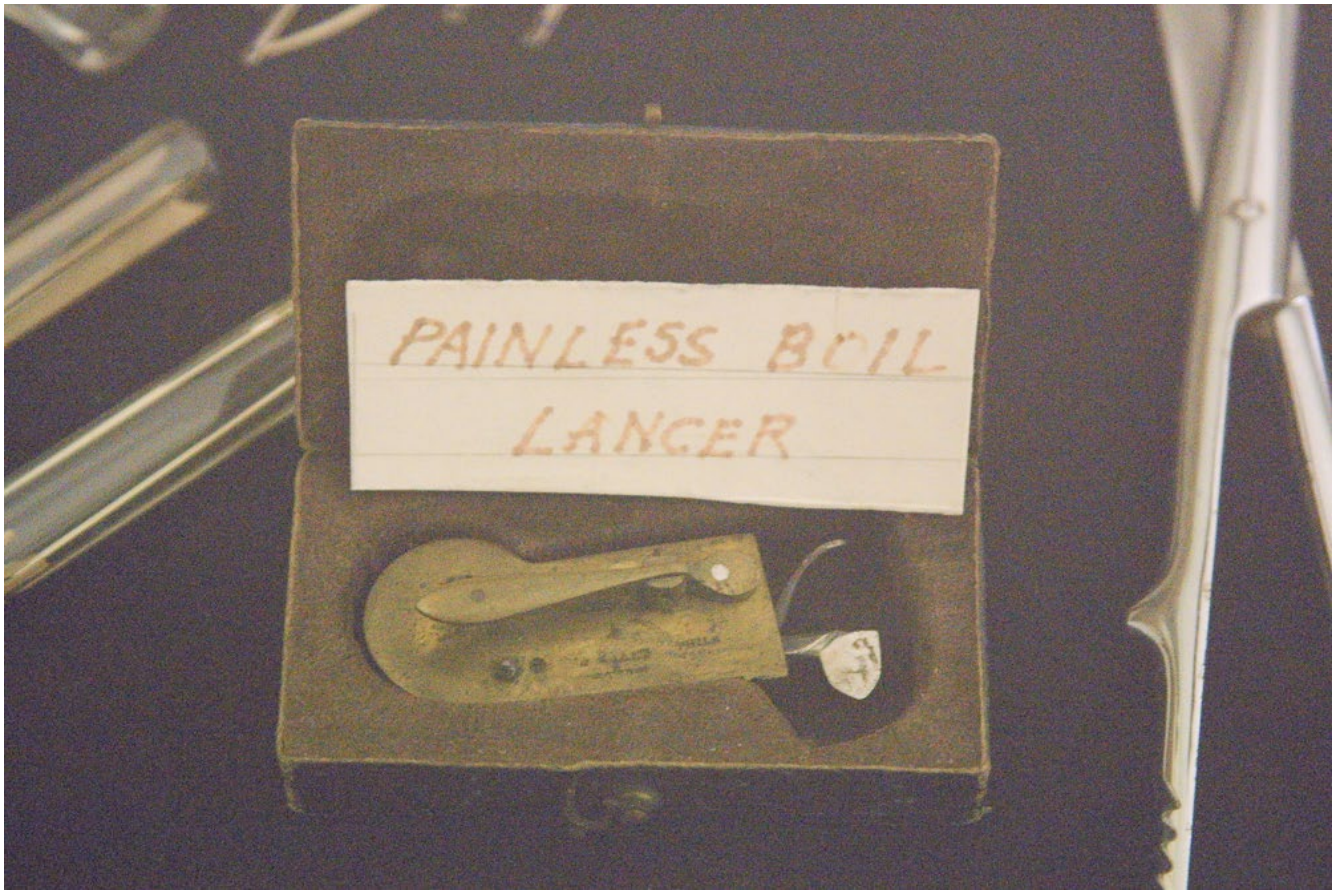
ISO = Film ASA

- Measure of film sensitivity
  - Larger numbers mean less light is needed
  - Doubling or halving works just like full F-Stops
- Originally from “sunny sixteen”
  - ISO was inverse shutter speed in sunlight with lens set to F16

ISO Side Effect

- Higher ISO's will show more "noise"
- Really high ISO's may have color issues
- Sensors and algorithms have improved and "noise" isn't as big a problem as it was in the early days of digital photography

