White Balance

Introduction to Digital Photography

Lecture outline

- Review of light and color

- Review of exposure triangle

- 18% Grey

- White balance
  - Selecting white balance
 - Presetting your own white balance
  - When AWB goes bad

- Shooting RAW

Review of light and color

- Light: medium through which we capture images
  - Quality of light / intensity of light
  - "The Golden Hour"
    - 1 hr after sunrise & 1 hr before sunset
    - ~15 minutes before sunrise & ~15 minutes after sunset
  - Incidence / reflected light
    - Camera Through-The-Lens (TTL) metering: reflectance
    - Hand-held light meter: incidence and/or reflectance

Review of light and color

- Color
  - Has a temperature value in degrees Kelvin
  - The hotter the color in degrees K the bluer it appears
    - Warm colors—red, orange, yellow—have low K temps
    - Cool colors—blue, violets, purples—have high K temps
  - The human eye sees green colors the best

Review of the exposure triangle
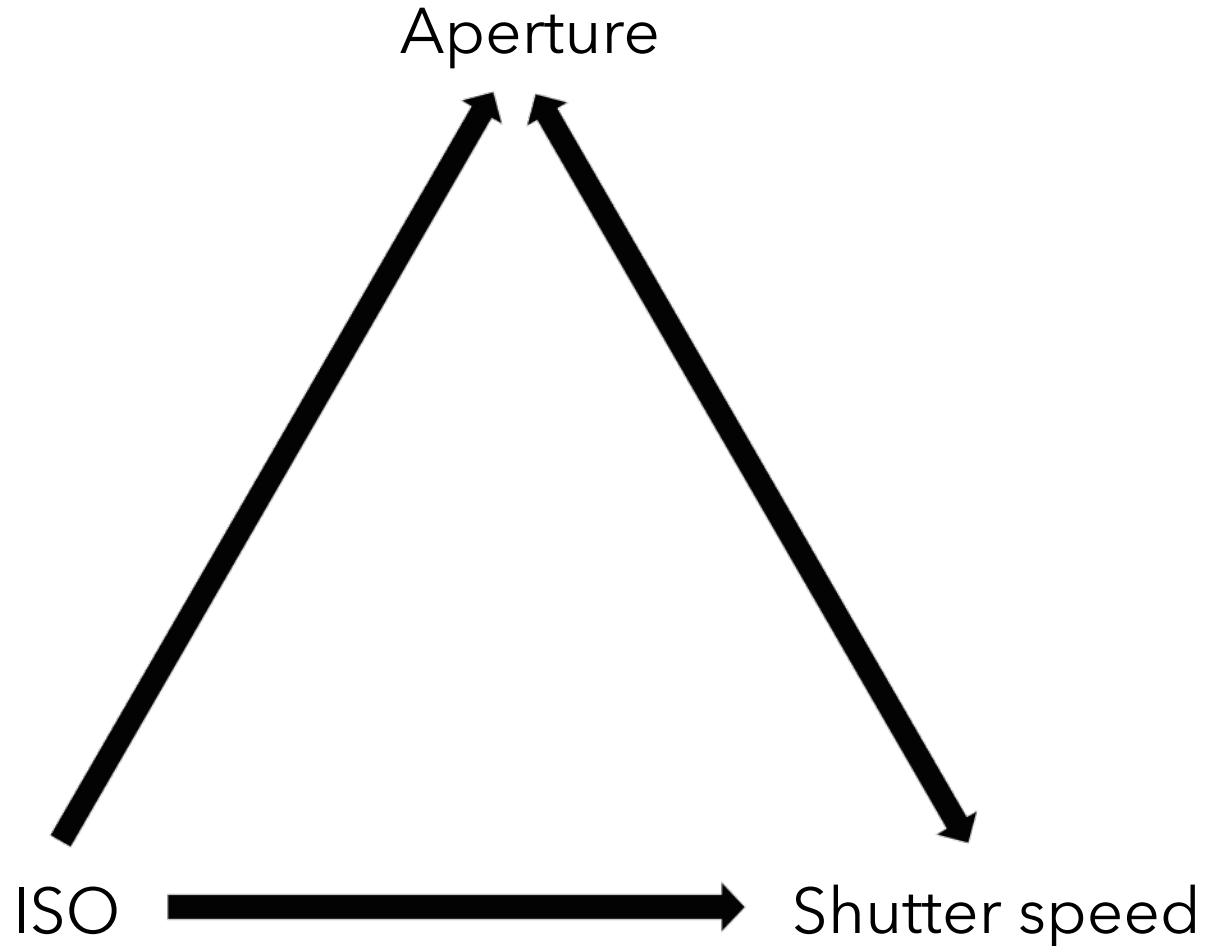
Review of exposure triangle

