

# Seeing Like Your Camera

PART 2 - FALL 2016

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## Accessing [Lynda.com](https://www.lynda.com)

- Free to Mason community
- Set your browser to [lynda.gmu.edu](https://lynda.gmu.edu)
  - Log-in using your Mason ID and Password
- Playlists
  - My list of specific videos I recommend for homework i.e. pre- and post-session viewing..
  - Clicking on the name of the video segment will bring you immediately to Lynda.com (or the login window)
  - I recommend that you eventually watch the entire video class, since we will only use small segments of each video class

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## Ways To Take This Course

- Each class will cover on one or two topics in detail
  - Lynda.com videos cover a lot more material
  - I will email the video playlist and the my charts before each class
- My Scale of Value
  - Maximum Benefit: Review Videos Before Class & Attend Lectures & Practice after Each Class
  - Less Benefit: Do not look at the Videos; Attend Lectures and Practice after Each Class
  - Some Benefit: Look at Videos; Don't attend Lectures

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## What Creates a Photograph

- Light
- Camera
- Composition
- Camera Setup
- Post Processing

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## This Course - “The Shot”

- Light
- Camera
- Composition
- Camera Setup
- Post Processing

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## This Course - “The Shot”

- **Camera Setup**
  - Exposure
    - “Proper” Light on the Sensor
    - Depth of Field
    - Stop or Show the Action
  - Focus
  - Getting the Color Right
    - White Balance
- **Composition**
  - Key Photographic Element(s)
  - Moving The Eye Through The Frame
    - Negative Space
  - Perspective
  - Story

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## Outline of This Class

### PART 1 - Summer 2016

- Increasing Your Vision
  - Shutter Speed
  - Aperture
  - ISO and White Balance
- A New Way to Think About Composition
- Putting it all together in the field
- Critiquing

### PART 2 - Fall 2016

- Brief Review of Part 1
- Seeing The Light
  - Color, dynamic range, histograms, backlighting, etc.
- Seeing Like Your Lens
- Making Your Images Come To Life
  - Visualizing your composition
  - Negative Space --Moving the eye through the picture space
  - Adding mystery to your images

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## Class Topics

- **Topic 1**
  - Review of Part 1
  - Shutter Speed, Aperture, ISO
  - Composition
- **Topic 2**
  - Checking and Adjusting Exposure Using the Camera Histogram Display
- **Topic 3**
  - Dynamic Range
  - Shooting HDR Photos
  - White Balance
- **Topic 4**
  - Seeing Like Your Lens
  - Example: Shooting Portraits

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## Videos To Review For The First Class

### Videos Used in Part 1 of the Class – Summer 2016 in Reston

#### Class 1: Intro and Shutter Speed

<https://www.lynda.com/SharedPlaylist/a61a223f5c2141ed8332586f51af1ae7?org=gmu.edu>

#### Class 2: Aperture

<https://www.lynda.com/SharedPlaylist/7af38f02fd4641caab4d47b2880221f3?org=gmu.edu>

#### Class 3: ISO

<https://www.lynda.com/SharedPlaylist/c99e9573e5334293ae32ef95937802f4?org=gmu.edu>

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## Videos To Review For The First Class (cont'd)

### Videos Used in Part 1 of the Class – Summer 2016 in Reston

#### Class 4: Composition

<https://www.lynda.com/SharedPlaylist/f8ea6fddba564385962bff2def864026?org=gmu.edu>

<https://www.lynda.com/SharedPlaylist/3a71ae8e7eec4b0ab5222bc980fef4f4?org=gmu.edu>

<https://www.lynda.com/SharedPlaylist/39ce021c1554479292cab9b1c0079070?org=gmu.edu>

#### Class 5: No Videos

#### Class 6: Critiquing

<https://www.lynda.com/SharedPlaylist/e9f76d166e7948638843e404928a6825?org=gmu.edu>

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## Exposure

- “How do you tell that **your** Exposure is correct?”
  - *Look at the results on back of camera*
  - *Camera is on automatic so it is always correct*
  - *Previsualize my shot so I can adjust the camera settings properly and thus get a good exposure*
  - *Wait until I get home and check it on the big screen*
- Three main camera adjustments for exposure discussed in Part 1
  - Aperture
  - Shutter Speed
  - ISO

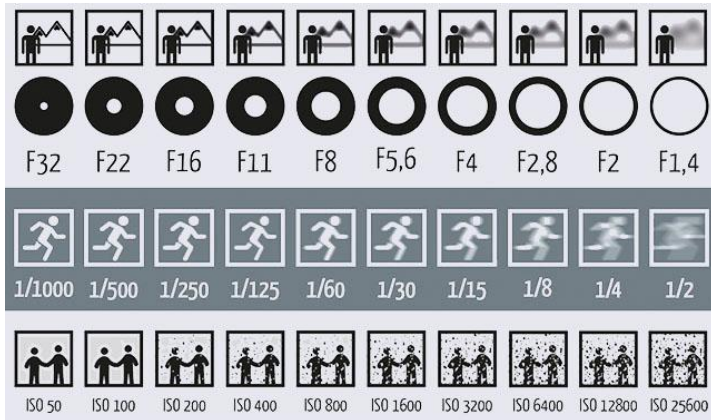
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## Camera Modes For Setting Exposure

- Automatic Modes
  - Fully Automatic (Typically you are not involved)
  - Program Mode
    - Camera selects both Shutter Speed and Aperture with some adjustment by you
    - ISO can be Auto or Manual
- Semi-Automatic Modes
  - ISO can be Auto or Manual
  - Aperture Priority Mode
    - You select the Aperture for the desired DOF; Camera selects Shutter Speed
  - Shutter Priority Mode
    - You select the Shutter Speed for stopping or showing the action; Camera selects the Aperture
- Manual Mode
  - You select both the Aperture and Shutter Speed
  - ISO can be Auto or Manual

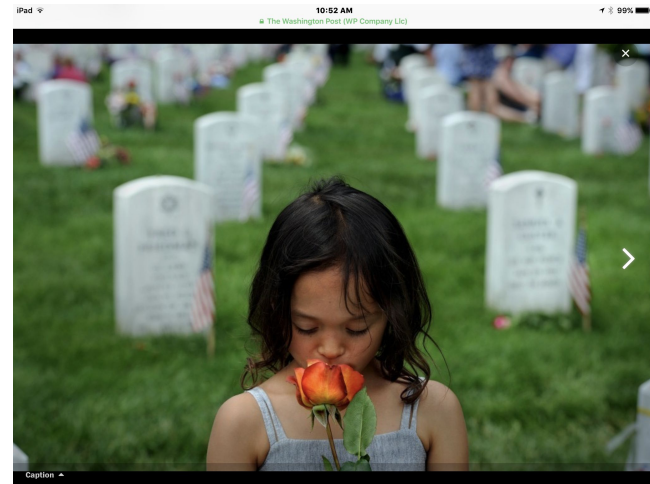
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## Exposure Adjustments



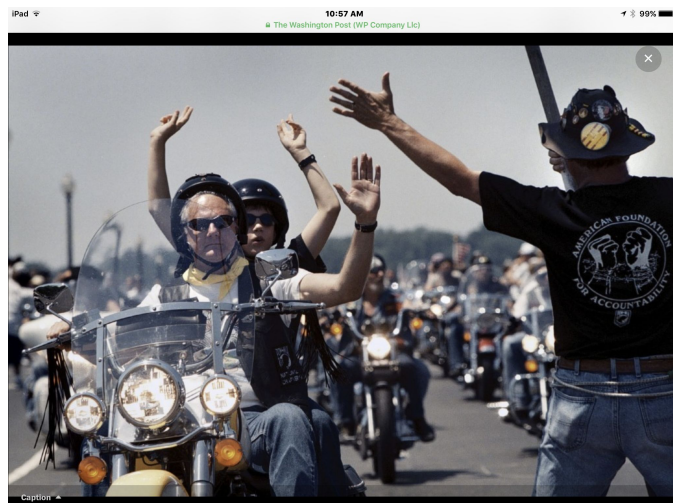
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## Examples



