

Today: Focus, Exposure, shutter speeds, ISO/Sensitivity

Edit your FlowVis.org post publish dates:

Clouds: date you made the image

Team First: Feb 19 + team number

Team second: March 19 - team number

Team third: April 23 + team number

Office hours ECME 220

Fridays at 3, Tuesdays at 2

Report Critique

2 weeks

Use S, A, F as rubric

Pull strengths - SPECIFIC

Make suggestions & ask questions

Exercise: Make the same image with three f/stops: max, min and low medium. (Keep ISO the same, and use tripod or keep shutter time short.) Inspect the three images closely. What happened?

#### 4. EXPOSURE

For a given light intensity, exposure = (aperture area) X (time shutter is open)

Shutter speeds: 30 = 1/30th of a second etc.

5 = 1/5th of a second

30" = 30 seconds

T = time, click to open shutter and again to close

B = bulb, shutter stays open as long as button is pressed (or bulb is squeezed)

Limit mech      Electronic

Check your camera shutter speed options. What is the range?

4000      >10,000

Tv or S = Time priority; you set the shutter speed and ISO, camera AE will choose the aperture.

Av = aperture priority. You choose the aperture, camera will choose shutter speed.

Equivalent exposures: f/5.6, 1/100 sec

f/8, 1/50 sec

f/11, 1/25 sec

ISO = sensor sensitivity, gain

1 EV = 1 stop = factor of 2 in ISO

1/      1/1

ISO = sensor sensitivity, gain

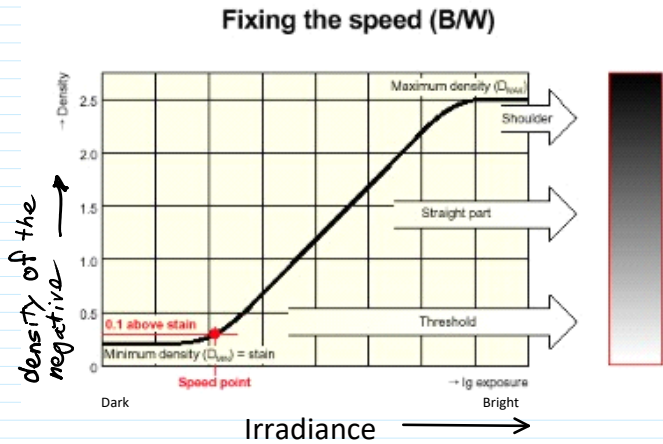
1 EV = 1 stop = factor of 2 in ISO

100 200 400 800 1600 3200 6400 12800 25000

Used to be called ASA for film.

From [American Standards Association](#) (now named [ANSI](#))

ISO = International Organization for Standardization

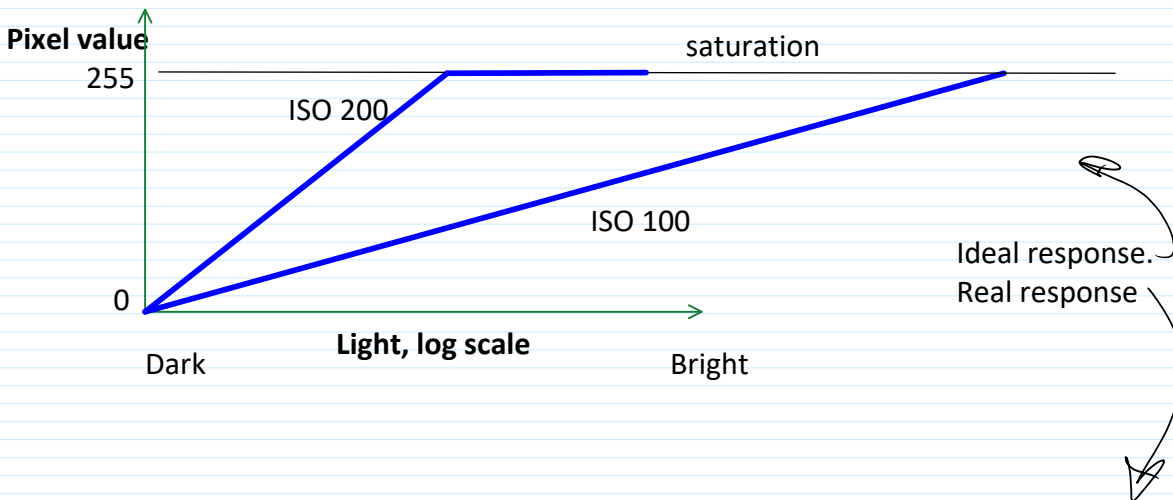


[http://www.sapiens.itgo.com/documents/foto/photographic\\_terms8.htm](http://www.sapiens.itgo.com/documents/foto/photographic_terms8.htm)

Minute paper:

1. Have you been taught to count in binary or base 8 or 16? When?
2. What is a pixel? What is it made of (for software purposes)?