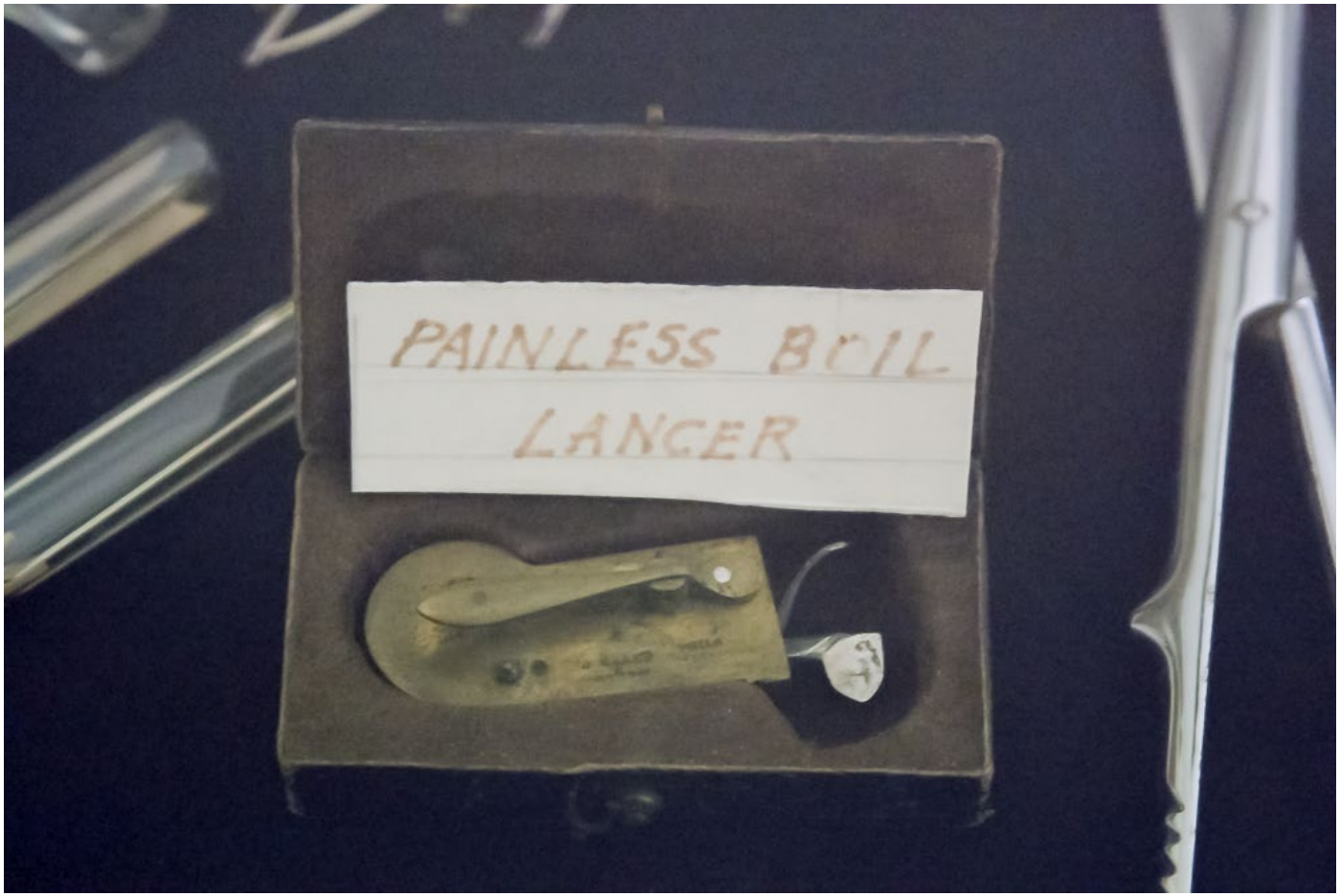
Color Noise Example



Notice how there is less noise in the bright areas

Label is wrong, this is actually a fleam.

After a Makeover in Lightroom



Notice how the image is not as sharp, it is a little bit “soft”, detail has been lost


_DSC0352.NEF
0.5 sec at ƒ / 4.0, ISO 25600
24 mm (NIKKOR Z 24-120mm f/4 S)
Direct from camera with noise reduction off and very high ISO

Adobe Lightroom AI noise reduction.
Unlike tradition noise reduction,
there is very little sharpness lost.

High ISO from Camers

Adobe AI Noise Reduction

Manual Sharpening

Notice how the image is not as sharp as the AI version

Camera Noise Reduction

- High ISO noise reduction
  - Only affects jpg, not raw image
  - Trade-off between noise and details
  - Turn off, use computer later for more control
- Long exposure noise reduction
  - Takes a “dark frame” exposure equal in time and subtracts from real image
  - A 10 second exposure will take 20 seconds

AI is Game Changer

- The noise reduction is amazing in Adobe Lightroom, Topaz Labs, etc.
- Note that RAW format is typically required

Summary Thoughts

- ISO noise is a result of amplifying the sensor signal, noise also gets amplified
- Minimize with the lowest ISO setting, I.E. get as much light as possible to sensor
  - Get the most light to the sensor that we can, longer shutter speeds and larger apertures
    - Just remember that shutter and aperture are constrained by artistic and blur-avoidance issues
    - The most important issue is to “get the shot”

Exposure Modes

S (Tv), A (Av), M, and P where (…) is Canon

And of course green box and subject type

Setting the Exposure Mode

- Either a dial or a menu setting
- Sometimes it's a button first and then a dial

A, Av – Aperture Priority

- You choose the F-Stop/Aperture
- The camera chooses the shutter speed
  - The slowest allowed value is sometimes keyed to the focal length, but may be user set
- The ISO might also be changed if auto

S, Tv – Shutter Priority

- You choose the shutter speed
- The camera chooses the aperture
  - Within the limits of the lens of course
- The ISO might be changed if auto

M – Manual Mode

- You choose aperture and shutter speed
- The camera chooses the ISO if auto
- If ISO is not auto the image might be over or under exposed (light or dark)
  - Change ISO to correct

P

- Program mode, the camera picks a shutter speed and F-Stop combination and lets you pick different combinations that give the same exposure
- I don’t find this useful, but somebody might

Others

- Green or full auto
  - The camera chooses everything for you
- Subject (flowers, sports, landscape, etc.)
  - The camera chooses what should be the best mode for the chosen subject

Exposure Compensation

- Let's you make the exposure darker or brighter
- Does not always work in all modes on some cameras
- Either on a dial or a menu entry
  - Dials are very convenient

Exposure Area

Where should I be looking to measure the light?