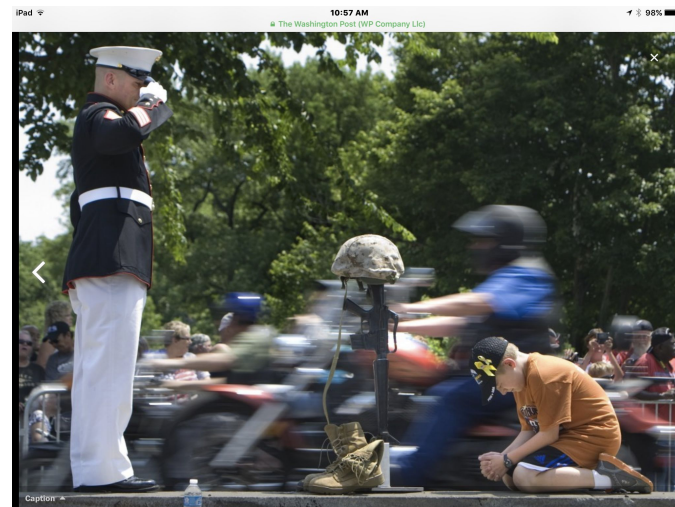
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## Examples



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## Examples



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## Examples



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## Depth of Field Examples



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## "Approximate" Aperture To Achieve The Same DOF vs Camera Type

DIFFRACTION  
LIMIT (APPROX)

SENSOR	Smaller DOF	<=====	=====	=====	=====	>=====	Larger DOF
Full	f/2.8	f/4.0	f/5.6	f/8	f/11	f/16	<b>f/22</b>
Cropped	f/2.0	f/2.8	f/4.0	f/5.6	f/8	f/11	<b>f/16</b>
m4/3		f/2.0	f/2.8	f/4.0	f/5.6	f/8	<b>f/11</b>
1"			f/2.0	f/2.8	f/4.0	f/5.6	<b>f/8</b>
P&S / Phone				f/2.0	f/2.8	f/4.0	<b>f/5.6</b>

EACH COLUMN REPRESENTS THE SAME  
SIZE PHYSICAL HOLE IN THE LENS

(ASSUMING WE ARE TAKING THE SAME  
PICTURE FROM THE SAME PLACE WITH  
EACH CAMERA)

NOTE SMALLER SENSOR  
CAMERAS TYPICALLY HAVE  
SMALLER RANGES FOR  
SUPPORTED F-STOPs

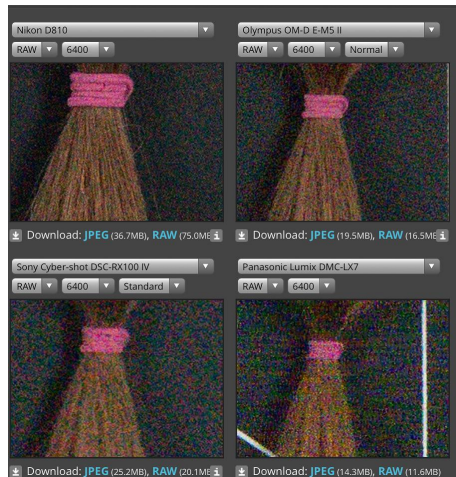
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## Effect of ISO



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## COMPARE SENSORS @ISO 6400 RAW FILES



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## Approx Print Size Capability vs Sensor Size & ISO

		ISO								
	Area	100	200	400	800	1600	3200	6400	12800	25600
35mm	860	30x40	30x40	30x40	30x40	24x36	23x36	16x20	11x14	8x10
m4/3	225	24x36	24x36	20x30	20x30	16x20	13x19	8x10	5x7	4x6
1"	115	24x36	24x36	20x30	13x19	11x14	8x10	5x7	4x6	
P&S	43	13x19	13x19	11x14	8x10	5x7	4x6			
Cell	20	11x14	8x10	5x7	4x6					

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## JPG IMAGE f/5.6, 1/1600 @ISO 6400 P&S



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## JPG IMAGE f/5.6, 1/1250 @ISO 6400 1" sensor



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JPG IMAGE f/5.6, 1/3 sec @ISO 6400 1"sensor



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## Possible Composition Workflow

### **1. SIMPLICITY**

- # image elements  $\leq 4$
- Internal Complexity
- Separation
- Primary visual element

### **2. ASYMMETRY**

- Vertical
- Horizontal line
- Compare 4 quadrants
- Rule of thirds

### **3. EYE LINES**

- Types of eye lines
  - I. Physical
  - ii. Perspective
  - iii. Tonal/Color

### **4. POINT OF VIEW**

- Scale: Large/small
- Position: High/Low
- Unusual, e.g. look thru
- Unexpected, e.g. non-human

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## Class Topics

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  - Shutter Speed, Aperture, ISO
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- Topic 2
  - Checking and Adjusting Exposure Using the Camera Histogram Display
- Topic 3
  - Dynamic Range
  - Shooting HDR Photos
  - White Balance
- Topic 4
  - Seeing Like Your Lens
  - Example: Shooting Portraits

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## Videos To Review

Metering, Exposure Compensation, and Histograms

<https://www.lynda.com/SharedPlaylist/917b5b6df7fd4c48b43db99e2337f56d?org=gmu.edu>

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## OLLI Photo Club (OPC) Group on Facebook

- Private, Closed Group
  - Established by Bob Baker
  - <http://www.Facebook.com/>
- Photo Information, Sharing and Questions
- Sign up For Facebook and then request to Join this Closed Group

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## “Seeing Like Your Camera”

It is not obvious on how to take good photographs

“When I scroll through my Facebook timeline, most pictures are outright horrible.  
**Bad composition, bad lighting, bad exposure, bad camera technique, resulting in slanting horizons and a lot of garbage in the background with backlit and extremely underexposed subjects and a dash of camera shake. Teaching people a few simple techniques will result in much larger increase in image quality than the capability of shooting RAW.**”

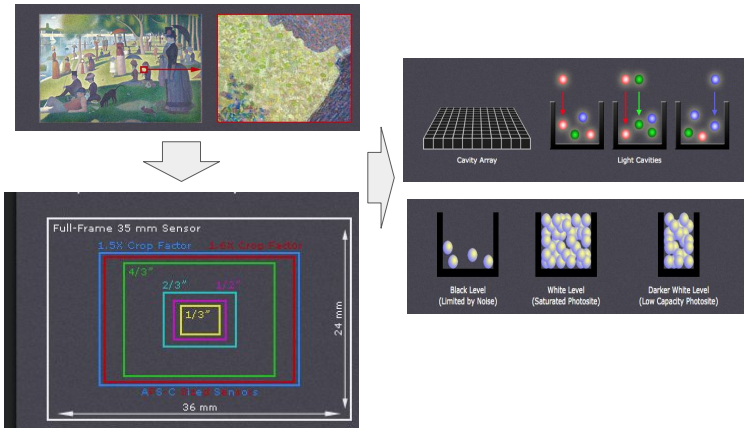
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## “Seeing Like Your Camera”

- Our Eye/Brain vs *The Camera*
- Single ‘Normal’ Field of View vs *Various Fields of View Depending on Lens Used*
- Great Flexibility of What is in Focus vs *Rigid Focus Region based on Lens DOF*
- Highly Selective Composition vs *Capturing Everything in the Camera Field of View*
- Three Dimensions and Depth vs *Two Dimensions*
- Very Wide Instantaneous Dynamic Range vs *Limited Instantaneous Dynamic Range*
- Very Limited Color at Night vs *Better Color at Night*
- No Blurring of the Image vs *Possible Blurring Within the Image*

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## Pixels, Sensor Size, and Dynamic Range of YOUR Camera



- Dynamic Range Tutorial: <http://www.cambridgeincolour.com/tutorials/dynamic-range.htm>

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## Characteristics of Light

- Intensity
  - We can distinguish differences in light intensity of approximately 4,000,000 : 1
  - Our camera can at best capture light intensities of approximately 20,000 to 1 in the very best cases
    - Often much less, e.g. 4,000 : 1, depending upon both the sensor sizes and with low intensity light often <100 : 1
  - This range of light capture (from the very bright to the dark) is referred to as the **Dynamic Range** and is very important setting exposure
    - Incidentally good displays have approximately 1000 : 1 range and prints approximately 200 : 1
- Color
- Direction

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## Characteristics of Light (cont'd)

- Intensity
- Color
  - All light contains a range of colors
    - Can be seen using a prism or looking at a rainbow
    - Noontime light is more white; early morning and late evening light more full of colors
  - Is the camera capturing the correct color?
    - Terminology: White balance / Color Temperature**
    - "White Balance" sets the color balance in your camera so whites are captured as white and hopefully then all the colors be then captured correctly
- Direction