18 in college  
 7 in K-12  
 3 never

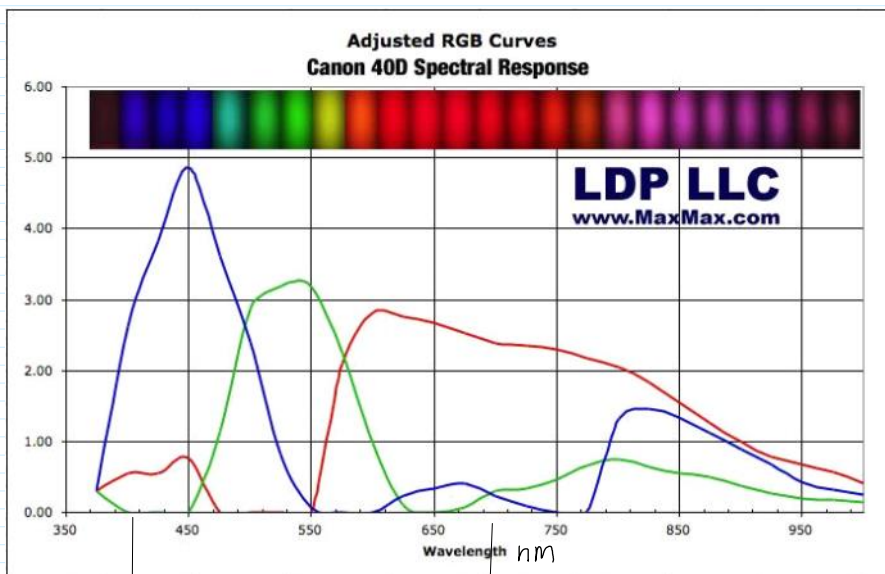
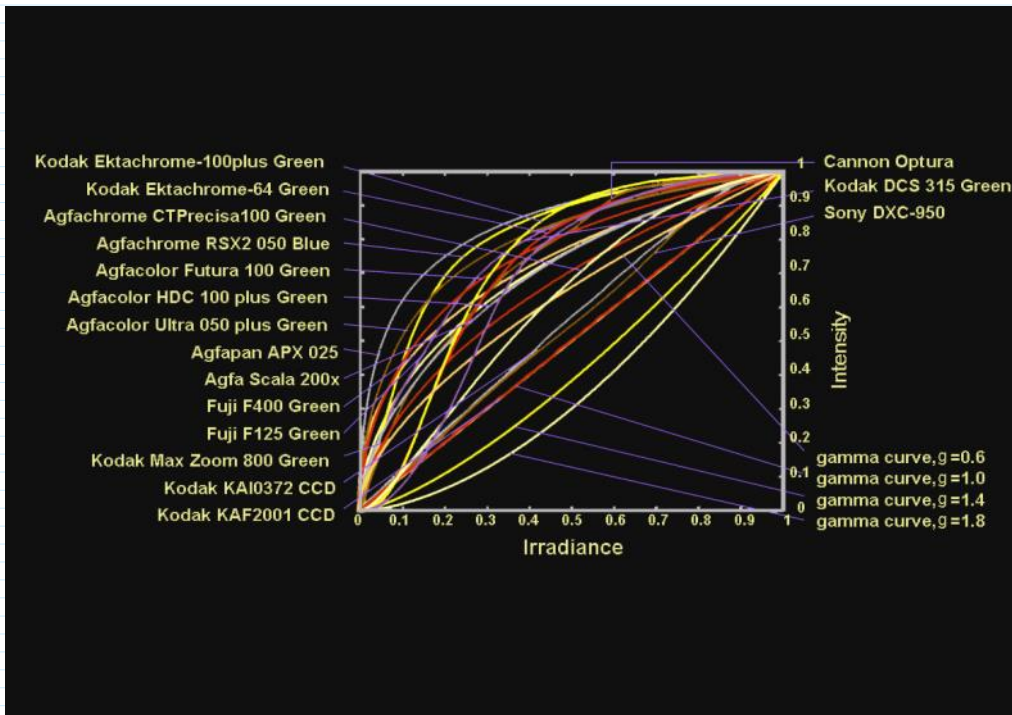


