

## Agenda for the evening

- Welcome and introductions
- Overview of factors that can ruin a photo
- Discuss the role of shutter speed in the exposure triangle
- Demonstrate the effects of shutter speed in action shots
- Discuss the techniques to dramatically increase or decrease shutter speed and maintain proper exposure
- Wrap-up by 8 PM

## Goals for “Tricks of the Trade”

- NOT show you the way you should work
- Demonstrate and discuss specific photography issues
- Discuss the rationale for my choices
- Give opportunity to discuss how to apply ideas to your photography
- Ultimately, improve your photography

## What ruins a photo?

- Poor composition
  - Lack of subject, foreground, background
  - Clutter and distractions
- Improper exposure
  - Over-exposure
  - Under-exposure (sometimes fixable in PP)
- Unintentionally blurred image
  - Out of focus / improper depth of field
  - Subject moves too fast for set shutter speed
  - Camera shake

## Learning Objectives

At the end of this session, you will be able to:

- List the determinants of exposure in digital photography
- Identify how shutter speed will change an image with a moving subject
- Show how to modify shutter speed to extreme values while maintaining proper exposure
- Discuss the use of filters to slow shutter speed
- Create interesting photos of moving subjects

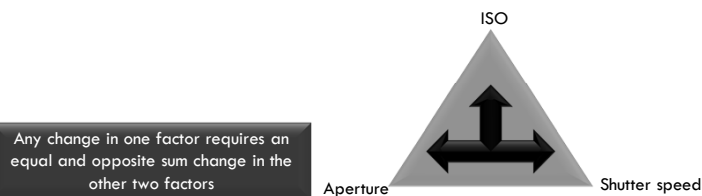
## Approaches to controlling motion

- Shoot 'fast' to freeze motion
- Shoot 'slow' to blur motion
- Pan with subject to blur background
- Shoot time-lapse to speed motion
- Shoot standard video to show motion
- Shoot high-speed video to slow motion

All require you to control your camera!

## Exposure Control Triangle

- Three elements control exposure
- ISO sets sensor sensitivity
- Aperture controls amount of light
- Shutter speed controls duration of exposure

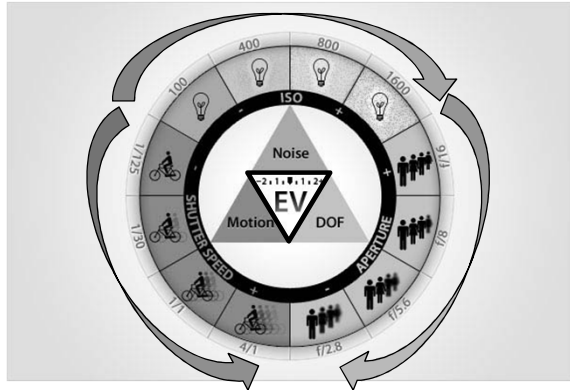


One "stop" or EV (exposure value) implies a doubling or halving of exposure.

## Exposure Control

- Shutter speed – How long is the exposure?
  - Motion blur
- Aperture – How much light gets to the sensor?
  - Depth of field
- ISO – How sensitive is the sensor?
  - Digital noise (grain)

## Exposure Control



Michael Zhang – PentaPixel 10-3-12

## Stabilization Gear

- Your tripod is your most important accessory
- Tripod
  - Aluminum versus carbon fiber
  - Height – maximum and minimum; weight
  - Stability
  - Leg sections, locks, elevator, and other features
- Head
  - Pan (3 axis) head, ball head, or gimbal
- Quick connect – ARCA Swiss versus proprietary
- Monopod and other stabilization devices
- Spend the money now or spend more later!