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## Characteristics of Light (cont'd)

- Intensity
- Color
- Direction
  - Light can be
    - 'Hard' - creating harsh shadows and outlines
    - "Soft" - without harsh shadows - flat looking architecture
  - Illumination can be from different directions
    - Front - squinty eyes and shows aging of subject
    - Back - great for silhouettes
    - Side - great for texture and some patterns

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## Exposure -- Questions You Should Ask Yourself

- “How do you tell that **your** Exposure is correct?”
  - Look at the results on back of camera
  - Camera is on automatic so it is always correct
  - Previsualize my shot so I can adjust the camera settings properly and thus get a good exposure
  - Wait until I get home and check it on the big screen
- “What **result** am I exposing for?”
  - Immediately Use the Picture With NO Additional Editing (except cropping)
    - Shoot JPG
  - Minor/Auto Corrections and Cropping in Editing
    - Shoot JPG
  - [Shoot With Post Processing in Mind](#) - Best data vs best image out of the camera
    - Shoot RAW or JPG

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## RAW vs JPG

- RAW
  - Very large files
  - Captures actual sensor data
  - Easy to manipulate color and exposure in Post Processing
- JPG
  - Captures “Perceived Brightness” and NOT actual light intensity
  - Smaller Files and often compressed even smaller
  - More difficult to change in Post Processing
  - Output optimized by camera manufacturer to provide best image
    - Lens corrections
    - Noise Reduction
    - Higher Contrast
    - Sharpened
    - More Saturated Colors

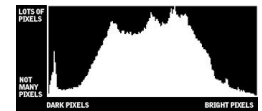
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## Light Metering in Your Camera

- The camera has a light metering process that will set the exposure automatically
  - Light Metering algorithms are typically designed to achieve a “statistically average” scene (18% reflective) and many of our shots are not ‘average’
- Types of Light Metering
  - Matrix or Evaluative (Often the best place to start)
    - Looks over entire frame and uses a vendor specific algorithm to select correct exposure (“secret sauce”)
  - Center-Weighted
    - Weights light from center of frame higher than edges
  - Spot
    - Only uses light from approx 5% of image

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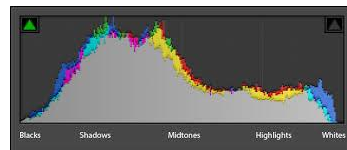
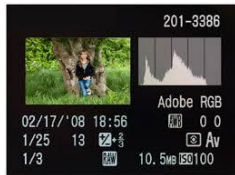
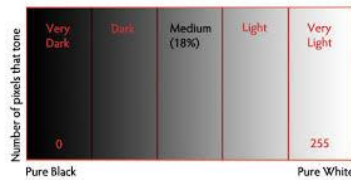
## Histogram



- Takes Guesswork Out Of Capturing the Light Correctly
  - Best to review the histogram immediately after taking a picture
    - Learn how to set your camera to do this
  - Even if you are using the ‘totally automatic’ mode of your camera, you still should be checking the histogram
- **A histogram is, by definition, a plot of frequency-of-occurrence of perceived brightness (i.e. the tonal values of pixels)**
  - **Brightness is how WE SEE and is not the same as the physical amount of light!**
    - E.g. Shining two flashlights on an object does NOT double its perceived brightness
  - Low Brightness (black) on the left side ==> High Brightness (white) on the right side
  - The height of represents the relative amount of pixels with that brightness level
  - There is NO ‘best’ histogram, but there are some ‘bad’ ones
- **Key things to remember**
  - All pixels along either the right (high brightness) or left (low brightness) edges of the graph contain NO recoverable information
  - If most pixels are in the left (less bright) part of the graph then you will have a dark image. Conversely if most pixels are in the right (more bright) part of the graph then you will have a bright image

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## Histogram Examples



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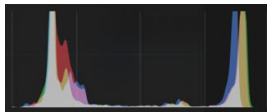
## Things To Consider Before You Snap The Shot

- Exposure → What needs to be exposed 'properly'
  - All or Part of the Image?
  - Do I want a Dark Image or Bright Image?
- I PREFER TO CAPTURE THE LIGHT WITH THE CAMERA AND THEN MAKE ADJUSTMENTS IN THE SOFTWARE
  - The image shown on the camera display may not represent my final objectives
  - Capturing the most data (i.e. dynamic range) is important to me so I can maximize my final result
  - Usually preventing "blowing out" highlights (bright pixels) is most important to me, since I may be able to recover some image information from the darker pixels using post processing but cannot recover from overexposed highlights
    - Important to know just how much your camera will tolerate "nearly" blown out pixels as displayed in your histogram

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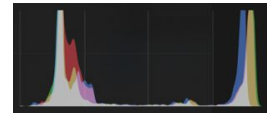
## Verify the Exposure Whenever You Take a Shot

USE THE HISTOGRAM TOOL PROVIDED IN YOUR CAMERA



IS THIS A GOOD EXPOSURE -- DOES IT PROVIDE ALL THE IMAGE DATA YOUR CAMERA IS CAPABLE OF COLLECTING?

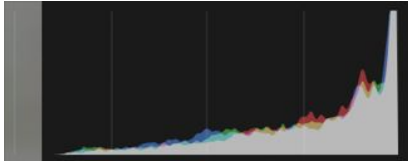
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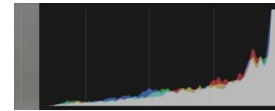
## Verify the Exposure Whenever You Take a Shot

USE THE HISTOGRAM TOOL PROVIDED IN YOUR CAMERA



IS THIS A GOOD EXPOSURE -- DOES IT PROVIDE ALL THE IMAGE DATA YOUR CAMERA IS CAPABLE OF COLLECTING?

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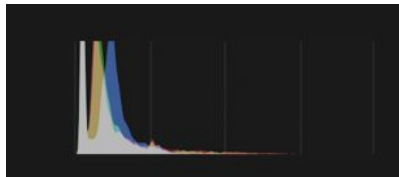
Over Exposed?



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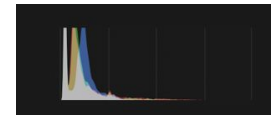
## Verify the Exposure Whenever You Take a Shot

USE THE HISTOGRAM TOOL PROVIDED IN YOUR CAMERA



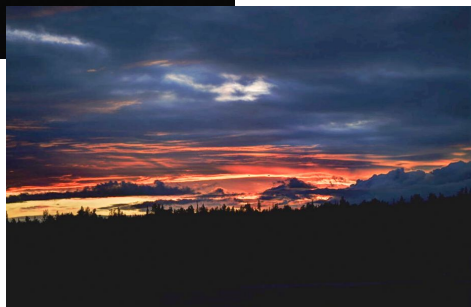
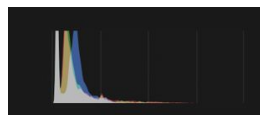
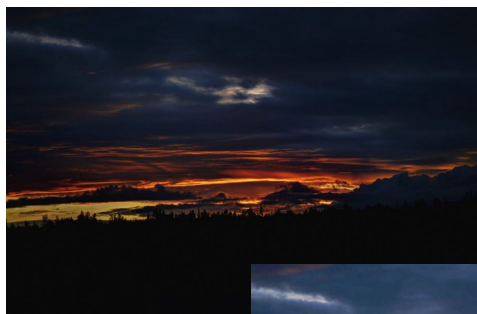
IS THIS A GOOD EXPOSURE -- DOES IT PROVIDE ALL THE IMAGE DATA YOUR CAMERA IS CAPABLE OF COLLECTING?

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Under-Exposed?

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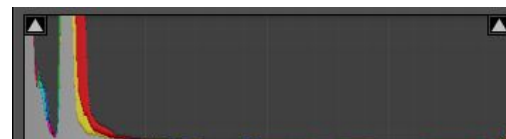


+2 EV

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## Verify the Exposure Whenever You Take a Shot

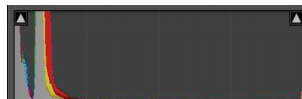
USE THE HISTOGRAM TOOL PROVIDED IN YOUR CAMERA



IS THIS A GOOD EXPOSURE -- DOES IT PROVIDE ALL THE IMAGE DATA YOUR CAMERA IS CAPABLE OF COLLECTING?

