



Digital Photography

Use Your DSLR to Turn Light
into Interesting Images

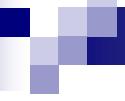
Both are from same
distance showing
same image size



DSLR crop
Nikon Z6

Cell phone crop
Samsung Galaxy S22



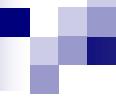


YouTube Videos for Learning

- There are thousands of YouTube videos from photographers that can help improve your own photography
 - Can help you analyze your own style and lead to improvements
 - Teach things you may not have thought of
 - Show you many examples

Will AI Replace Photographers?

- Tech gets better, but AI really just tries to match what you say
- Photographers have skills in
 - Light
 - Composition
- Timing
- Story
- Patience
- Restraint
- Printing
- Curiosity

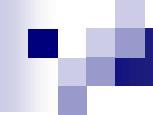


DSLR Green Rectangle

- I want you to get away from using the green rectangle (full automatic) setting on your camera all the time
 - You can control settings on the camera for creativity and better image quality

DSLR/MILC's Are Complex

- Break it down into these areas to learn
 1. File formats, jpg and raw
 2. Lenses, focal length, zoom, aperture
 3. Exposure, aperture, shutter speed, ISO
 4. Metering modes, spot, average, matrix
 5. Shutter release modes, single and multi
 6. Focus modes, manual, auto, tracking
 7. White balance, auto and presets

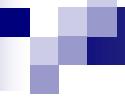


Understanding Your Camera

- Bring your camera
 - Try camera settings and experiment
- Read the manual and online guides
 - At least look up topics you are interested in
- Shoot pictures, lots of them
 - Experiment with settings and observe effects

Comments

- Some concepts may be new, and you may not completely understand right away, please ask questions in class and practice and experiment with your camera
- Understanding your camera will help you solve challenging photo situations to get better images



General Hints for Best Results

- Use Av, Tv, or manual instead of full auto
- Use correct focus mode
- Use proper exposure, over/under, and ISO
- Use Raw format instead of JPG
- Don't use auto white balance
- Hold the camera correctly

Preparation

- Proper Preparation Prevents Poor Performance!
- Learn how to use your camera before the moment you need it

Useful Phone Apps

- LunaSolCal (free)
 - Figures out where the sun and moon will be
- Photopills (\$10)
 - Shows sun, moon, and milky way, lots more
 - AR (augmented reality)
- Many others that I don't know about

Digital SLR

- SLR = Single Lens Reflex
- You look through the lens using the mirror and a pentaprism
- Sensor is behind the mirror and shutter
- The mirror flips up and the shutter opens to let light hit the sensor
- The shutter is two curtains or blades

Mirrorless (MILC)

- Interchangeable lenses
 - No mirror or pentaprism
- Lighter bodies
- Very quiet when using electronic shutter
- Use a tiny display in the viewfinder
- Sony, Olympus, Canon, Nikon, Fuji, others
- Slightly shorter battery life, still $>\sim 400$
- IBIS (in body image stabilization)



Viewing the Image

The different ways cameras let you see what is about to be recorded

- Cell phone
- Mirrorless
- DSLR
- The screen
- Screen on back or tiny screen as view finder
- View finder through lens or screen on back

View finder or screen

View Finder

- See what lens sees, on DSLR
- Easy in bright light
- Must hold camera at eye level
- Can be hard with tripod

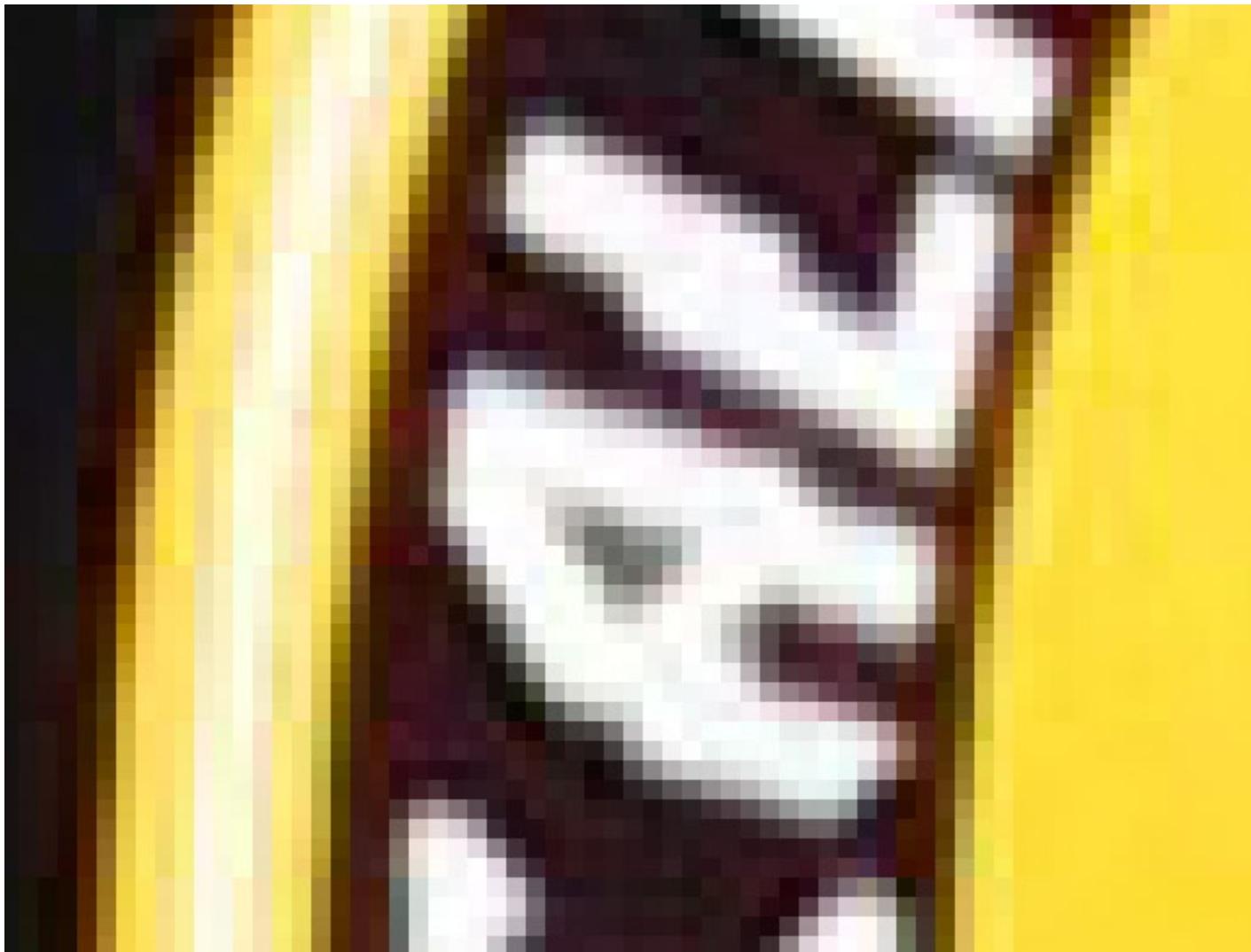
Screen on back

- See what sensor sees
- Hard in bright light
- Can hold camera at different heights
- Good with tripod, tilt screen useful



Pixels

Let's explore the tiny world of picture elements



Notice each block has one color and brightness.



All you have to do is make them small enough so you can't see them.

Pixels (Picture Element)

- An image is made of little pixels
- Each one has 3 colors with brightness
- 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

How Many Mpixels Needed?

- Many monitors about 2MP (1920 x 1080)
 - 2560x1600 is 4MP
 - Monitors are now often rated as 4k, 8k, etc. which is the approximate number of columns
- 8 MP is enough unless extreme crop
 - Billboards are 15 ppi and about 2MP

Megapixels

- More megapixels can make more detailed images, but also tend to have more noise
- Ideal ranges are in the 18-45 Megapixels
 - Lower megapixels are typically better for night photography, 18-25
 - Sweeping landscapes can use 45+



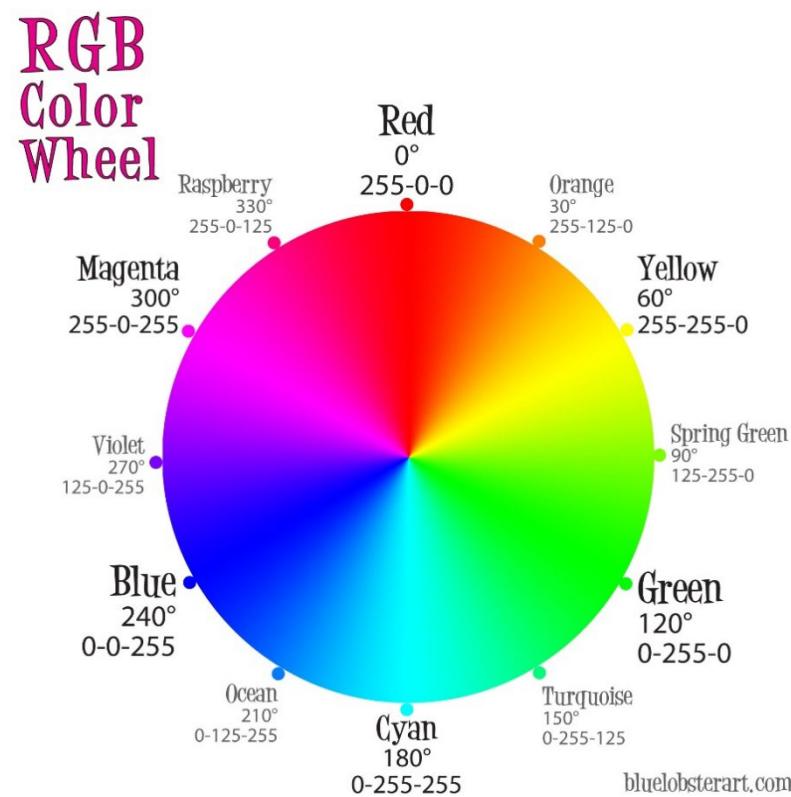
Colors

Wonderful World of Color

Color Mixing of Primaries

- Any color can be made up by mixing varying amounts of primaries
- Two sets of primary colors are used in digital photography
 - RGB (red, green, blue)
 - Additive, things that glow, like monitors
 - CMY{K} (cyan, magenta, yellow, {black})
 - Subtractive, things that absorb, like paper
- Not the same as you learned in school with crayons!

RGB Color Wheel



Color Relationships

- Understanding the color wheels will help you fix image color problems or to use colors creatively
- Learn these relationships

R+B=M

Opposites

- R ~ C

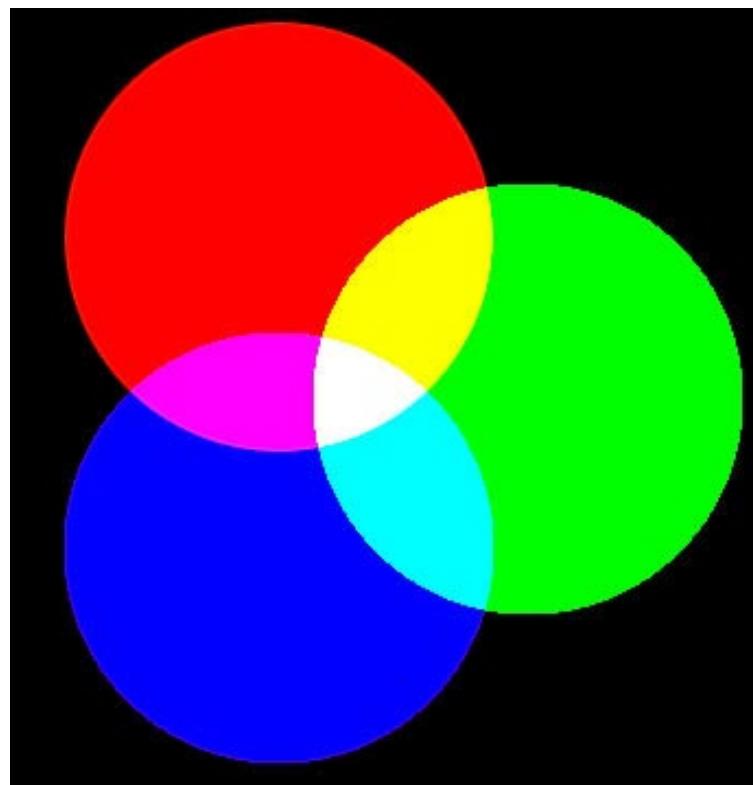
R+G=Y

- G ~ M

B+G=C

- B ~ Y

Combining Colors



Think of these as
three colored
spotlights hitting a
white background.

RGB Color Values

- Often shown as byte values (0, 255, 255)
- Sometimes shown as (100%, 0%, 100%)
- 255 is 100% of a single byte value
- What is (255, 255, 255)?
- What is (50, 50, 50)? Or (0, 0, 0)?
- How about (255, 0, 0)?

The Sensor

Collect photons to create pixels

Sensor size comparisons for digital cameras.

PhotoSeek.com

For new **digital cameras**, a bigger **sensor area** captures better quality, but requires larger diameter, bulkier lenses. To optimize the size of a serious **travel camera**, consider **1-inch Type sensor** or up to **APS-C sensor size**.

Full-frame sensor (Nikon FX, Canon EF, Sony FE) = **36 mm wide**

"Full-frame 35mm" sensor / film size (36 x 24 mm) is a standard for comparison, with a **diagonal field-of-view crop factor = 1.0**

In comparison, a pocket camera's 1/2.5" Type sensor crops the light gathering by 6.0x smaller diagonally (with a surface area 35 times smaller than full frame).

APS-C Nikon DX, Sony E = **1.5x crop**

APS-C Canon EF-S = **1.6x crop**

Four Thirds 4/3" = 2x crop

1" Type = 2.7x crop

Sony RX10, RX100

1/1.7": 4.6x

**1/2.5":
6.0x crop**

"Medium format" size 48 x 36 mm

Compact & pocket zoom cameras have small, noisy sensors, tiny enough to extend superzoom lens reach.

APS-C sensor gathers 15 times more light (area) than a 1/2.5" Type sensor, and 2.4 times less than Full Frame.

24 mm

Dynamic Range

- The range of dark to light that can be recorded without losing or both of:
 - Highlights (blown out)
 - Shadows (blocked)
- Eye sees at least 16 stops (doublings)
- Some Digital sensors are 14+ stops now

HDR (High Dynamic Range)

- Take multiple images at different exposure setting to capture more image data and combine later on the computer
 - Some DSLR's have a feature to do this
- Some cell phones take several exposures quickly for high contrast scenes, e.g. night
 - This is also possible on MILC's



Expose for the rocks and the lights get blown out.



Expose for the lights and the rocks are blocked out.

Combine them and you get this (actually from 3 exposures)



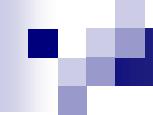


Memory Cards

Where are my images stored?

Get the Correct Card

- One class member 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 SD, so the maximum size was 32GB
- Those cards appear to be identical, but they aren't!



Computer Image Files

How images are stored

File Formats, Container Files

- BMP
- **JPG/JPEG/JPG2000/JFIF**
- GIF (pronounced like JIF)
- **TIFF**
- PNG
- **PSD**
- DNG
- **Raw** (many variations)
- Others

BOLD ones are
the most *important*

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!

■ 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 permanently eliminates some detail
- 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

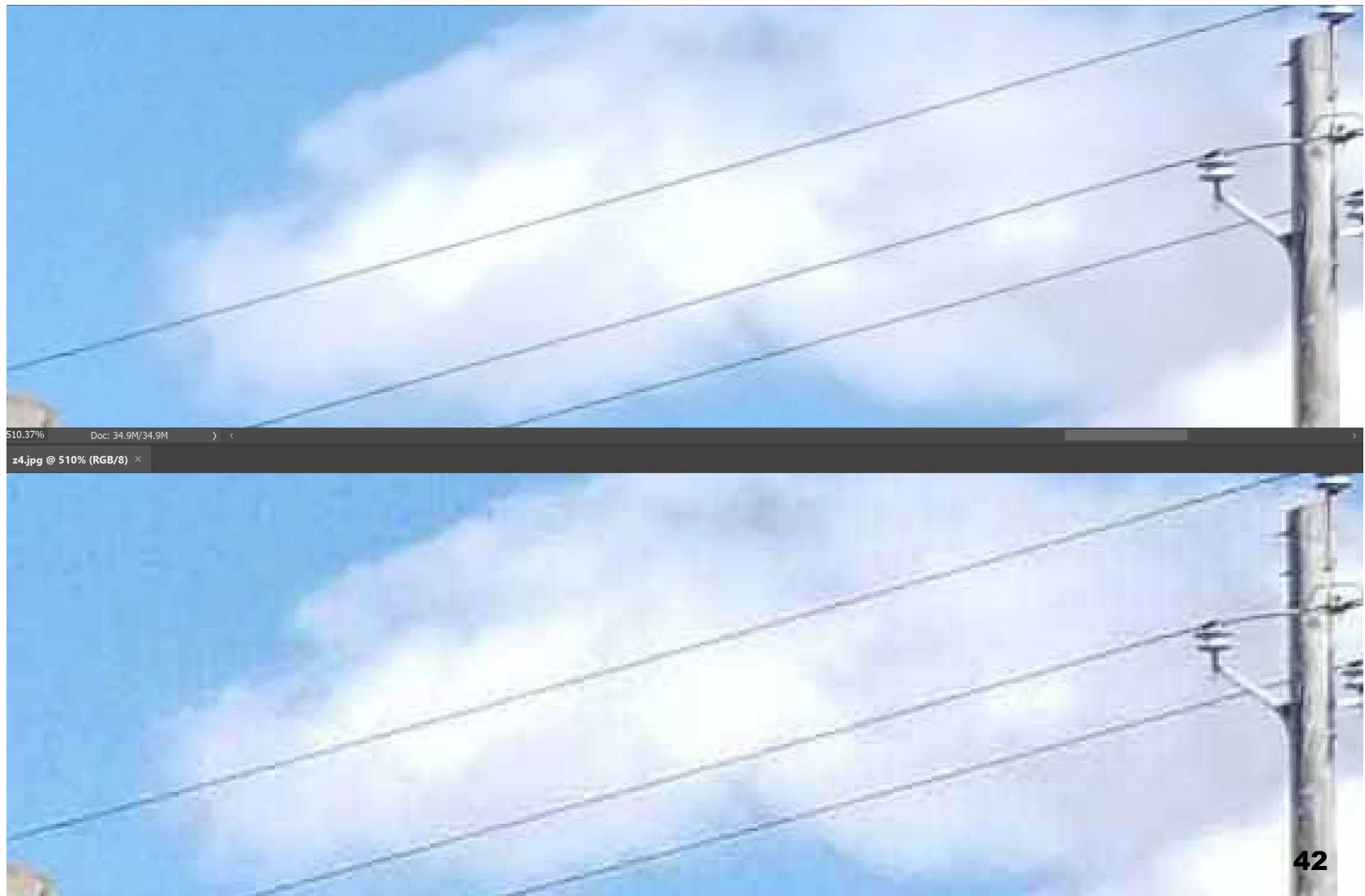


Image File Metadata

- Data that is attached to the image file
 - Automatically contains date, camera, lens, flash, F-Stop, shutter speed, ISO, and others
- Also holds keywords, copyright, etc.



Lenses

Bring the world into focus

Lens Properties

■ Main Properties

- **Focal Length(prime) or range(zoom)**
- **F-Stop, maximum or range for zooms**

■ Other Attributes

- Manual/automatic focus
- Filter diameter
- VR/IS



Lense Attributes

- Focal length
 - **Normal** is diagonal of the squared sensor
 - **Telephoto** is longer than normal
 - **Wide Angle** is shorter than normal
- F-Stop (Aperture)
 - “Light Hole” diameter through the lens
 - Bigger=more light; smaller=less light passed
 - F-Stop is a ratio (Focal_length/hole)
 - Allows F numbers to always indicate light amount

Depth of Field



F4



F8



F22

Shallow Depth of Field



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

Aperture Controls Depth of Field

- Larger F-Stop number (smaller hole)
 - Longer depth of field
- Smaller F-Stop number (larger hole)
 - Shorter depth of field

Focal Length Effects

- Longer focal length
 - Shorter depth of field
 - Compresses spatial relationships
 - Brings things closer
- Shorter focal length
 - Longer depth of field
 - Expands spatial relationships
 - Pushes things away

Telephoto Compression



Wide angle, front flowers pop



Wide angle lenses are especially useful to emphasize a foreground subject because the background is pushed away.

Lastly on Lens Properties

- Bokeh
 - What out of focus shapes look like
 - Easiest seen in highlights, halos, donuts, etc.
- Sharpness and Contrast
 - Lens with fewer elements are often sharper with higher contrast
 - Primes are typically better than zooms

Try at home

- Take several images at different F-Stops without changing the focus point (manual focus) and see how the depth of field is affected

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)

Zooming

- Change the focal length of the lens
 - Usually a ring on the lens but can sometimes be controlled by buttons on the camera
- Changes the angle of view

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
 - Can also tilt vertical lines

Wide vs Telephoto

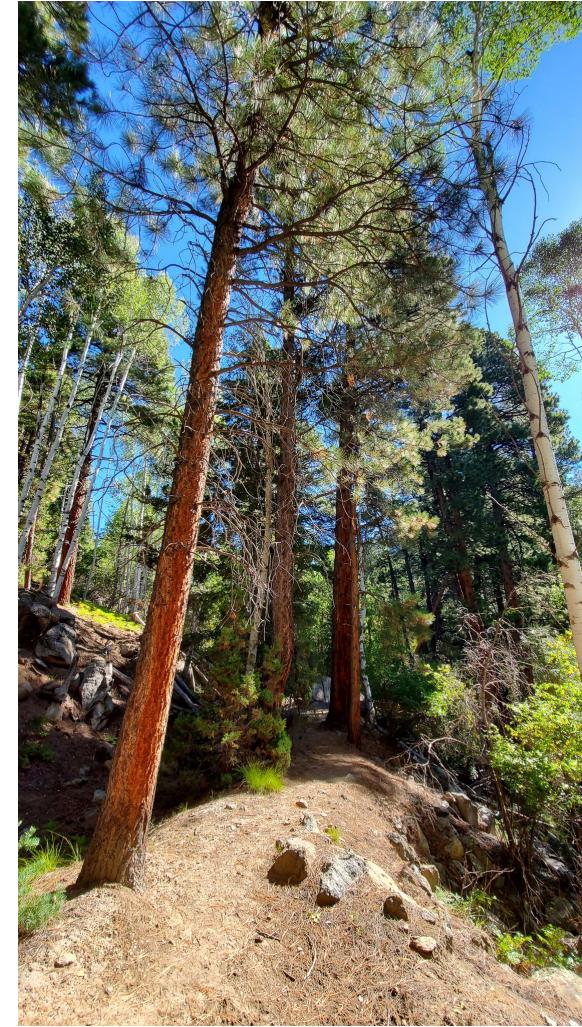


28mm

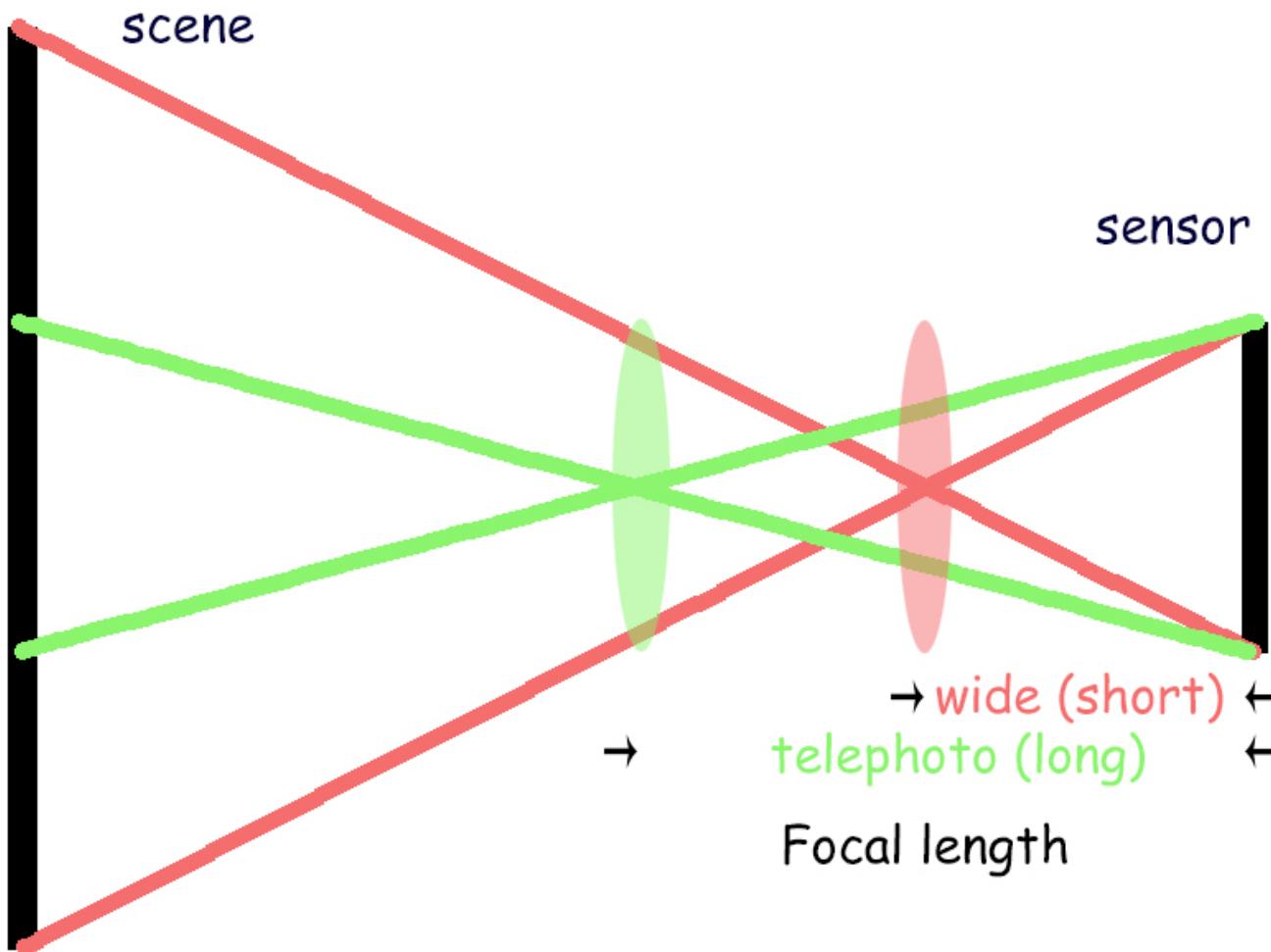


300mm

Tilted Wide Angle Tilts Angles



Focal length affects field of view



Sensor Sizes

- Full-frame is same as 35mm film
 - 24 x 36 mm
- APS-C – smaller sensor
- Lens designations
 - Nikon uses FX for full frame, DX for smaller
 - Canon uses EF and EF-S

Sensor Size Effects

- Normal focal length is 1.414 times the longest side of the sensor
 - ~50mm for a full frame sensor 24x36 mm
- APS-C smaller sensor
 - 50 mm normal lens acts like a slight telephoto
 - ~1.6 for some sensors, 100mm acts like 160
 - Easy to get longer lenses
 - Harder to get really wide angle lenses

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

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

Modern Lens Features

- Auto/manual focus
- Anti-shake
 - VR (vibration reduction) by Nikon
 - IS (image stabilization) by Canon
 - It may be known by other names
- Mirrorless bodies often move the sensor
 - Works with any lens (aka IBIS)



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

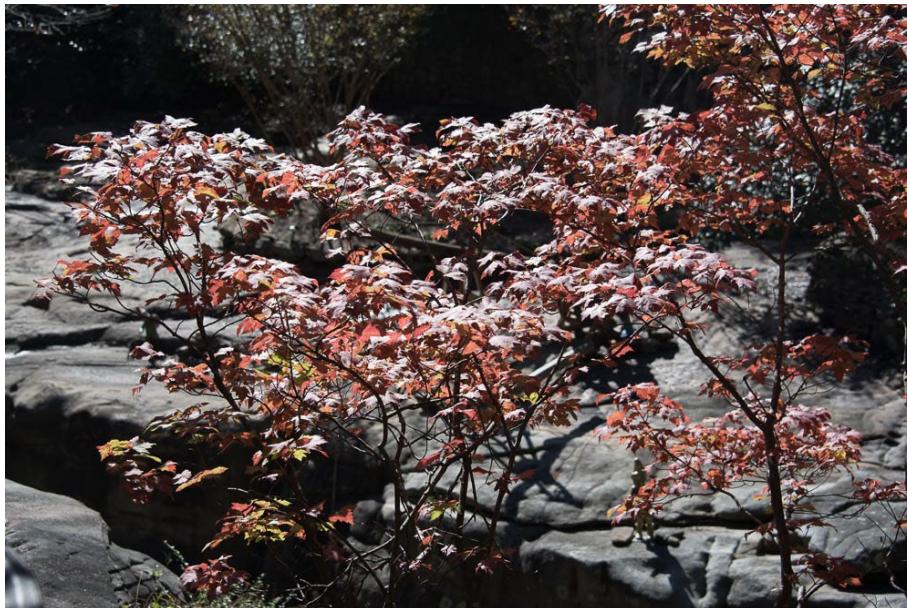
- UV/clear may protect lens from scratches
 - [UV Filters Are NOT Designed to Protect Your Lenses, Manufacturers Confirm | PetaPixel](#)
 - DSLR's already block UV
 - [Why UV Filters are Basically Useless on Modern Cameras | PetaPixel](#)
 - Lens hood helps to protect lens
- Skylight, warming and cooling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

Circular Polarizer

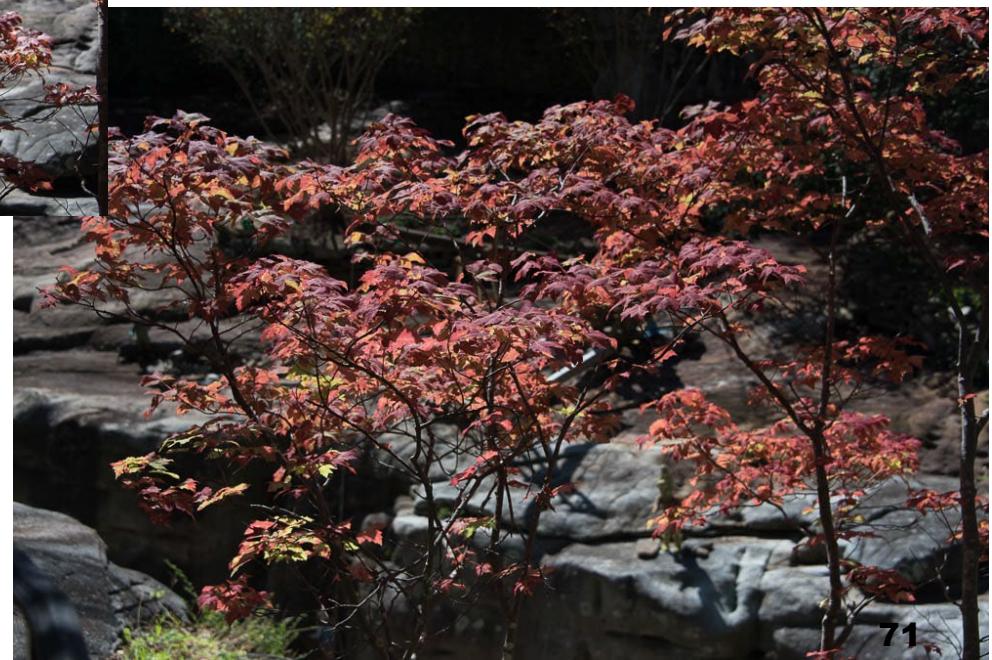
Can't simulate later in Photoshop

- Works best at 90° ($\pm \sim 15^\circ$) to light source
- Removes glare and reflections, good on shiny things, glass, water, leaves and rainbows
- **Note:** Old Linear polarizers will not work
- Thread onto front of lens, **rotate to adjust**
- Available for cell phones as a clip-on

Polarizer Example



With rotated polarizer





With polarizer





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



The Shutter

Open the curtains and let the sunshine in

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 2-4 stops

Effect of Speed

Fast

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

Slow

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



Shutter speeds from
 $\frac{1}{4}$ to 1/500 second.
The fan was running
at a constant speed!

