

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

Edit your FlowVis.org post publish dates:

Clouds: date you made the image

Team First: Sept 14 + team number

Office hours ECME 220 Thursdays 1 pm

OpenShot IS on ITLL computers, there should be a shortcut on start menu; if not just search for it.

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

Handwritten notes: 3000, 3400 DSLR, 8000, 4000, 100, iPhone = 1/8000

ISO = sensor sensitivity, gain

1 EV = 1 stop = factor of 2 in ISO

Handwritten notes: 1/1, 1/1/1, 517.00

ISO = sensor sensitivity, gain

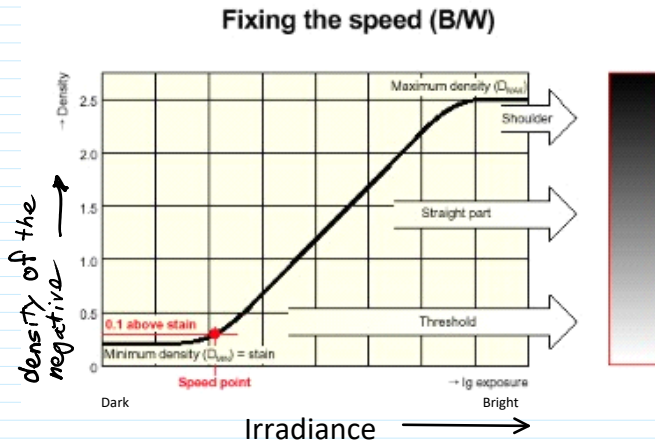
1 EV = 1 stop = factor of 2 in ISO

100 200 400 800 1600 3200 6400 12800 25000 51200

Used to be called ASA for film. *iPhone = 2000*

From [American Standards Association](http://www.americanstandards.org) (now named [ANSI](http://www.ansi.org))

ISO = International Organization for Standardization



http://www.sapiens.itgo.com/documents/foto/photographic_terms8.htm

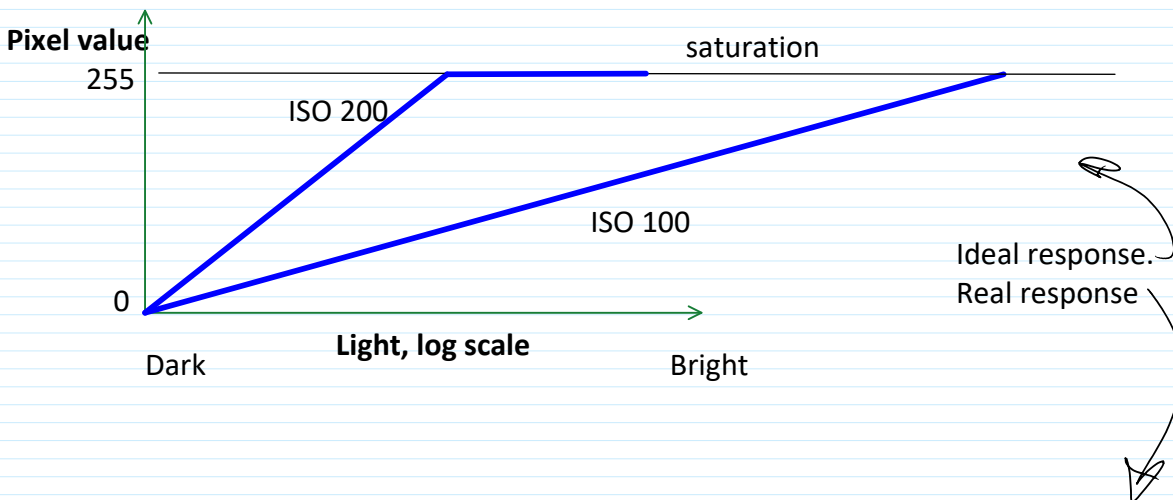
More sensitive film will have

- a) steeper "straight" part
- b) shallower "straight" part
- c) whole curve is shifted up
- d) whole curve is shifted down