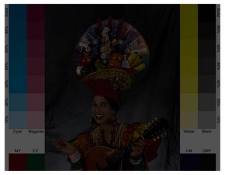
Different Areas to Look for Light

- Matrix/Evaluative/…, AI or guessing
- Spot, just a little piece of the image
  - Spot size and location are usually adjustable
- Average, the whole scene
- Center weighted, middle more important
- Stage or spotlight, looks at bright areas
- Names differ between camera brands

Exposure

Not too dark, not too light, but just right

Things Affecting Exposure



Exposure

less noise **ISO** more noise

more depth of field **F-Stop** less depth of field

stop motion **Shutter Speed** motion blur

Expose for the rocks and the lights get blown out.

Expose for the lights and the rocks are blocked out.

Advanced technique: Combine them and you get this

Exposure

- Light can be measured in EV units
  - Each unit represents a doubling or halving
  - Light meters can show, but digital cameras rarely show this
- Correct exposure is controlled by
  - Shutter speed, how long the shutter is open
  - F-Stop, how much light the lens lets through
  - ISO, how much light the sensor needs

EV

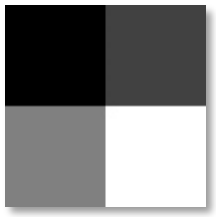
- Makes every number equivalent to a stop
  - +1=2 × light
  - -1=1/2 × light
- 0 is F 1 at 1 Second
- Cameras often show focus sensitivity in EV using ISO 100

Sensor needs right amount of light

- Too much = highlight detail loss
- Too little = shadow detail loss
- Sometimes you have to accept one or both of the above
  - High dynamic range (contrast) scenes

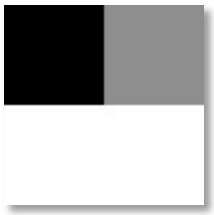
4 shades of gray over-exposed

$$\begin{bmatrix} 0\% & 25\% \\ 50\% & 100\% \end{bmatrix}$$

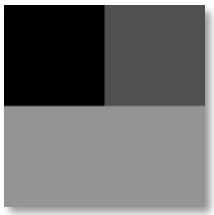


Over expose by 1 stop, I.E. a doubling of light
This results in these new values

$$\begin{bmatrix} 0\% & 50\% \\ 100\% & 100\% \end{bmatrix}$$

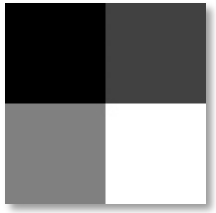


Note that the difference between the two spots on the bottom is now lost.
And there is no operation that can bring back that detail!
All you can do is make everything a bit darker, the detail is lost.



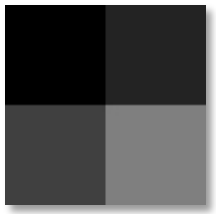
4 shades of gray under-exposed

$$\begin{bmatrix} 0\% & 25\% \\ 50\% & 100\% \end{bmatrix}$$



Under expose by 1 stop, I.E. a halving of light
This results in these new values

$$\begin{bmatrix} 0\% & 12.5\% \\ 25\% & 50\% \end{bmatrix}$$



Now we see that we can recover by multiplying by 2 again!
But… noise and other artifacts might also be increased.

This shows why it is often preferable to under-expose slightly.

Rules for Exposure

It often depends on the scene!

- Expose for highlights and live with whatever shadow detail you can get
- It is best to expose for the dark or light area that matters most when the dynamic range of the camera is exceeded

What is ‘Correct’ Exposure?

- Technical intent
  - At least 6 “correct” values
    - F stop/shutter combinations
    - Camera will pick one for you in automatic
- Artistic intent
  - Depth of field to isolate subject or include all
  - Shutter speed for motion, blur or freeze

F-Stop Shutter Variations

- These all give the same amount of light
- Choose the combination that is the best compromise for artistic or technical need
- Note: shutter speeds directly affect the amount of light, but F-Stop is a diameter, so the amount of light is a squared value
  - ½ shutter speed matches ~1.4 larger F-Stop

Aperture	F16	F11	F8	F5.6	F4	F2.8	F2	F1.4
Shutter	1/15	1/30	1/60	1/125	1/250	1/500	1/1000	1/2000

Exposure Compensation

- Dial or menu item
- Applies an adjustment to the camera calculated exposure
- Can be used to darken or brighten an image

Where Automatic Metering Fails

- Backlight and sidelight
- Large dark areas
- Large light areas
- Low contrast scene
- High contrast scene

White Cup in Snow Sunshine

Camera auto

Compensation +1

Compensation +2

Camera auto exposure

-2 stops from what camera wanted to do

HDR – High Dynamic Range

- Multiple exposures, combine in software
- Some cameras have built-in HDR
  - Some cell phones also do this in night mode or when the scene has a wide dynamic range
  - Note that these multiple exposure are taken in sequence so any motion in the image will cause problems

Bright outside, dark inside, very high dynamic range. Single automatic exposure. You could get brights or darks better by sacrificing the other.