Exercise

- Try different shutter speeds on moving things and notice how the blur changes
- A good way to see the effect is to take pictures of a ceiling fan using different shutter speeds

ISO

Give me light, but not too much or too little, just the right amount please, I'm sensitive

Call me eye-soh or eye-es-oh, both are OK

ISO

- In the past was ASA, then ANSI
- DIN was German equivalent
 - $100 \text{ ASA} = 21 \text{ DIN}$
- Combined in the 80's to just plain ISO
 - Approximately shutter speed sunlight at F16
- Higher values have more noise
 - Best to stay below 800

More Details on ISO

- Native, Amplified, and simulated
- Excellent article here:
 - <https://www.bhphotovideo.com/explora/photography/tips-and-solutions/understanding-iso>
 - The comments about “higher voltage” are not actually correct (it is really gain or amplification that is increased), but the result comments are correct

Sensor Noise

- Smaller sensors have more noise
 - Modern sensors are very good
- Two kinds
 - Luminance (brightness)
 - Chrominance (color)
- Temperature affected, cold is better

Digital Noise

DSC0384.NEF

1/10 sec at $f / 5.6$, ISO 1800

71 mm (NIKKOR Z 24-120mm f/4 S)



DSC0385.NEF

1/160 sec at $f / 5.6$, ISO 25600

71 mm (NIKKOR Z 24-120mm f/4 S)



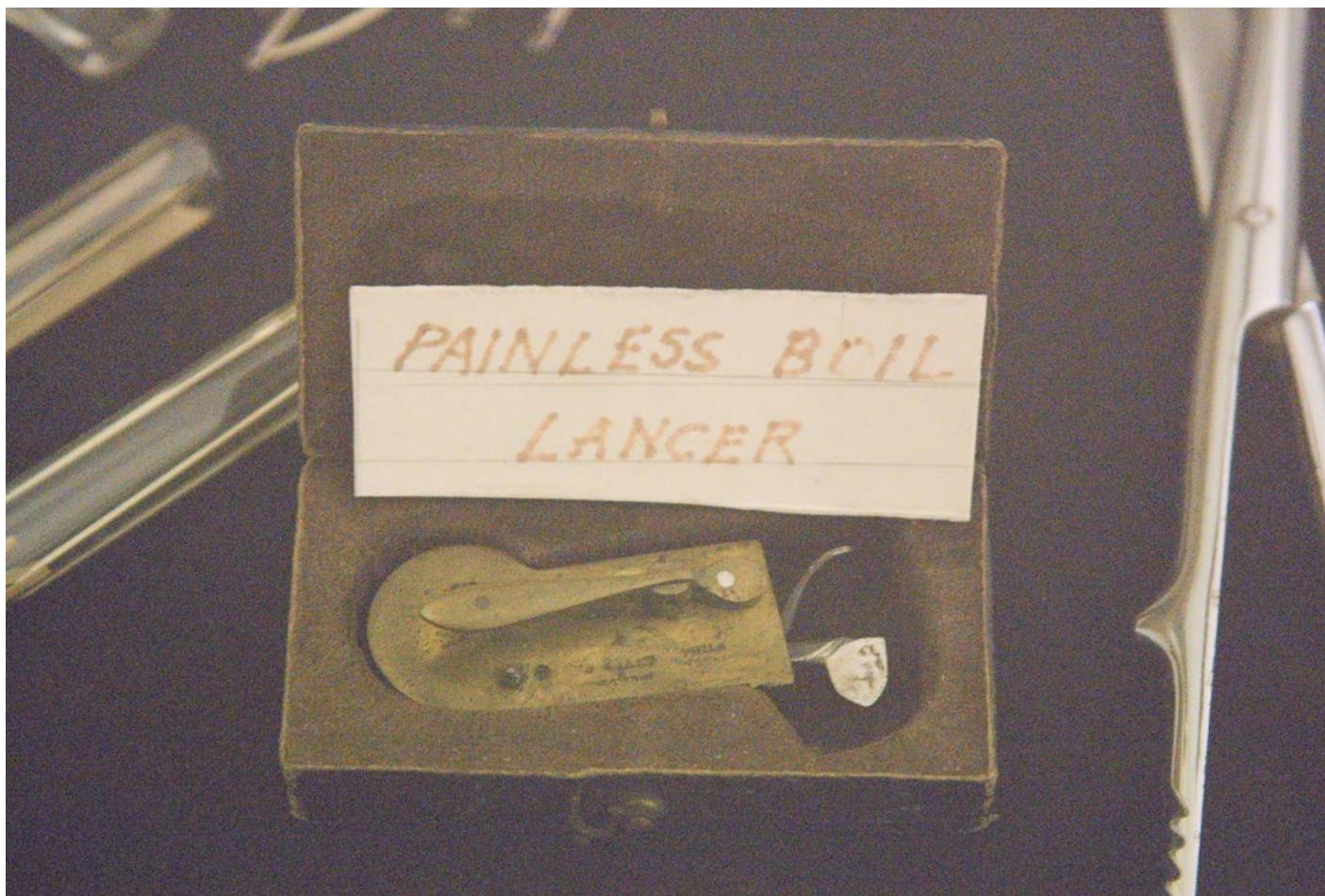
High ISO Noise



Don't see much in really dark areas here because blacks have been clipped which masks the noise



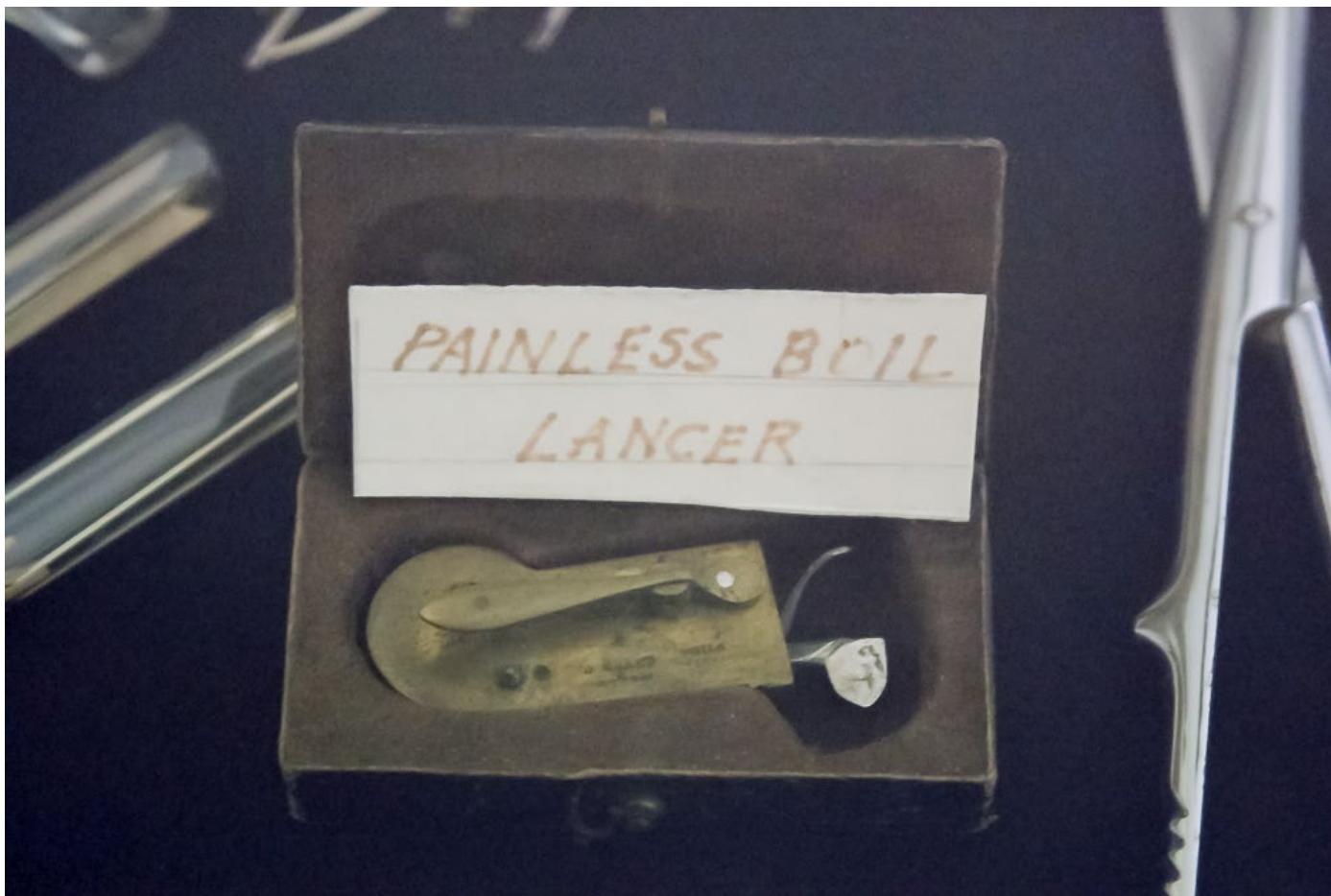
Color Noise Example



Notice how there is very little noise in the brightest areas of the image

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

High ISO and Sharpness

- Higher ISO images are not as sharp
 - Especially if noise reduction is on
- Until AI that is...

DSC0352.NEF



0.5 sec at $f / 4.0$, ISO 25600

24 mm (NIKKOR Z 24-120mm f/4 S)



Direct from camera with noise
reduction off and very high ISO

DSC0352-Enhanced-NR.dng

0.5 sec at $f / 4.0$, ISO 25600

24 mm (NIKKOR Z 24-120mm f/4 S)



Adobe Lightroom AI noise reduction. Unlike tradition noise reduction, there is very little sharpness lost. Only works with raw images!

High ISO from Cameras



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, computer AI is much better
- 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

Minimizing Noise

- Lower ISO (might make exposure longer!)
- Collect as much light as fast as possible
 - Move histogram right without clipping hi-lights
 - Use larger aperture (smaller F number)
 - Note: this reduces depth of field
 - Use shorter exposure time, sensor heat noise
- Use camera noise reduction feature

Summary Thoughts

- Higher ISO amplifies the sensor signal, noise also gets amplified
- Minimize with the lowest ISO setting
 - Get the most light to the sensor that we can, longer shutter speeds and larger apertures
 - Remember that shutter and aperture are constrained by artistic and blur/sharpness issues
 - The most important thing is “get the shot!”

Oh, Two More Things...

- Dynamic range shrinks with higher ISO
 - <https://www.photonstophotos.net/Charts/PDR.htm>
- Noise isn't linear with higher ISO
 - https://www.photonstophotos.net/Charts/RN_ADU.htm



Sharpness

Look sharp, everybody!

Sharpness Advice (1/2)

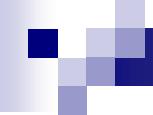
- Buy good lenses (see: www.dxomark.com/lenses)
- Use best focus mode, AF-C (Canon AI-Servo) for moving things, or AF-S for still
- Use fast enough shutter speed
 - 1/focal length
 - holding method (hand or tripod)
 - IS or IBIS improves often > 2 stops

Sharpness Advice (2/2)

- F-Stop, 1 or 2 above wide open and at least that much below max
- Shutter delay, self-timer, lets vibration stop with slow shutter speeds
- No strap when using tripod, wind can move it around
- Lower ISO is better

Cell Phones

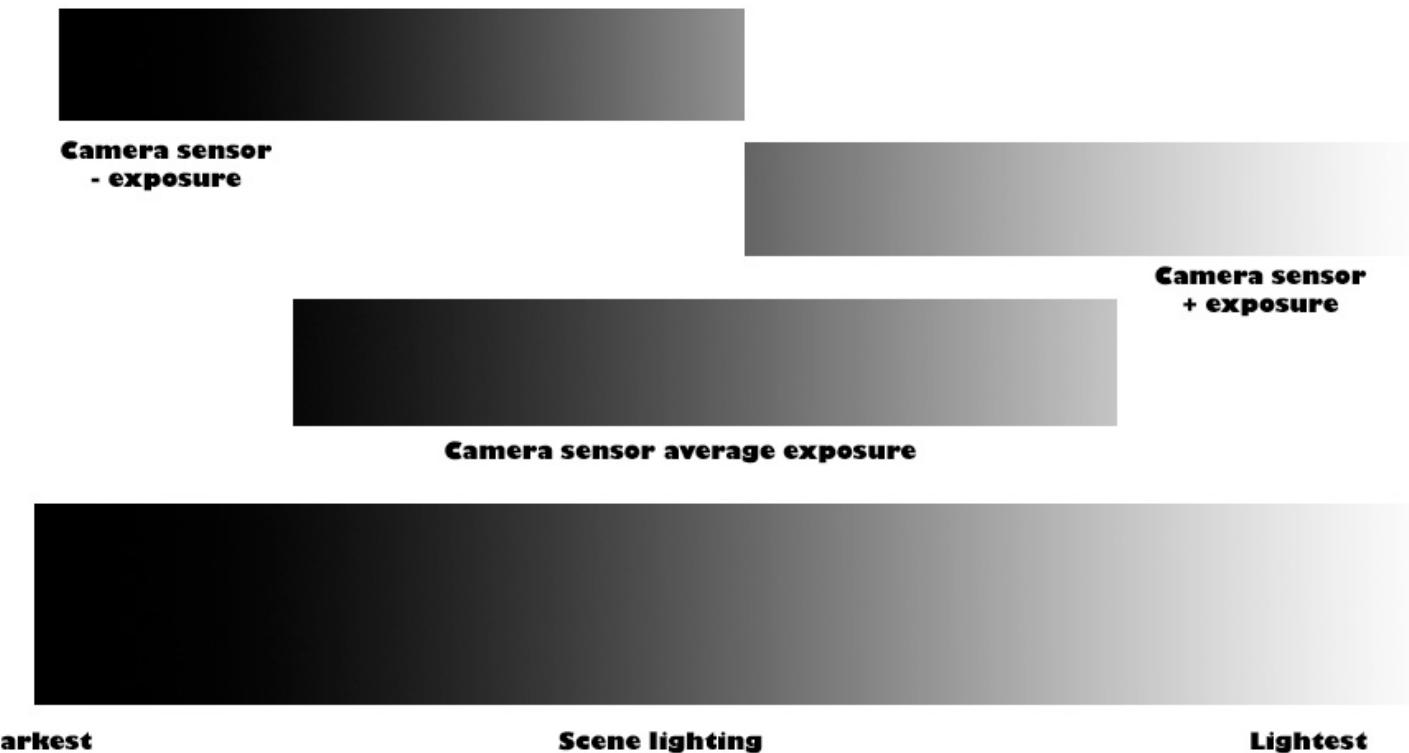
- Images look sharp on small screens even when they aren't
- DSLR's are much less forgiving of focus errors due to shallower depth of field



Exposure

Getting the correct amount of light to the sensor
Control by Shutter, F-Stop and ISO settings

Dynamic Range Scene/Sensor



Things Affecting Exposure



Exposure

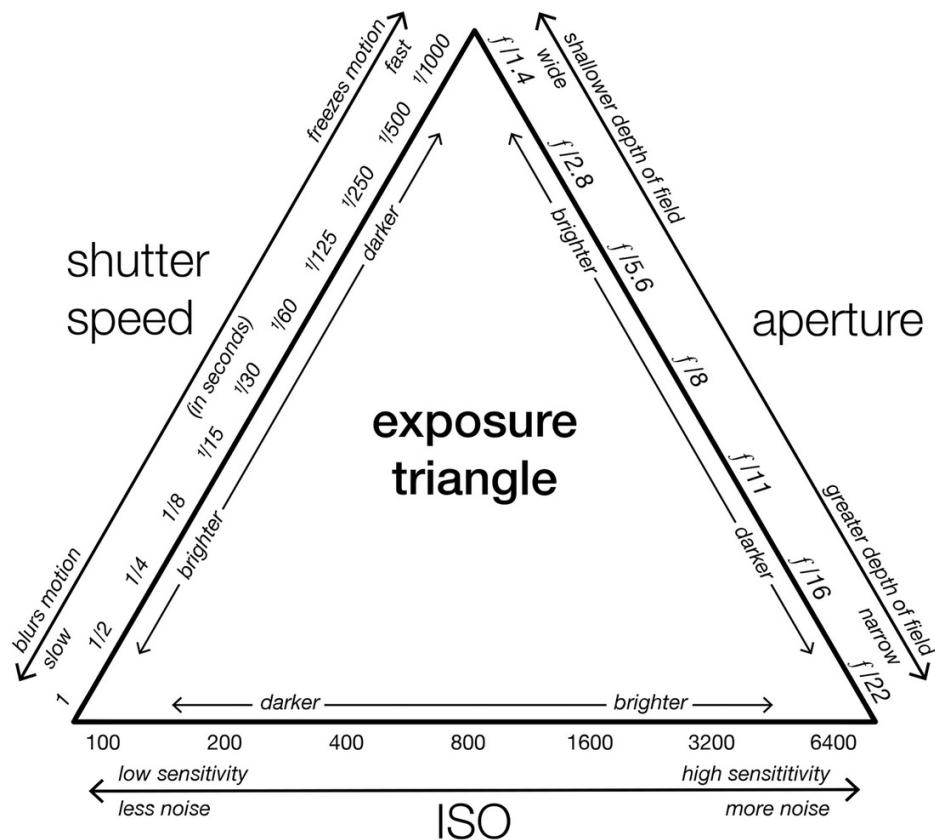
less noise **ISO** more noise

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

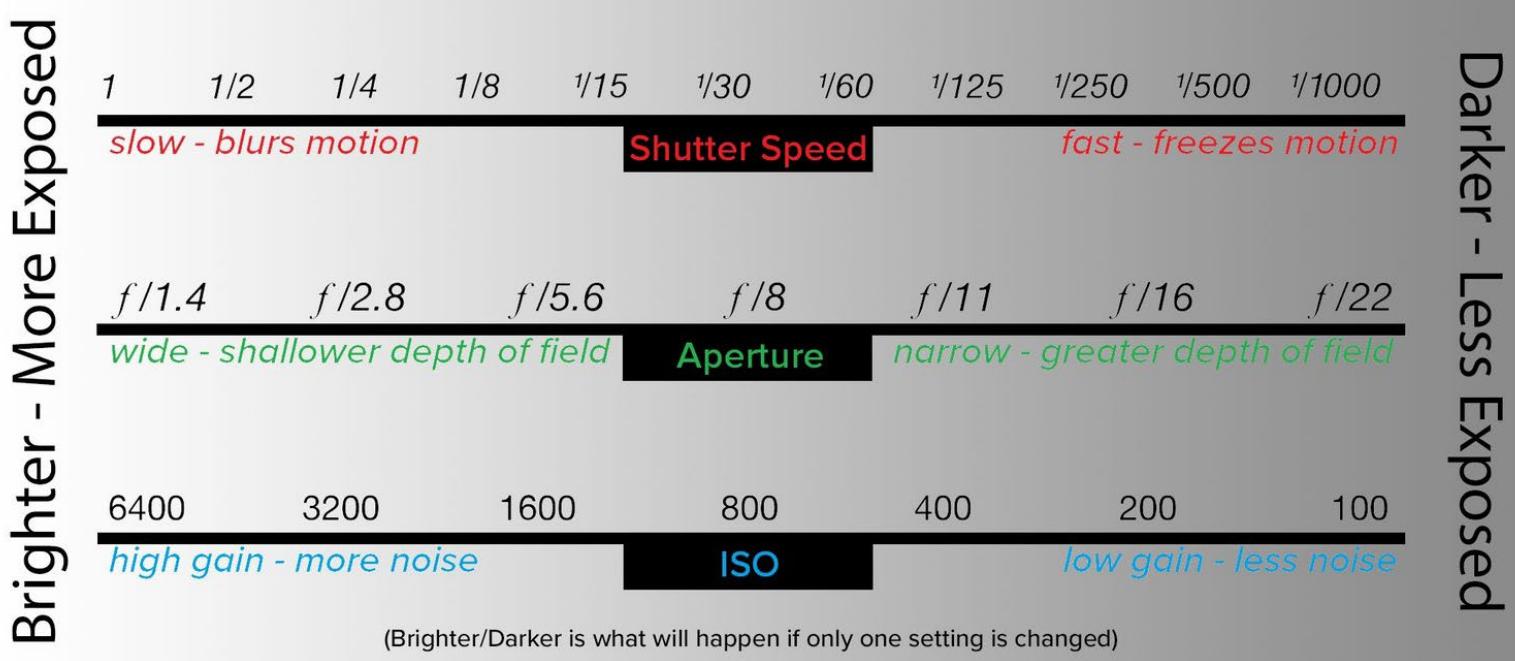
stop motion **Shutter Speed** motion blur

Exposure Triangle

You will find this many places. I don't like it because it doesn't really show the relationships between the 3 settings. It gives no indication of where the correct exposure is. It is just 3 things arranged in a triangle!



A Better Diagram



This shows how things get brighter one way and darker the other way. If you adjust one, then you must adjust one or both of the others to get the brightness correct again.

Credit to Mike Dixon

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
 - ISO, how much light each element needs
 - Shutter speed, how long the shutter is open
 - F-Stop, how much light the lens lets through

EV

- Makes every number equivalent to a stop
 - $+1 = 2 \times \text{light}$
 - $-1 = 1/2 \times \text{light}$
- 0 is F 1 at 1 Second
- Cameras often show focus or sensitivity in EV using ISO 100

The Math (Won't be on test!)

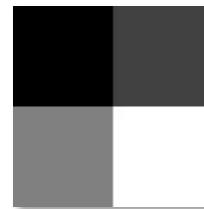
- $EV = \log_2 \frac{F^2}{t}$
- F is F-stop, t is shutter speed (in seconds)
- Using \log_2 results in each integer step being a halving or doubling of light

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

4 shades of gray over-exposed

0%	25%
50%	100%



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

0%	50%
100%	100%

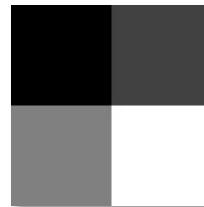


Note that the difference between the two spots on the bottom is now lost.
And there is no operation that can bring back that detail!
All you can do is make everything a bit darker, the detail is lost.



4 shades of gray under-exposed

0%	25%
50%	100%



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

0%	12.5%
25%	50%



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.

Two Ways to Measure Light

Reflectance

- What your camera does
- Least accurate
 - Affected by the properties of your subject

Incidence

- What a light meter does when at the location of your subject
- Most accurate
 - Measures the actual light, not what is reflected

Grey Card

- 18% reflectance
- Your palm is ~36% (your results may vary)
- The world is gray?
 - The camera looks at the world as if it is gray when deciding the exposure, this will result in some pictures not being exposed correctly
 - Consider a black cat in a coalbin or a white cat in a snowstorm!

Rules for Exposure

It often depends on the scene!

■ Film

- Expose for shadows and develop for highlights

■ Digital

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

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
 - $\frac{1}{2}$ 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

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. Higher speeds can be used to stop motion.

Summary of exposure effects

- ISO
- Shutter speed
- F-Stop/Aperture
- Noise
- Motion blur
- Depth of field

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

Artistically Correct Exposure

- Isolate subject with DOF
- Make everything sharp
- Freeze motion
- Show or imply motion with blur
- Show motion with panning
- Darken or lighten for mood or atmosphere



Artistic Settings

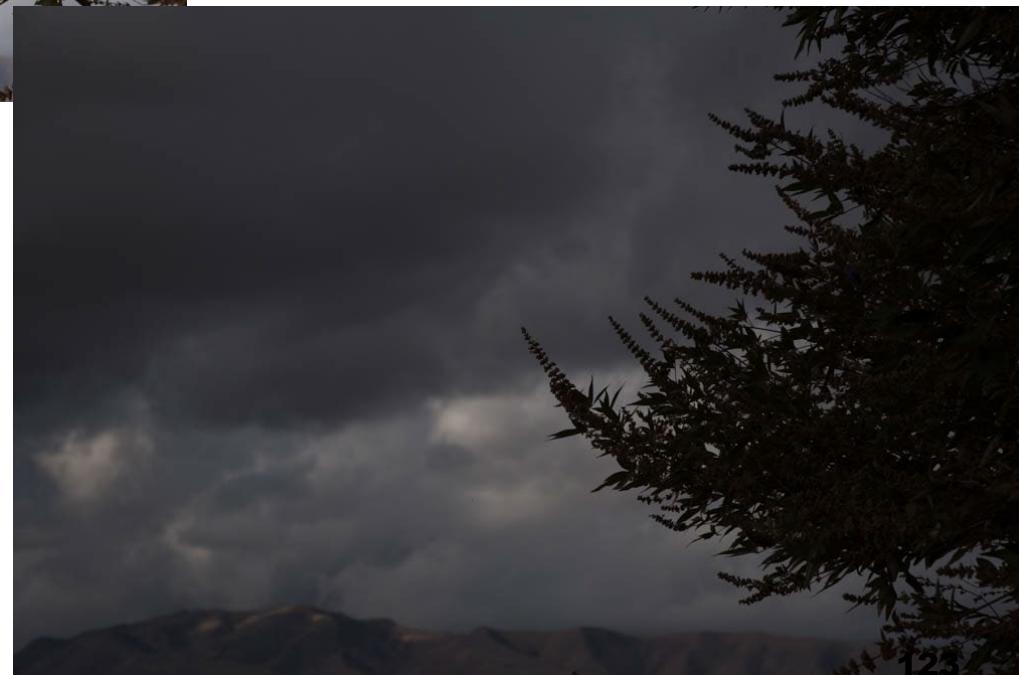
Choosing the correct F-stop and/or shutter speed to get the image you want, the camera is not always right!

Dark and Light Mood



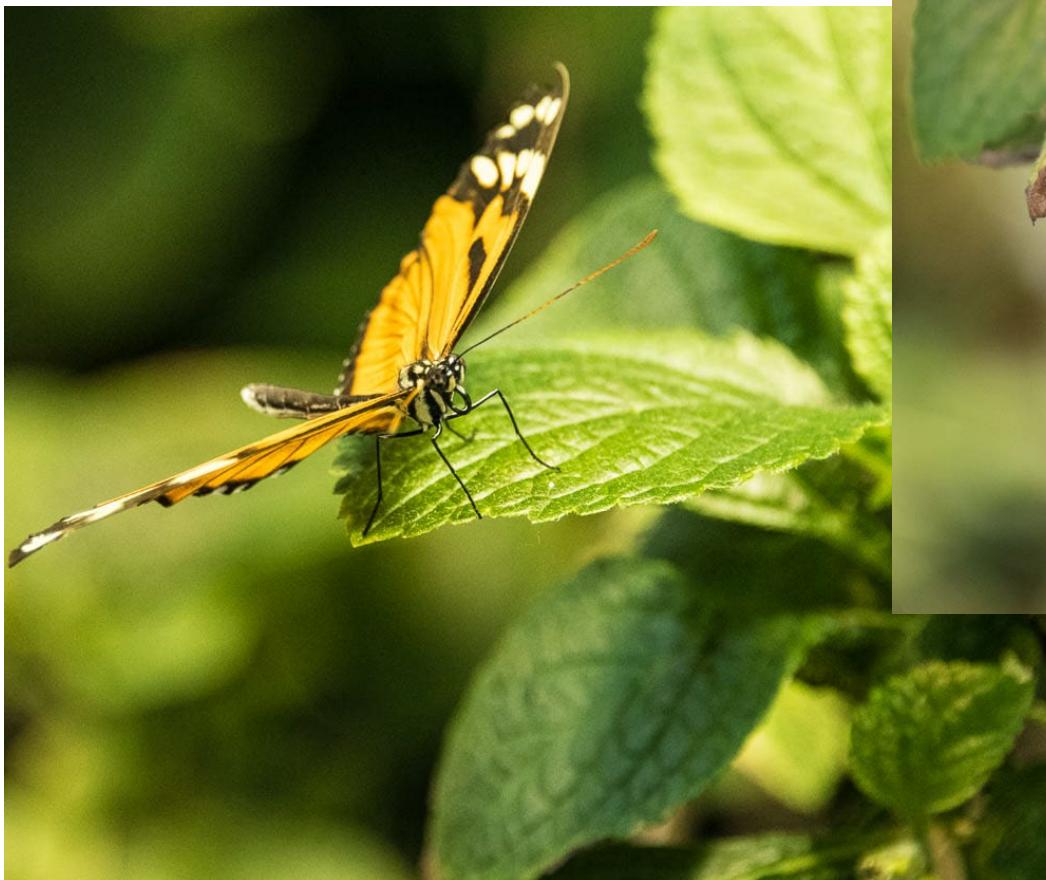


“correct exposure”



“-2 stops”

Depth of Field Isolation



Notice how there is almost a 3D effect?

Glass Wing Butterfly



Everything Sharp



Freeze Motion



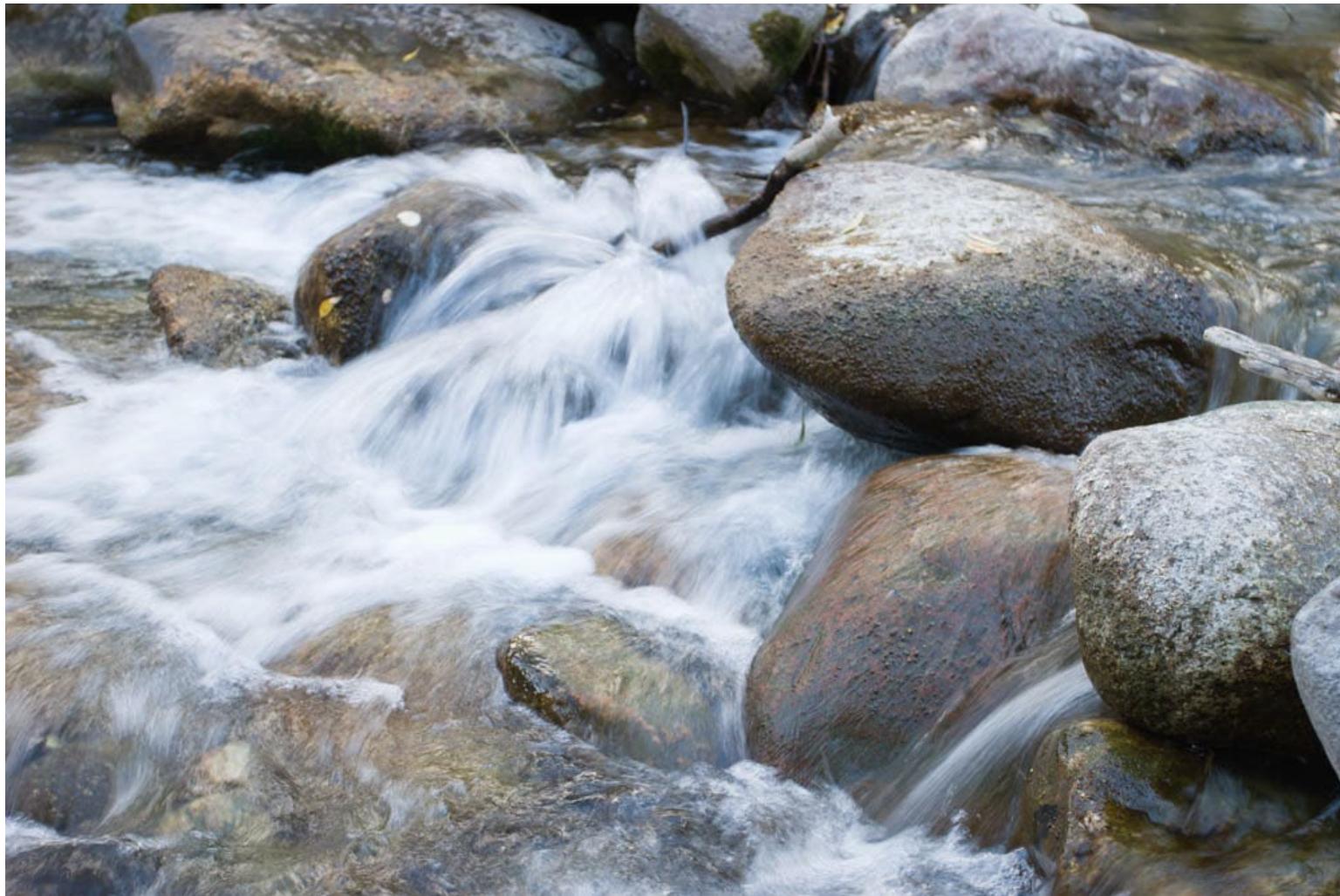


Fast shutter freezes the water while large aperture creates shallow depth of field to isolate subject and separate it from the background.