- Aperture
  - Diameter of opening of diaphragm in f/stops

- *f*/stop
  - Dimensionless number based on focal length of lens divided by diameter of aperture
  - f8 on 50mm, 100mm, 400mm delivers same amount of light to sensor
  - A full f/stop either halves or doubles the amount of light reaching the sensor

Review of exposure triangle

- ISO
  - Sensitivity of sensor to light, programmable
  - Cameras have a native ISO (most either 100 or 200)
  - The higher the ISO, the more digital noise you have

- Shutter speed
  - How fast the shutter opens and closes
  - Times vary from bulb (open until closed) to 1/8000 of a second

Review of exposure triangle

- Depth of field (DoF)
  - How much is in focus
  - Aperture affects depth of field
    - Wide open = shallow DoF
    - Closed down = deep DoF
  - When bracketing vary shutter speed, not aperture

f/5.6

f/8

f/22
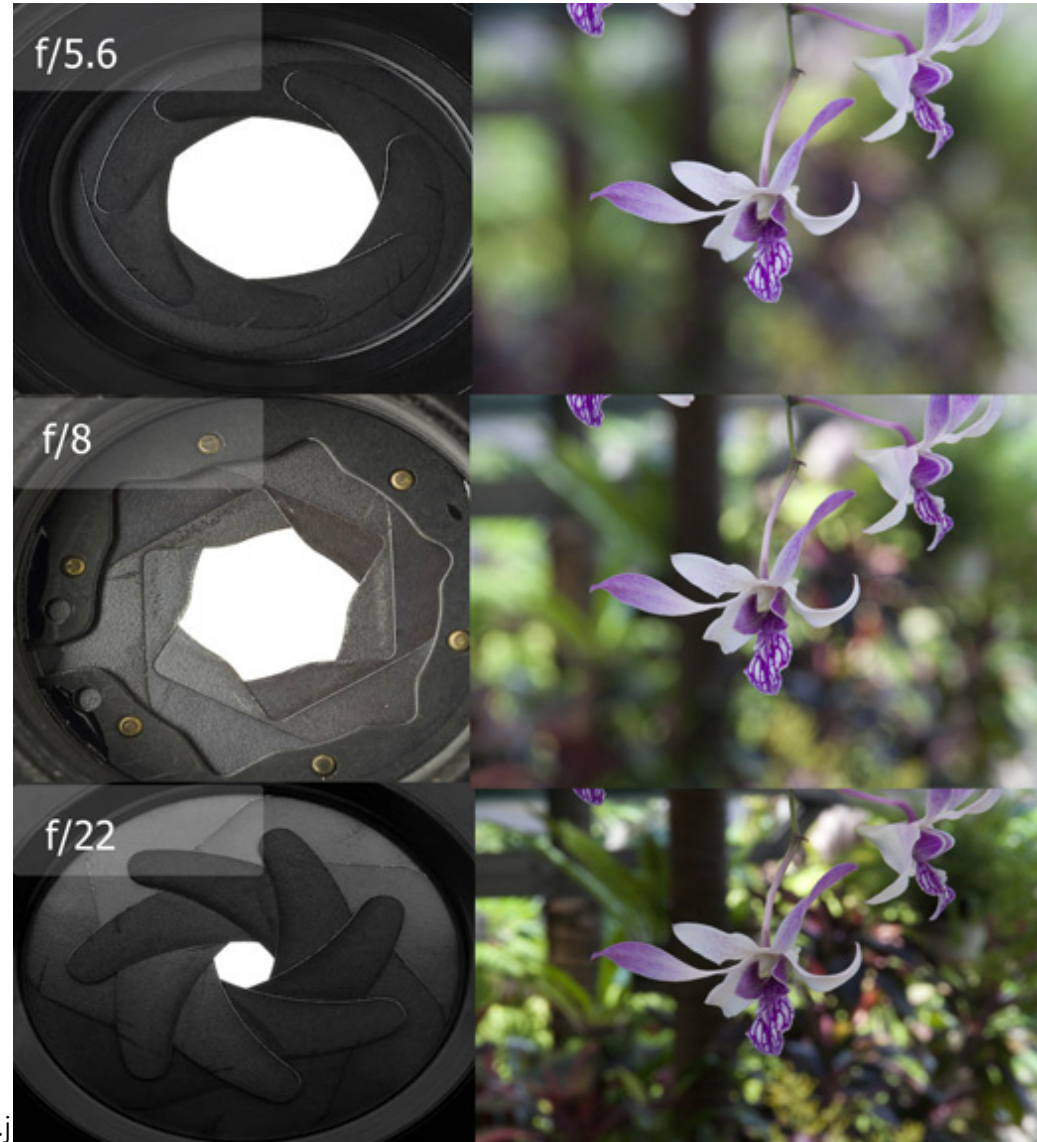
18% Grey

How we see the world…

How the camera sees the world…

18% Grey

- Why 18% grey?
  - Neutral grey representing midtones reflect 18% of light
  - The camera only sees the world in neutral grey