Shot with camera HDR setting. Notice highlights and shadows are much better. The camera actually takes 3 images in sequence so any motion in the scene can be a problem.

Summary - Choosing Settings

Setting	Effect	Comments
ISO	How much light is needed by the sensor	Higher values result in more image noise but let you use faster shutter speeds and/or slower lenses. Use 100-200 outside and 1200+ inside. This setting is fine to use in automatic mode.
F-stop **Av or A**	The amount of light the lens allows through	Smaller numbers give a smaller depth of field. Should also be used in low light. Larger numbers create more depth of field, but require more light or a slower shutter or higher ISO.
Shutter speed **Tv or S**	How long the shutter lets light through to the sensor	Slower speeds show motion and blur. Faster speeds are used to stop motion.

Exposure Bracketing

When one image just isn’t enough.

Bracketing

- Bracketing exposures takes several exposures at different settings
- ISO, shutter, or F-Stop can be varied between exposures
  - ISO is best to change, but shutter or F can be
- Odd numbers, 3, 5, 7 etc. images
- Useful for high dynamic range photos

Focus Areas

What am I supposed to focus on?

Focus Area Types

- Auto – AI or guessing to pick something
- Spot – uses a smaller area of the image
  - The spot can be moved and the size changed
- Facial recognition – one or more faces
  - Some cameras even find dogs and cats
- Tracking – follows some feature
  - Requires continuous mode

Focus Modes

When do I focus?

Focus Mode Types

- Manual
  - Turn ring on lens or use menu entry and dial
- Single
  - Hold shutter button down half-way
  - Or use back focus button
- Continuous
  - Keeps refocusing as scene changes
  - Sports, birds etc.

Shutter Release Modes

Do you want one or more images?

Different Release Modes

- Single or one-shot
  - Press the release button all the way down
- Multiple
  - Keeps taking pictures while button held down
    - Great for sports, find the best shot later
- Delay or self-timer
  - Waits before taking the picture
- Remote control

White Balance

What color is this scene really?

White Balance

- Light sources have some color
  - Sunlight and shade are different
  - Incandescent and fluorescent are different
- Some cameras can measure from a gray or white card, custom white balance
- Shooting “raw” images allows adjustment later, as the image isn’t adjusted until “de-mosaicking” process

Our Eye/Brain White Balance

- Your eye calibrates to the room you are in, so white paper will look white, faces look right, I.E. it adjusts to the ambient light
- Camera sensor sees “real” colors
  - White balance attempts to fix this
- Looking at a print, our eye still uses the room calibration, so colors may be off

To Make Things Even Harder

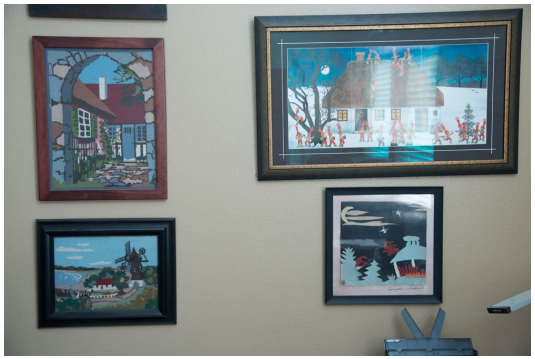
- Color monitors must be calibrated to display colors correctly
- Few of them are correct ☹
  - The controls can also be set incorrectly

Color Test Photo – Test Display

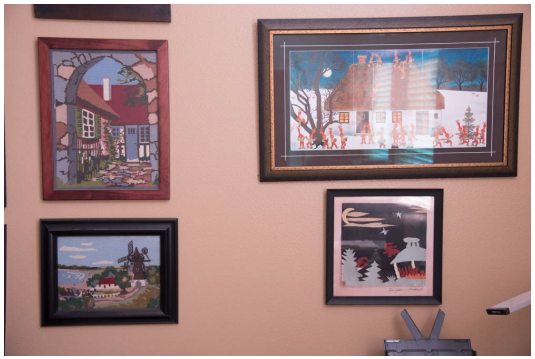
White Balance Example

- Left is original, has too much orange light, right is corrected
  - If we were in a room with incandescent light it would look fine
- Strangely our eye/brain system corrects when we are there, but not looking at a picture, that is why we must correct the images