## Hand-held shutter speed 'rules'

- Prevention of 'camera shake' blurring
- Rule: Shutter speed should be faster (shorter duration) than  $1 / \text{focal length}$  for a full-frame camera
- Many modify this to  $1 / (\text{focal length} \times \text{crop factor})$
- Example for 100mm lens on crop sensor camera body:
  - Longest hand-held exposure =  $1/150$  sec
- May reduce shutter speed with 'image stabilization' by 1-4 EV
  - $1/150$  sec reduced to  $1/60$ ,  $1/30$ ,  $1/15$ ,  $1/8$  sec on crop sensor
  - $1/100$  sec reduced to  $1/50$ ,  $1/25$ ,  $1/10$ ,  $0.4$  sec on full-frame - ???

## How to Freeze Motion

- Very fast shutter speed
  - Always shorter than  $1/250^{\text{th}}$  sec
  - Usually shorter than  $1/1000^{\text{th}}$  sec
  - Sometimes shorter than  $1/4000^{\text{th}}$  sec
  - Usually means large aperture
  - Usually means high ISO
- Electronic strobe (Speedlight)
  - Shutter speed has little effect (fastest synch usually  $\sim 1/250^{\text{th}}$  sec)
  - Reduce the effect of ambient light by using small aperture
  - Duration of flash is dependent upon power setting
  - High power (1:1) flash exposure is  $\sim 1/100^{\text{th}}$  sec
  - **Lower power (1:16) flash exposure is  $\sim 1/10,000^{\text{th}}$  sec**

### 'Nelson's rule' for controlling motion

- (Almost) always shoot faster than  $1/60$  sec with lenses from wide angle to 'normal' (50mm) to avoid camera shake –  $1/$  (focal length x crop) for telephoto lenses
- Anything is OK on a tripod with good technique
  - Remote shutter release or 2-second delay
  - Mirror lock-up
  - Stable tripod in good wind conditions
- Shoot slower than  $1/10$  sec to achieve soft motion blur
- Avoid the  $1/10$  –  $1/60$  sec **danger zone**
- Different rules for panning with subject movement

### Avoid the Danger Zone

- $1/10$  –  $1/60$  – the *Danger Zone*
- Too slow to freeze
- Too fast to blur



### Shutter Release Triggers

- Light
- Sound
- Motion

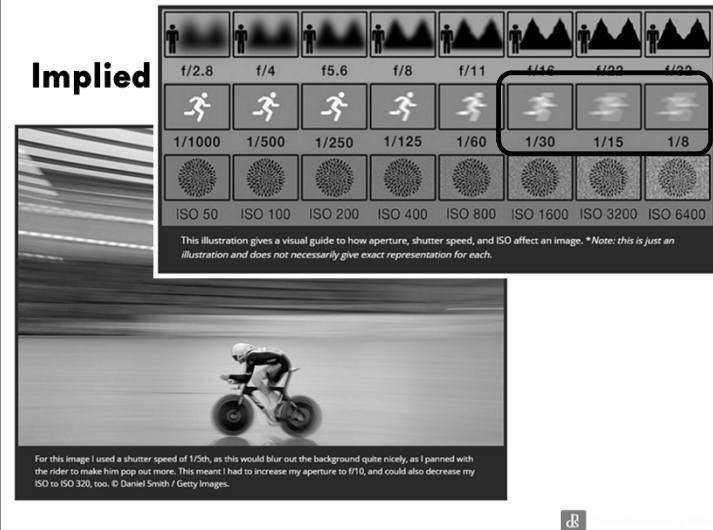


## Moving Subjects

- Intentional blur
  - Slow shutter speed
  - May need stabilization (tripod)
- Panning
  - Blurs the background and not the subject



## Implied



## How to “Induce” Motion

- Slow shutter speed in action shots to induce motion blur
- Allow subject to move through scene – blurring subject
- Pan with subject to blur background