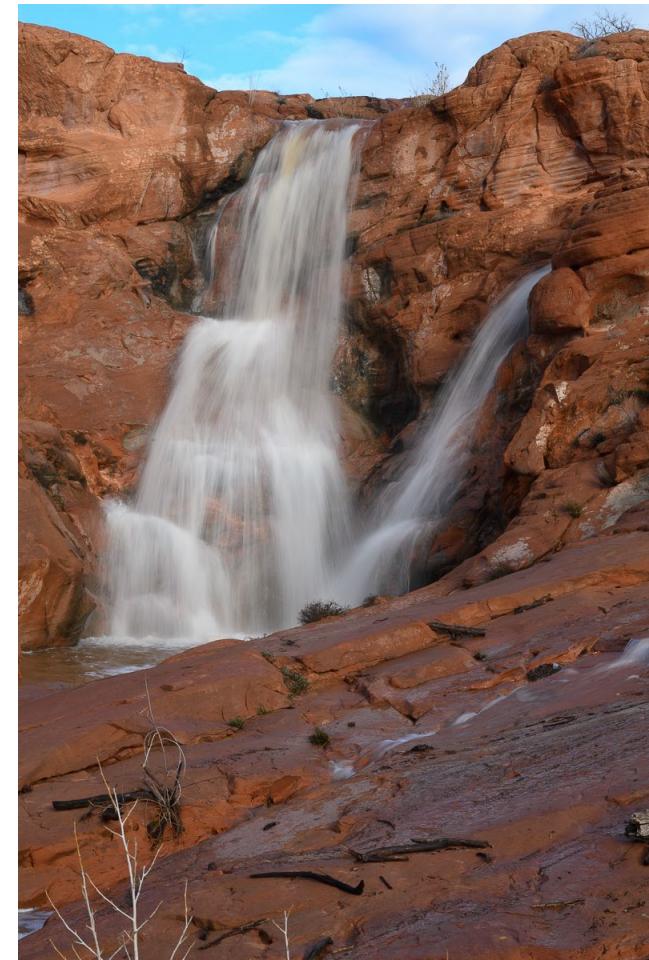
Imply Motion with Blur



Slow Shutter Shows Motion



Waterfalls, blur with slow shutter



Sometimes less blur is better



Panning







Pan and Slow Shutter





The Histogram

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

Histogram

- An important tools to understand
- It's just a bar graph showing the count of pixels at each brightness level
 - Black on left
 - White on right
 - Grays in between
- A glance will tell you much
- Keep your eye on it while editing

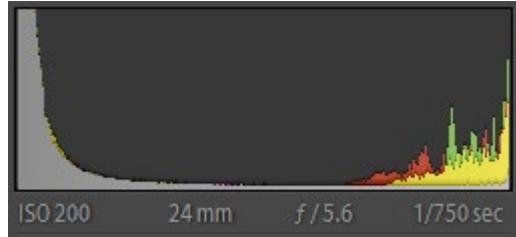
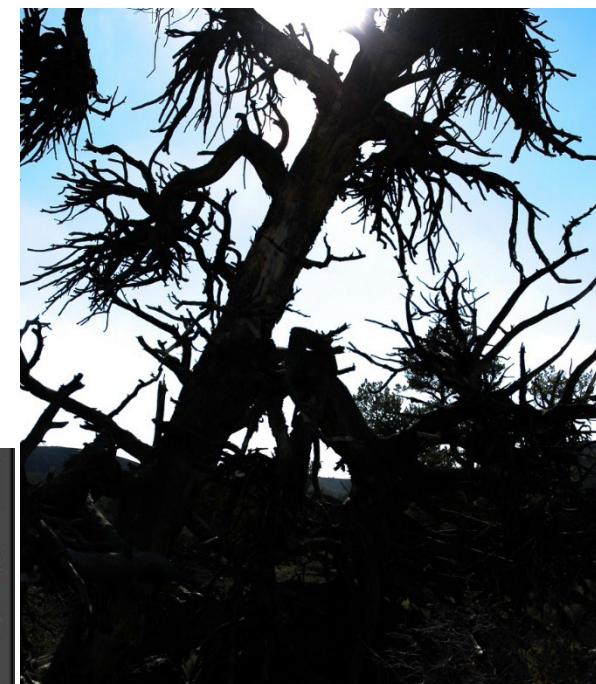
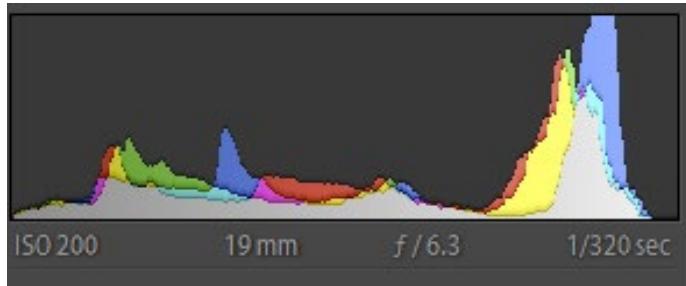
More Histogram

- Some cameras also show the RGB values
- Can see shadow and highlight issues
- Can see overall exposure
- A tool to analyze exposure quickly

Histogram Analysis

- Spikes show loss of data when adjacent pixels combined
- Holes show loss of data when pixels spread
- Crowding on black side shows poor shadow detail
- Crowding on white side shows poor highlight detail

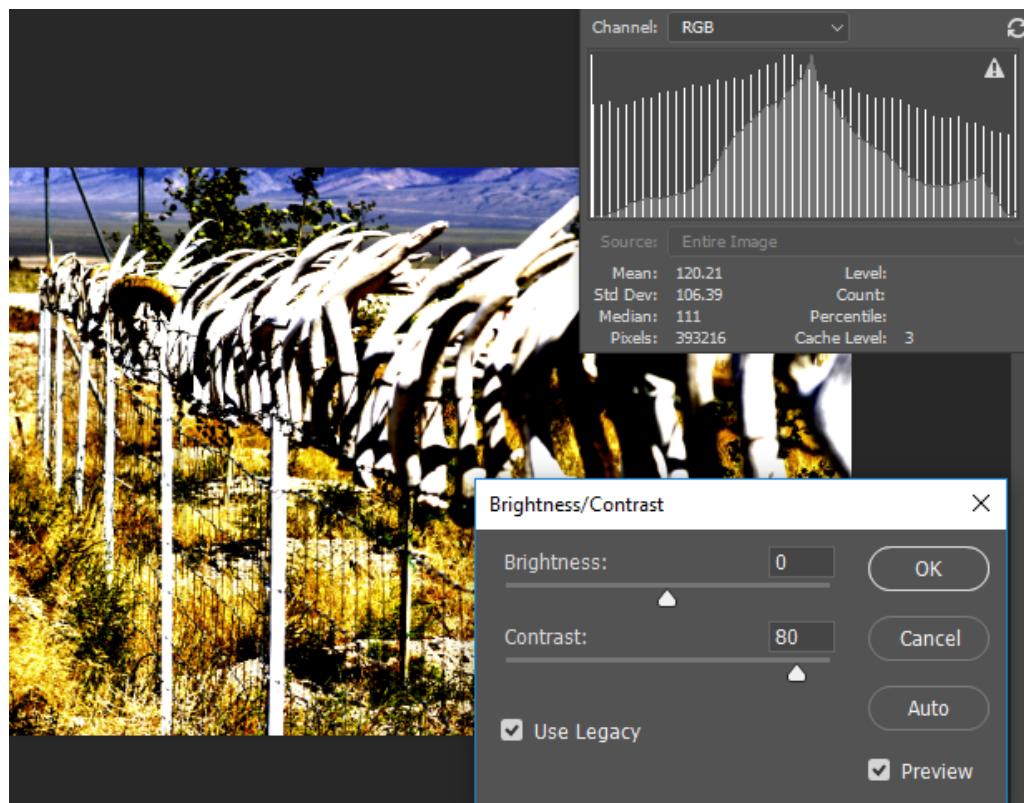
Histogram example 1



Histogram example 2



Histogram example 3



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

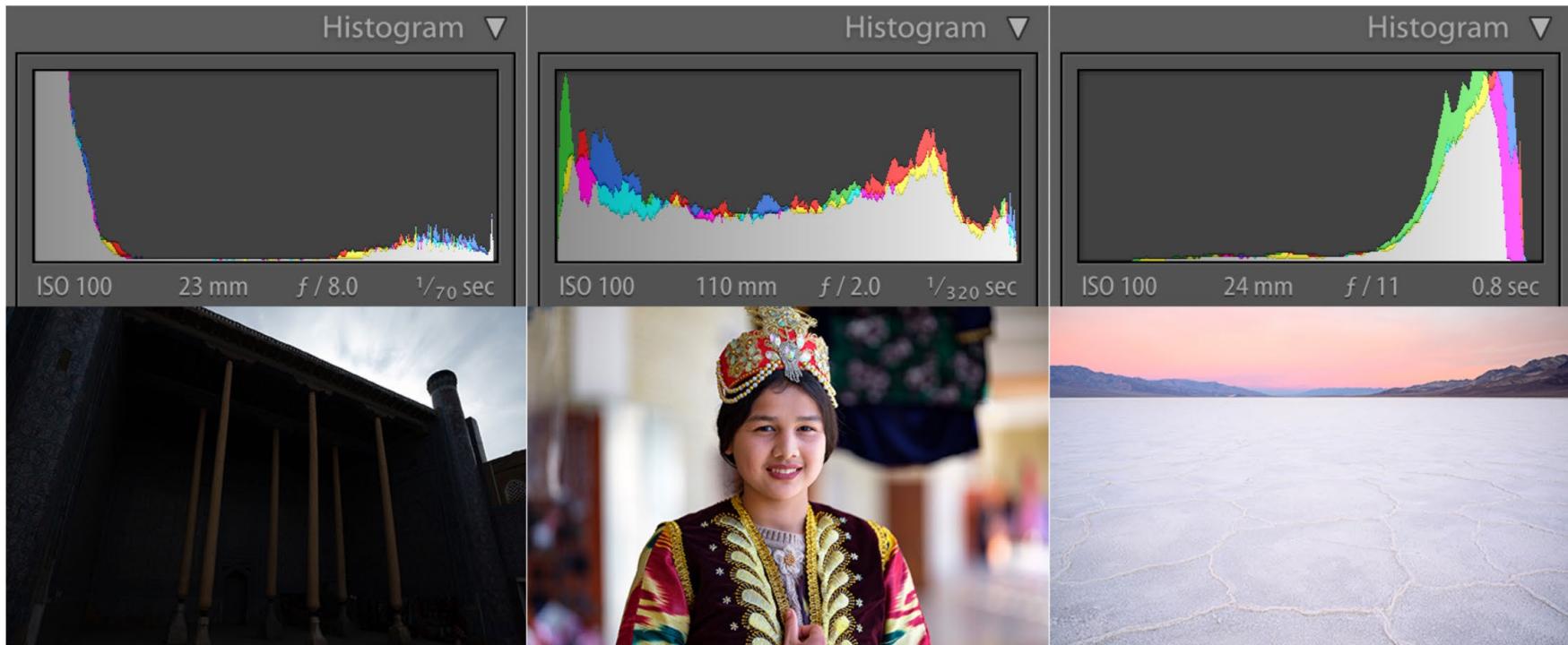
More ETTR

- 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

From excellent article:

The Myth of "Exposing to The Left" (photographylife.com)

Exposing to the left is better for film, but not digital.



The camera would have lightened this image if left in full automatic exposure mode, possibly losing sky details

The camera would have darkened this image if left in full automatic exposure mode

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 DSLR cameras can 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



Camera Controls

Unless you tell me what to do, I will make all the decisions for you, but I don't always make the best choice!

Camera Controls Summary

On dial, menu, or button

- ISO
- Shutter speed
- Aperture (F-Stop)
- Exposure comp
- Metering mode
- Focus Modes
- Flash modes
- White balance
- ISO
- S Nikon, Tv Canon
- A Nikon, Av Canon
- +/-
- Often a rectangle
- Description
- Icons
- Icons

Other Camera Controls

- There are usually many options in menus
- Programmable buttons
- User settings
- Exposure lock modes
- Focus locations
- Flash controls
- ...

Fully Automatic Modes

- Auto, the camera decides everything
- Creative Zone or Scene, giving a hint
 - Flowers
 - Landscape
 - Portrait
 - Night
 - Stage
 - Sports
 - Etc.

Semi-automatic Modes

- A, Av (aperture priority)
 - You pick aperture, camera picks shutter speed and possibly ISO
- S, Tv (shutter priority)
 - You pick shutter speed, camera picks aperture and possibly ISO
- P (program)
 - Camera picks shutter and aperture but you can choose a different set

Manual Settings

- You pick shutter and aperture
- The camera will adjust the ISO if auto-ISO
 - Usually something will blink if your chosen combination cannot give proper exposure
- A “light meter” usually displays somewhere showing what the camera thinks is correct
 - ISO might have to be adjusted (non-auto)

Metering Modes

- Where to look at light in the image
 - Matrix (Nikon) Evaluative (Canon)
 - Uses AI to figure out what kind of scene this is
 - Center weighted
 - Looks mostly at the middle
 - Average
 - Looks everywhere and takes an average value
 - Spot
 - Looks only at a tiny spot, often where the focus is

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



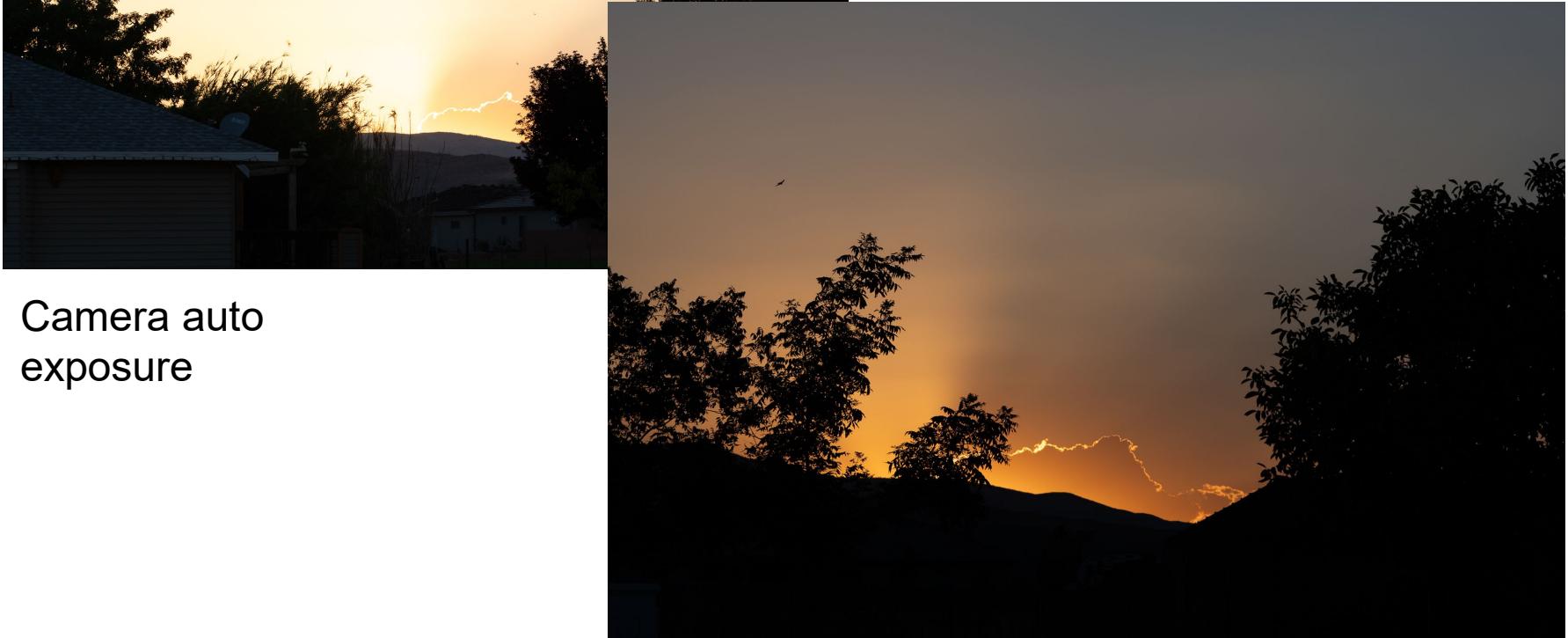
Compensation +1



Compensation +2



-2 stops from what camera wanted to do



Camera auto
exposure

Exposure Bracketing

- The camera takes 3 or more at different values
- You can later choose the best one or combine parts from different ones
- Some cameras have HDR mode that takes 2 or more exposures at different values and combines them
 - Some cell phones do this automatically

Camera ISO Settings

- Manual

- You decide what ISO to use

- Automatic

- The camera decides
 - Usually has a maximum and minimum value

- Higher values give more noise

- Might be needed for F-stop & shutter speed

Manual Exposure

- You get to choose F-stop and shutter
 - If auto ISO is then the camera will still try and get the exposure it thinks is correct, so you can't really control the actual exposure value unless ISO is also set to manual

Exposure Compensation 1/3

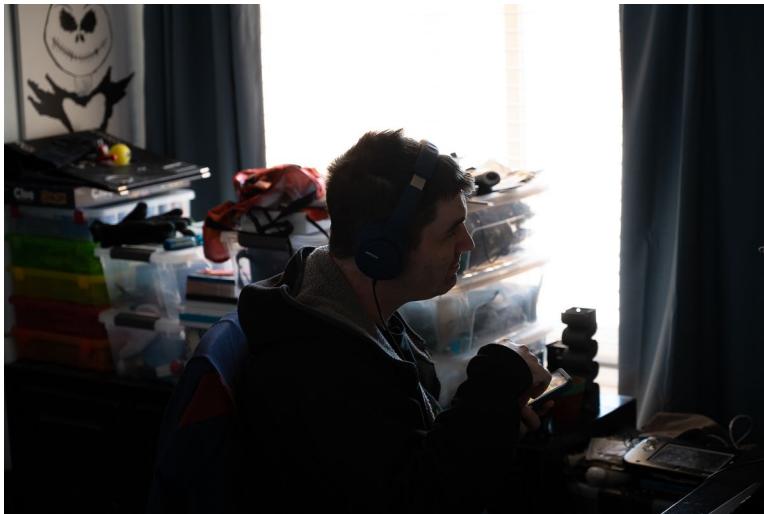
- In most/all of the automatic exposure modes the exposure compensation control can be used to **lighten or darken** the image to match your creative vision
- Either a dial or a menu on your camera
 - Touch and slide on cell phone
- I use this frequently, it is very convenient

Exposure Compensation 2/3

- Use in backlight situations, windows or sun behind subjects
 - Could use spot metering but it is often just as easy to dial the compensation until the subject looks good
 - The background will be very light, but that is not the subject so it is often ok

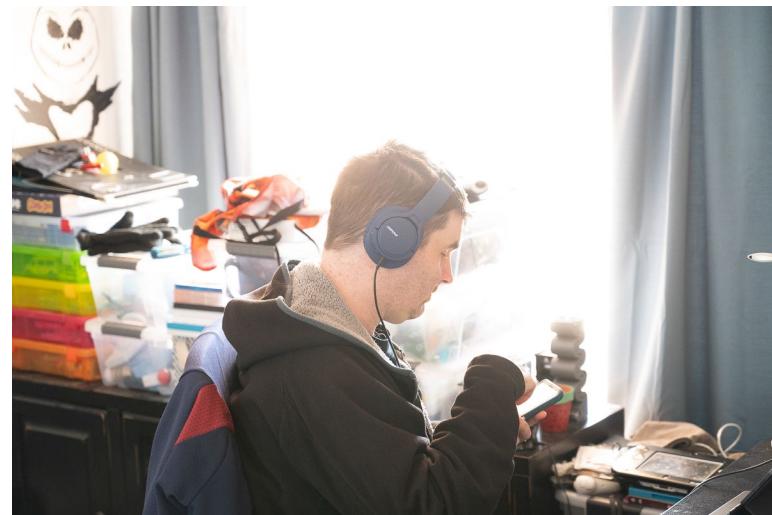
Exposure Compensation 3/3

- Automatic exposure is very good on modern cameras, I trust it frequently
- But... often the image needs to be adjusted lighter or darker
 - Exposure compensation dial is perfect for this
 - NOTE: remember to turn it back to 0 when done, some cameras do this automatically



The strong window light makes the subject dark.

Dial the exposure compensation up until it looks better. You may lose details in bright areas.



Completely Manual

- Set aperture/shutter to M
- Turn off auto ISO
- You can use the meter to see how close you are to what the camera thinks is correct
 - The viewfinder only shows the effect partially and “exposure preview” must be on
 - Examine the histogram to discover the truth

So What Do I Use?

- Mostly M (manual with auto ISO)
 - Lets me control motion blur and depth of field
 - I accept the noise of high ISO
- M with manual ISO for night
- Exposure compensation when needed
- Mostly matrix metering
 - Stage and backlit often use spot metering
 - Some cameras have a special stage setting

Class Demo

- We now know enough about exposure, let's see how the different modes work on your camera

Try at home

- Experiment with the manual settings
- Notice how the images get darker and lighter
- Experiment with the automatic settings
 - Find and use the exposure compensation button or menu that will adjust the exposure, usually something like: +/-



Focus

Look sharp, everybody

Focusing Area

- Manual, you choose
- Autofocus
 - Spot
 - Auto
 - Group
 - 3D
 - Others

Focus Modes

- Single, press shutter release halfway
 - Useful to focus on something, then reframe
 - Focus stays, even if camera is moved
- Continuous
 - Keeps adjusting focus constantly
- Auto
 - Focus will try and track the object it was focused on if it moves

Notes About Focus Spot

- Auto mode picks a spot from a large area
 - Not always where you want it
- Spot mode, we often leave in center, focus and then recompose the image
 - This is sometimes a bad idea since the exposure is tied to the focus spot, it might end up being wrong, move the focus spot instead

Where Automatic Focus Fails

- Low light
- Low contrast
- Many potential objects to focus on
- Fast moving objects

Focus Peaking

- Some cameras can show sharpness by putting colored outlines around sharp edges, this is very easy to see sharpness
- Only works in LiveView mode or with mirror-less camera view finder

Try at home

- Learn the focus modes of your camera
- Experiment with how they work
- Practice using the press half-way focus lock



White Balance

What color is that 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

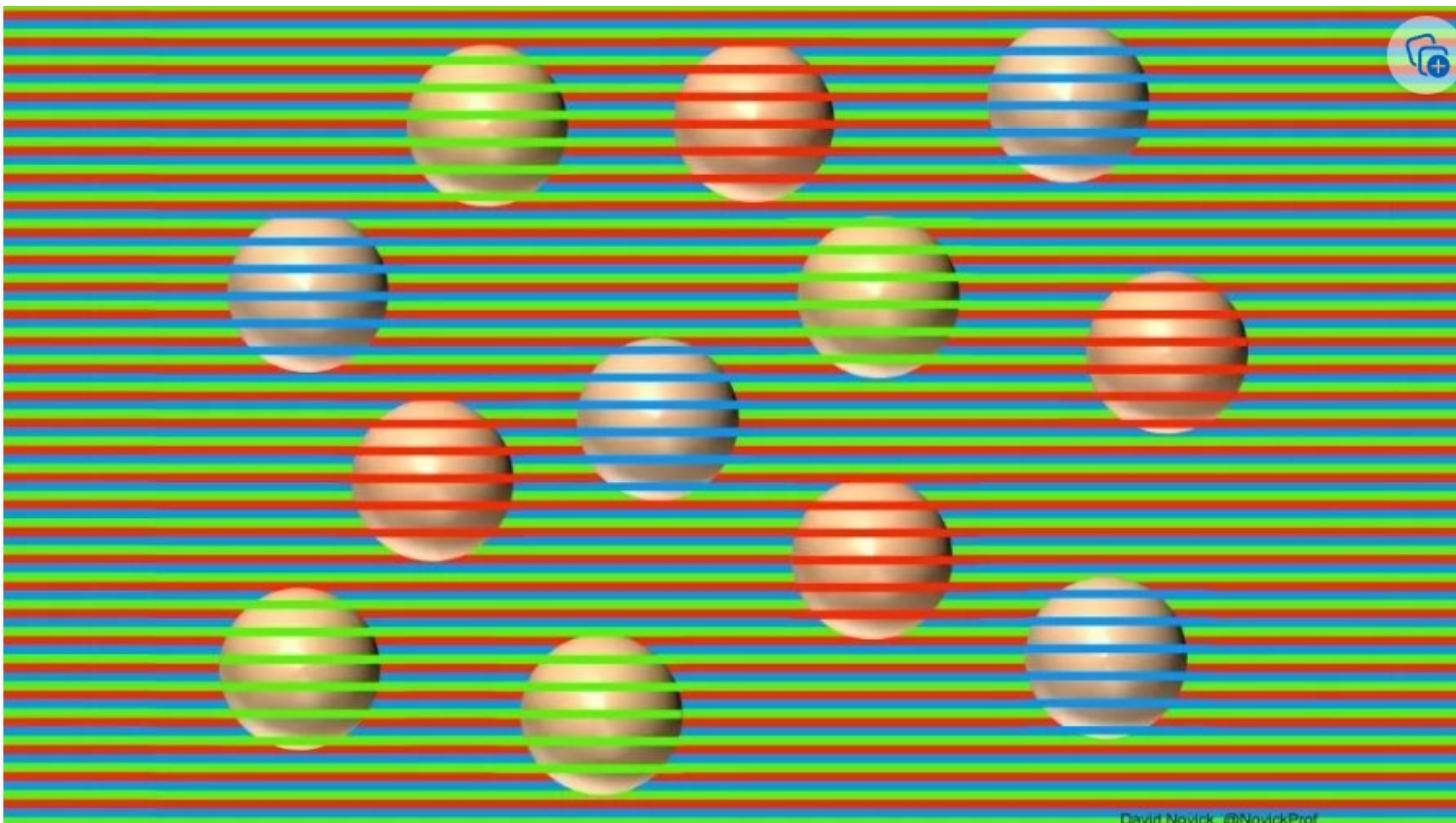
To Make Things Even Harder

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

And to Make it Really Hard...

- Each of us sees color differently
 - The white-gold, black-blue dress controversy raised scientific questions about visual perception, but the way our eyes and brains work explain the illusion (msn.com)

And Even Harder!

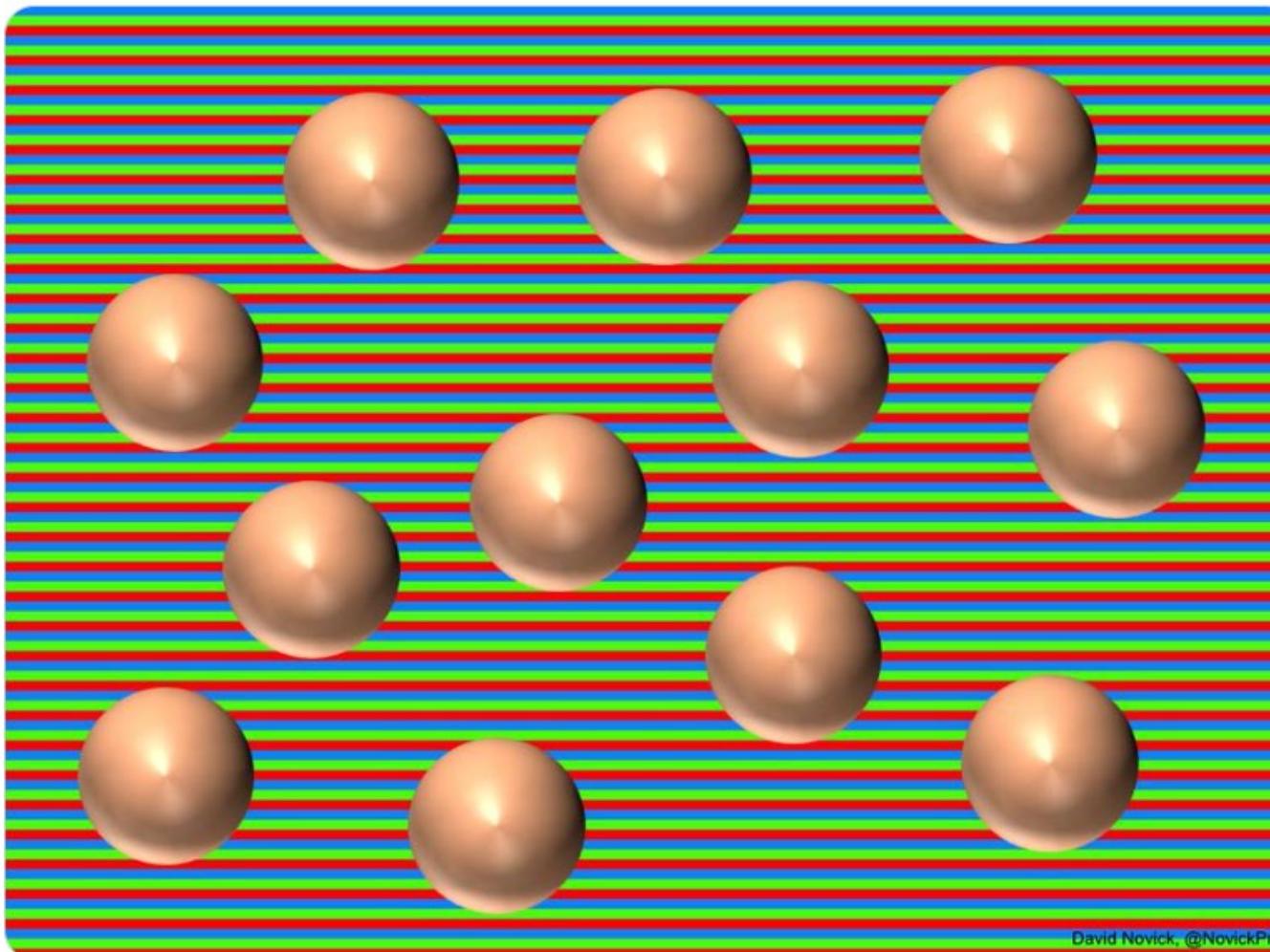


Munker-White
Illusion

The balls are all the same color.