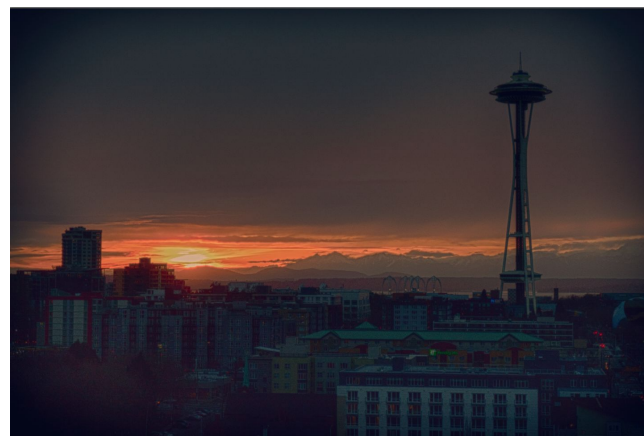
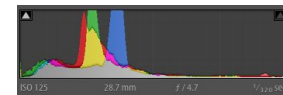
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## Shot To Retain The Highlights



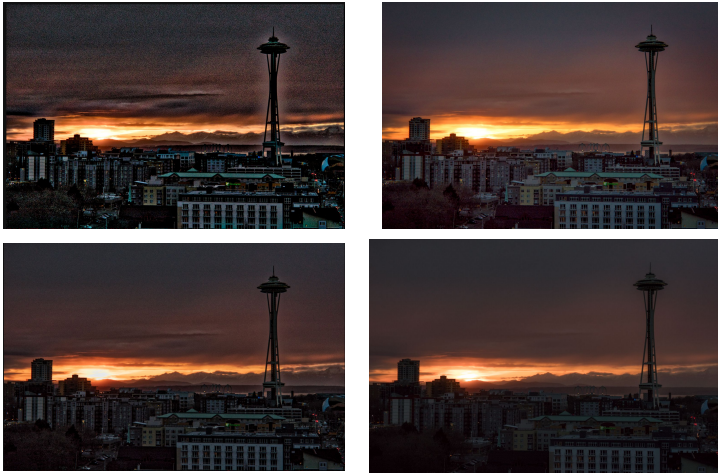
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## Post Processed To Reveal Image Data Within Dark Tones



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## Overprocessed?



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## Stan's Preferred Workflow for "Light" Capture

- Use Matrix Metering
- Check Exposure With The Camera Histogram
- Adjust "Exposure Compensation" to:
  - Capture All The Light Without Bumping Into Either the Histogram
    - + Compensation for a Captured Image That is Too Dark
    - - Compensation for a Captured Image That is Too Bright
    - Note: Next Week We Will Discuss Pushing Exposure Even Further To The Right
  - Some Exceptions Based on YOUR Taste
    - Make Sure Your Subject Will be Properly Exposed, e.g. Girl's Face in the Brightly Backlit Scene
- Rationale
  - Capture all the Information your Camera is Capable of Recording
  - Electronic Noise in Your Camera is Constant, so Capturing The Light at Higher Level for Each Pixel Provides a Higher Signal/Noise
- Adjust the Final Image "For Taste" in the Computer



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## Class Topics

- Topic 1
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- Topic 3
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  - Shooting HDR Photos
  - White Balance
- Topic 4
  - Seeing Like Your Lens
  - Example: Shooting Portraits

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## Videos To Review

### Contrast

<https://www.lynda.com/SharedPlaylist/fdbfad4fac4c4840a090d66f86c96ddf?org=gmu.edu>

### HDR Setup in The Camera

<https://www.lynda.com/SharedPlaylist/3ca7e079b3ed4eb2ab12181c019681b3?org=gmu.edu>

<https://www.youtube.com/watch?v=aDZg8vBVYZU>

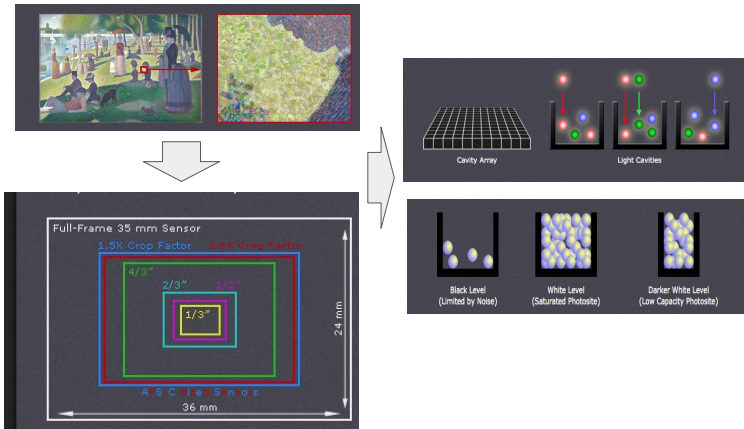
<https://www.youtube.com/watch?v=HHRdFitpGGs&index=1&list=PLy9ukXux0-JLD8DAL7VgI-ZH-qh7rrkopP>

### White Balance

<https://www.lynda.com/SharedPlaylist/edc00184ccf44b71823b051f9757def8?org=gmu.edu>

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## Dynamic Range of YOUR Camera

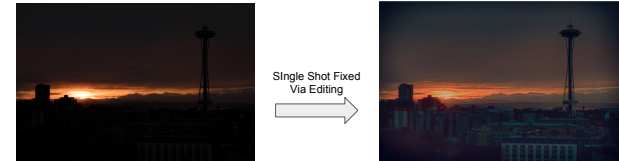


- Dynamic Range Tutorial: <http://www.cambridgeincolour.com/tutorials/dynamic-range.htm>

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## High Dynamic Range Photography

- Why
  - Capture Scenes With Dynamic Range Greater Than the Camera Can Handle
  - Reduce Noise in the Dark Parts of Any Scene
  - Recall The Photo From Our Last Class



- Why Some People Hate HDR
  - Overdone Editing
  - Garish Colors
  - Doesn't Look Like a Real Photograph
  - Usually Requires Post Processing So Is Not Real Photography

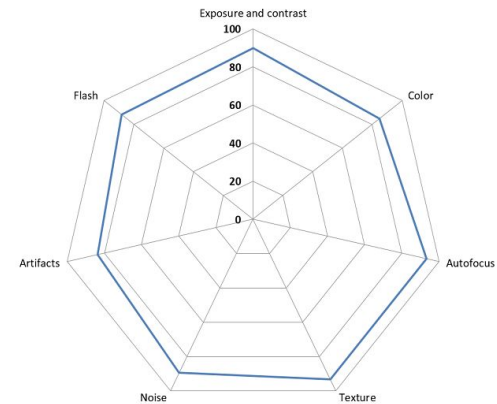
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## DxOmark

- Dxomark.com -- site that evaluates cameras "objectively"
  - Use their own standards and processes
  - Some pushback from some photographers
  - Most sites now use the "dynamic range" charts prepared by DxO for RAW
- DxO has created a different approach to evaluate 'mobile' cameras
  - Based on JPEG results
  - Measure of how well the "automatic" mobile phone camera is working

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## DxOmark

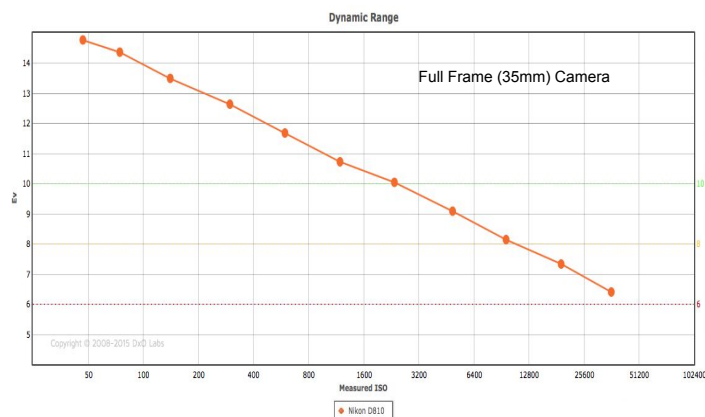


**DxOMARK**  
THE REFERENCE FOR IMAGE QUALITY

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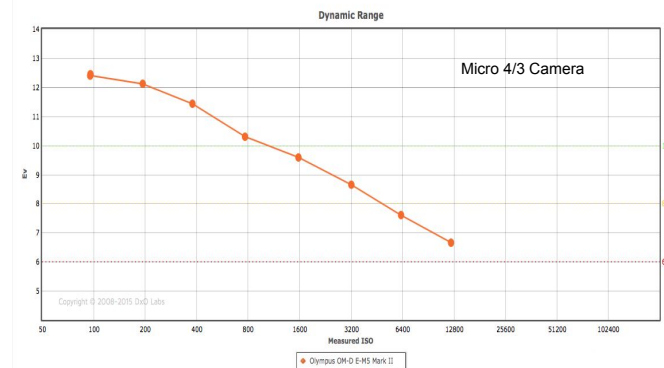
## What is the Dynamic Range of YOUR Camera