Camera White Balance Settings



incandescent

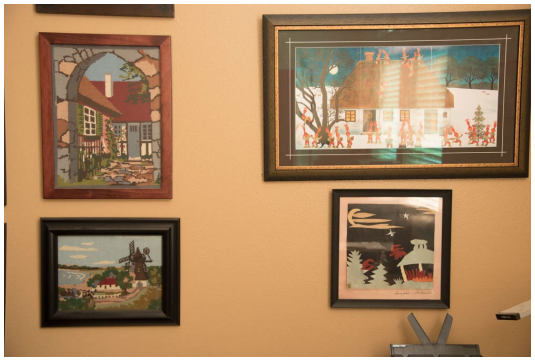


fluorescent

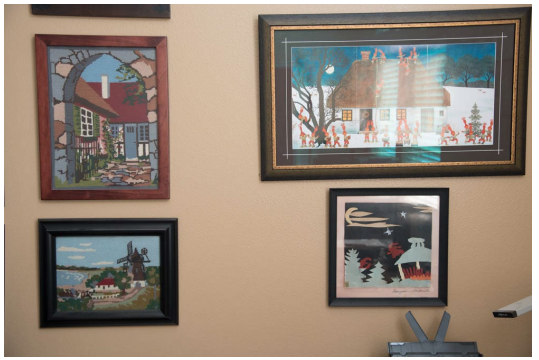
cloud

shade

Sun (this one is closest)



auto



Camera White Balance Settings

incandescent

fluorescent

cloud

shade

sun

auto

Note how auto desaturates the colors!

Auto White Balance challenges

- Camera will try to make grey!
  - Dominant colors will get muted
  - I.E. Do not use automatic setting
- Mixed light
- Different fluorescents
- Use gray card

Notice the warm (yellowish) candle light, with the cold (bluish) light from outside. This can often make interior pictures challenging to get correct colors.

Correct Color

- Once again, it depends…
- Should be accurate for fashion & products
- Can be considered creative interpretation
- Color can change the mood of the image
- I often use “sunlight” setting and fix later
  - This gives an image close to what was there

Two Uses of White Balance

- Use to correct color accuracy
- Use creatively to make better image

File Types

How the image data is stored.

File Types

- Most important ones
  - **JPG/JPEG,** data loss
  - **Raw** (many variations), no data loss
  - **TIFF/PSD** for editing
- Other common ones
  - BMP, GIF, PNG, DNG, JPG2000, …
- Adobe hoping to make raw standard
  - DNG (digital negative)
    - Pentax, Hasselblad, Samsung so far
    - Not Canon, Nikon, or Sony

New Formats

Smaller and less lossy than JPG!

- HEIF (High Efficiency Image Format)
  - Rotation, cropping, titles, and overlays are stored without altering the underlying image. This means you can undo those edits later.
  - Transparency is supported
  - 16 bit data! (jpg is only 8 bits)
- HEIC
  - Apple container variant holding an HEIF

RAW vs JPEG

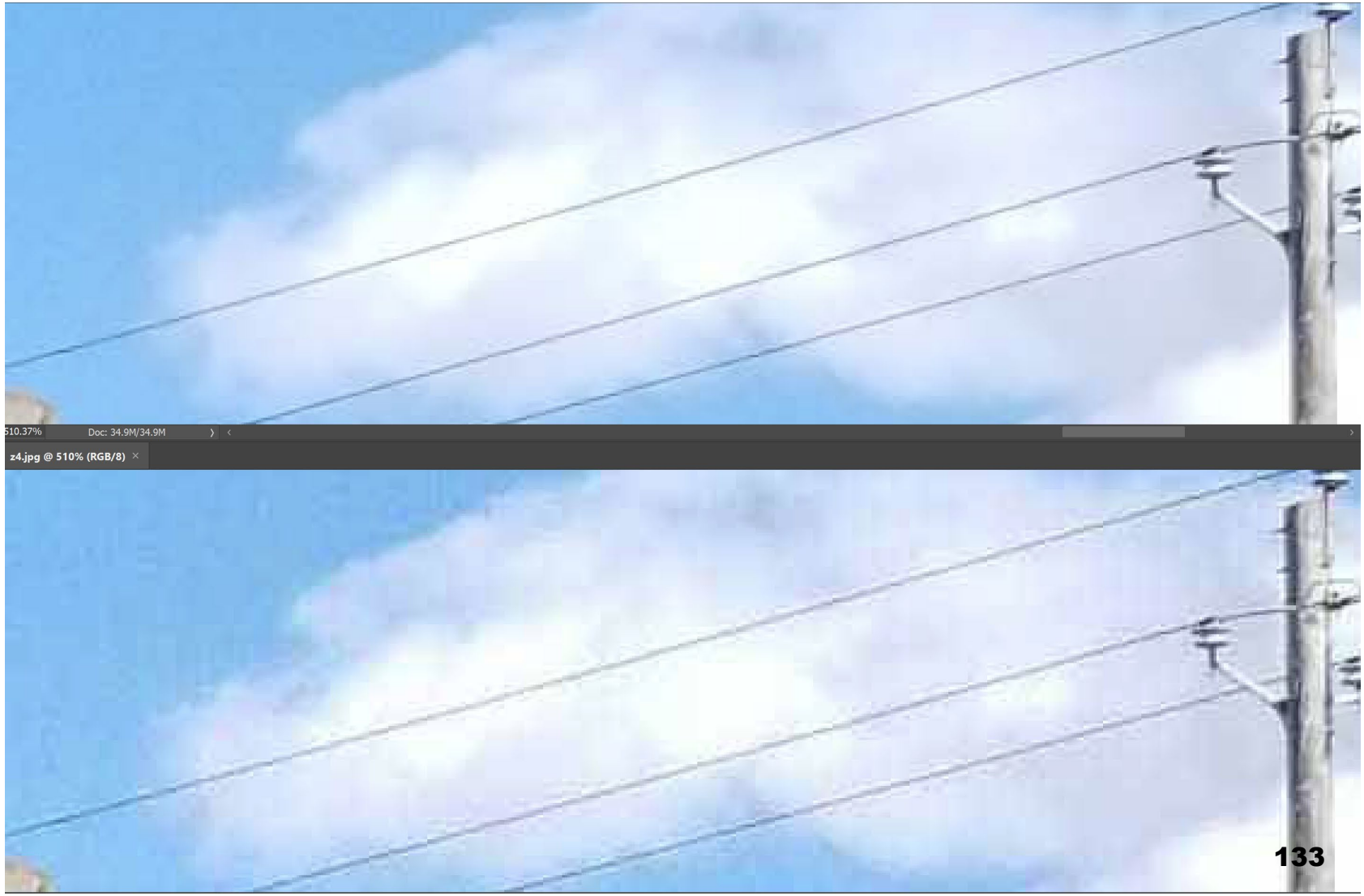
- If your camera supports RAW, use it!
- It saves all of the sensor data
- JPEG reduces resolution to 8 bits and eliminates some detail
  - This lost data can NEVER be restored
- Editing in 16 bits allows for large changes with less image degradation