## Using filters to lengthen shutter speed

- Check exposure at lowest ISO (L) setting
  - ISO 64 or 50 available on many cameras (2/3 – 1 EV) longer
- Try smallest aperture (*f*-stop) – *f*/22 or *f*/32
  - Remember diffraction artifacts at small aperture
- Add polarizing filter to reduce speed 1-2 EV
- Add neutral density filter(s) for additional slowing
  - 0.3 – 1 EV
  - 0.6 – 2 EV
  - 0.9 – 3 EV
- “Dark” ND filters – 6-10 EV
  - Special techniques for focus and composition
- Variable ND filters – 1-6 (8?) EV
- Combine filters for greater slowing

### Sunny *f*/16 rule

- Shutter speed = ISO at *f*/16
- ISO – 100 = 1/100 sec
- ISO 50 = 1/50 sec
- *f*/22 = 1/25 sec
- Polarizing filter = 1/10 – 1/5 sec
- ND filter = 0.1 – 0.2 – 0.4 sec
- 10 EV “dark” filter = ~50 sec

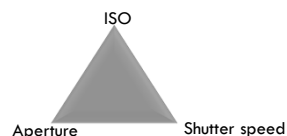
## Shutter Speed Pros and Cons

### Pro high (fast) shutter speed

- Freeze action
- Minimize camera shake
- Large aperture so narrow depth of field
- Need higher ISO

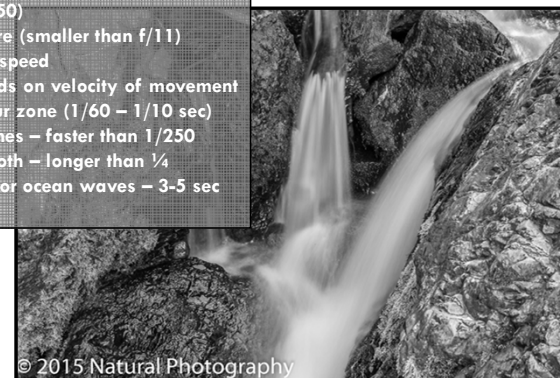
### Con low (slow) shutter speed

- Blur image for motion effect
- Smaller aperture so greater depth of field
- Can use lower ISO



## Smoothing water

- Shade, overcast or even lighting
- Lowest ISO (50)
- Small aperture (smaller than *f*/11)
- Slow shutter speed
- Speed depends on velocity of movement
- Avoid the blur zone (1/60 – 1/10 sec)
- Freeze splashes – faster than 1/250
- Dreamy smooth – longer than 1/4
- Smooth lake or ocean waves – 3-5 sec



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- Intentional blur
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  - May need stabilization (tripod)
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  - Blurs the background and not the subject

## Video is always an option

- Standard video frame rate delivers high-quality real-time motion
  - Most digital cameras offer video capture at 24/25 frames per second
  - Standard resolution, HD, ultra-HD (4k) are newer options
  - Frame capture rate is set in camera prior to shooting
- Time-lapse (video) compresses time and speeds motion
  - Intervalometer is used to set frame capture rate
  - Frames to capture = Runtime (sec) x 24fps
    - 10 second video needs to capture 240 frames
  - Capture rate is usually determined by speed of event
- High-speed video expands time and slows motion
  - Many digital cameras capture up to 50-60 fps
  - Standard playback will yield 50% slowing of action
  - Software can further slow playback

## Post-processing / Editing

- Viewing only versus editing
- Raw file conversion
- White balance control
- Exposure / luminosity control
- Contrast / tonality
- Saturation of color
- Crop and straighten
- Sensor dust / distraction removal
- Distortion of shape control
- Noise reduction
- Sharpening

### PhotoShop Blur Filters

- Gaussian blur
- Box blur
- Spin blur
- Radial blur
- Camera blur

## Key Points

- Shutter speed control is the key to inducing motion in still images
  - Fast shutter speed will freeze action
  - Slow shutter speed will blur moving subject
- Panning with moving subject will blur background
- Very long shutter speeds create dreamy effects on moving water
- Video and time-lapse are always options
- Post-processing can induce artificial blur