Digital camera response database



<http://www.cs.columbia.edu/CAVE/project>

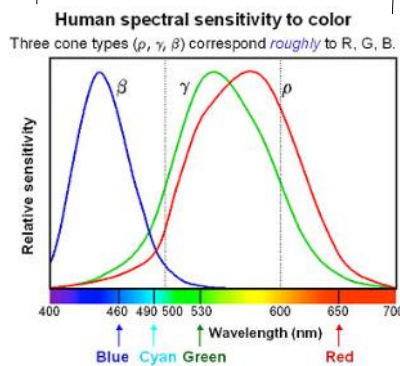
[http://www.cs.columbia.edu/CAVE/projects/rad\\_cal/](http://www.cs.columbia.edu/CAVE/projects/rad_cal/)



[http://www.maxmax.com/spectral\\_response.htm](http://www.maxmax.com/spectral_response.htm)

FLIR in ITLL

TIC



<http://pixinsight.com/forum/index.php?topic=2542.0>

Don't worry, images come from camera with compensation done automatically (mostly);

color management again.

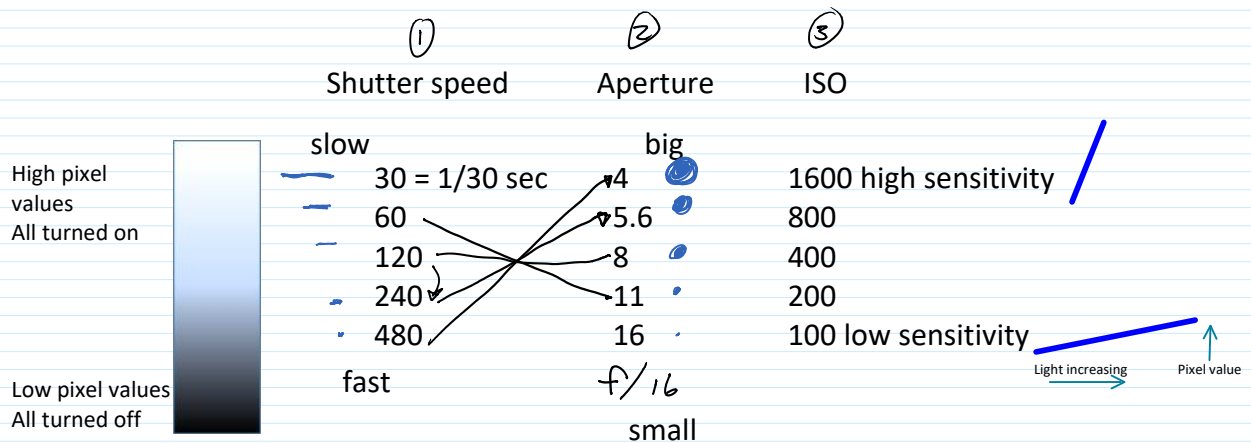
Same image density f/5.6, 1/100 sec, ISO 200  
f/8, 1/100 sec, ISO 400  
f/4, 1/200 sec, ISO 400

Used to be hard to change sensitivity , ISO: change film or go into menus.  
Now is becoming easier; single button or thumbwheel select.

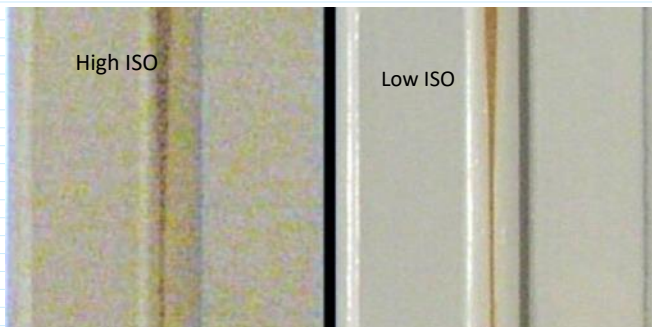
Check your camera ISO settings. How easy to change?