JPEG compared to Raw

- JPEG
- 8 bits/pixel
- Color resolution loss
- White balance fixed at shot time
- Should NEVER be re-saved, image rot (generation loss)

- RAW
- 12-15 bits/pixel/RGB
- No loss
- White balance adjustable later
- Save in PSD/TIFF or other non-lossy format

- re-compression causes problem, happens on cropping or quality settings etc.
- IF you don’t change size or jpg settings the quality loss can be minimal
- Top is original, bottom is 6 pixel cropped and saved 4 times



RAW Issues

- When you first look at a RAW image it looks worse than the jpg, much worse
- The jpg has been processed! Not the RAW
  - Contrast, sharpness, saturation, noise, black/white points, etc. have all been processed in the jpg
  - However, the RAW image has inherently more data, it just needs to be processed first

Metadata

- Data that is attached to the image file
  - Automatically contains date, camera, lens, flash, F-Stop, shutter speed, ISO, and others
- No more little notebooks to record exposure and other details
- Can add keywords, copyright, etc.
- Either stored in image file or as “sidecar”
  - Jpeg and tiff store in file
  - Raw in file and more in sidecar file (xmp)

Filters

I like my rose-colored glasses!

What Size Filter?

- Buy for your largest lens diameter
- Use step rings to adapt to smaller lenses

Filters

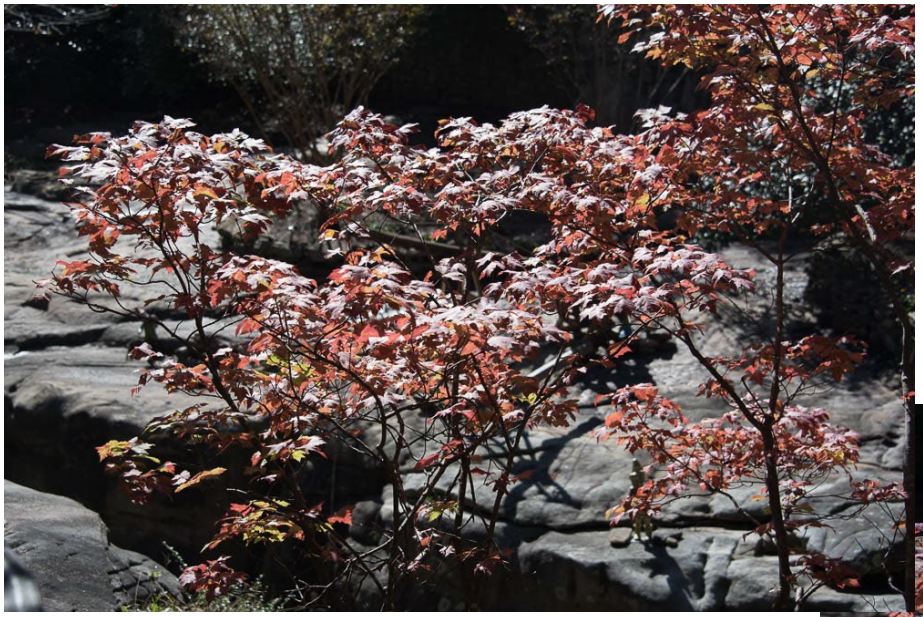
- UV/clear may protect lens from scratches
  - UV Filters Are NOT Designed to Protect Your Lenses, Manufacturers Confirm | PetaPixel
  - DSLR's already block UV
    - Why UV Filters are Basically Useless on Modern Cameras | PetaPixel
  - Lens hood helps to protect lens
- Skylight, warming and cooling filters
  - Easily done during editing