- Dynamic Range Tutorial: <http://www.cambridgeincolour.com/tutorials/dynamic-range.htm>
- Dynamic Range For a Specific Camera: Search for "dxomark" "your camera name", e.g. dxomark d5100

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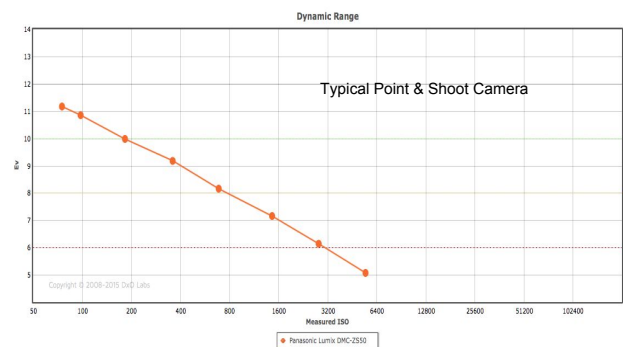
## What is the Dynamic Range of YOUR Camera



- Dynamic Range Tutorial: <http://www.cambridgeincolour.com/tutorials/dynamic-range.htm>
- Dynamic Range For a Specific Camera: Search for "dxomark" "your camera name", e.g. dxomark d5100

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## What is the Dynamic Range of YOUR Camera



- Dynamic Range Tutorial: <http://www.cambridgeincolour.com/tutorials/dynamic-range.htm>
- Dynamic Range For a Specific Camera: Search for "dxomark" "your camera name", e.g. dxomark d5100

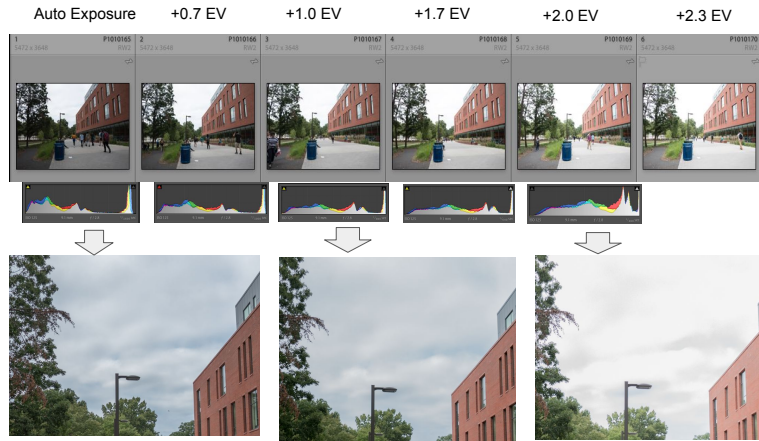
67

## If You Will Be Post Processing, Then You Can Increase Exposure To Capture the Maximum Data

- Best To Shoot in RAW Rather Than JPG
- Best Not to "Blow-out" Highlights Unless That Is a Very Important Compositional Element
- RAW Offers Larger Dynamic Range Than JPG
  - RAW Usually Provides 1-1.5 Stops of Extra Highlight Range Over JPG
  - Camera Algorithms Play It Safe
    - In-Camera Light Intensity -> Brightness Conversion Approximate
  - As Long As The Photon Capacity of Pixel is Not Exceeded, RAW provides lossless data collection
    - Compare Histograms in Camera To Those in Lightroom
  - To Evaluate Your Camera
    - Shoot a Wide Dynamic Range Scene, e.g. trees with cloudy sky
    - Start with Camera Auto Exposure, Keep Pushing Exposure 1.5 to 2 Stops
    - Verify in Lr or Other RAW Program When True RAW Histogram Is Blown-out

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## How Much Extra Highlight Can You Extract Using RAW



## HDR - The Ugly

Dave Wilson  
Blog.webartz.net  
June 3, 2013



- Uninteresting Picture
- Over-Cooked Sky



- HDR Does Not Fix Boring Picture



- Un-Natural Sky
- Un-Natural Variation in Brightness



- Over-Saturated Color

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## HDR - The Good

Dave Wilson  
Blog.webartz.net  
June 3, 2013



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## Taking Photos For HDR

TR Aurora Video

- **Camera Setup**
  - Best to Shoot using RAW
    - Always shoot "single-shot HDR" candidates in RAW
  - Aperture Priority
  - Auto Exposure
    - Make sure that the slowest shutter speed will handle any motion happening in the scene!
  - Automatic Exposure Bracketing start with three shots +/- 1 stop or +/- 2 stops
  - Cable Release
  - Exposure Compensation: 0, +/- 0.7 or 1 or even 2 depending on the light in the scene
  - Tripod
- **Handheld Shooting**
  - Make sure shutter speed is as high as possible
  - Remember: You can correct the noise created by higher ISO, but you cannot correct an out-of-focus, blurry photo.
  - Use optical viewfinder and Hold camera very tight to your body with hand underneath the lens/body
- **HDR will not help a bad photo**
  - Great composition is always the most important thing
- Hint: Shoot your hand at the beginning and end of a HDR sequence so you can identify them when you get home

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## Class Topics

- Topic 1
  - Review of Part 1
  - Shutter Speed, Aperture, ISO
  - Composition
- Topic 2
  - Checking and Adjusting Exposure Using the Camera Histogram Display
- Topic 3
  - Dynamic Range
  - Shooting HDR Photos
  - White Balance
- Topic 4
  - Seeing Like Your Lens
  - Example: Shooting Portraits

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## Videos to Review

### Seeing Like Your Lens

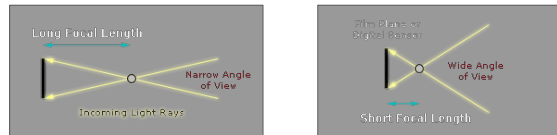
<https://www.lynda.com/SharedPlaylist/4ad949472c4e41d795f0076531b7def3?org=gmu.edu>

### Photographing Portraits

<https://www.lynda.com/SharedPlaylist/9c346d883d804a2fb5a4ccc2ffc99dde?org=gmu.edu>