  - The camera wants to make everything neutral grey

18% Grey

- Problem exposures
  - Composition is primarily black or white
  - Black: camera will overexpose to get black to 18% grey
  - White: camera will underexpose to get white to 18% grey
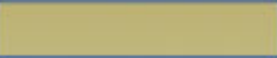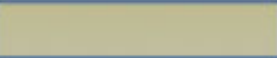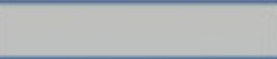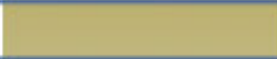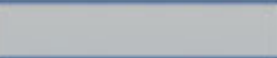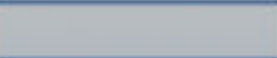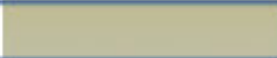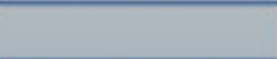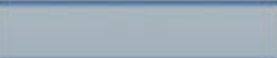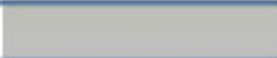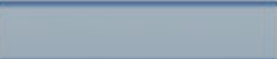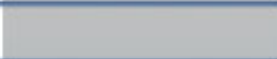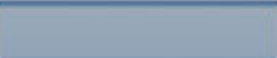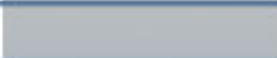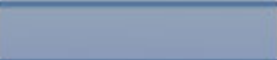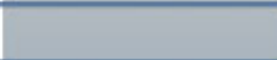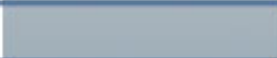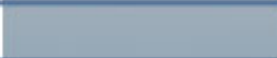
White Balance

- More accurately color balance
  - Removing potential color cast in images
  - White balance shifts color along blue-yellow axis
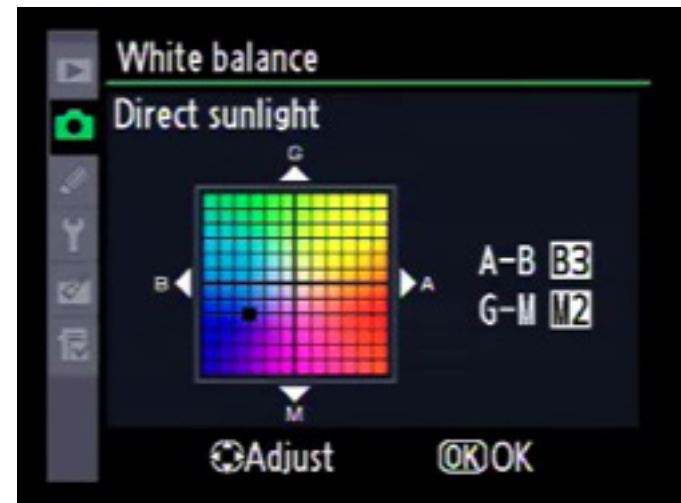
White balance