Proper exposure = middle value on an average pixel

3 ways to control pixel values so far



Other implication of ISO: Noise



[http://en.wikipedia.org/wiki/Image\\_noise#Low\\_and\\_high-ISO\\_noise\\_examples](http://en.wikipedia.org/wiki/Image_noise#Low_and_high-ISO_noise_examples)

\$\$\$\$ in camera buys less noise at high ISO

## Autoexposure programs (AE)

Wide variety. Stay away if you can.

Semi-automatic programs are better.

Av = aperture priority. You choose the aperture, camera will choose shutter speed. ISO might be automatic too.

Tv = Time priority; you set the shutter speed and ISO, camera AE will choose the aperture.

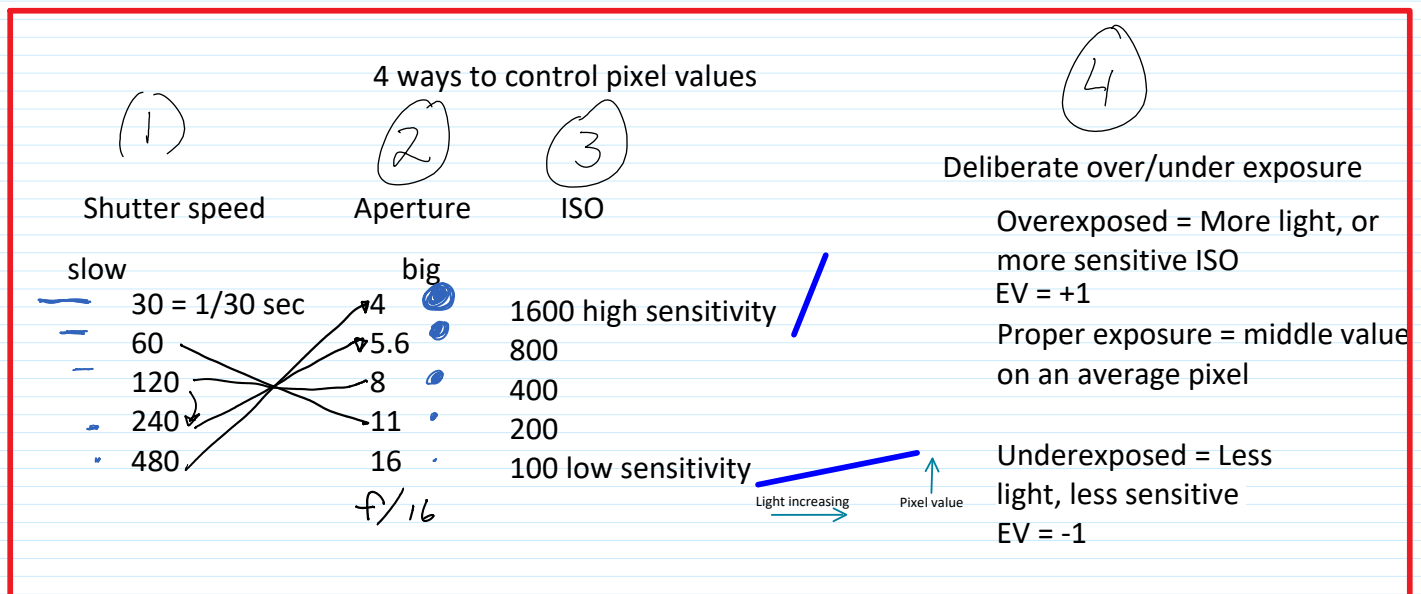
M = Manual (maybe). You choose both aperture and shutter speed. Meter will tell you if exposure is OK.



to set over/under exposure

Lighten image, overexpose compared to AE suggestion +++

Darken, underexpose compared to AE, ----



Minute paper, in groups: List the side effects of each method, beyond the effect on exposure:

Aperture: DOF  
Shutter: Motion Blur  
ISO: Noise  
Deliberate +/-

Shutter speed: motion blur at slow speeds

Aperture: low depth of field at large aperture

ISO: Noise at high ISO

Deliberate under/over: Camera will change one or more of the other three settings, with attendant side effects.