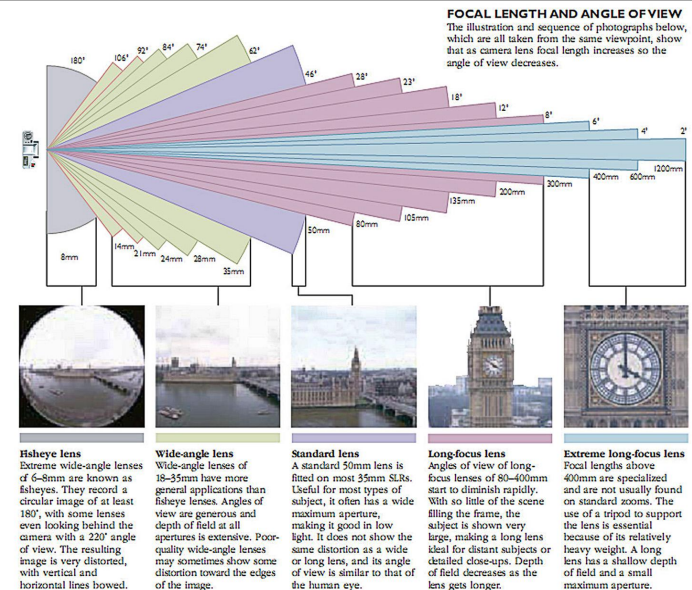
74

## What is the Focal Length of Your Lens



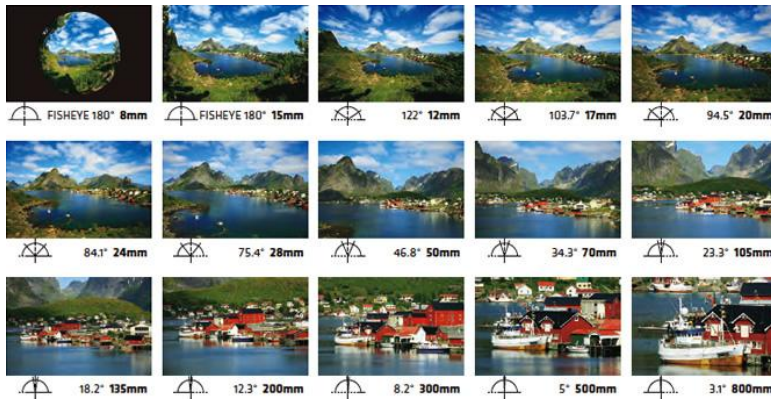
- Focal length, usually represented in millimeters (mm), is the basic description of a photographic lens. It is not a measurement of the actual length of a lens, but a calculation of an optical distance from the point where light rays converge to form a sharp image of an object to the digital sensor or 35mm film at the focal plane in the camera. The focal length of a lens is determined when the lens is focused at infinity.
- The focal length tells us the angle of view—how much of the scene will be captured—and the magnification—how large individual elements will be. The longer the focal length, the narrower the angle of view and the higher the magnification. The shorter the focal length, the wider the angle of view and the lower the magnification.

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## Comparison of the Lens Field of View



[Focal Length Simulator](#)

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## So What is the "Effective Focal Length" of Your Lens



- All removable Lenses are Marked With a "Physical Focal Length in mm"
- But This is Actually the Focal Length Assuming a 35mm sensor and photographers generally talk about wide angle/normal/telephoto lenses in terms of 35mm sensors
- So if you do not have a 35mm sensor in your camera, e.g. you have a DX sensor or m4/3 sensor or 1" sensor, then what do the lens markings mean to YOUR camera
- Multiply the marked focal length by the crop factor for YOUR camera

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## Crop Factors For Cameras with Interchangeable Lenses

35mm (Full Frame)	=	1
Nikon DX	=	1.5
Canon "DX"	=	1.6
Micro 4/3	=	2.0
1" Sensor	=	2.7



The Nikon 1 camera is the only interchangeable lens 1" sensor camera

[Focal Length Simulator](#)

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## Non-Interchangeable Lens Cameras

- Mostly 1" and smaller sensors
- Usually refer to the 35mm equivalent Focal Length in the user interface
- However, the information in the Detailed picture data (EXIF) usually has the exact focal length in mm along with the 35mm equivalent

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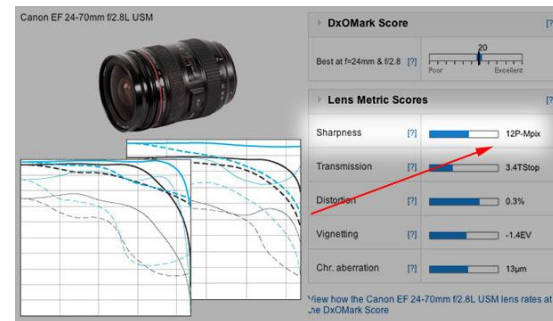
## How Good Is Your Lens?

- The **DxOMark Score** shows:
  - The amount of information captured by the lens for a given camera.
  - How well the lens and camera perform together.
- DxOMark Score does not show:
  - The intrinsic quality of the camera sensor.
  - The camera sensor's performance under high-light conditions.

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## How Good Is Your Lens?

- **Traditional Presentations of Sharpness For a Lens vs DxO Single Number**



Modulation Transfer Function (MTF) charts are a very commonly used tool in the photo industry for measuring and describing how sharp a particular lens is. However, it's a system that is largely enigmatic to those outside the realm of optic experts and camera gearheads.

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## How Good Is Your Lens?

**DxOMark Score** is a linear scale related to the largest print size that provides excellent quality. Doubling the size of the print requires doubling the DxOMark Score. A difference in scores of less than 10% can be considered irrelevant.

- The **DxOMark Score** corresponds to an average of the optimal quantity of information that the camera can capture for each focal length.
  - The quantity of information is calculated for each focal length/aperture combination and the highest values for each focal length are weighted to compute the DxOMark Score.
- **DxOMark Score is based on low-light conditions** (150 lux and 1/60s exposure time).
  - We chose these conditions because we believe low-light performance is very important in photography today and because photographers need to know how well lenses perform at their widest aperture.
  - Lenses with large apertures are usually more expensive so photographers want to know if the performance is worth the expense.
  - The score does not account for depth of field, and only considers performance at best focus.
- **DxOMark Score is an open scale**, limited by the lens and camera resolution, and by sensor noise.

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## How Good Is Your Lens?

**Perceptual Megapixels**, P-MPix for short, can be described as the "equivalent" number of megapixels when using a particular lens. Just as lenses offer different equivalent focal lengths when paired with different sensor sizes, sensors can have different equivalent megapixels when paired with lenses of various optical qualities.

If you stick a horrible lens onto a high-megapixel camera, your photographs may pop out with a large megapixel "size", but the sharpness of the photo may be equivalent to the sharpness of a photo taken with a much smaller sensor and a "perfect" lens.

The DxOMark resolution score shows **sharpness** performance of a lens-camera combination averaged over its entire focal length and aperture ranges

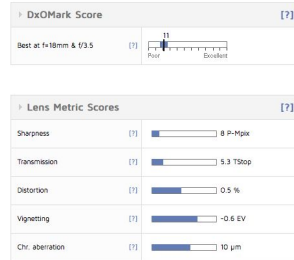
- The resolution score is computed as follows:
  - For each focal length and each f-number, we first compute sharpness and then weight it throughout the field, tolerating less sharpness in the corners than in the center. This gives one number for each focal and aperture combination.
  - Then, for each focal length, we select the maximal value of sharpness over the range of available apertures. We average this value over the whole range of focal length to obtain the DxOMark resolution score that we report (in P-MPix).
  - Note that for a wide-range zoom, there are huge differences between the resolutions for different focal lengths
- Sharpness is expressed in P-Mpix and is typically between 50% and 100% of the sensor pixel count. Differences below 1 P-MPix are usually not noticeable
- Best resolutions are usually attained for fixed focal lenses and moderate apertures (depending on the lens, between f/2.8 and f/8).

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## How Good Is Your Lens?

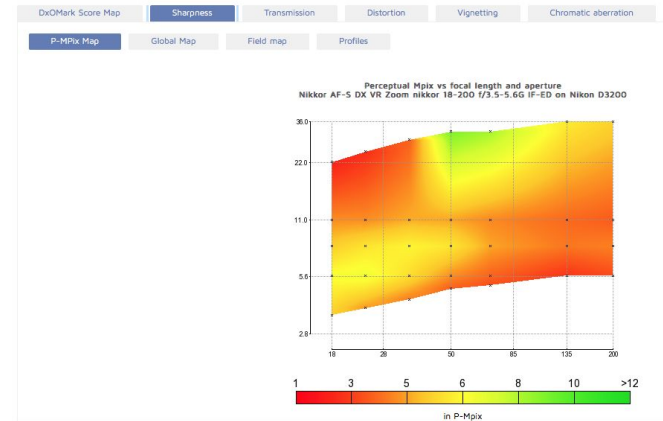
- DxOMark.com
- Measures Camera/Lens Combinations

Nikon AF-S DX VR Zoom-Nikkor 18-200mm f/3.5-5.6G IF-ED



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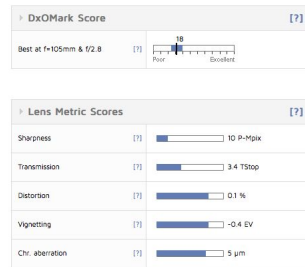
## How Good Is Your Lens?