Degrees Kelvin	Type of Light Source	Indoor (3200k) Color Balance	Outdoor (5500k) Color Balance
1700-1800K	Match Flame		
1850-1930K	Candle Flame		
2000-3000K	Sun: At Sunrise or Sunset		
2500-2900K	Household Tungsten Bulbs		
3000K	Tungsten lamp 500W-1k		
3200-3500K	Quartz Lights		
3200-7500K	Fluorescent Lights		
3275K	Tungsten Lamp 2k		
3380K	Tungsten Lamp 5k, 10k		
5000-5400K	Sun: Direct at Noon		
5500-6500K	Daylight (Sun + Sky)		
5500-6500K	Sun: through clouds/haze		
6000-7500K	Sky: Overcast		
6500K	RGB Monitor (White Pt.)		
7000-8000K	Outdoor Shade Areas		
8000-10000K	Sky: Partly Cloudy		

Based on information from the book [digital] Lighting & Rendering

Chart and colors (c)2003 Jeremy Birn for www.3dRender.com

White balance

~2700 K
60 W Incandescent

3500 K
13 W Fluorescent

5500 K
13 W Fluorescent

http://en.wikipedia.org/wiki/File:Incand-3500-5500-color-temp-comparison.png

White balance

- Most cameras have a white balance that can be set by the user

- These default setting have a specific color temperature for the given type of lighting
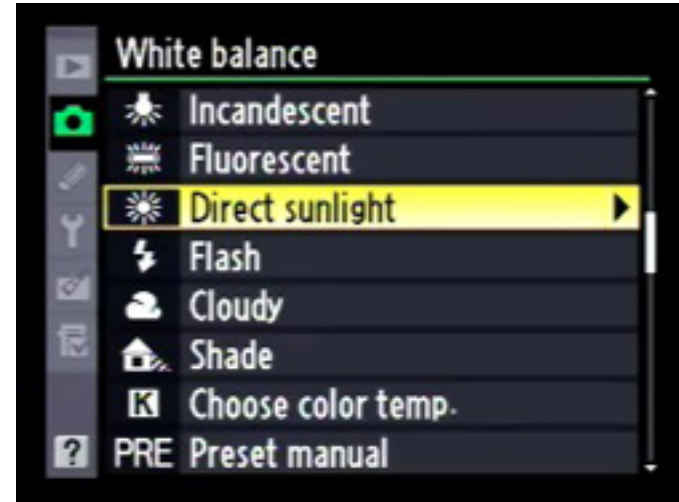
http://www.digitalreview.ca/content/pics/
D300/D300_white_balance2.jpg

White Balance: setting white balance

- On most cameras, setting white balance
  - Done through the menu
  - Done through buttons on the camera
  - Can set camera to a specific color temperature
  - Can do a custom white balance using a grey card
  - Can do a custom white balance using an Expodisc