Circular Polarizer

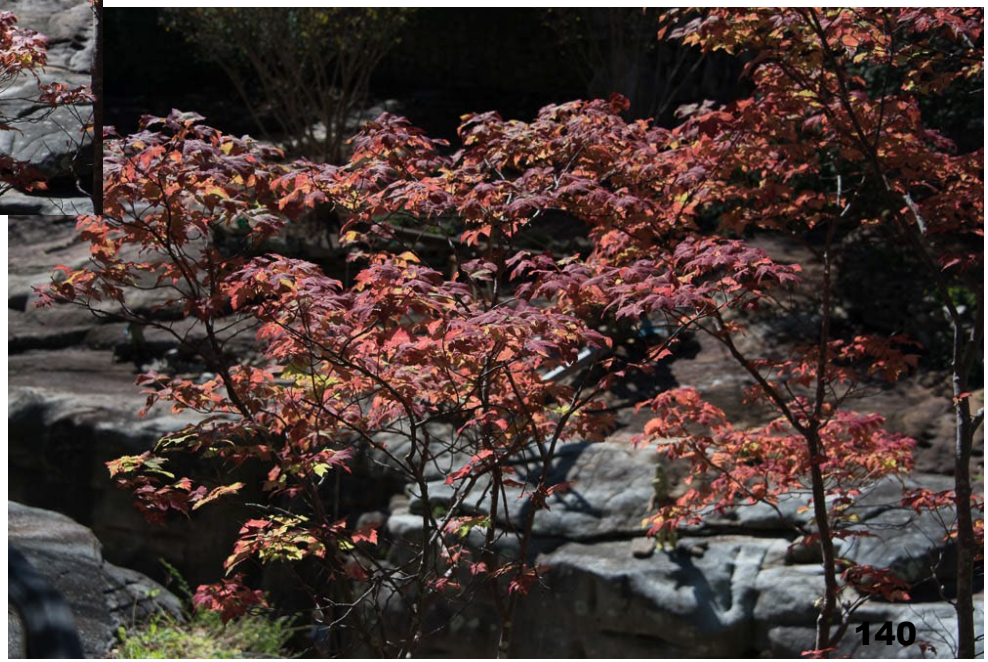
Can’t simulate later in Photoshop

- Removes glare and reflections, good on shiny things, glass, water, leaves and rainbows
- Thread onto front of lens, **rotate to adjust**
- Available for cell phones as a clip-on

Polarizer Example



With rotated polarizer



With polarizer


Addition 0-12


Addition 0-12

Left is normal, bottom is with polarizer. Subtle differences, but notice shadow detail in bush and mountain is better. The mountain rock color is also slightly better.

ND (Neutral Density) Filter

- Available in different densities or adjustable
- Used to reduce light when exposure needs to be modified outside of limits based on the brightness of the light
  - Example: allowing a slow shutter speed in bright light, often used for waterfalls

Special Effects

Change the image in countless ways

Camera Special Effects Settings

- Black and white
- Various colors
- Odd distortions, example “tiny scene”
- Fun, but mostly not useful since they permanently modify the image and it can’t be made normal again, effects can always be added later to a copy

The Histogram

Show me how I’m exposed, and don’t get hysterical

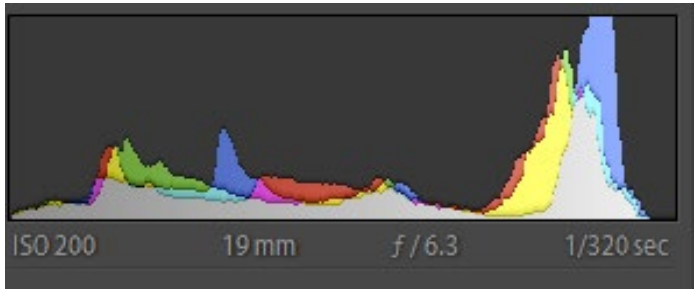
Histogram

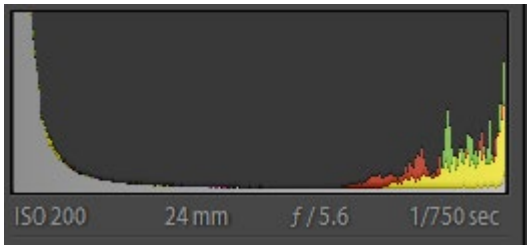
- Quick exposure analysis
- It's a bar graph showing the count of pixels at each brightness level
  - Black on left
  - White on right
  - Grays in between