86

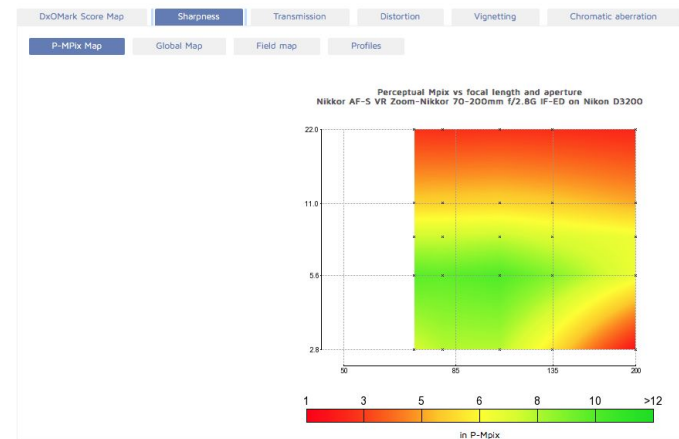
## How Good Is Your Lens

Nikon AF-S VR Zoom-Nikkor 70-200mm f/2.8G IF-ED



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## How Good Is Your Lens



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## How Good Is Your Lens

Nikon AF-S VR Zoom-Nikkor 70-200mm f/2.8G IF-ED



mounted on: Nikon D810

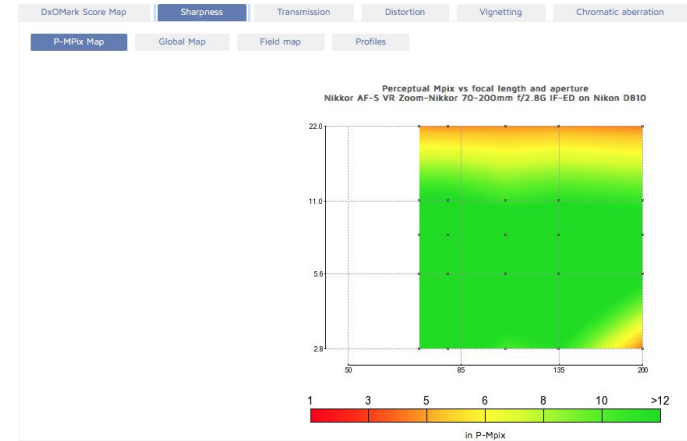


Lens Metric Scores [?]

Sharpness	(?)	20 P-Mpix
Transmission	(?)	3.4 TStop
Distortion	(?)	0.3 %
Vignetting	(?)	-1.8 EV
Chr. aberration	(?)	8 μm

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## How Good Is Your Lens



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## How Good Is Your Lens

Carl Zeiss Distagon T\* Otus 1.4/55 ZF.2 Nikon



mounted on: Nikon D800E



Lens Metric Scores [?]

Sharpness	(?)	33 P-Mpix
Transmission	(?)	1.7 TStop
Distortion	(?)	0.2 %
Vignetting	(?)	-1.6 EV
Chr. aberration	(?)	6 μm

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## How To Shoot People

[A Set of YouTube Videos by Joe Sinnot](#)

[Selecting Your Portrait Lens](#)

[Making People Look Good In Pictures](#)

[Portrait Photography Tips](#)

[Shooting Outdoors](#) [Groups](#) [Pets](#)

[Shooting Indoors](#) [Groups](#)

[Environmental Portraits](#)

[Sunset](#)

[Night](#)

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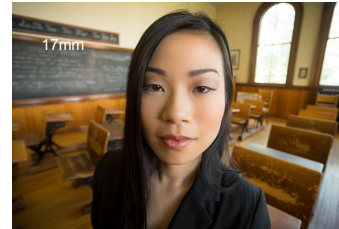
## Photographing People -- Hints

### Establish Your Standard Camera Settings

- One option is to use the portrait scene mode of your camera
- Natural light is best
  - Sometimes augmented by a little bit of "Fill Flash"
  - Flash might add 'years' to your subject
- Use Aperture Priority Mode
  - Use the lowest f-stop for one or two people (f/1.8, f/2.0, f/2.8)
  - Use f/3.2, f/5.6 for groups of three or more
- Shoot in RAW for the most 'wiggle room'
- Shoot Your Automatic Rapid Fire Mode
- Use your best lens, if possible -- (use a prime lens if possible)
- Underexpose (Do not overexpose)
- Make sure everyone is in sharp focus

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## Choosing the Most Flattering Focal Length



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## Photographing People -- Hints

### Simplify Simplify Simplify the Composition for Portraits

- Portraits should have clean uncluttered backgrounds
  - Can achieve this using small DOF
  - Move Your subject(s) and/or yourself so the background is simple
- No horizon lines running through people's heads
- No Trees or buildings popping from their heads
- The people are the main show and everything else is a supporting character

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## Photographing People -- Hints



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## Photographing People -- Hints

### Shoot From Their Eye Level or Higher, and At An Angle

- Photographing a Person From Below --> "Chin Capture Syndrome"
- Eye Level is Most Flattering
  - Get down to the eye level of small children or pets
- Don't Take "Flat Stanley" Photos
  - A little twist in your subject will lead to much better portraits



There is always an exception

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## Photographing People -- Hints



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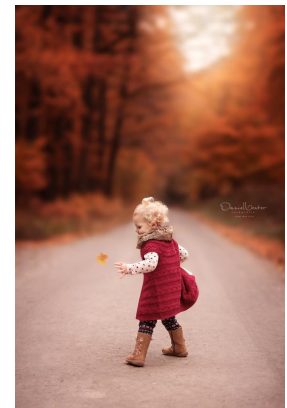
## Photographing People -- Hints

### Giving Directions is OK, but Don't Command a Smile, etc

- Try To Shoot Candid
  - Even with "Posed" shots
- Forced Feelings Will Show Up In Your Photos
- Engage in Conversation While Shooting
  - Just Keep Shooting and You Will Capture The Single Second of Utter Perfection
- A True Portrait Needs To Be Genuine (At The Very Least)

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## Photographing People -- Hints



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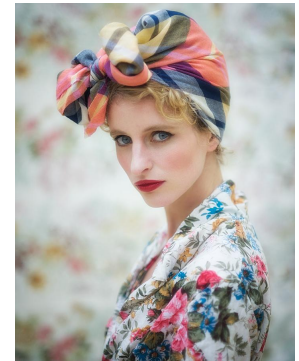
## Photographing People -- Hints

### Shoot Portraits Not Art

- Don't Overdo The Fancy Poses
- A Lot of Photoshop Can Ruin A Great Portrait
  - Use Manual and Not Automatic Changes
  - Clean up blemishes
  - Simple Sharpening
  - Color and Light Level Corrections

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## Photographing People -- Hints



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## Class Topics

- Topic 4
  - Photographing the Landscape
  - Composition

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## Videos To Review

### Photographing The Landscape

<https://www.lynda.com/SharedPlaylist/4ad949472c4e41d795f0076531b7def3?org=gmu.edu>

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## Focal Length Reviewed

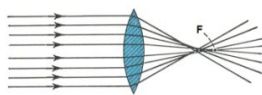


Fig. 10

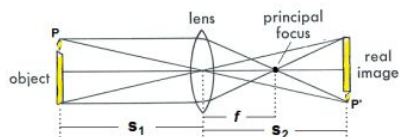


Fig. 13

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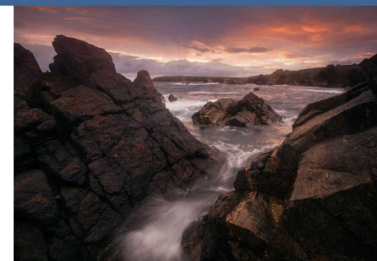
## WHAT AFFECTS COMPOSITION?

42  
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This might perhaps be the most practical lesson in this book, and as such, it is probably the least useful. A number of things can affect your composition, including the following:

- Your distance from your subject.
- Your height (up or down) relative to your subject.
- Your position (left or right) relative to your subject.
- Your focal length (as we will discuss in more detail later, changing focal length does not alter perspective, but it does change your composition as lens choice includes or excludes various elements of the scene).
- Light and shadows can have a profound impact on composition, and they change as the light changes.
- Your focus. Most landscape images are composed with sharp near-to-far focus, but out-of-focus areas can be used effectively to create depth and are much more common in wildlife, portraits, and street photography.

Although these might seem obvious, it never ceases to amaze me when I see a photographer show up at a location, throw down his camera bag, and then start shooting from that very spot without ever walking around to explore the area. Compositions don't just fall from the sky; you need to move your feet and check out different angles, seeing how visual elements align as you move back and forth, left and right, and even up and down.