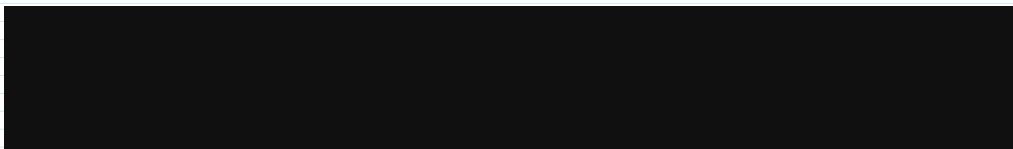
Minute paper:

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

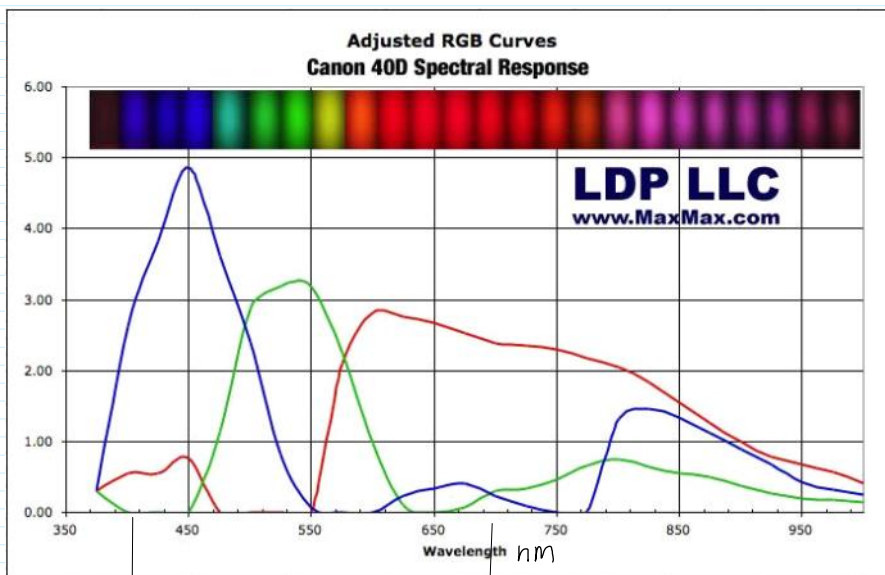
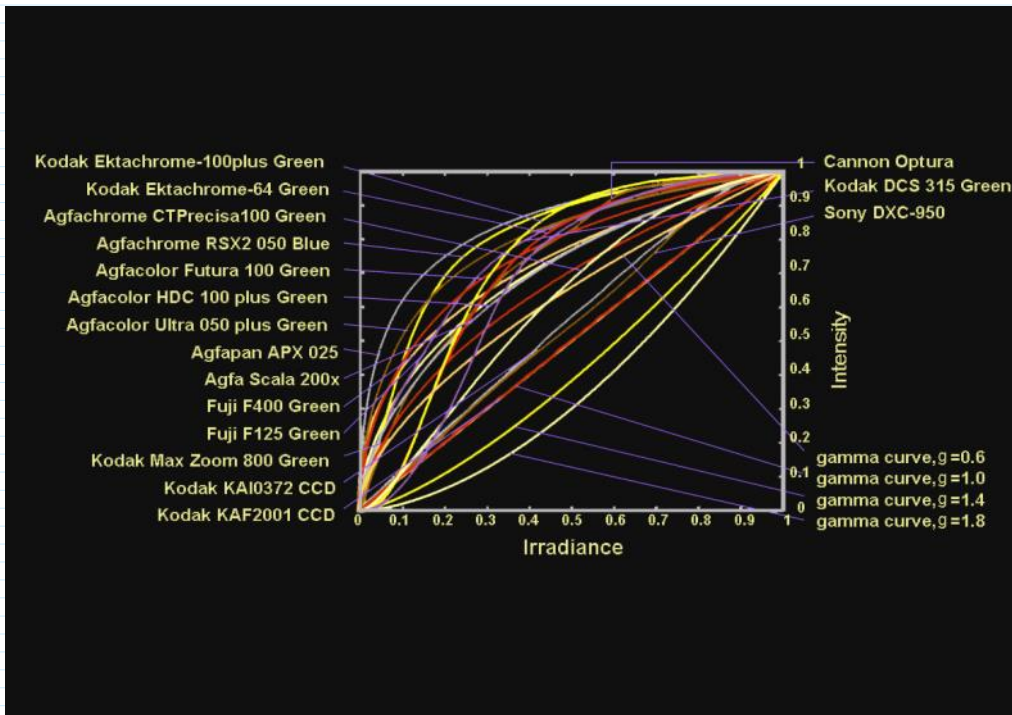