See here: <https://www.livescience.com/confetti-munker-white-optical-illusion.html>

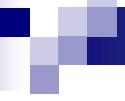
With Colored Bars Removed



David Novick, @NovickProf

Color Test Photo – Test Display





Color Card – Shoot on site

Use later to correct colors



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



But...

- Which one of those 2 previous images actually looks more pleasing?

Camera White Balance Settings



incandescent



fluorescent

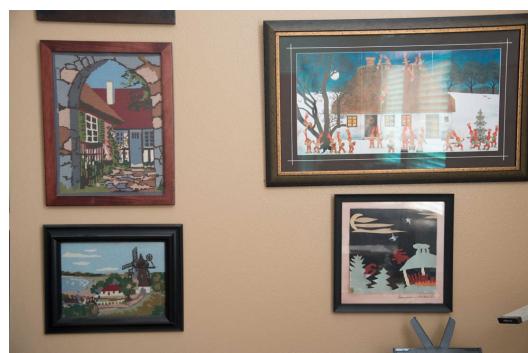


cloud

shade

Sun (this one is closest)

auto



Camera White Balance Settings



incandescent



fluorescent



cloud



shade



sun



auto

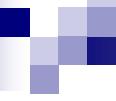
Note how auto
desaturates
the colors!

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

Try at home

- Take images of the same scene with different white balance settings
- Notice how the colors change



Two Uses of White Balance

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

White Balance Conclusion

- After all the above technical stuff, just make it look right to you!



Things About Light

Photography is about light, and composition!

Light Quality

- Source size affects shadow edge fuzziness
- Direction affects where the shadow falls
- Light color affects the overall color of the image, least noticed in the shadows and really bright areas
- Strength affects the bright/shadow ratio

Types of Light Sources

■ Sunlight

- Overcast (blue)
- Shade (cold blue)
- Direct (warm yellow)

■ Artificial

- Incandescent (warm yellow/orange)
- Fluorescent (varies, but often greenish)
- Led (cold blue, but varies greatly)

Light Direction

- Frontlight (flat, soft)
- Sidelight (strong shadows)
- Backlight (Useful for halos)
- Toplight (outside causes dark eyes)
- Bottomlight (used in horror films)
- Portraits often combine several of these

Controlling Light

- Shadows hide or outline objects
- Reflectors brighten dark areas
- Wait for sun, better “mood” or position
- Flash
- Move around to change your position



+1 Stop exposure compensation



Ceiling light on



ordinary



flash

To Do

- Walk around and watch light behavior
- What do bright things look like?
- What do shadows look like?
- Notice the interaction of shadows and lights and how they define shapes and objects to create interesting scenes

Try at home

- Use light from window or a single light shining on a face in a dark room
- Move around and take images from different positions
- Notice how the shadows change



Better Pictures

Photography as Art and Visual Fun

Some people feel the rain while others just get wet

- Bob Marley

We Live in a Flood of Images

- Many aren't worth looking at for very long
- Plenty of images, not enough art
- We need to learn how to improve our images to be more art-like (visual literacy)

Important Tools

- Yes, the camera and lenses are somewhat important
- Most important tool: Our Eyes

What do you see?



Visual Literacy

Less Literate

- Describes the scene as a picture of an apple

More Literate

- Night photo
- Square frame
- Strong sidelight
- Dark foreboding background
- Apple symbolizes?
- ???

Eye/Brain Analysis

1. Recognize shapes
2. Assign names to shape objects
3. Applies emotional response to each

Trick of the Eye

- Use composition tools to make things look better and even 3D
 - Trompe l'oeil

Why Do We Take Pictures?

- Pure enjoyment of images
- Help us remember event, places and people, it's like a time machine!
- Share with others
- Get published, sell
- Ansell Adams “Two people in every photo, the photographer and the viewer”



See and Feel

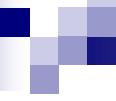
- Capturing what you see is easy
- Capturing what you feel is not so easy
- Art is evoking feelings
 - Easy when it is our own memories
 - If you can get the viewer to experience the same feelings as you, then you have truly succeeded in producing art

Camera as Artist Tool

- Even cell phones can be great tools
- It's a poor artist who blames his failures on his brushes!
 - A bad rower blames his oars! (Icelandic proverb)
 - Your tools may limit the kinds of art you do, you can't do watercolors with oil paints!
- Many people look, but not all see
 - Practice the art of seeing

Another Trend in Automation

- www.witharsenal.com
- There is a facebook page about arsenal



First Some Excuses

- I'm just an amateur
- I'm not creative
- I don't have the right equipment
- This has been done before, I'll never be as good as those
- I don't do portraits, or I don't get up early, or I can't stay up late, or I can't can't

Don't Worry, be Happy

- Don't worry too much about what others think of your work, please yourself first
- It's great if others like your work, but don't stop taking pictures the first time somebody doesn't like one of your images

Vision & Technology

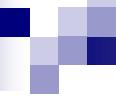
- Easy to teach mechanics of focus and exposure and white balance
- Teaching the ‘eye’ is different
 - Many people look, but only some see
 - Consider what children see
 - Example: Rain!
 - We see mud, mess, inconvenience, they see rain drops, puddle, rainbows, fun. Learn to think like a child again!

Miksang

- <https://www.miksang.com/>
- Literal translation: “good eye”
- Practice of taking a natural situation, seeing it clearly and applying discipline to keep it that way

Location

- Exotic locations are easy
- Interesting images are close to home
 - You may need to travel the same road many times to see the beauty and interest
 - Revisit the same places in different moods
 - Both yours and the places
 - Sometimes you will see what others miss



Why Take Pictures

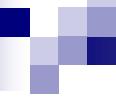
- Memories
- Art
- Emotions
- Illustrations
- History
- Etc.

Taking Better Pictures

- Your picture tells a story, or maybe it is fun to look at, or maybe it is just beautiful or interesting or attention holding
 - Topic – example nature scene
 - Subject – example a tree
 - **Composition** – how elements are arranged
 - Technique – the mechanical stuff, exposure, focus, lens, etc.

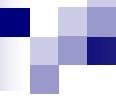
Topics

- Portrait
- Landscape
- Sports
- Flowers
- Trees
- Abstract
- Insects
- Weddings
- Events
- Weather
- Adventure
- Travel
- Animals
- Etc.



Why am I Telling You This?

- To make you think while you're composing a picture
- Analyze the elements in your photo
- Do they belong?
- How should they be arranged?
- How can I guide the viewer to see it?



Learn From Others

- Look at images that move you and figure out why
- Study the work of others and try to understand how it was done
- Martha Stewart started with a cookbook
- You will eventually discover your own “style”

My Approach

- Look at scene with one eye or viewfinder
- Analyze why I find the scene interesting
- Emphasize the subject or story
 - Move around, angles
 - Declutter
 - Exposure
 - Focus



Composition

Arranging elements for maximum visual impact

You are striving to make the eye linger on the image

Some Advice

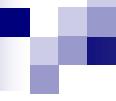
- Take lots of pictures with different compositions and even exposures
 - Remember, they are free!
- Look at the images on your computer and make note of which ones jump out at you and get your attention
 - This will improve the kinds of images you take in the future so you can spend less time shooting, editing, and organizing

Composition

- Light and dark areas
 - Light areas attract the eye, so do dark ones if surrounded by light
- Colors
 - Bright saturated colors attract the eye
- Lines and shapes
 - Leading lines, circular, diagonal, patterns
 - Direct the eye
- Rule of thirds, golden mean, golden spiral

Clutter

- Anything that doesn't belong or detracts from the message or story of the image
- It must be removed or minimized



Lines, Shapes, and Frames

- Always look for these graphic elements in your photos, emphasize them to make more compelling images

Layers

- Foreground, middle, background
- Build up the image with layers of different things

Frames Within Frames



Contrasting Shapes & Colors



More Composition

- Point of view, don't stick to eye-level
 - Low is often good for children and animals
 - Flowers against sky are good
- Don't be afraid to walk around looking for a better angle
- Pay attention to background
- Look at all the elements in the photo
- Framing, use something as a frame
- Use light and shadows

Techniques 1

- Selective focus
 - F-Stop and the correct focal length
- Exposure
 - Dark, light
- Lens choice
 - Wide, tele, normal, fish-eye
- Vignettes
- Adjusting colors

Techniques 2

- Shutter speed
 - Slow to let things blur, fast to freeze them
 - Water is usually good with slow shutter
 - Sports sometimes needs fast shutter
- Panning can blur background while letting a moving subject remain sharper

So What?

- Ultimately images are less about technique than they are about the feelings they invoke
- Techniques are necessary but don't think that technique alone will make an enjoyable image
- Practice techniques so you don't have to think about it while creating images

Left and Right Brain

Left - logical

- Exposure settings
- Lens choice
- Lighting

Right - emotions

- What do I feel when I see the image?
- Do I linger while viewing it?

You need to balance both of these, the left is used to improve the right

Inspiration and Creativity

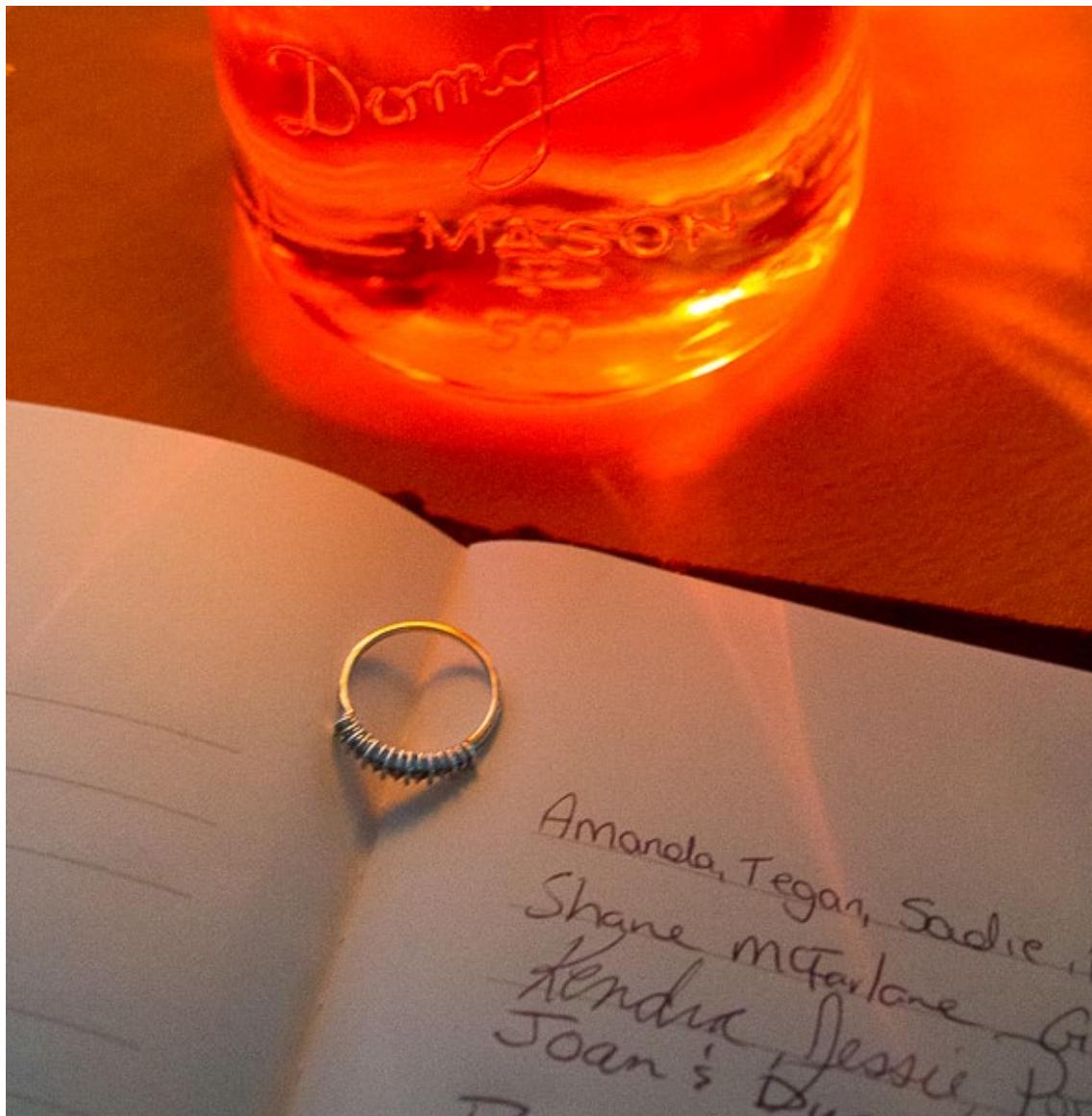
- They ebb and flow, even great artists have “dry” periods where they aren’t inspired
- Try “jump-starting” with a challenge
 - Take 12 pictures from the same spot
 - Make 12 abstracts from the same object
 - Limit yourself to 24 exposures on a day trip
 - Walk around with no camera looking for art
 - Etc etc

Books on Creativity

- Many of them, a couple I like
- “Extraordinary Everyday Photography” and “Creative Nature & Outdoor Photography”, Brenda Tharp & Jed Manwaring
- “Bryan Peterson Photography School” and “Understanding Color in Photography” by Bryan Peterson

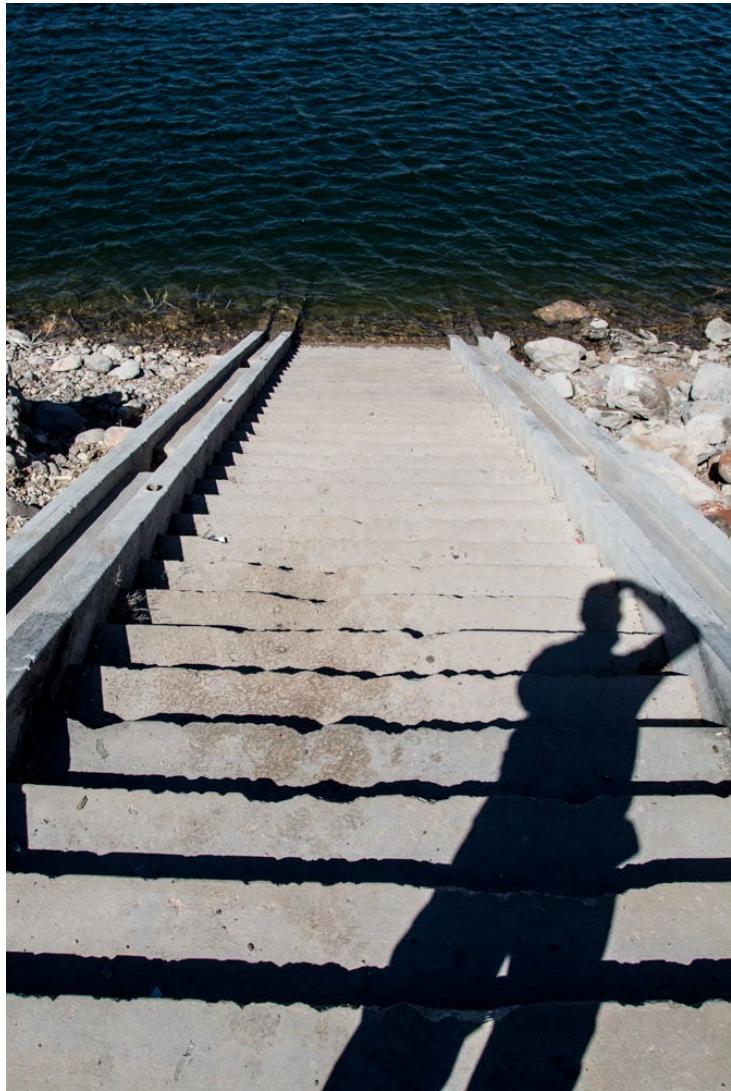
Light and Shadows

- Photography is about light
- Study the effect of light every day
 - Sidelight – emphasize texture
 - Shadows – give depth
 - Colors
 - Time of day
 - Brightness



Shadows are often interesting, notice the wedding ring shadow

Steps, lines, and shadows



Always look for interesting shadows



Sometimes you need to add shadows

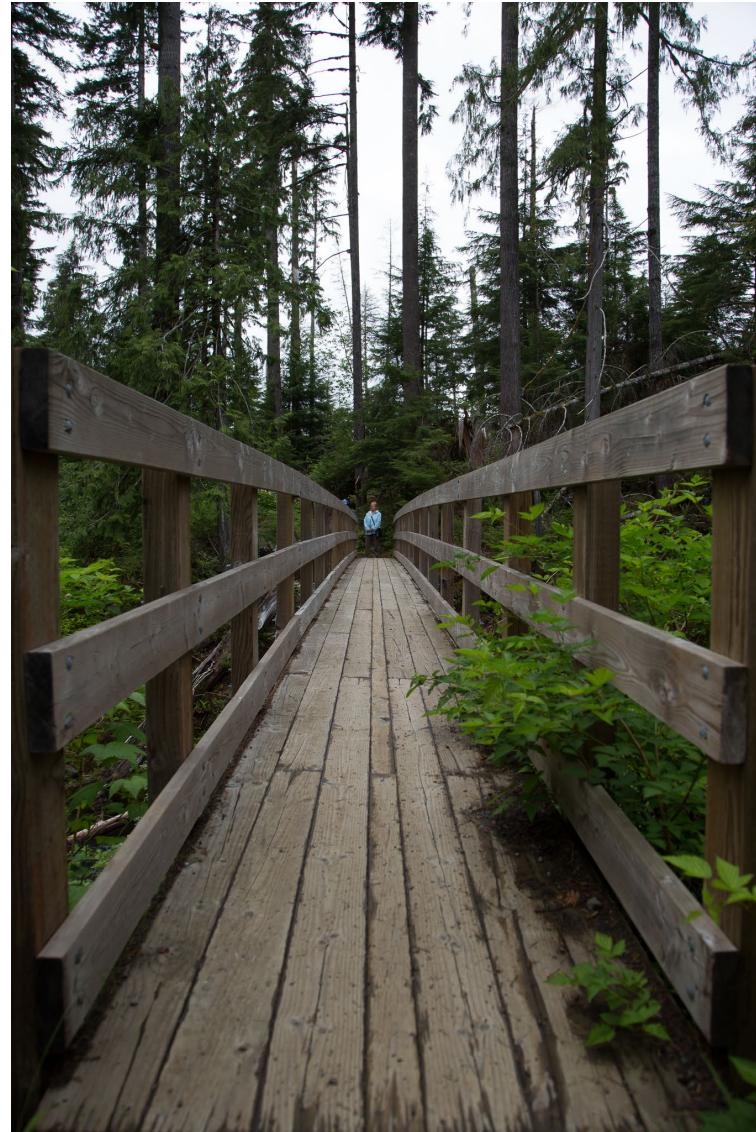
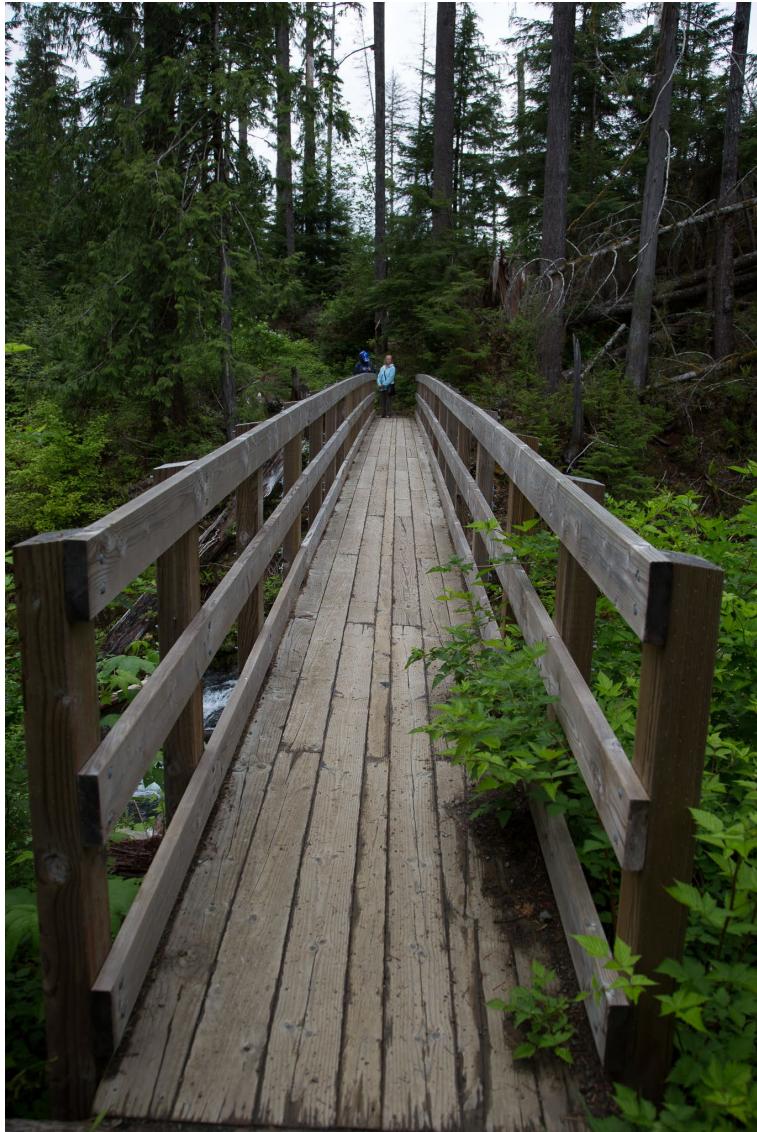


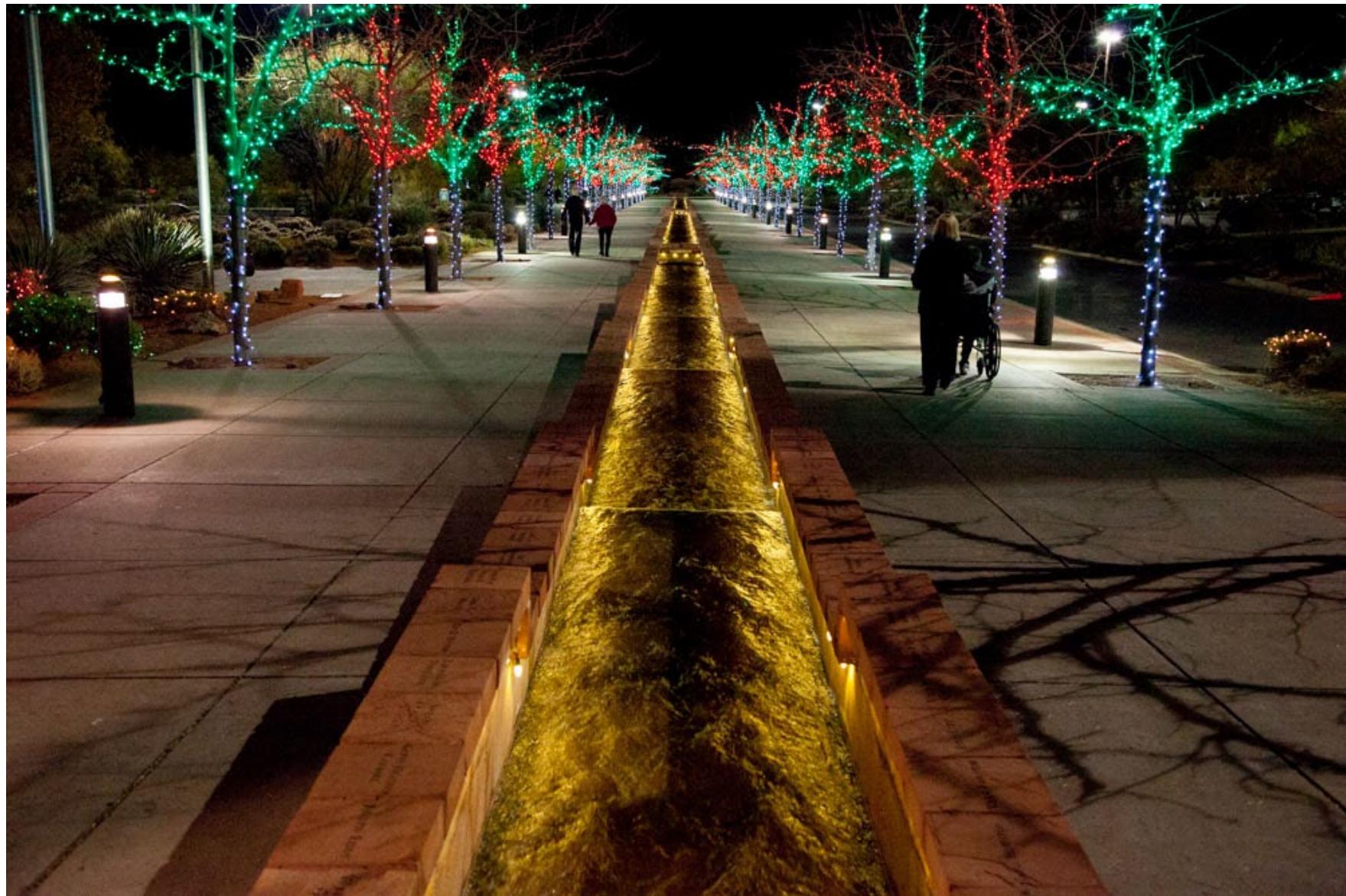
Leading Lines





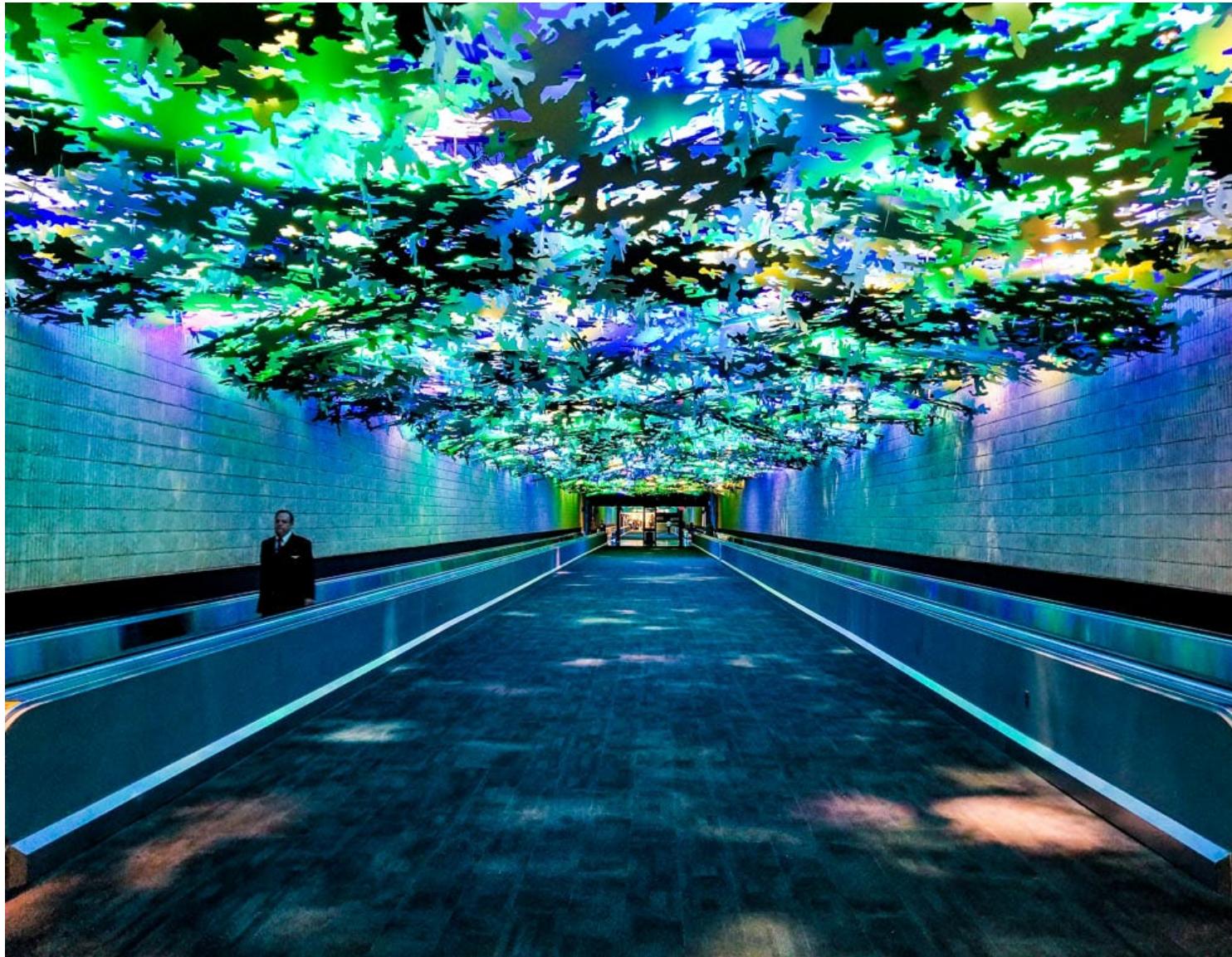
Note how the image on the right draws you in with more power.



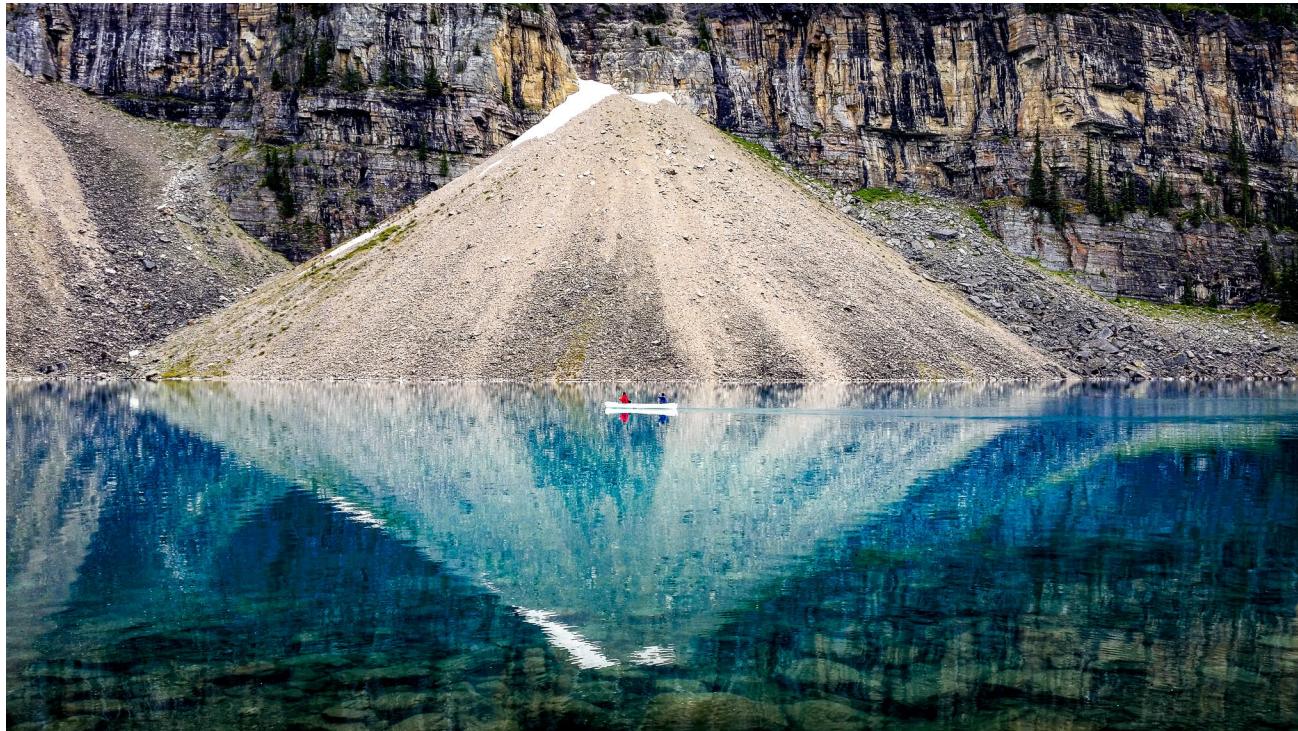




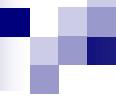
Water reflections and leading lines are powerful compositional tools



Notice the
nice
symmetry



This also has a pleasing symmetry, almost vertical and horizontal directions. Often the center should be the line reflected around.