*It was only by moving around and exploring the area that I was able to find the one single position that allowed me to place the rock in the water framed in between the distant shore and the rocks to the left and the right. Using your feet is essential to finding the best compositions. "Red Dawn" by Ian Plant (Scotland).*

Even if you think you have found "the spot," it makes sense to look around and explore as much as possible and to try as many different variations on a composition as is reasonable. A little bit of curiosity goes a long

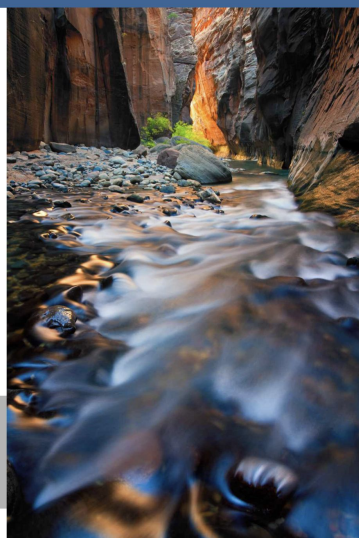
## WHAT IS "VISUAL FLOW"?

44  
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Visual flow is more than just a fancy title for this book. It is my way of conceptualizing photographic composition. It is by no means the only way to conceptualize composition, but I think it is a helpful way of thinking about the visual effect you will seek to create with each and every photograph you make. It goes something like this.

Imagine you are standing in the middle of a small river, gazing downstream. As you survey the scene, you notice that the water flows around, beneath, and past you on its journey into the distant landscape beyond. As the river gets farther away from you, it appears to shrink in size, eventually receding to a single point on the horizon before vanishing from view. Along its way, the water rushes over rocks and small drops and curves and turns around successive bends. The flow of the river is irresistible—anything caught in its path is swept along, following every twist and turn, perhaps getting caught for a moment on a rock emerging from the river's surface, but inevitably transported into the distance.

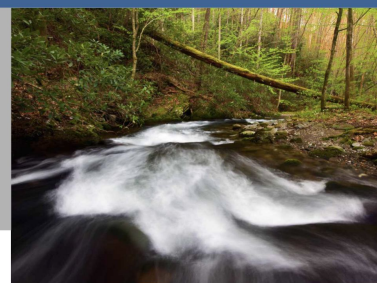
*Not unlike the flow of a swift-moving stream, you want the viewer's eye to get trapped in the "visual flow" of your images, swept along deep into the composition. "Kaleidoscope" by Ian Plant (Zion National Park, Utah).*



*For this image, I stood in the stream, so the water was flowing around, beneath, and past me on its journey into the background. The resulting photograph leads the viewer's eye deep into the scene and is rich with the illusion of perspective and depth. As a result, it gives the viewer a sense of place, of actually being in the scene that is photographed. With any luck, they might even feel, on some small level, the cold water rushing past their bare legs. "Spring Rush" by Ian Plant (Great Smoky Mountains National Park, Tennessee).*

This effect—this irresistible pull—is precisely what you want to accomplish visually with your photographs. Your goal as a photographer is to engage the viewer's eye, commanding their attention, leading them deeper and deeper into the scene before them. By doing so, you transform the viewer from a passive observer of the image into an active participant, giving them a sense of *being there*, of being immersed within the scene. This helps establish an emotional connection between the viewer and the photograph and ensures that they will keep coming back to look at it time and time again.

The irresistible pull is what I like to call "visual flow," which I define as the active progression of compositional elements designed to facilitate visual



movement throughout the image, enticing the viewer to study important and relevant aspects of the scene. Visual flow is essentially a way of leading a viewer's eye through the scene using composition, tonal transition, and color. Visual flow is a way of creating the illusion of three-dimensional perspective and motion over time in a two-dimensional static capture. It is a way of creating energy and a sense of visual excitement in your photographs. Visual flow helps capture the dynamic forces of our world at work, creating an illusion of movement and vitality. To create visual flow, we can use line, shape, pattern, perspective, space, color, motion, mood, and light.

45  
●○○○○

*“Your goal as a photographer is to engage the viewer's eye, commanding their attention, leading them deeper and deeper into the scene before them. By doing so, you transform the viewer from a passive observer of the image into an active participant, giving them a sense of being there, of being immersed within the scene.”*

In this book, we will explore three principal ways of controlling the viewer's eye and leading it on a visual journey through your photographs: (1) recognizing and relating abstract shapes, (2) creating depth through the use of perspective cues, and (3) creating eye-catching images through the spacing of elements in a composition. In addition, we will explore some related concepts which help to solve a number of challenges unique to photography, including (1) creating visual order and simplification, and (2) establishing mood.

You will notice that shape, depth, and space are indistinct categories, blending seamlessly with the next. Depth draws a viewer into a photograph; space provides structure to the composition, whereas shapes fill the space and bring life to the image. In the hands of a skilled artist, the three come together in a carefully choreographed dance, drawing the viewer in and establishing visual interest. Likewise, mood and visual simplification



*The best compositions use shape, depth, and space to entice the viewer's eye to travel deep within the picture frame. "Canyonlands Dawn" by George Stocking (Canyonlands National Park, Utah).*

work hand in hand with composition. Together, they form a unified compositional theory, one that I like to call—you guessed it—"visual flow."

## Composition

- Guest Lecture (video) -- Ian Plant
  - Video -- [Visual Flow: Mastering the Art of Composition](#)
  - [Article](#)
  - [Book](#)

## Class Topics

- Topic 5
  - Establishing Your Composition Workflow





## Videos To Review

### Key Elements of Composition

<https://www.lynda.com/SharedPlaylist/3a71ae8e7eec4b0ab5222bc980fef4f4?org=gmu.edu>

### Establishing Your Composition Workflow

<https://www.lynda.com/SharedPlaylist/39ce021c1554479292cab9b1c0079070?org=gmu.edu>

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## Possible Composition Workflow

### **1. SIMPLICITY**

- # image elements  $\leq 4$
- Internal Complexity
- Separation
- Primary visual element

### **2. ASYMMETRY**

- Vertical
- Horizontal line
- Compare 4 quadrants
- Rule of thirds

### **3. EYE LINES**

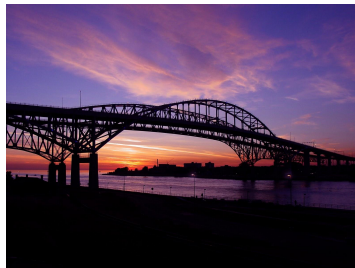
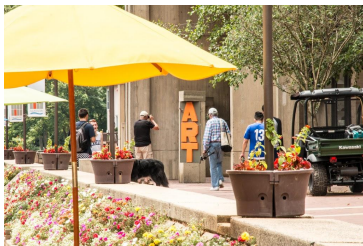
- Types of eye lines
  - I. Physical
  - ii. Perspective
  - iii. Tonal/Color

### **4. POINT OF VIEW**

- Scale: Large/small
- Position: High/Low
- Unusual, e.g. look thru
- Unexpected, e.g. non-human viewpoint

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## Complexity vs Simplicity



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## Negative Space

### Video:

<https://www.youtube.com/watch?v=oA5Mh80oEow&list=PLy9ukXux0-JLakLtzXhatO0LPaXcjBhd8&index=8>

<https://www.youtube.com/watch?v=7N3F0XZ2PKY&index=10&list=PLy9ukXux0-JLakLtzXhatO0LPaXcjBhd8>

- Negative Space
  - Areas of low texture or activity that contrast the subject and allow it to "breathe"
    - Simple backgrounds, skies, flat colors, black, white, etc
  - Create interest by allowing things room

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## Simplification

### Video:

<https://www.youtube.com/watch?v=IKc-0QEbzbo&index=9&list=PLy9ukXux0-JLAkLtzXhatOOLPaXcjBhd8>

- **Simplification**
  - Simplification is the reduction of elements in the composition to only what is necessary for the picture
  - Everything in the composition is there to serve a purpose and no element is distracting
- **Negative Space**
  - Areas of low texture or activity that contrast the subject and allow it to "breathe"
    - Simple backgrounds, skies, flat colors, black, white, etc
  - Create interest by allowing things room

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## Leaving Space

### Video:

<https://www.youtube.com/watch?v=9KzR3a83FM0&list=PLy9ukXux0-JLAkLtzXhatOOLPaXcjBhd8&index=11>

- **Creating Activity In Your Image**
  - Applying motion or activity in your visual composition
  - Involves using negative space in front of the subject to imply a conclusion of the subject moving toward that space
- **Negative Space**
  - Areas of low texture or activity that contrast the subject and allow it to "breathe"
    - Simple backgrounds, skies, flat colors, black, white, etc
  - Create interest by allowing things room

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