White Balance: setting white balance

- On most cameras, setting white balance
  - Done through the menu
  - Done through buttons on the camera
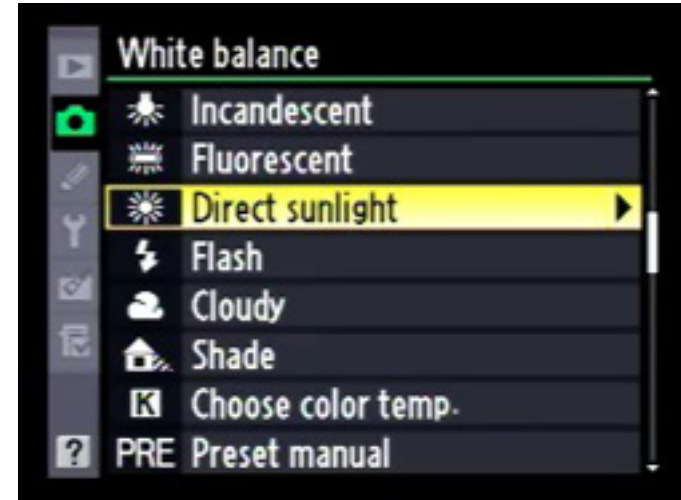 - When in doubt use the default white balance of AUTO (AWB)
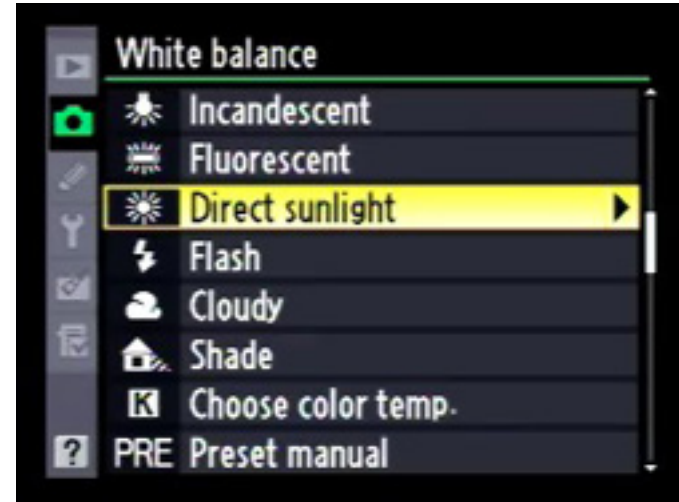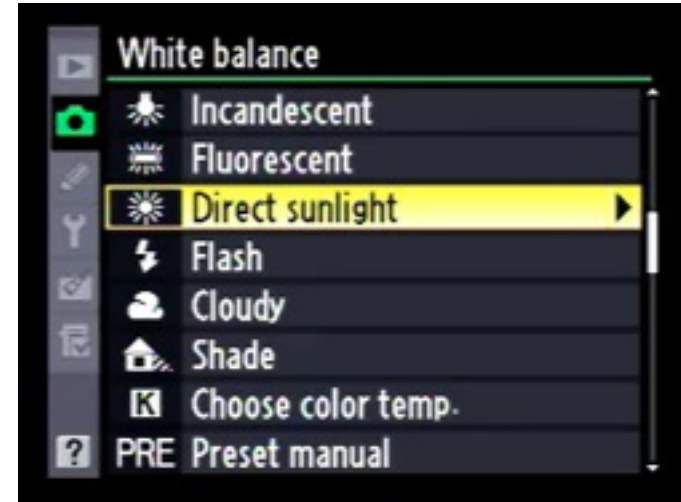
White Balance: setting white balance

- Choose color temp
  - Can set the white balance to a specific color temperature

White Balance: setting white balance

- PRE Preset manual
  - Can set the white balance by taking a picture of a grey card under the same lighting conditions as later images
  - Use this image to set the neutral grey point in Photoshop for the rest of the images

White Balance: setting white balance

- PRE Preset manual
  - Can set the white balance by using an Expodisc to make an image that is neutral grey under the lighting conditions of subsequent images
  - Use this image to set the neutral grey point in Photoshop for the rest of the images
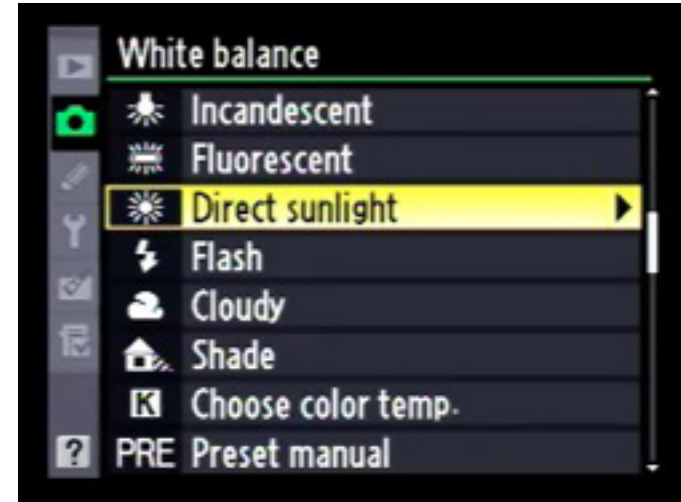
White Balance

- When AWB goes bad
  - Identities blurred to protect the guilty
  - Light was added between pictures; the one on the right is more yellow in tone
  - Shot as JPEG, not RAW; white balance is encoded!

Shooting RAW

- Why always shoot RAW
  - JPEG: white balance encoded into image
    - Exposure modes: Auto / Program
    - Color space: sRGB (8 bit)
    - Harder to correct color shifts
  - RAW: ability to change white balance in post-processing
    - Exposure modes: A / Av, S / Tv, M
    - Color space: AdobeRGB (12 – 14 bit)
    - Easier to correct color shifts