Bright Colors & Leading Lines



B&W Lines and branches to hold the bottom left



Rule of thirds, put objects at intersections of thirds



Thirds and Animate/Inanimate Contrast



The Rock and Lady at Thirds



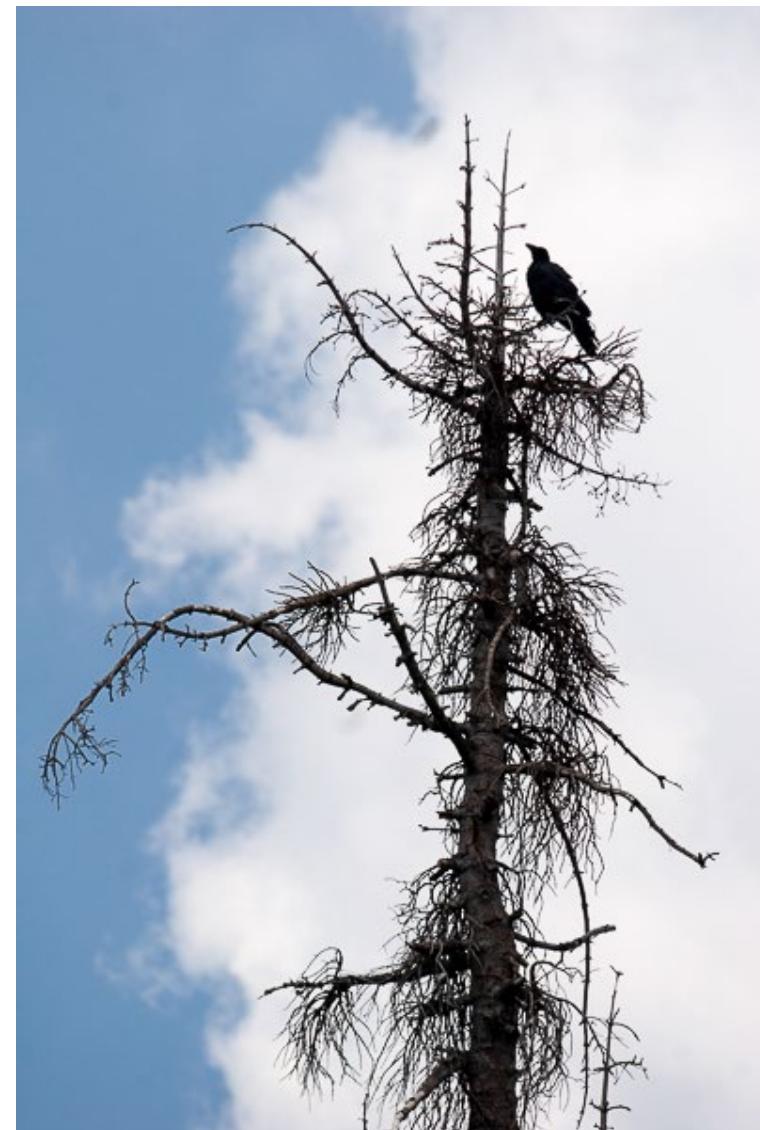
Center and thirds example



Thirds Help from Camera

- Some cameras display a grid showing the thirds lines on the screen

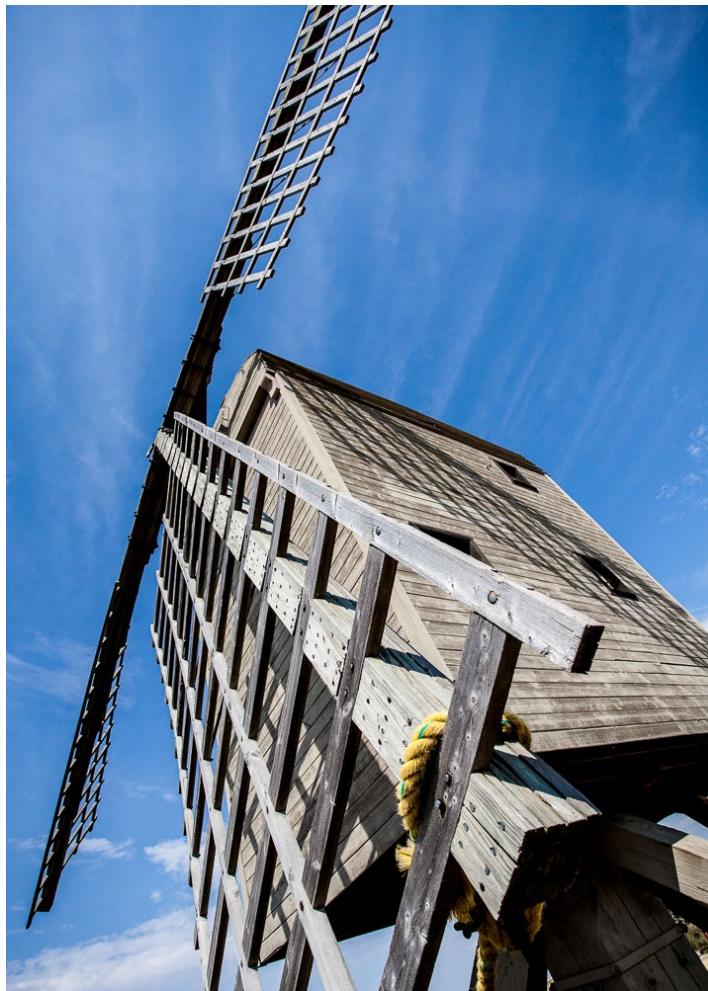
Change your position just a little



Position Really Matters!



Look for different views



Don't be afraid to climb
or lay on the ground.

Panning, choose shutter speed



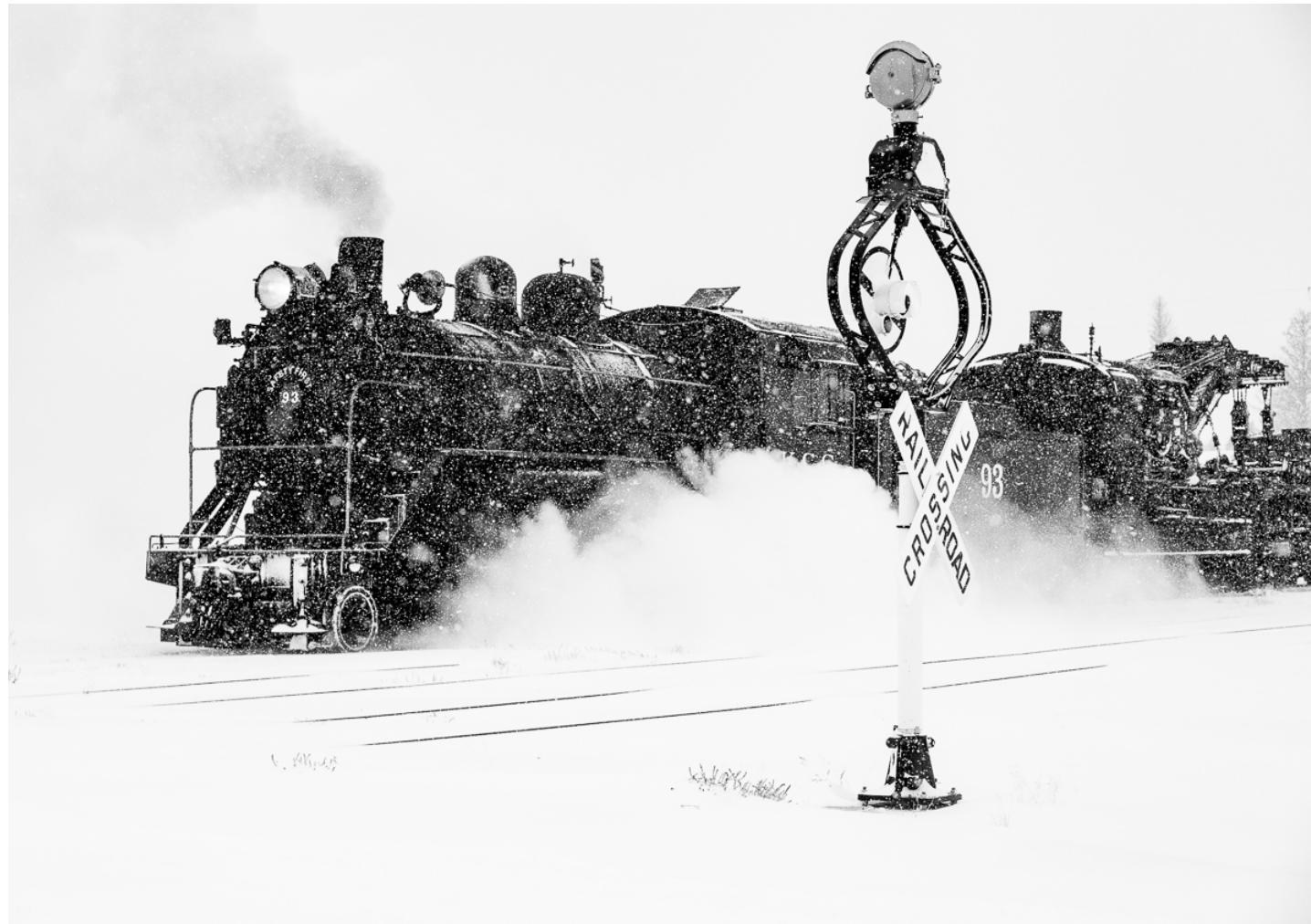
Selective focus removes clutter





Notice how your eye isn't interested in the background. Also notice the leading line that moves your eye to the dragon fly, the real subject.

Uncluttered Train



Radial with vignette



Contrasting Shapes

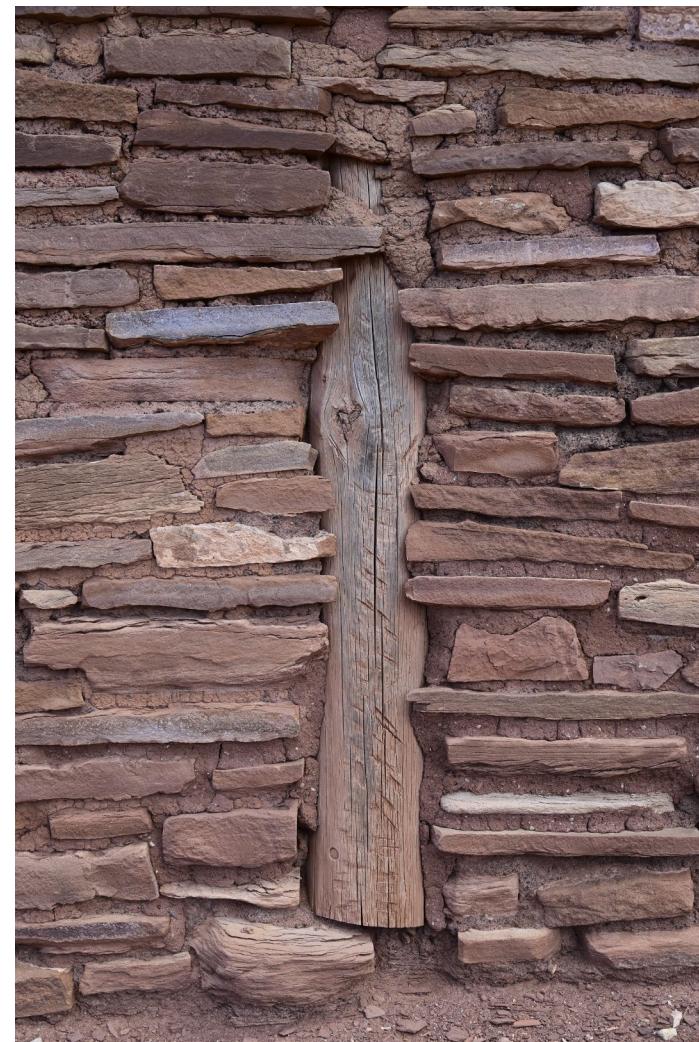


Notice how the bricks lead the eye but the wheel stops the eye from leaving the image. This picture was originally reversed, but since we read left to right it is often better to arrange the elements that way.

Original – note different feel



Different Shapes



Visually jarring

Things Looking Like Other Things



Add Size Indicator



Collections of Things

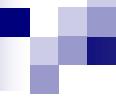


Spring Time



Fall Grouping





Juxtaposition

- Combine elements that are opposite to emphasize the differences or whatever they might have in common
- Could be shapes, colors, function, brightness, etc.

Patterns Juxtaposition



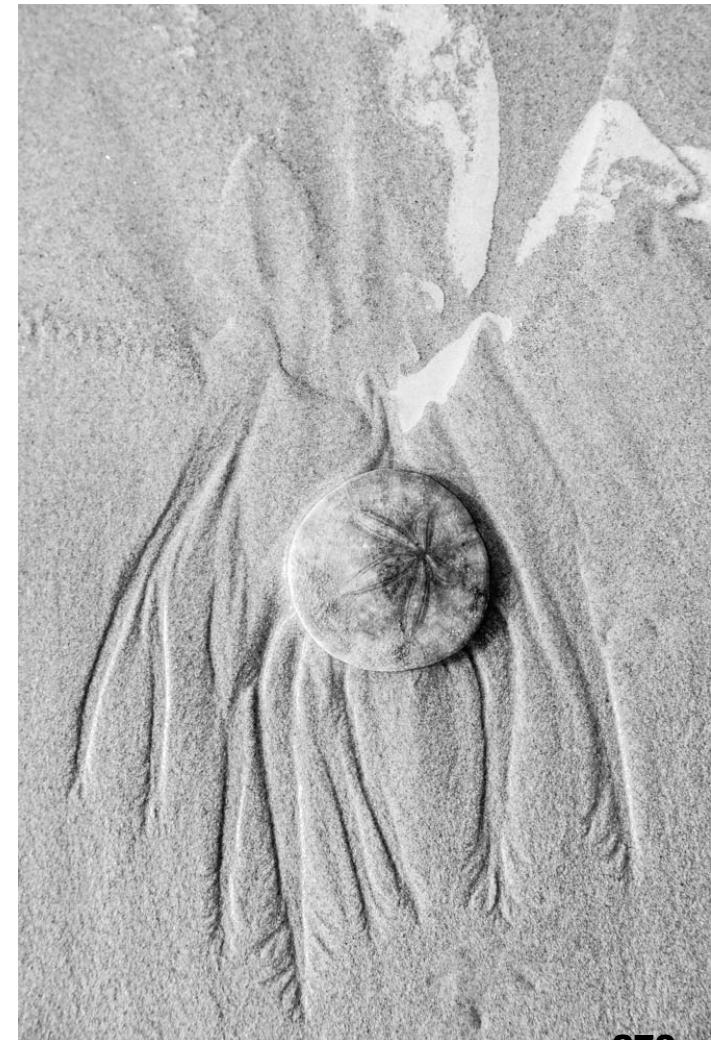
Yep, Dangerous (note sign)



How Many Locks to Keep Cows In?



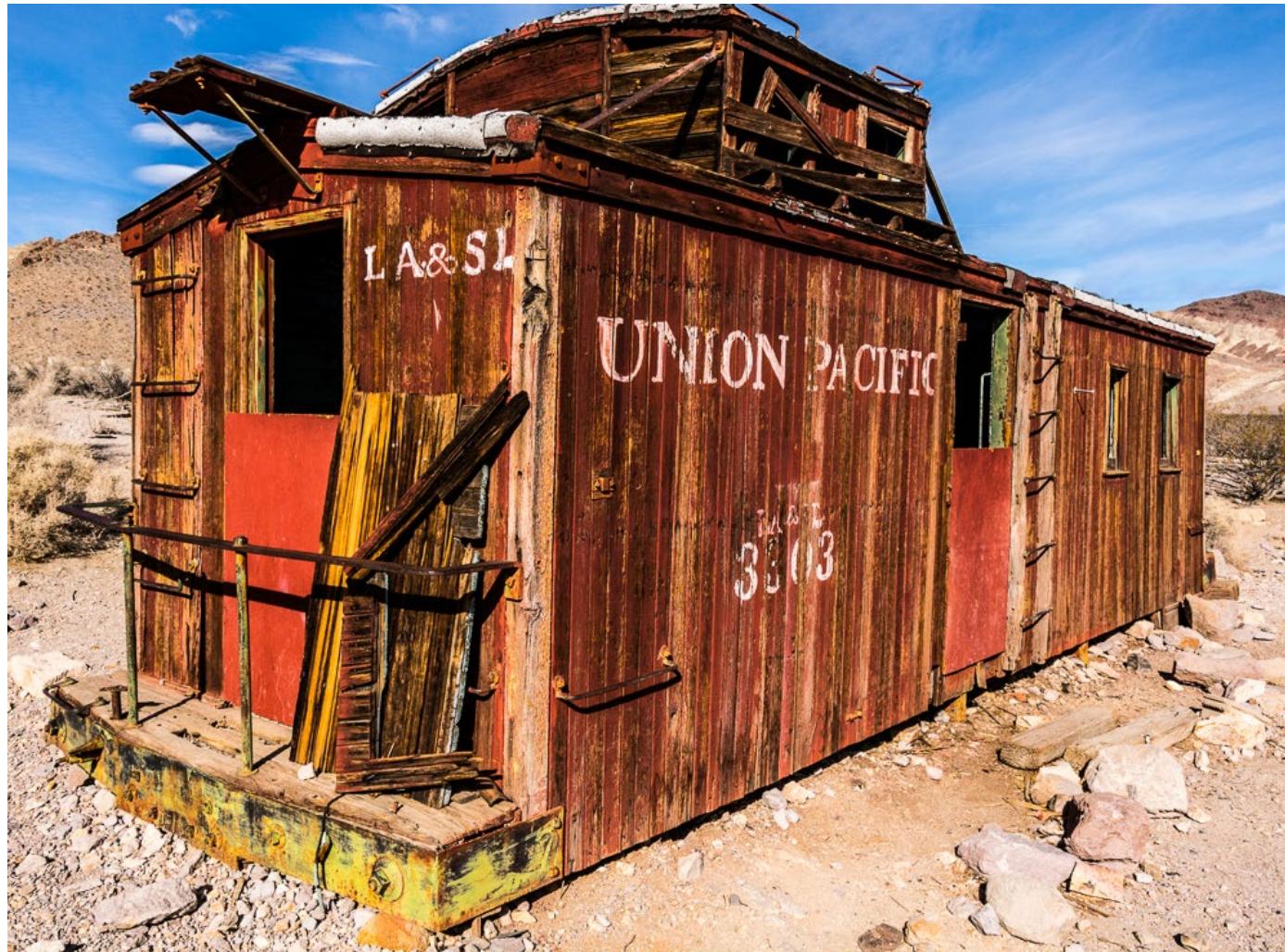
Sand Patterns – Side Light



Out of Place (juxtaposition)



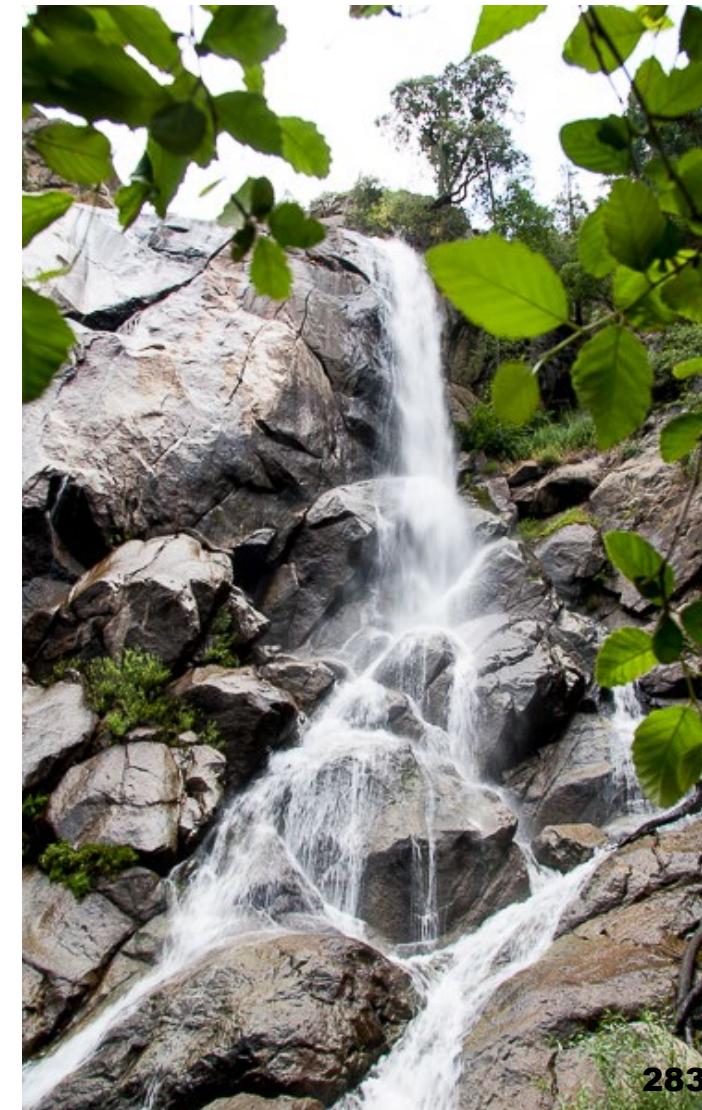
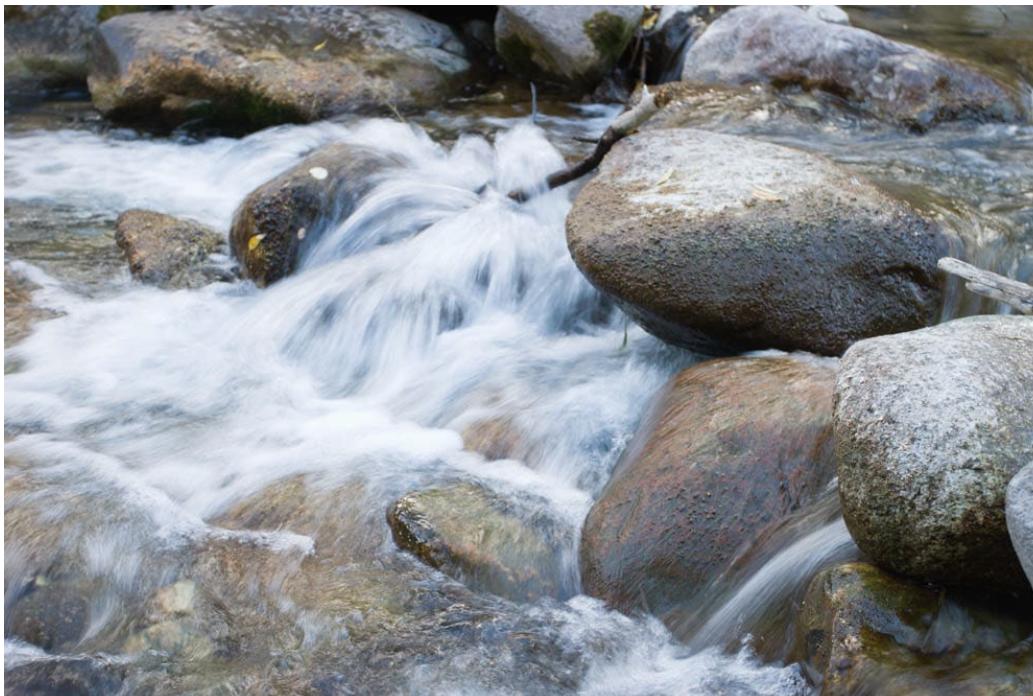
A Glimpse of History



Backlight



Water with slow shutter



1/60 vs $\frac{1}{2}$ second



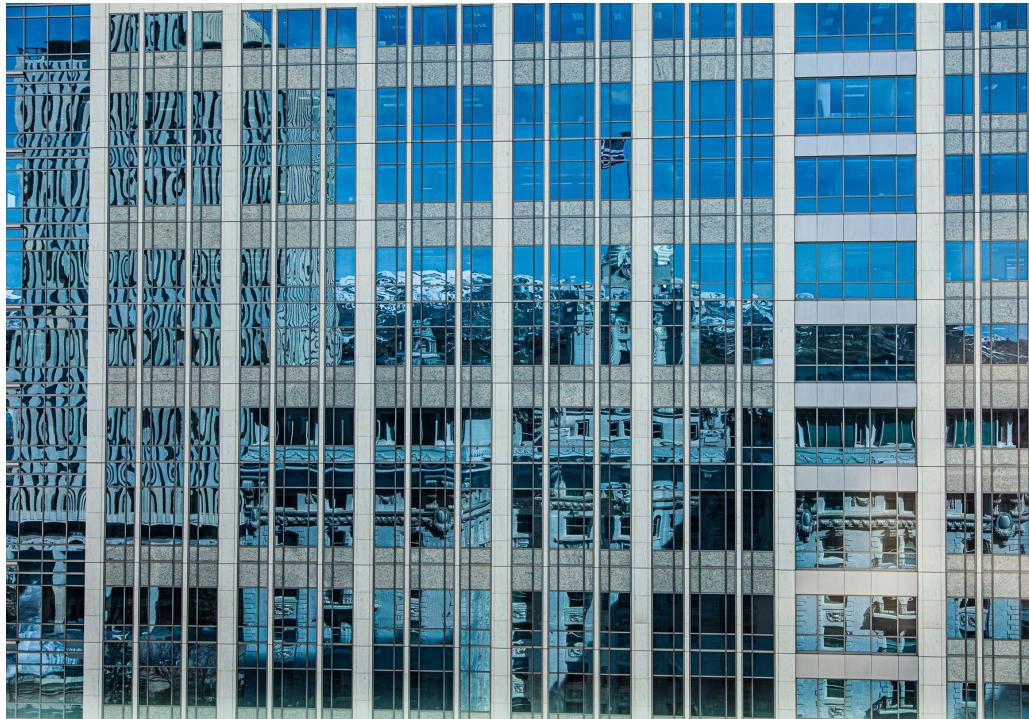
Try at home

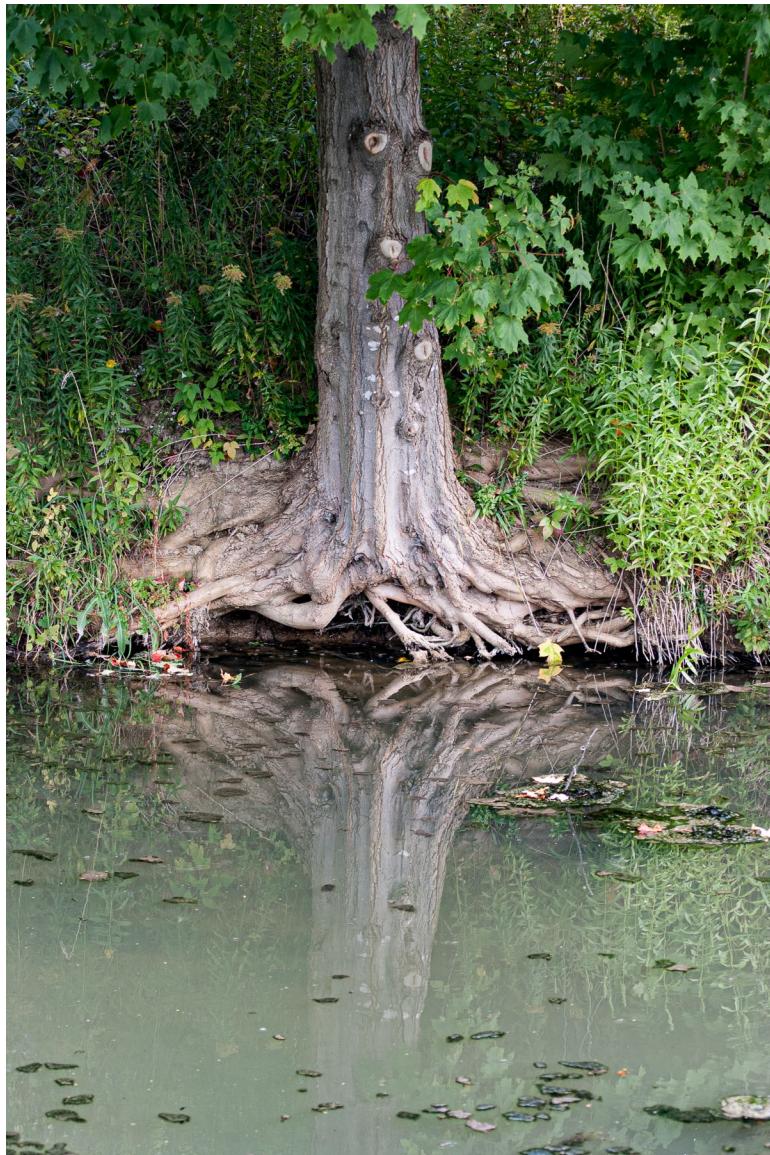
- Take several images at different shutter speeds of something moving, like a fan
 - Notice how the blur amount changes
 - This will give you a feel for different shutter speeds and amount of blur