Histogram Analysis

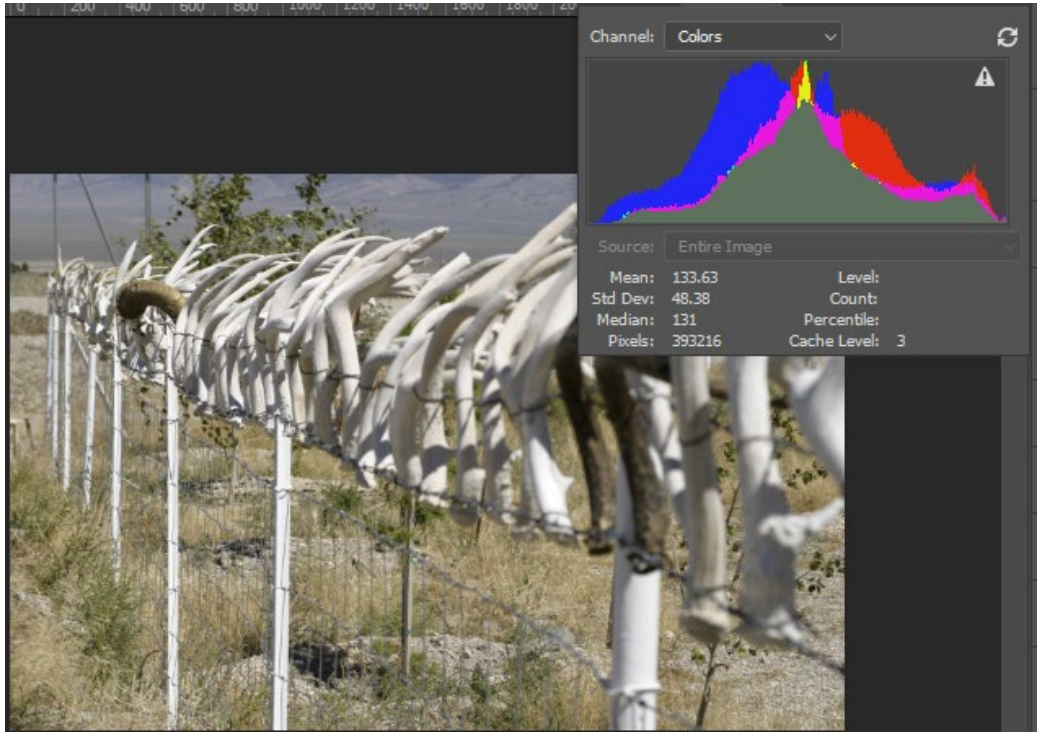
- Spikes and holes show loss of data when contrast (or other things) changed
- Crowding on black side shows poor shadow detail
- Crowding on white side shows poor highlight detail

Histogram example 1

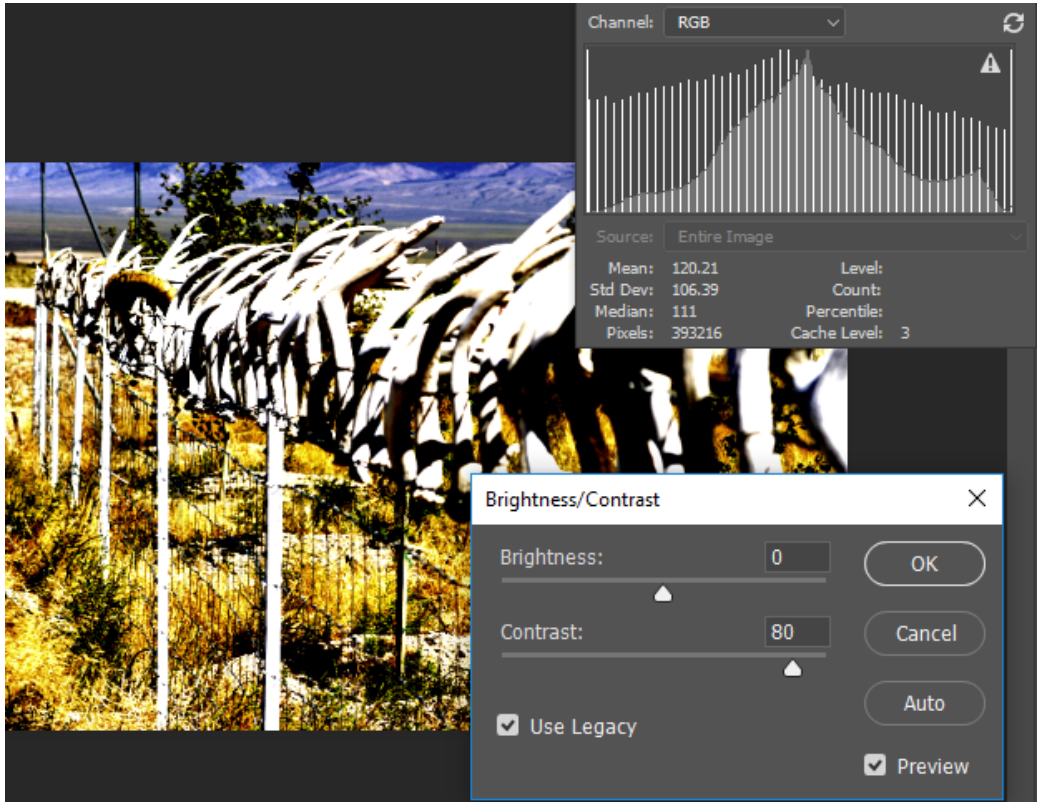




Histogram example 2



Histogram example 3



Ideal Histogram

- Well, it depends…
- Dark images will be crowded on left
- Light images will be crowded on right
- Average ones will be spread across
- Look on the left and right spikes to see where detail is lost, then decide which one is most important and expose for that

Live View & Histogram

- Many cameras show a histogram in Live View, this is useful to check the exposure
- Mirrorless cameras can show the histogram in the view finder or the display

ETTR Histogram Exposure

- Expose To The Right
- Get as much detail on right side but without over-exposing any important highlight areas
- Avoids some digital noise, since noise is more noticeable on the dark (left) side
- Controversial… may look too bright
  - Fix later

More ETTR

- Sometimes the contrast range is too great and detail will be lost in brights or shadows
- ETTR does NOT mean the histogram curve will be to right of center, it might be that most of the image information is in the darker half
  - Don’t sacrifice highlight details