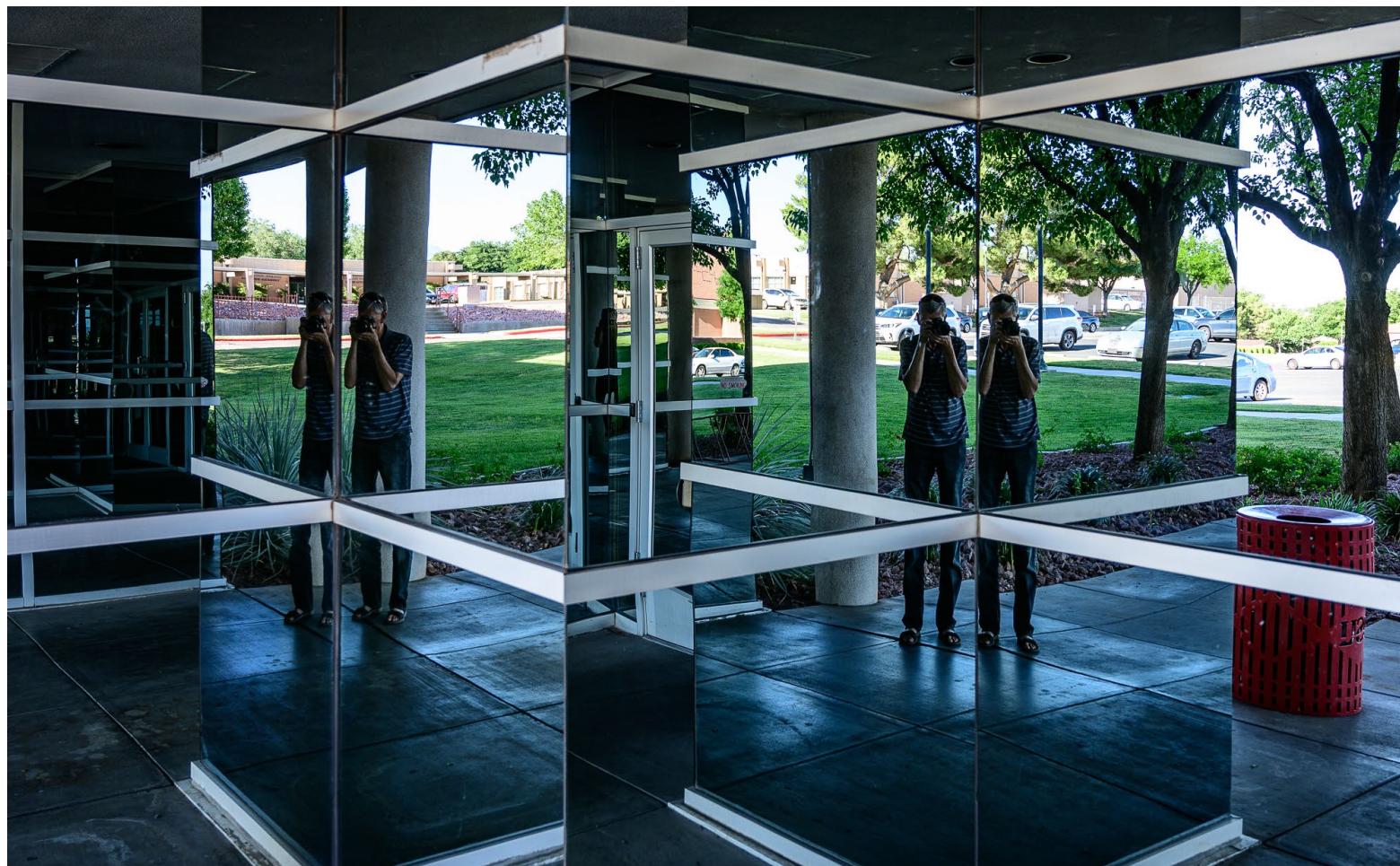
Panning Practice

- Rotate around your waist, keep camera level
- Cars, try shutter speeds around 1/30
 - I don't recommend police cars
- Children, they're always running somewhere and don't stop much

Reflections

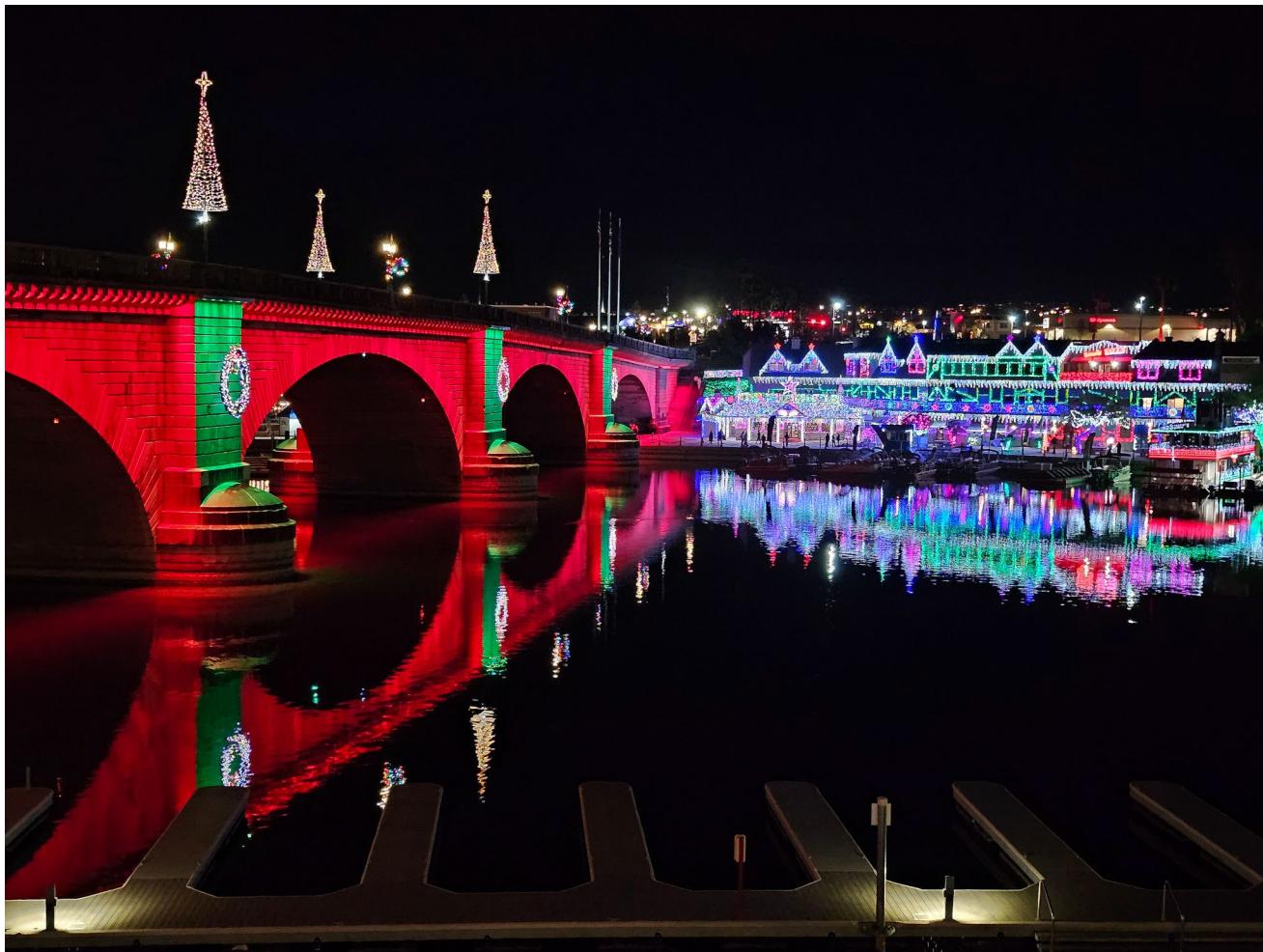












Shapes with different zooms,
also notice background layer





Notice the guiding lines in ground and sky, and the contrast between sky and ground. There are also solid rocks on the bottom to anchor the image.

Layering of foreground and background. Note the shadow that echoes the pole shape. The center of the cross is close to a “thirds point”.





Background layer is blurred to focus your attention on the foreground. Diagonal composition with a root part sticking out to the left to provide balance. The small flowers on the bottom left serve to anchor and to provide scale.

Water acts as a leading line to the subject. Bottom left greenery balances with upper greenery. Note the stump at the “thirds” point, bottom right and of course the other “thirds” is the subject. Tree to the left of subject delineates and frames. Always watch for branches sticking out of heads!





Many leading lines and reflections to capture your interest, and a little bit of mystery at the bottom of the water.

Lines, lines everywhere! Note also “thirds” at lower left, bottom of grass. Grass points to sun and sky. Clouds stop your eye after grass leads the eye up.



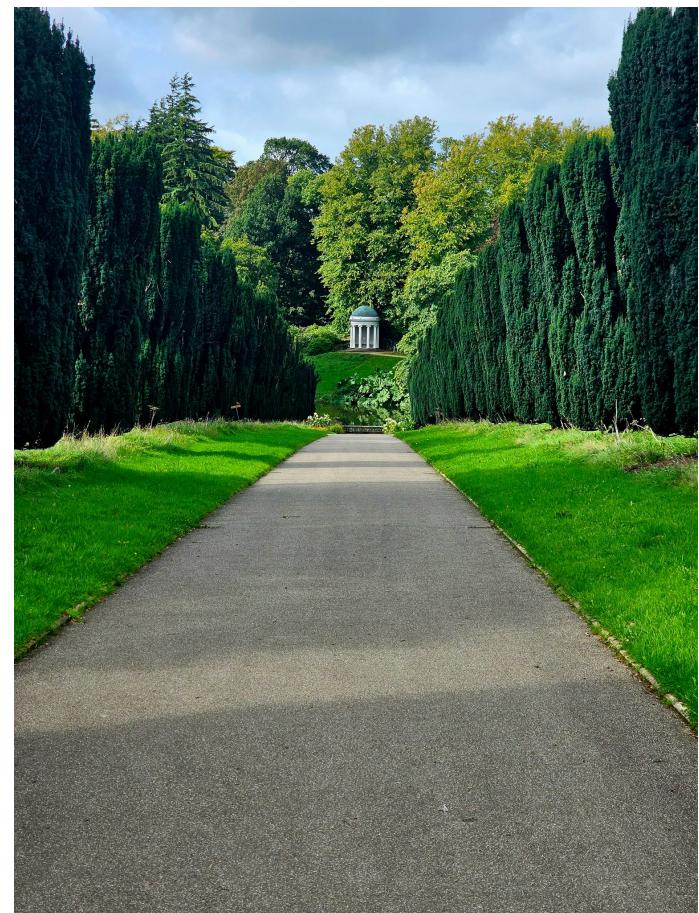
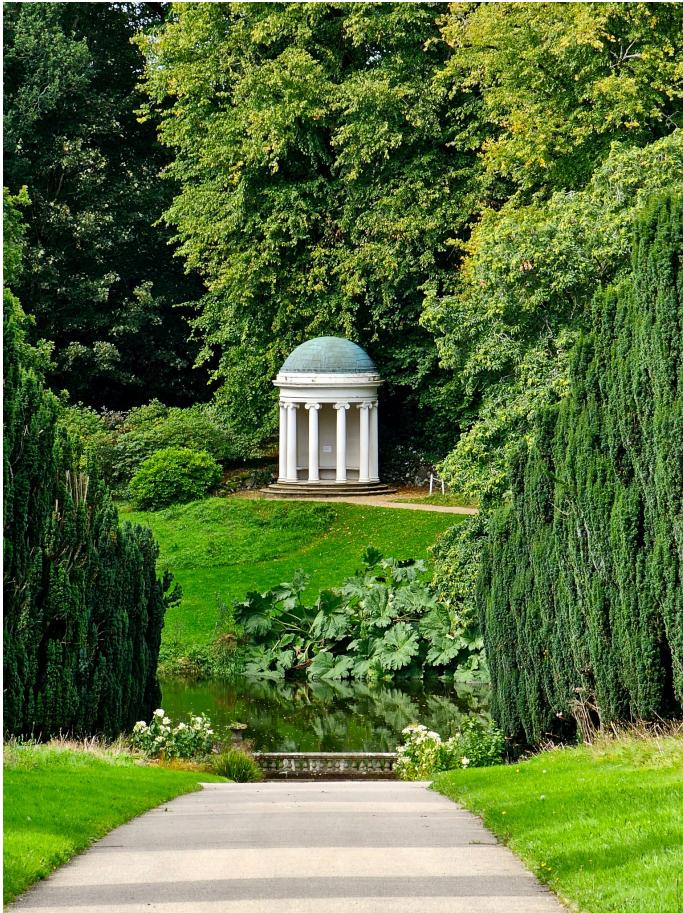
See the “thirds” objects? Notice the layers (at least 3)? There is also a solid anchor at the left bottom. Diagonal lines?



Layers and framing. Water is always interesting in photos.







Same subject with leading lines. Two different positions.



Leading lines with tight framing.

Lines pointing at
each other.





Lines crossing.

Thirds, lines
and reflections.
Note the layers
also, rocks and
grass/water.



The nice straight lines become confused and jumbled as they exit the bottom of the image. Or perhaps the jumble becomes organized and less chaotic as you rise through the image!



Holding up the rainbow! Note the contrast between the straight fence and the curved rainbow and how they both frame the subject.



Perspective distortion.
Spoon size boy! Also, can
you see the “thirds” and
how it provides balance?



Night Photography

- Tripod
 - Use self-timer to avoid shake
- Meter from sky for starting values
- Long shutter speeds
- Extreme dynamic range
- More image noise
- I offer a separate class on this

Dusk, almost night



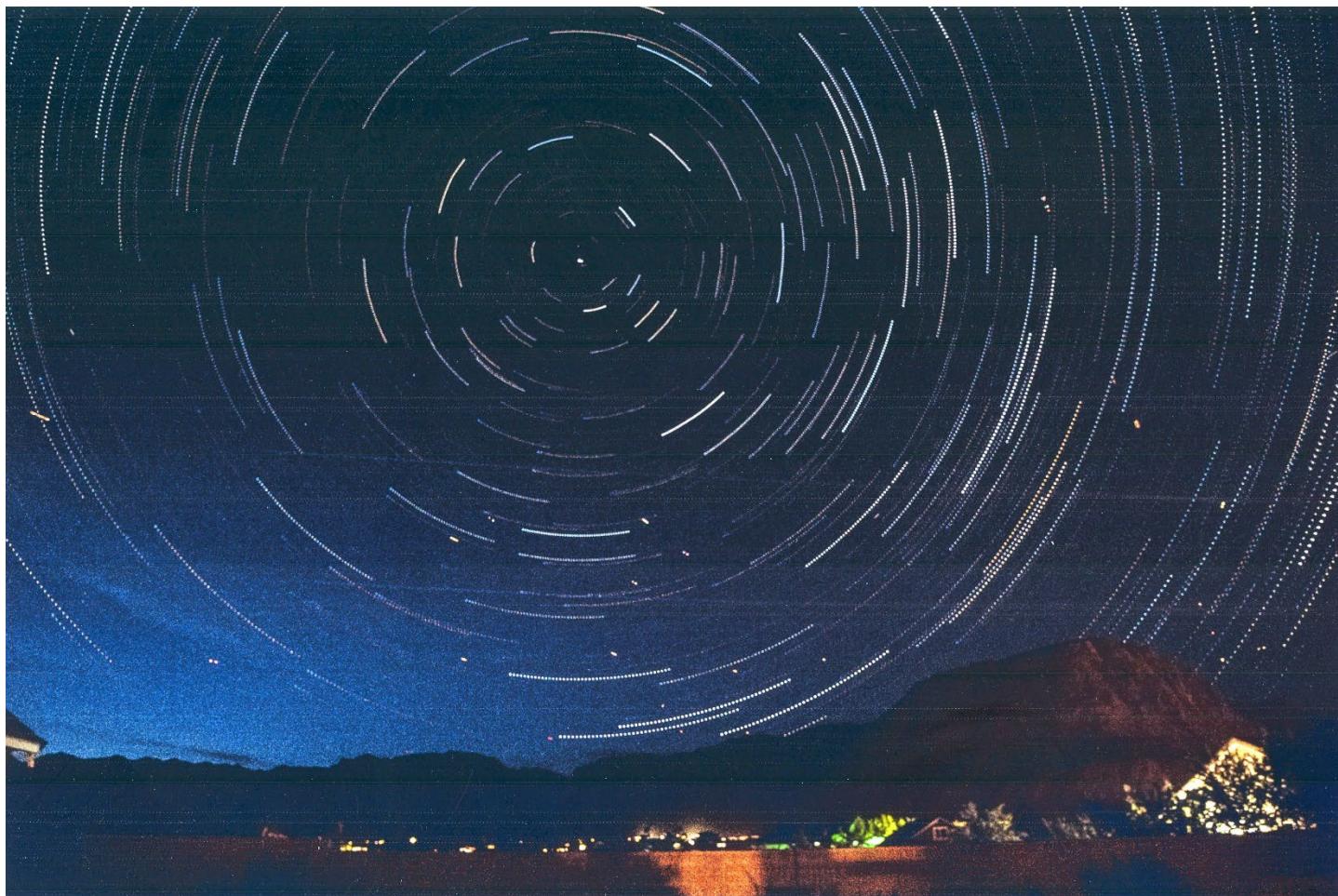
Extreme Dynamic Range



Clipped shadows and blown-out highlights (the moon and sun)
But does this really matter?



Night Sky, Multiple Exposures



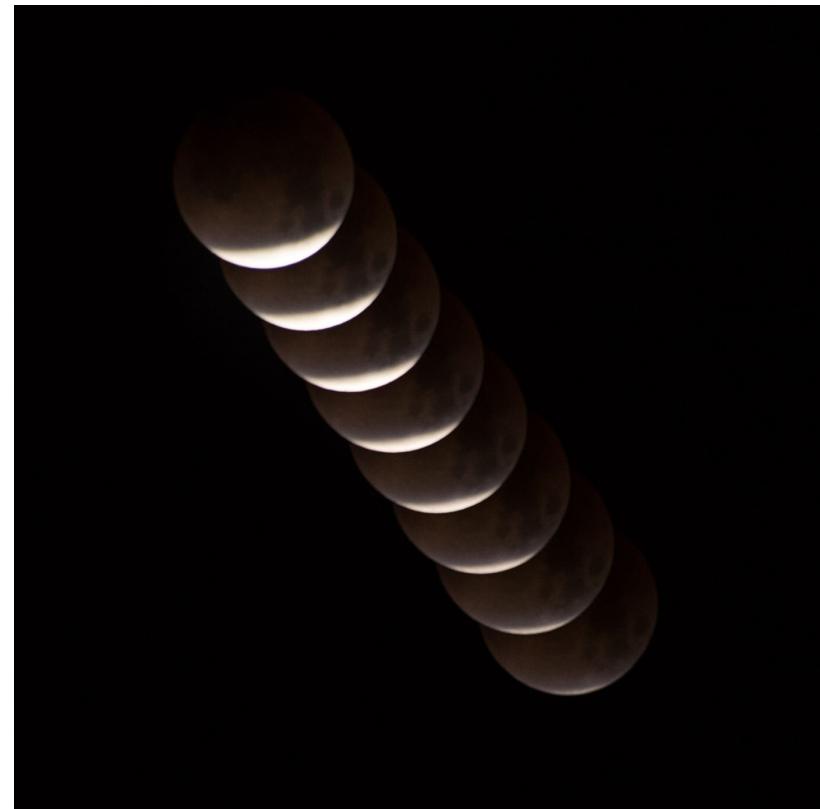
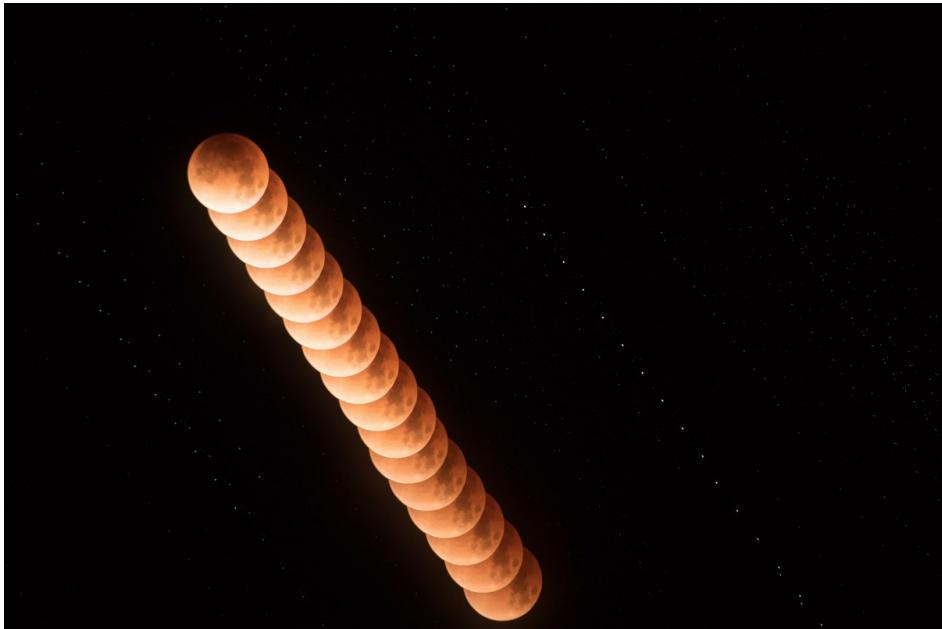
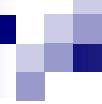


Shot with 3 exposures, +- 2 stops.
Combined as HDR in Lightroom.
It is usually best to use a fixed f-
stop and vary the shutter speed to
keep edges the same between
images.

It is also possible to change the ISO
instead of the shutter speed.

In general moving objects are
problematic and should be avoided,
except water of course.





Lunar Eclipse 31JAN2018

Deer in Lights



Southern
Utah
Art
Guild

Red Cliff Gallery

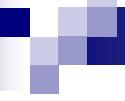
—
Photography
—

1st
PLACE



Landscapes Look Easy

- You're hiking somewhere, you see a fantastic view, you whip out your camera and take that great shot!
- Later you look at it, and disappointment strikes, it just doesn't look inspiring at all
- You want the photo to give the same emotions as when you were there
- Maybe landscapes aren't easy at all



3 Kinds of Photographers

1. Please you is enough
2. Need accolades from others
3. Professionals: need to sell!

Landscape Technicals

- Tripod sometimes, lets you concentrate
- Foreground
 - Often need something to establish scale
- Background
 - Will be hazy, due to dust and heat
- Middleground
- Often wide dynamic range sky & ground

Foreground, middle, and background



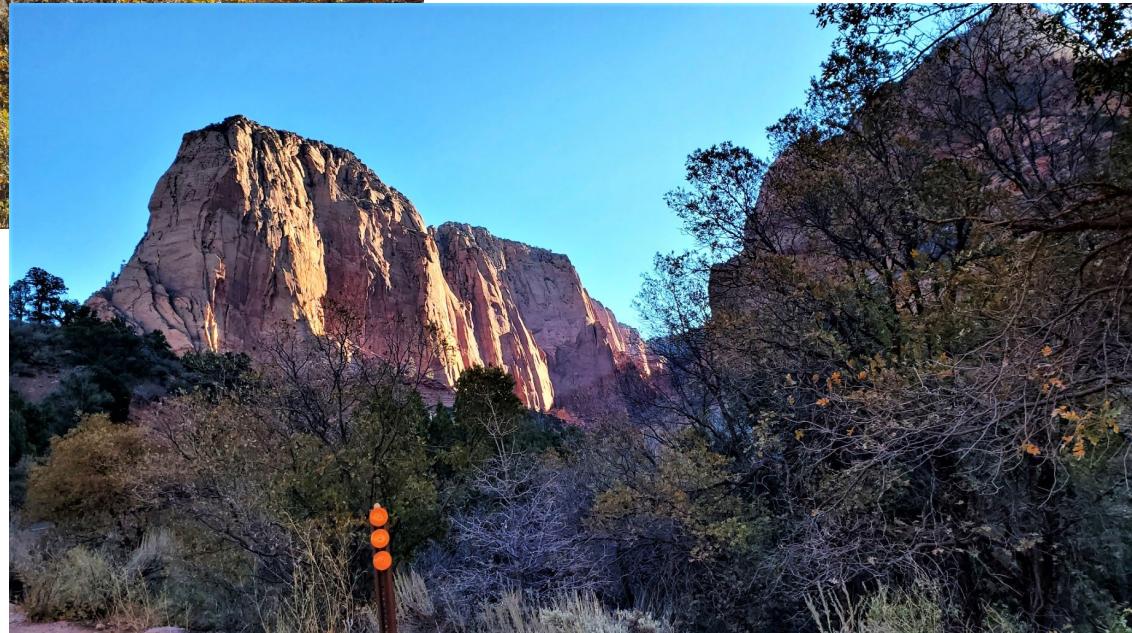
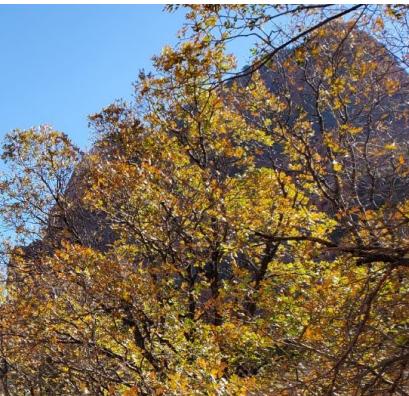
Foreground can Anchor and Balance the Image



Landscapes Often Need Sidelight



Light Direction



That was just a touch of landscape ideas

- Orton Effect still popular (hated by some)
- Many websites offer help
 - <https://www.capturelandscapes.com/>

Why Landscape Photos Fail

- Depth perception, 3D to 2D
 - Image is flat, scene isn't
- Limited dynamic range
 - Range of brightness has been compressed and relationships lost
 - Example: snow turns gray instead of intense white
- Limited sensory input, no smell, wind, birds, warm sun, etc.
- Correct color relationships
 - White balance can be lost, especially due to ambient viewing light
- Clutter
 - In real life we ignore things that are not interesting, but looking at pictures we tend to think everything is important, so we need to remove objects that aren't important
 - We think we see everything in one big gulp, but our eyes only see details in a very small area
- Focus
 - Our eyes are moving all over the place and noticing things of interest, & ignoring clutter

Clutter and Our Eyes

- Our eyes are actually fluttering about constantly, ignoring stuff in between the interesting things
- High resolution fovea only covers about as much as a 1000mm lens, very tiny spot
- We don't "see" the clutter in real life
- On a print or image we tend to focus on everything, including clutter

Brightness Issues

- Snow is white and our eye/brain will fix it
- We see bright areas as bright white
 - Camera will average the light and this makes the whites too dark, snow becomes gray
 - Our eye is calibrated to the room we are in, not the photo we are looking at
 - Overexposure often necessary

Sensory Input, smell, sound, etc

- Look through the view finder and ignore the smells, sounds, birds, bees, wind, sun, etc. and just look at the image, is it still interesting?
- If not, it will be difficult to fix later

Clutter, no interest spots



Interest, leading line, less clutter



Best one?



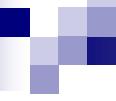
3D to 2D (Big Problem)

- We see 3D, photograph in 2D for people to look at in 3D with 2D retinas
- Use techniques to trick our eye/brain system into perceiving 3D
 - Leading lines
 - Depth of field – sharp to blurry parts
 - Size/position relationships
 - Shadows
 - Colors, more intense to softer



OK, What Makes Landscape Photos Succeed?

- *How Advertising (Sometimes) Works*, by Bruce Hall
 - Relevance and subconscious decisions
- *The Experience of Landscape*, by Jay Appleton
- Next slide...



Our Instinctual Preferences

- Open spaces of low grasses with bushes and tree groupings
- Presence of water
- Unimpeded view of the horizon
- Evidence of animal and bird life
- Diversity of greenery, flowers and fruits
- Element of mystery
- Hazard and refuge symbols

Ultimately

- We want the viewer to experience an emotion response
 - This is also what mostly sells things

Forests

- Often need to ignore the ground, cluttered
 - Unless the ground is the subject!



Forest Floor





In this example the forest floor is important.

Also watch the background very carefully, you don't want any trees growing out of their heads.



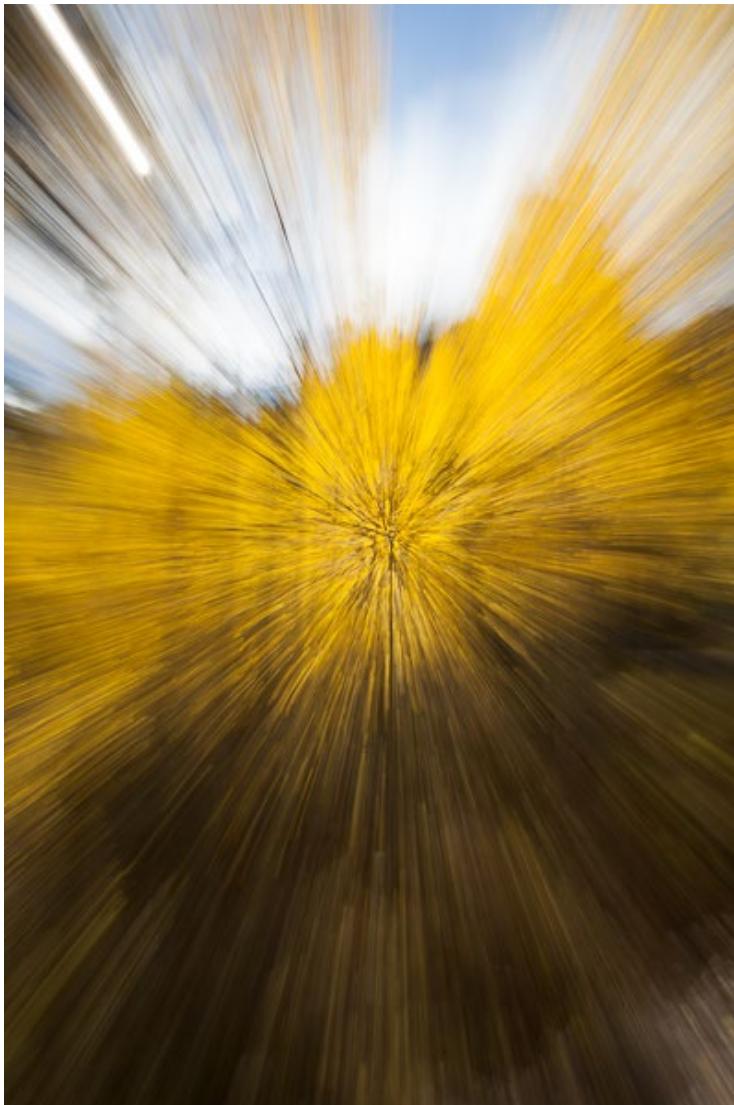
Look up



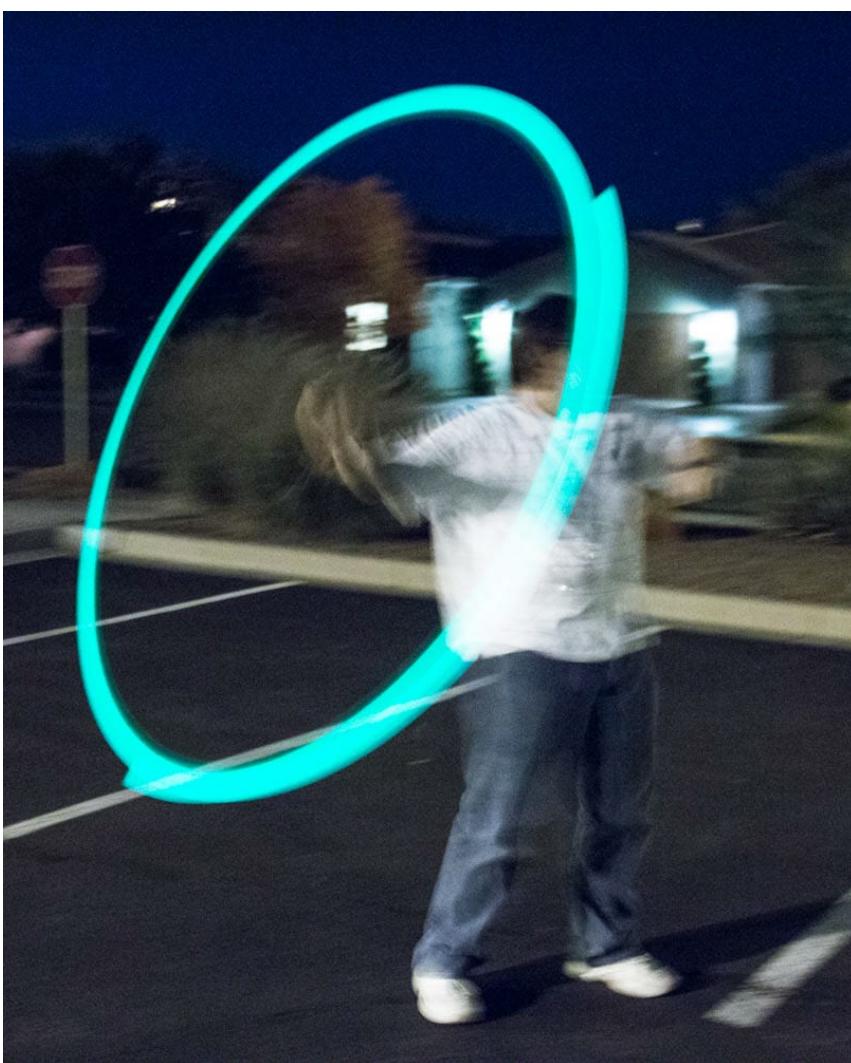
Barking up the Tree



Don't be afraid to experiment



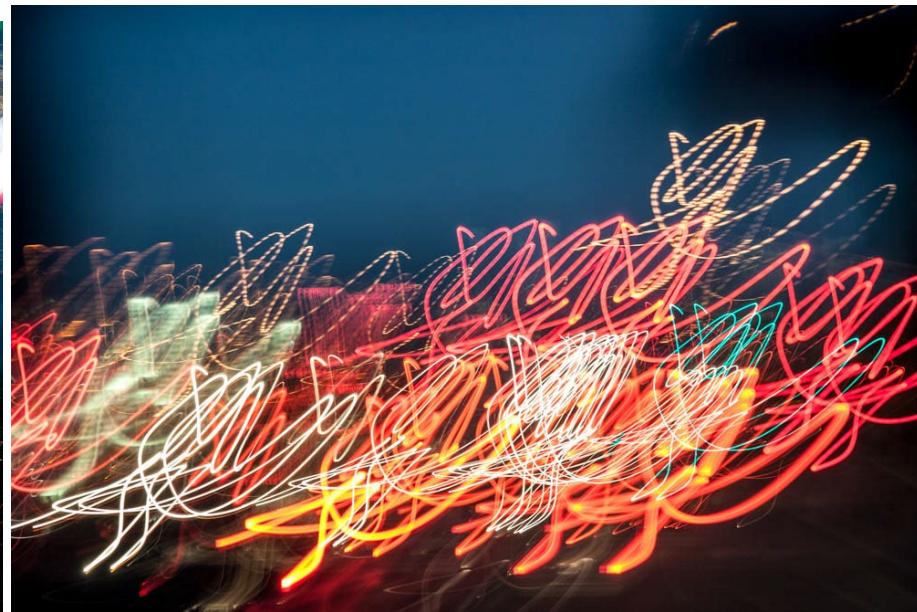
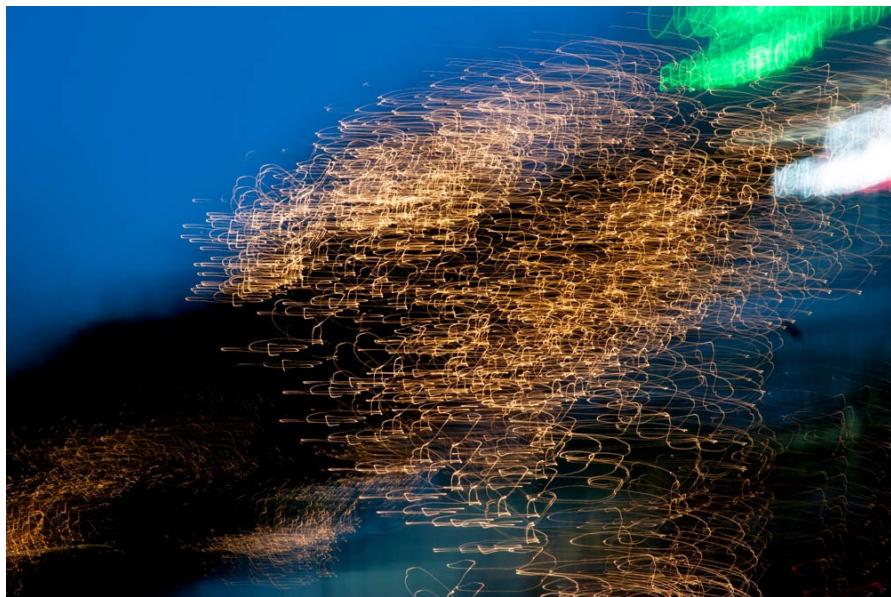
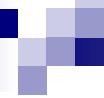




In automatic mode the camera won't let you do things like this. It will try to pop up the flash because there isn't enough light!

Abstracts can be fun





Life Metaphors





Isolate color to focus attention

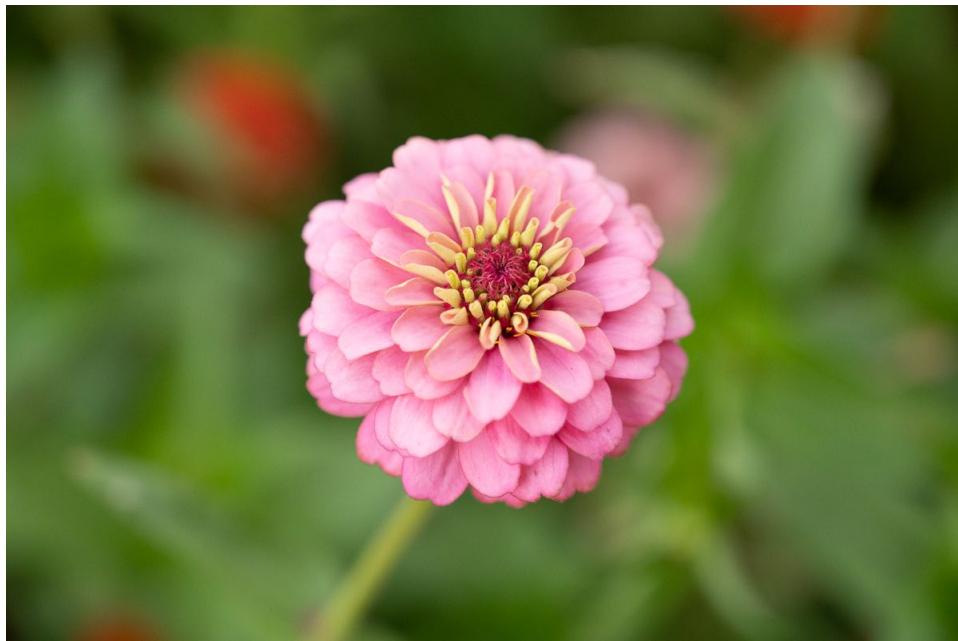
Flowers are Always Popular

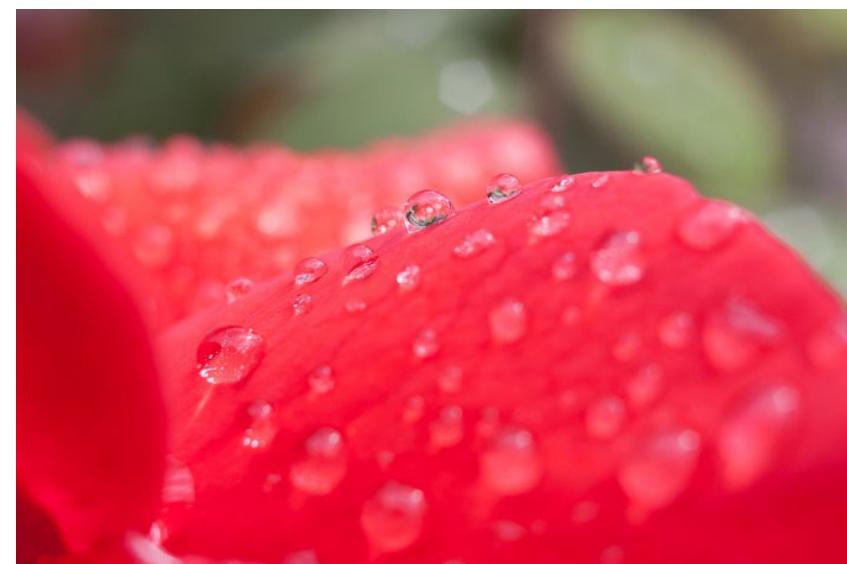
- Try different angles (like sky)
- Use depth of field to blur background
- Colored backdrop, reflector or cardboard
- Get close, sometimes really close!
- Look for bees and other insects
- Carry spray bottle for moisture droplets
 - Water with some glycerin
- Grab your flashlight and shoot in the dark

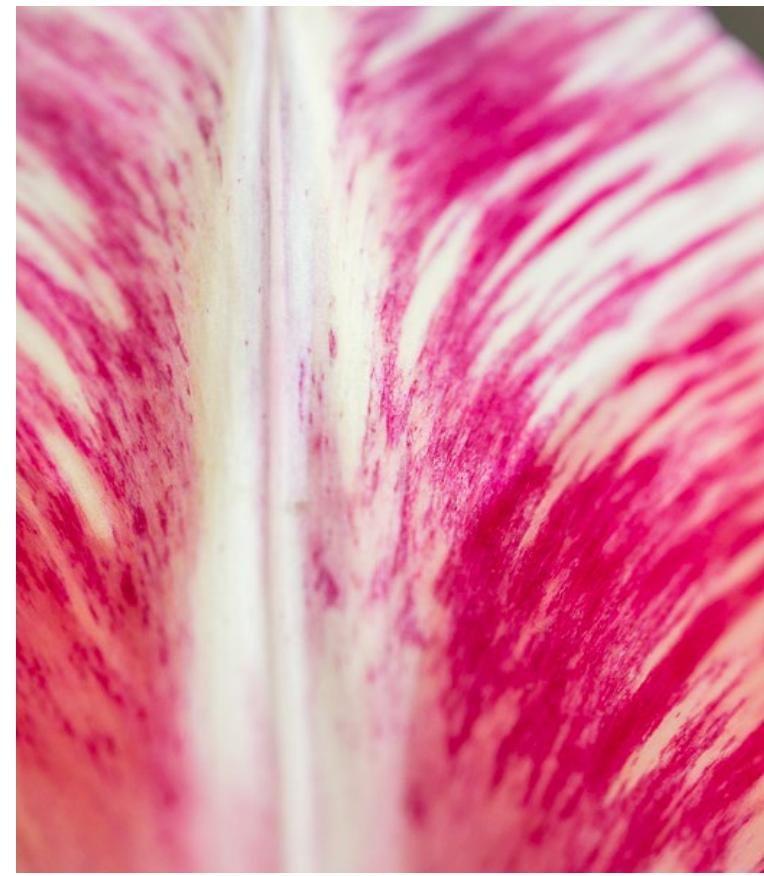
Bright Colors Attract the Eye



Different Backgrounds





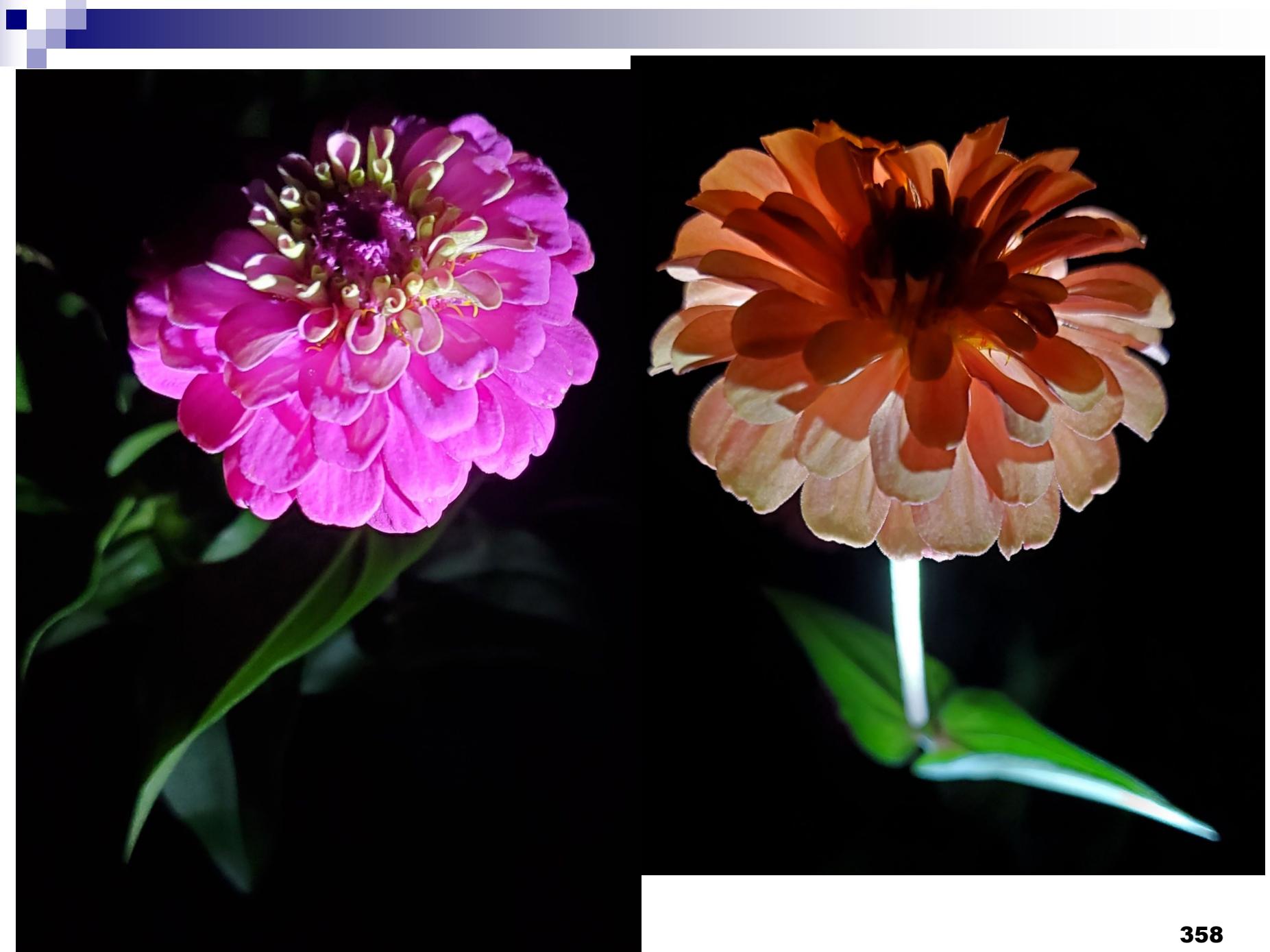




Fun Night Flowers







People

- Eyes in focus if face is seen
- Doing interesting things
- Sometimes need reflector or flash to keep face from being too dark

Children

- Get down to their level
- Catch their expressions and activities
- Place in interesting surroundings
- Getting cooperation can be challenging

Pets and Animals

- Focus on eyes
- Sometimes need room in front so they don't look trapped in the image

Eyes are Important

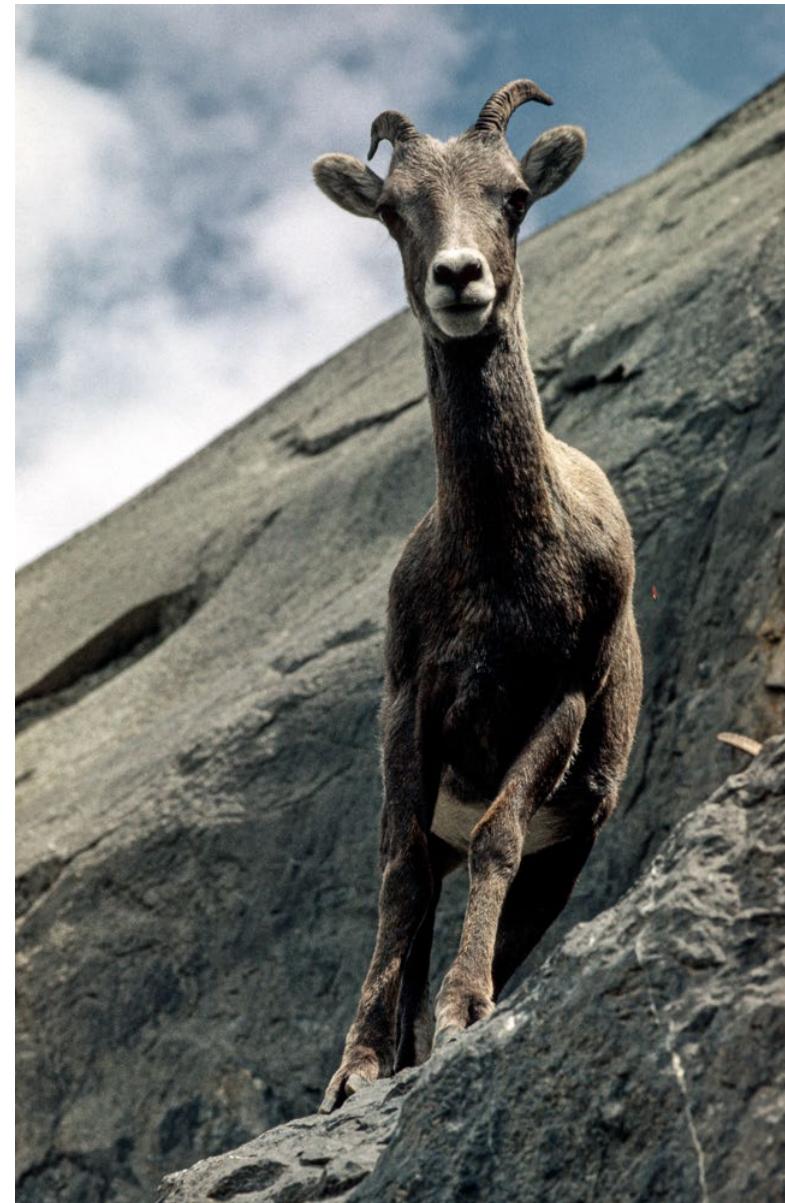


Even Bug Eyes Important



In Context

“Go ahead, climb up
here and get me!”



Sharp Not Always Necessary,
also notice space ahead of bird





Allow Room in Front to Fly Into



Get close



Closeups Show Details



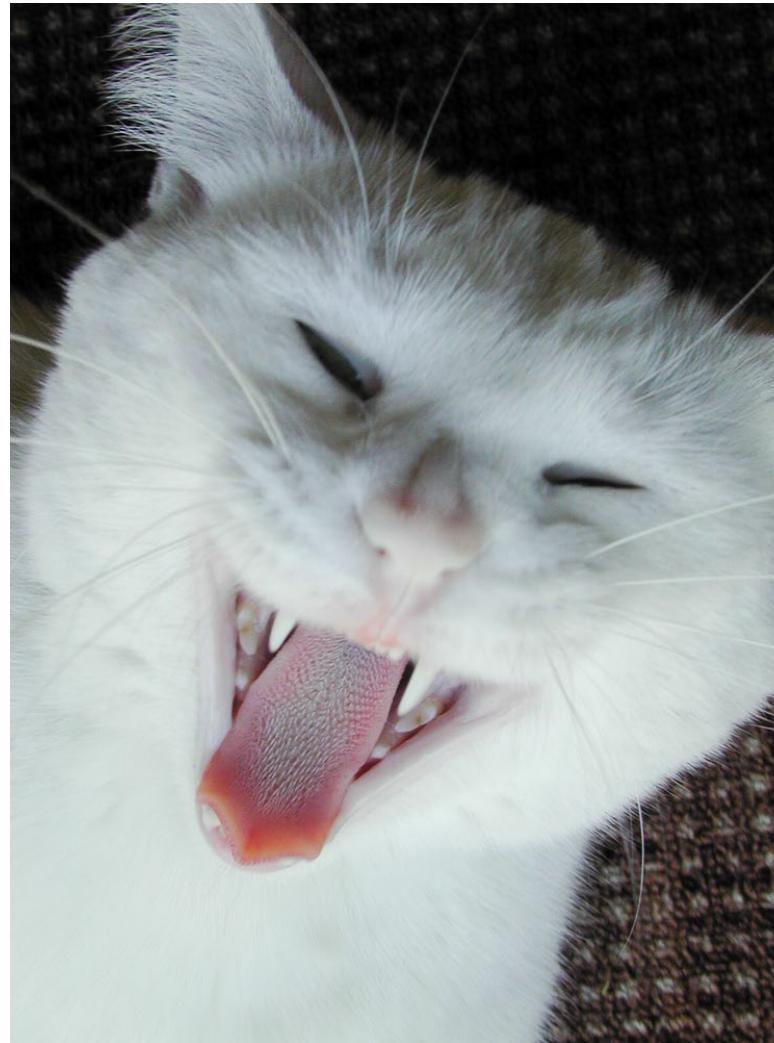
Interesting Background and Lines



Fast moving animals are fun



Funny expressions



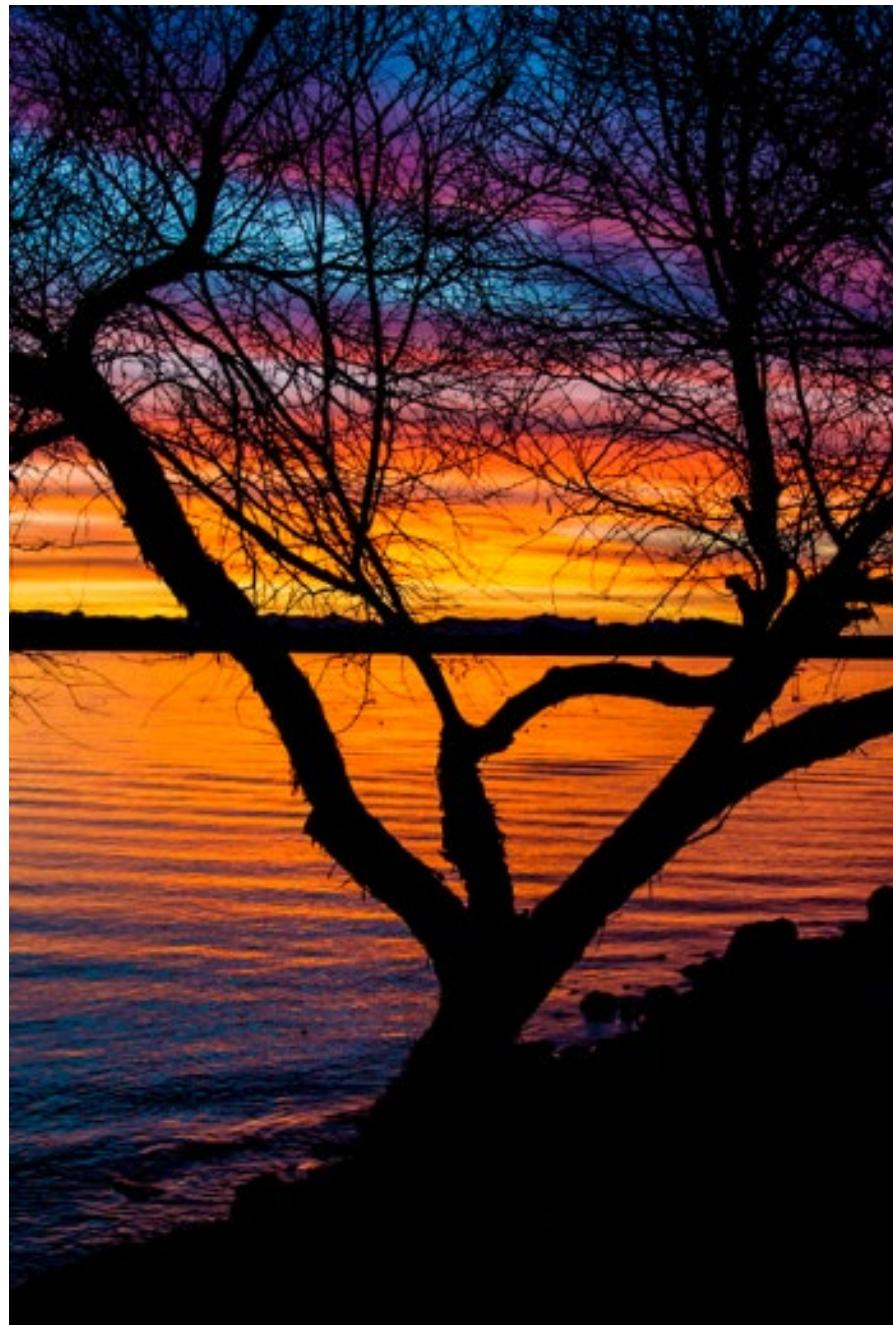
Rainbows

- Use polarizer filter to improve colors and darken sky
- Don't try to get the whole rainbow in one photo
 - Too small and polarization doesn't work on complete rainbow
- Light behind you, rain in front
- 42 degrees light, two hand rule



Sunset/Sunrise

- Silhouettes always interesting
- Underexpose and warming can improve
- Editing can also improve
- We saw some examples earlier





Street Photography

- Images of people doing normal (or abnormal) things as they go about their daily activities
- Study people, anticipate actions
- Must be quick, no posing!
 - Pre-focus using hyperfocal distance

Feed the birds



Framing



Not my photo, but I like it



Sports

- Get close, see the face
- Show movement, panning, shutter speed
- Or, freeze the important moment
- Mostly need long lenses



382







Look for Details



Backlight

- Silhouettes and semi-transparent things



Close-ups

- Many things look interesting up close





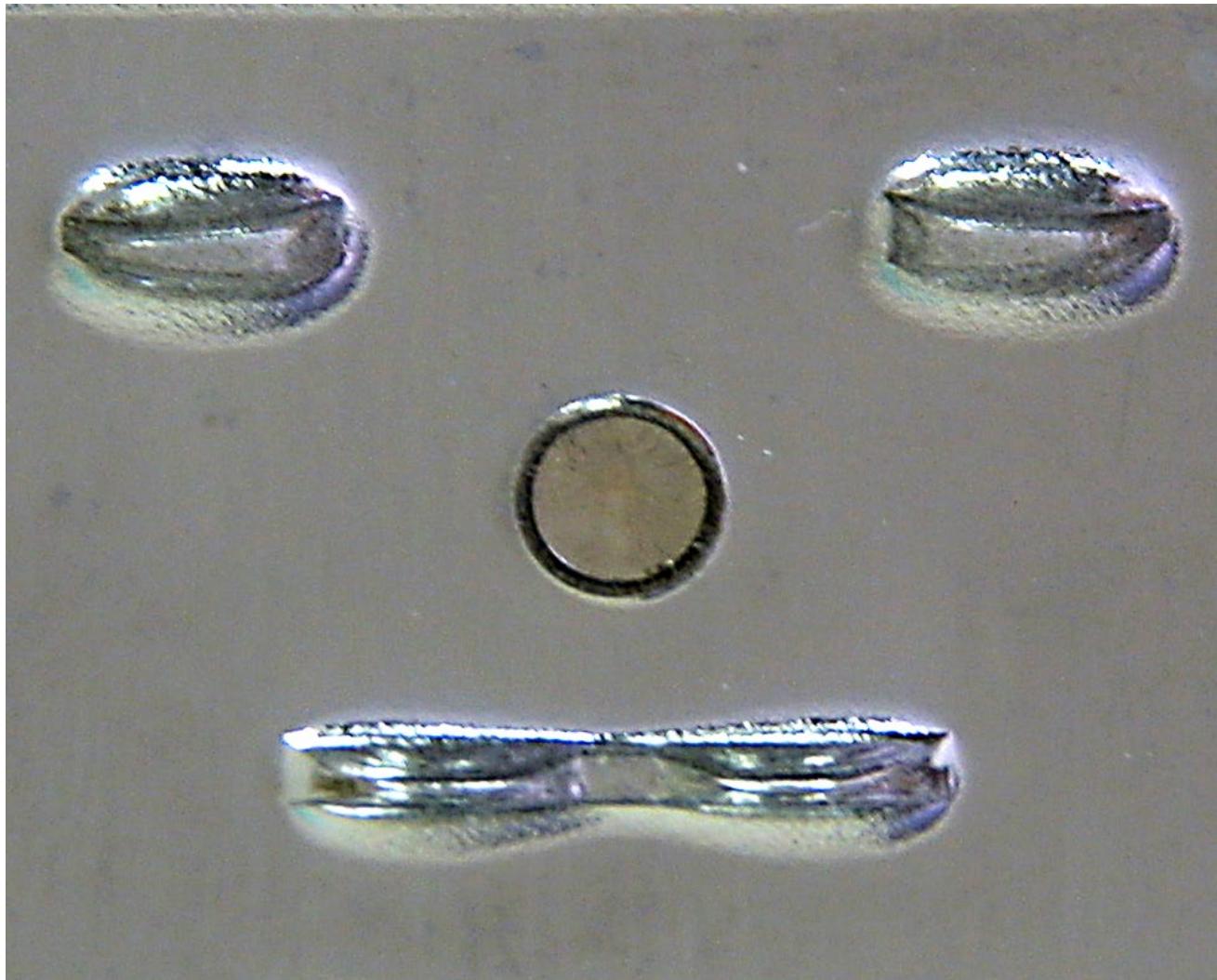


Paper behind to de-clutter





Smile



Framing – Classic but still good









Buildings

- Architecture is always interesting
 - Interiors can be challenging
 - Extreme light and dark
 - Sometimes no flash or tripods allowed
 - Restrictions on standing locations
 - Don't forget about exterior details
- Exception: DO NOT photograph government buildings anywhere!



You don't always need the whole building





Soft lighting, fog.



Perspective Corrections



Creative Copying



Creative Distortions



Created with distort | polar coordinates filter in Photoshop

Staging



Very static, nothing going on



Can you feel the wind now?

Declutter by getting closer



This still tells the story of a long hard life but with less visual clutter

Black and White

- Many cameras have a B&W setting
 - I don't recommend it
 - Common for yellow to be too dark
 - B&W involves mapping different colors to different gray ranges
 - Photo editing software give you more control to make better images
 - B&W film wasn't equally sensitive to all colors, so each film had a unique "look"

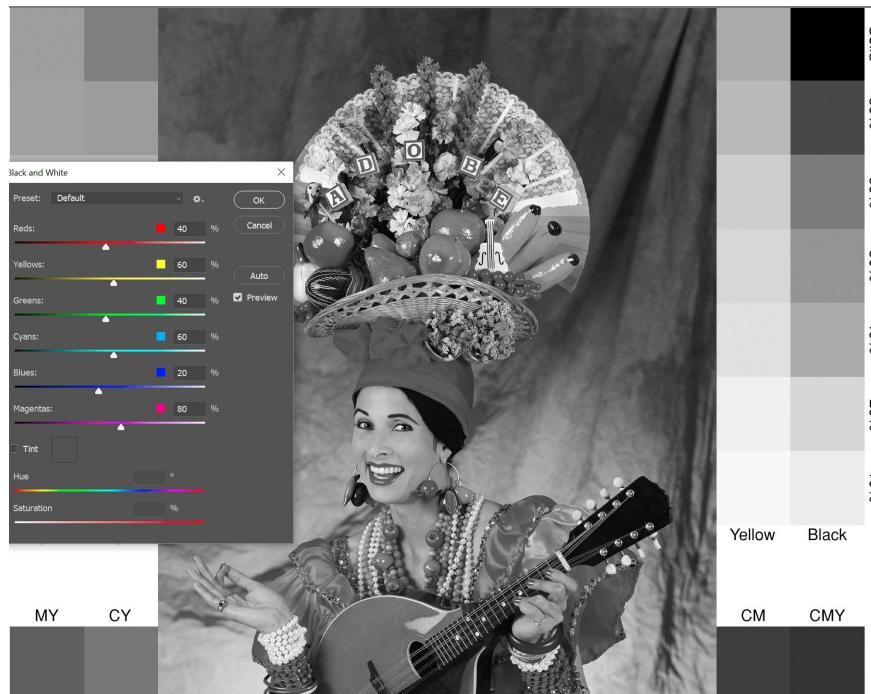
Advantages to Black & White

- Colors don't matter
- Harsh mid-day light often looks better
- Gives a “classic” look to photos
- White balance is irrelevant
- Concentrate on shapes rather than colors
- Often works well in poor light

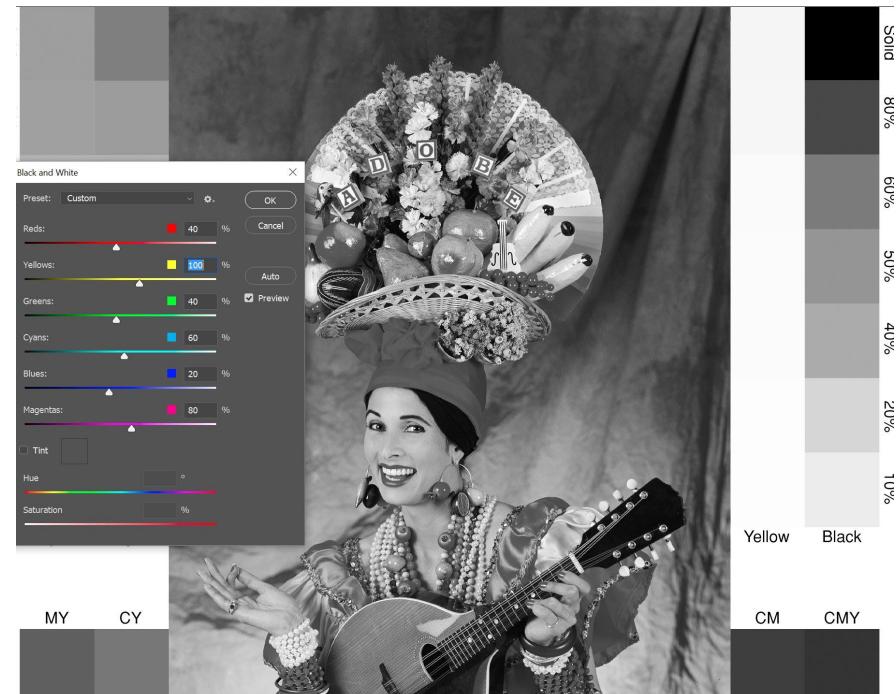


Mapping the different colors to gray values is mostly an artistic decision that the camera has no idea about how to do. So it is best to shoot color and adjust later.

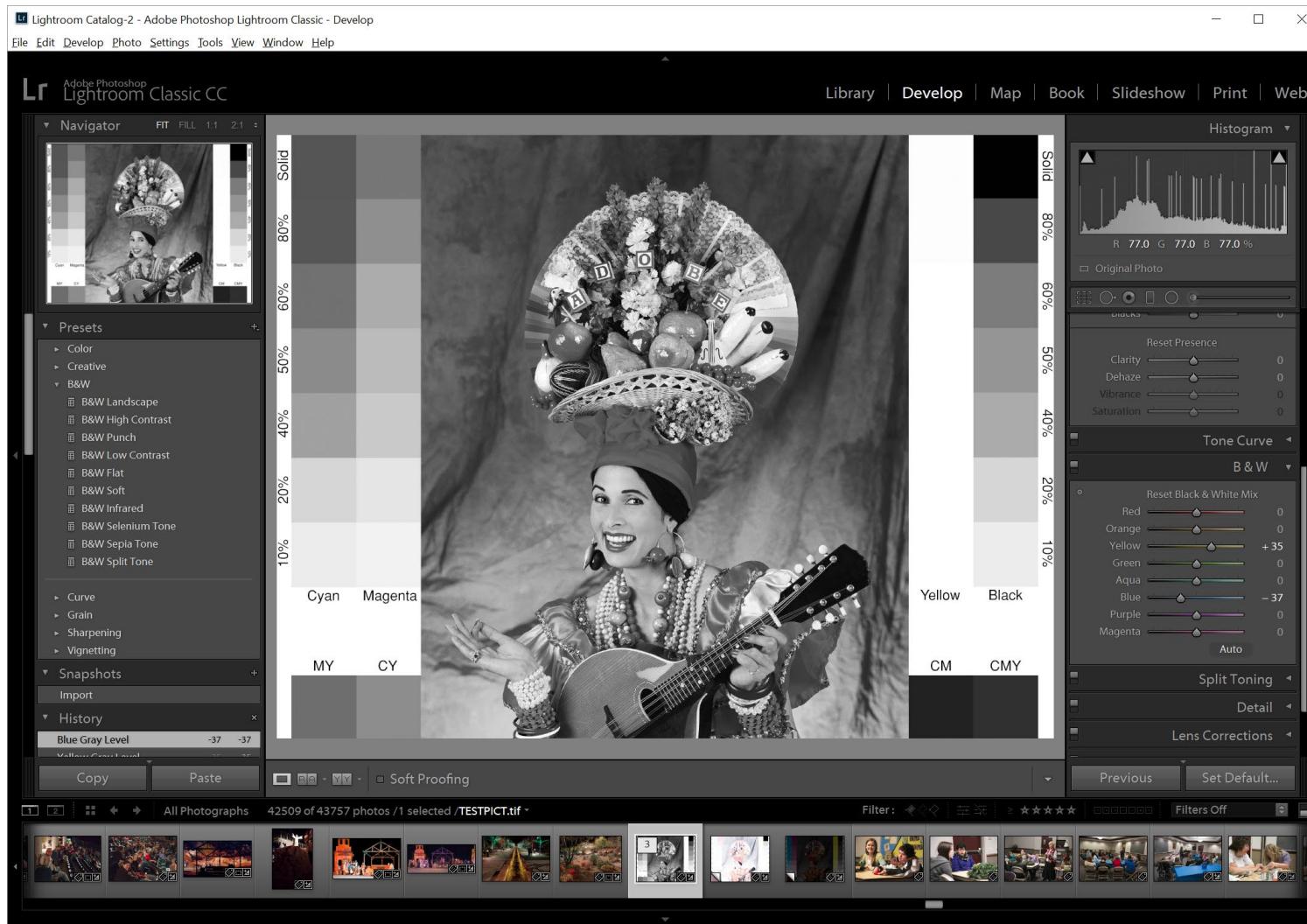
See how the bananas are too dark?



Light them up by adding yellow.



In Lightroom use the B & W panel to modify color mapping.

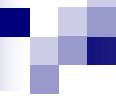


Travel

- Keep record of where you've been
- Try and find angles or lighting that you haven't seen before, otherwise you might as well buy the postcards/books

Today there is a push for local

- Create images close to home
- Look for interesting things constantly
- Keep an open mind and eye, there are interesting things to be found everywhere

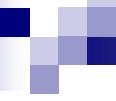


Look Around You

- Look around for interesting things
- Look in books and magazines for what has been done and what is popular

Common Mistakes

- Putting the face or other subject in the middle of the image, sometimes ok
- Take time to think about what the image story or interest is, don't rush
- Don't try to cram too much in the image, simplify, declutter, figure out what belongs
- Improper exposure, get it right! Don't always trust the camera



More Common Mistakes

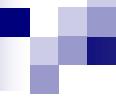
- Watch the background
 - Trees growing from head
- Blurry images, focus or shutter speed
- Try other viewpoints
 - Like eyelevel, experiment
- Edit too much, a little might be good
- Cutting subject parts off

How to get better images

- Practice practice practice
 - Think about images as you go about your daily life
 - What do I see? What story can I tell?
- Take lots of pictures, digital has almost no cost per image
- Edit photos and impress your friends

Assignment

- Pick a topic and bring a photo to show
- Take several images to illustrate
 - Depth of field
 - Simplification of image
- Constructive comments appreciated
- Negative criticism frowned upon
 - We're trying to improve, not be discouraged



Ideas 1

- Walk the streets
- Try different angles
- Sports
- Festivals
- Rain
- Night
- What you love

Ideas 2

■ Restaurants and shops

- Food, items and décor
- Cell phone light on glass
- Reflections

■ Ambience

- Throw some sand or dirt in the air
- Add water to get reflections

Ideas 3

- Twist your zoom lens
- Light painting at night
- Night lights, sharp and defocus

Ideas 4

■ Give yourself an assignment

- Numbers
- Patterns
- A single lens
- Window shopping
- Colors
- Shapes

Ideas 5

- Big pictures, landscapes
- Details, look closely
 - Once on a hike we found some 2mm flowers
 - Architecture is often full of little details



Photo Managers

It should be easy to archive,
sort, edit, and find images

Why Edit Photos

- Improve colors, contrast, exposure
- Crop to remove extraneous “stuff”
- Straighten tilted images
- Add or remove objects
- Blur and sharpen elements
- Fix lens problems
 - chromatic aberration, pincushion and barrel

3 Important Edits

- It is good to capture the best image in the camera, but it doesn't always happen
- Three basic adjustments often needed
 - White balance
 - Exposure
 - Crop and straighten

Quick and Easy Improvements



Crop, color, and sharpness

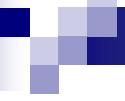


Backup to USB

- PhotoStick and Picture Keeper
 - USB memory with app to save images
 - Read the reviews carefully!
- OSX TimeMachine and Windows Backup
 - Work reliably

Image Managing Software

- ACDSee, Lightroom Classic CC
- Google Photos (replaced Picasa)
- Cyberlink PhotoDirector, Corel Paintshop
- Zoner, Luminar, On1, Capture One, Exposure X5, DXO, Radiant Photo, etc.
- www.mylio.com
- Look for the features you need
 - Easy searching and browsing
 - Editing, and printing (if needed)



Managers are More than Edits

- Archiving collections
- Easy format changes
- Indexing for ease in searching collection
 - Keywords and other metadata

Google Photos (replaced Picasa)

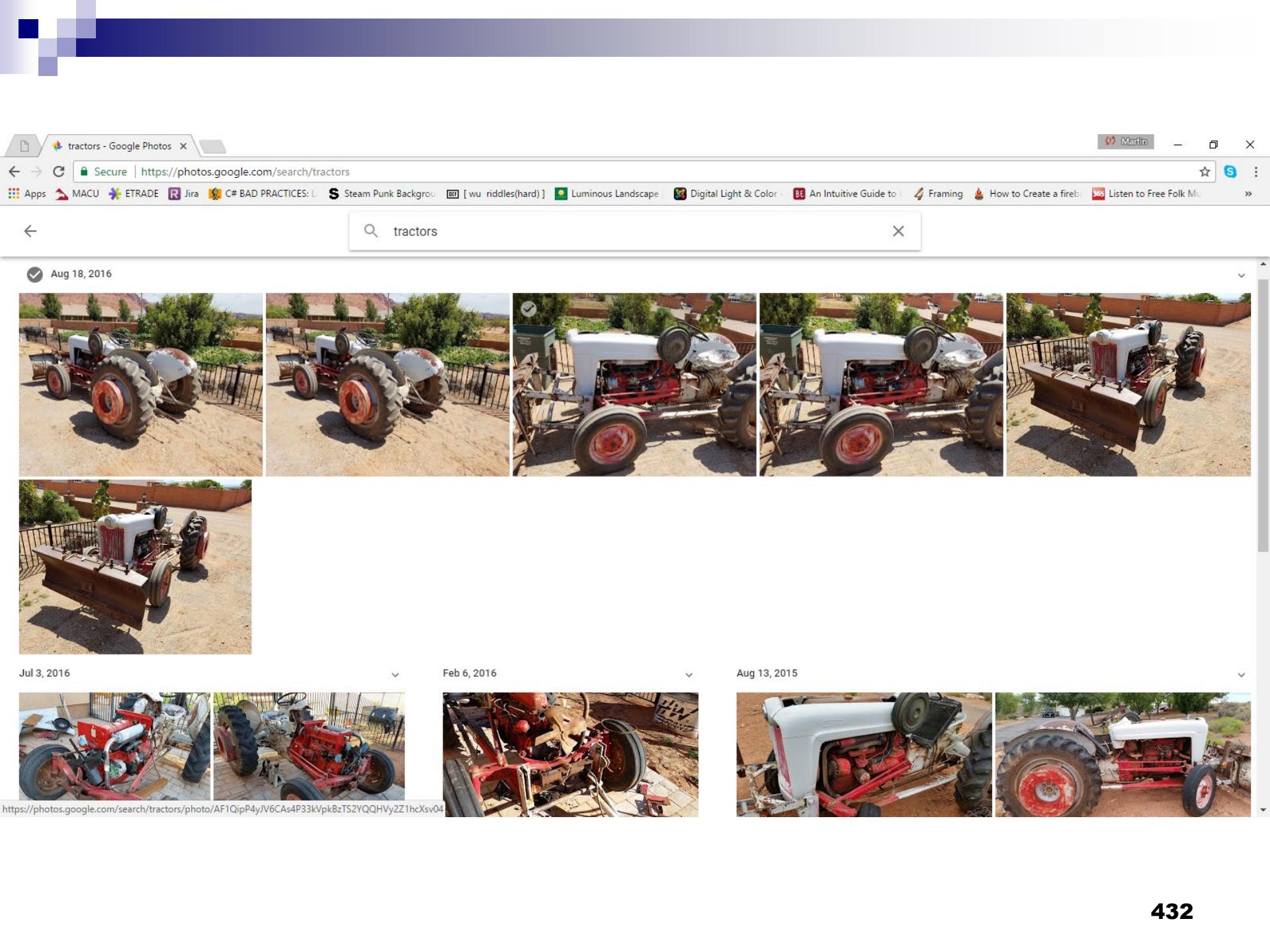
- Automatic tagging
 - Works amazingly well
 - Matches faces
- Non-destructive image editing
- Excellent price! Free, but photos must be on Google drive, you may need to buy space eventually

Example Prices (sometimes on sale)

- On1, \$89.99 (200GB), \$179.99 (1TB)/year
- Capture One, \$179/year or \$299 license
- Lightroom/Photoshop bundle, \$9.99/month
 - There is also a 1TB cloud for more money
- Luminar, \$149 license
- Cyberlink PhotoDirector, \$69.99 license
- ACDSee, \$149.99 license or \$89/year
- Zoner, \$49/year

Cell Phone Photo Apps

- Built-in, Gallery (Samsung), iPhone photos
- Adobe Lightroom, free or part of Adobe photographer suite for \$9.99/month
 - For more money, 1TB cloud with LR only
- Google Photos, free but photos must be in google cloud drive
- Snapseed (Google), free or \$4.99 for pro
- Many others are also available



Secure | https://photos.google.com/search/tractors/photo/AF1QipP4yJV6CAAs4P33kVpkBzTS2YQQHVyZ1hcXsv04

Apps MACU ETRADE R Jira C# BAD PRACTICES: L S Steam Punk Backgrou [wu riddles(hard)] Luminous Landscape Digital Light & Color BE An Intuitive Guide to 4 Framing How to Create a fireb Listen to Free Folk Mu



Info

Add a description

Details

Aug 18, 2016

Thu, 12:26 PM

20160818_122655.jpg

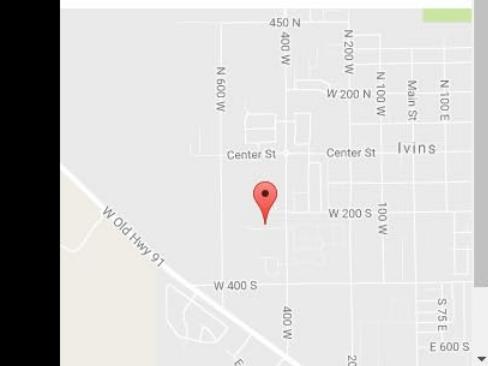
12.2MP 4032 x 3024 3.4 MB

SM-G930V

f/1.7 1/1584 4.2mm ISO50

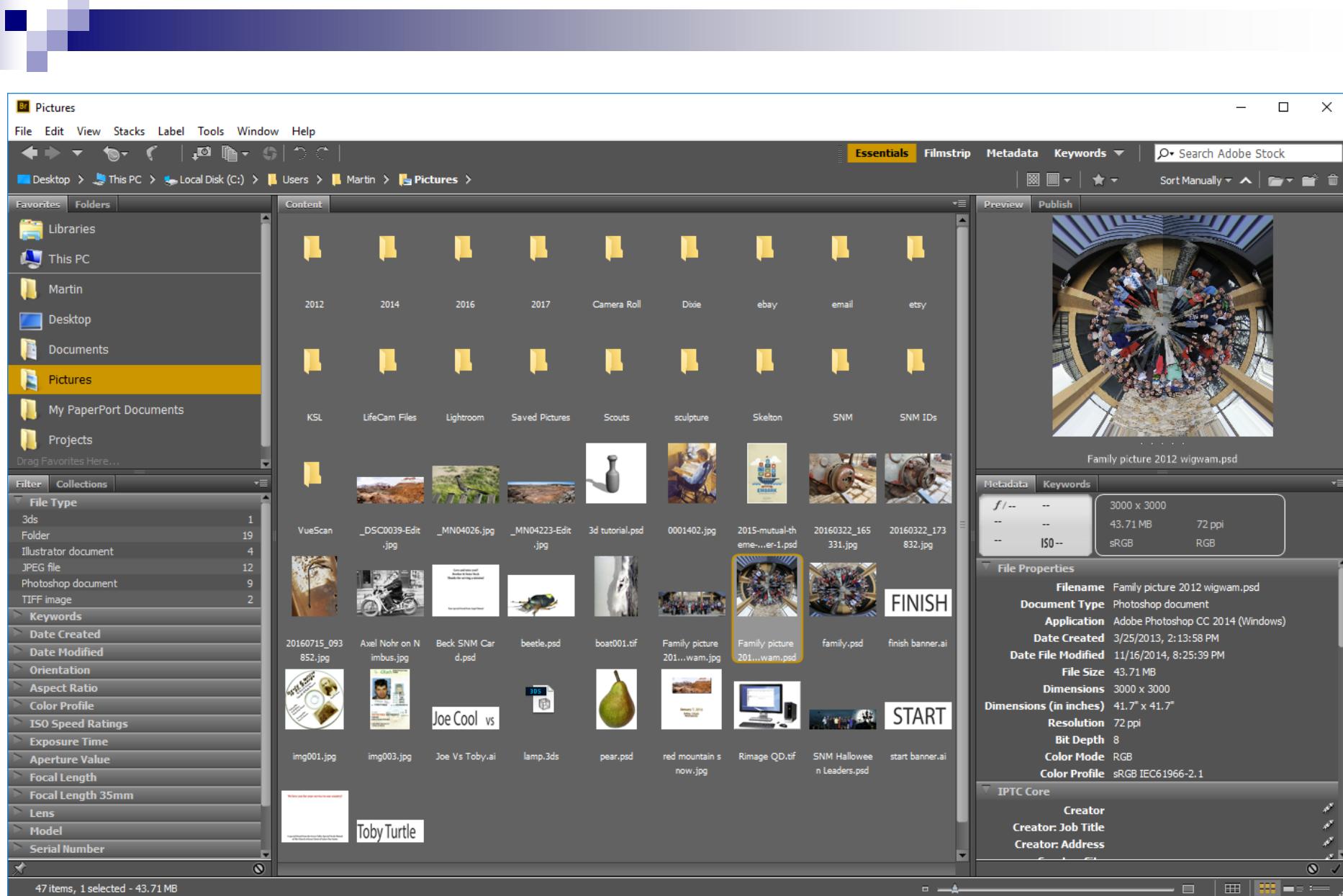
Ivins, UT

37.164, -113.69



Adobe Bridge

- Instead of Windows Explorer/Apple Finder
- Image oriented
- Different views
- Easy searching and filtering
- Handle metadata nicely
 - Search, browse and edit
- Included with Photoshop/Lightroom



Pictures

File Edit View Stacks Label Tools Window Help

Desktop > This PC > Local Disk (C:) > Users > Martin > Pictures >

Essentials Filmstrip Metadata **Keywords** | Search Adobe Stock

Sort by Filename

Favorites

- Libraries
- This PC
- Martin
- Desktop
- Documents
- Pictures**
- My PaperPort Documents
- Projects

Drag Favorites Here...

Keywords Filter

Assigned Keywords:

- Dell
- Events
 - Birthday
 - Graduation
 - Wedding
- People
 - Matthew
 - Ryan
- Places
 - New York
 - Paris
 - San Francisco
 - San Jose
 - Tokyo
- Taxes
- Utilities

Content

0001402.jpg

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Date Modified: 9/5/2016, 8:53:18 AM
7.92 MB
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2400 x 3000 @ 150 ppi

2015-mutual-theme-poster-1.psd

Date Created: 9/4/2014, 3:10:27 PM
Date Modified: 3/5/2015, 1:08:32 PM
30.11 MB
Document Type: Photoshop document
2400 x 3600 @ 150 ppi

20160322_165331.jpg

Date Created: 3/22/2016, 4:53:31 PM
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3.61 MB
Document Type: JPEG file
1/350 s at f/1.7, ISO 50

20160322_173832.jpg

Date Created: 3/22/2016, 5:38:32 PM
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3.40 MB
Document Type: JPEG file
1/120 s at f/1.7, ISO 80

20160715_093852.jpg

Date Created: 7/15/2016, 9:38:52 AM
Date Modified: 7/15/2016, 12:34:48 PM
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1/4000 s at f/1.7, ISO 50

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Color Profile: sRGB IEC61966-2.1

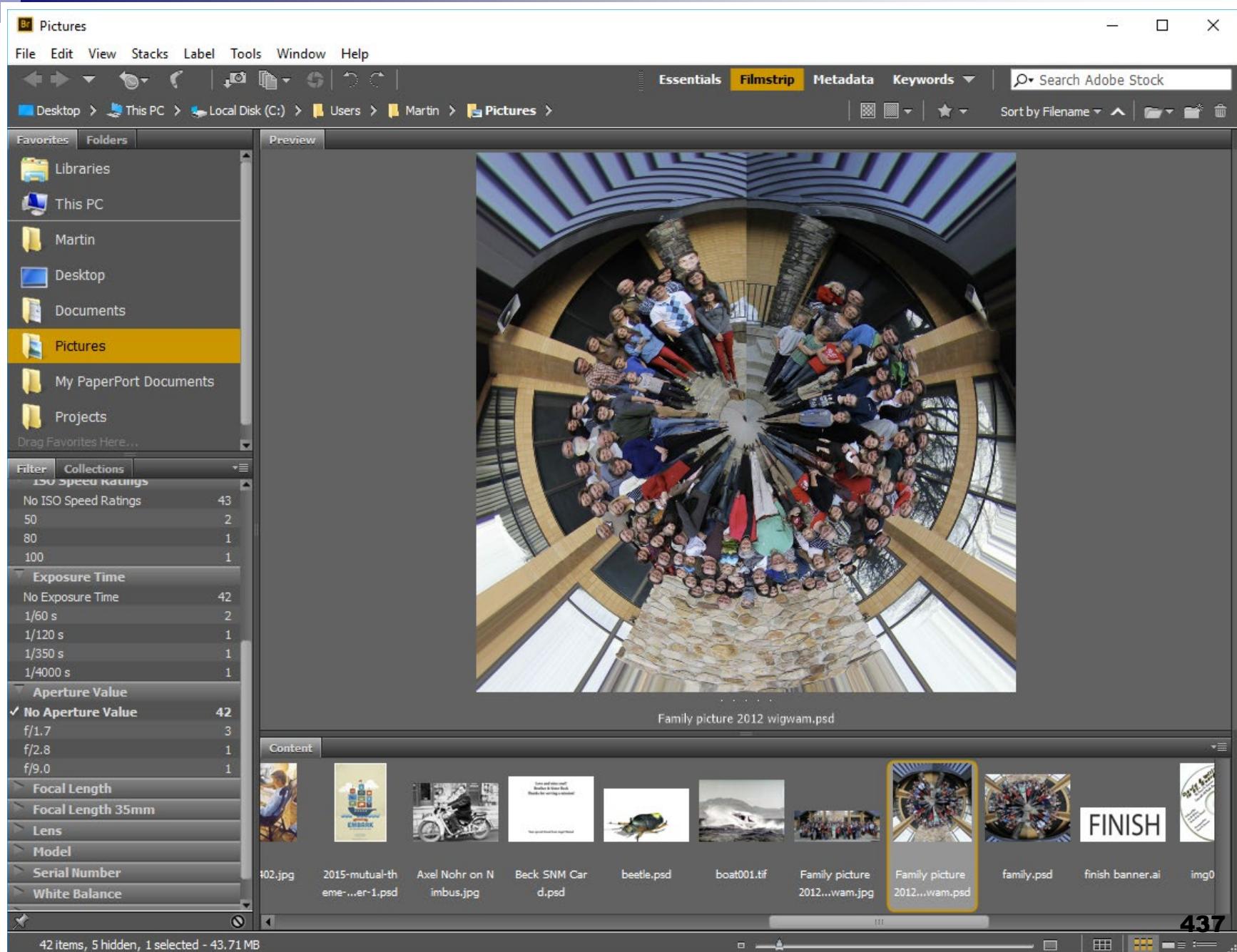
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4032 x 3024 @ 72 ppi
Color Profile: sRGB IEC61966-2.1

Focal Length: 4.3 mm
4032 x 3024 @ 72 ppi
Color Profile: sRGB IEC61966-2.1

Focal Length: 4.2 mm
675 x 900 @ 300 ppi
Color Profile: sRGB IEC61966-2.1
Android Phone

47 items, 1 selected - 3.61 MB

436



ACDSee

- Excellent and affordable
- Has many LR features and even some things that are better
- Does not have the create book and a couple of other things

Pictures - ACDSee Pro 10 - Trial

Buy Now!

Manage Photos View Develop Edit

Folders Catalog Calendar

Network MARTIN-I7-V2 Users (\MARTIN-I7-V2) Martin Pictures

Quick Search

Properties - Metadata

Metadata Presets (Ctrl+M) Apply

Default Metadata View

IPTC

Content

Title

Headline

Description

Description Writer

Keywords

IPTC Subject Code

Contact

Creator

Job Title

Address

City

State/Province

Postal Code

Country

Phone(s)

Email(s)

Web URL(s)

Copyright

Copyright Notice

Rights Usage Terms

Image

Intellectual Genre

IPTC Scene Code

Location

City

State/Province

Country

Country Code

Metadata Organize File

439

Desktop

Libraries

Camera Roll

Documents

Music

Pictures

Pictures

Pictures

Pictures

2014

05

10

11

26

2015

Saved Pictures

Subversion

Videos

Preview SeeDrive

SM-G930V 4032x3024 3.4 MB

P ISO 80 f/1.7 1/120 s 0.00 eV 4.25 mm

3/22/2016 5:38:32 PM

beetle.psd

boat001.tif

Family picture 2012 wigwam... Family picture 2012 wigwam...

family.psd

finish banner.ai

img001.jpg

img003.jpg

Joe Vs Toby.ai

lamp.3ds

Total 47 items (171.1 MB) 20160322_173832.jpg 3.4 MB, Date Taken: 3/22/2016 5:38:32 PM 4032x3024x24b

Adobe Photoshop Elements

- It is a perfectly good image editor
- It includes an image browser/organizer
- \$99 list
 - Remember that upgrade versions cost \$69 and are release every 12 to 18 months
- Compare to Adobe Lightroom/Photoshop for \$9.99/month

Mylio.com

- Organize photos, search tools
- Automatic backups
- Website works across all your devices
- Basic editing tools, non-destructive
- Handle jpg, raw, and others
- \$9.99/month



Lightroom Tour

LR is an excellent tool available on both Mac and PC

Two Lightrooms

Lightroom Classic

- Files stored anywhere
- Full featured editing, printing, exporting, etc.

Lightroom (new)

- Cloud based
 - Images stored in cloud
- Not as full featured as classic, but is constantly getting better

Photoshop and Lightroom

- Work together very well
 - Included in same price
- We will learn basic editing and image management



One or more drives with images



Photoshop
Edits
original
image files



Export

- Files
- Printer
- Web

Parametric Editing

Original image
Never modified

Image Edit Commands

- Brighten
- Contrast
- Color adjust
- Crop



- Stored in catalog
- Kept until explicitly deleted
- Can be edited

What the user sees
on the computer

Displayed image
Shows changes





Catalog holding information about each image

- How to process it
 - Color, exposure, crop, distort, noise, etc.
- Metadata
 - Name, title, copyright, date, people, etc.
- File Location, drive/folder/name
- Thumbnails/previews

Export

- Files, different formats
- Printer
- Web
- Books
- Slideshow

One or more drives with images

Lightroom Manages everything

Edit

- Any format
- Exposure
- Cropping
- Colors
- Gradients
- Masking
- Noise
- Many other tools

Adobe Lightroom

- Great tool for managing and editing a photo collection
 - Import, export, store, tag, locate, display, compare, edit, print, map, web, photo book, slide shows, and more
- Keyword/metadata searching
- Excellent editing tools
- Virtual copies, tiny disc space

Image Editing

- Shows the edited image
 - All formats including raw are handled transparently, you don't have to convert
- **Never changes image files**
 - All editing operations are saved automatically, you don't have to “save” your work
 - Changes can be undone at any time, even a later session

Lightroom

- Can get Photoshop and Lightroom for \$9.99/month
- Runs on OSX and Windows

Non-destructive Editing

Instructions

Stored in Lightroom
Can be changed anytime

Original - it is never modified



- Crop**
- Correct Perspective**
- Make Black and White**



Final Result



Lightroom Modules

- Import (get the images into LR)
- Export (get images out of LR)
- Library (browsing, searching, comparing)
- Develop (editing)
- Map (shows location, requires GPS)
- Book (coffee table books)
- Slideshow
- Print
- Web (photo collections)

Lightroom Workflow

1. Import images
2. Add keywords to aid searching later
3. Examine images
 1. Delete bad ones, improves your reputation!
4. Select some for editing
5. Output to web, PDF slides, print, or book
6. Later: search collection for further work

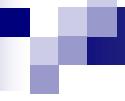
Lightroom Demo

- Do in class

Contrast and Frequency (detail)

Can use masking also

- Contrast – Whole image
- Clarity – midtone contrast boost but colors can get grungy
- Dehaze – low frequency/low contrast areas get boost, helps sky and landscapes
 - -ve gives glow, +ve removes haze
- Texture – mid frequency but not color
 - +ve good for feathers, -ve good for skin



Neat Features

- Handles video
- The new auto tone control is very good
- HDR and Panorama works well

Websites

- www.uglyhedgehog.com
 - Great photography blog site, daily emails
- www.bhphotovideo.com
 - Videos and equipment
- www.ppsop.com
 - Videos and classes
- www.asa100.com

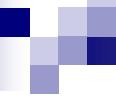
More Websites

- www.eyeem.com
 - Photo sharing
 - Phone app
- www.davemorrowphotography.com
 - Excellent tutorials
- www.picturecorrect.com
 - Many fun and educational ideas

Popular Sites

- www.eyefi.com
- www.facebook.com
- www.flickr.com
- photos.google.com
- www.instagram.com
- www.photobucket.com
- www.pinterest.com
- www.smugmug.com
- www.thislife.com
- www.youtube.com

NOTE: some sites don't store full resolution images



Landscape Photography Sites

- Maxrivephotography.com
- Ryandyarphotography.com
- Marcadamus.com
- Ianplant.com
- Davidthompsonphotography.com
- Codyscapes.com
- Bright-images.com
- Milesmorganphotography.com
- Twowanderers.com

Landscapes/Flowers

- <https://www.digitalfieldguide.com/>
 - Harold Davis
 - Landscapes and flowers
 - Multiple exposures, layered