Digital camera response database



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

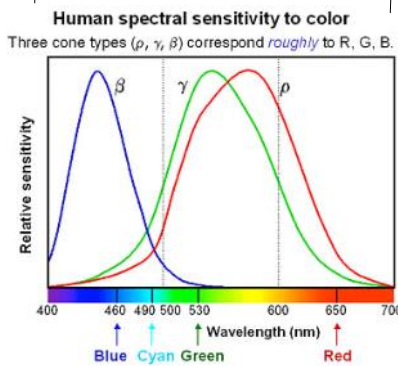
http://www.cs.columbia.edu/CAVE/projects/rad_cal/



http://www.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.

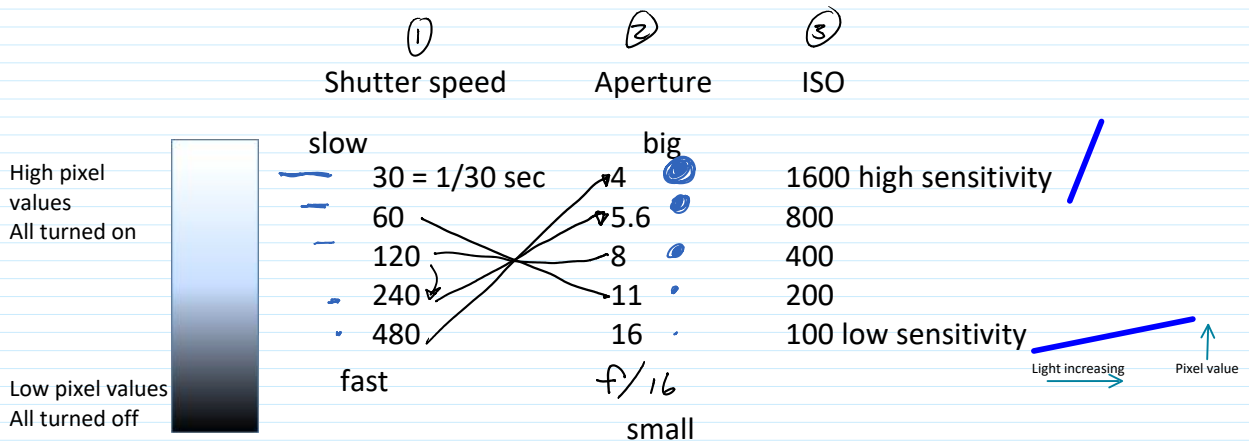
Same image density f/5.6, 1/100 sec, ISO 200
f/8, 1/100 sec, ISO 400
f/4, 1/200 sec, ISO 400

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

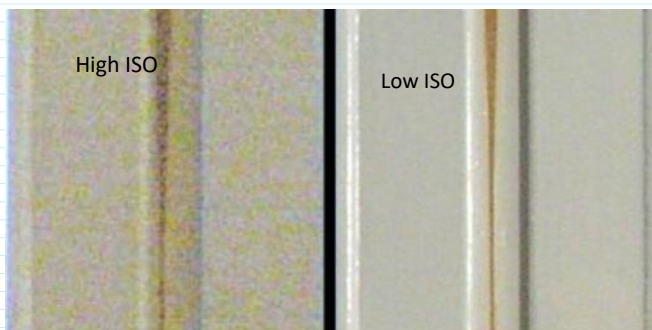
Check your camera ISO settings. How easy to change?

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

\$\$\$\$ 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.

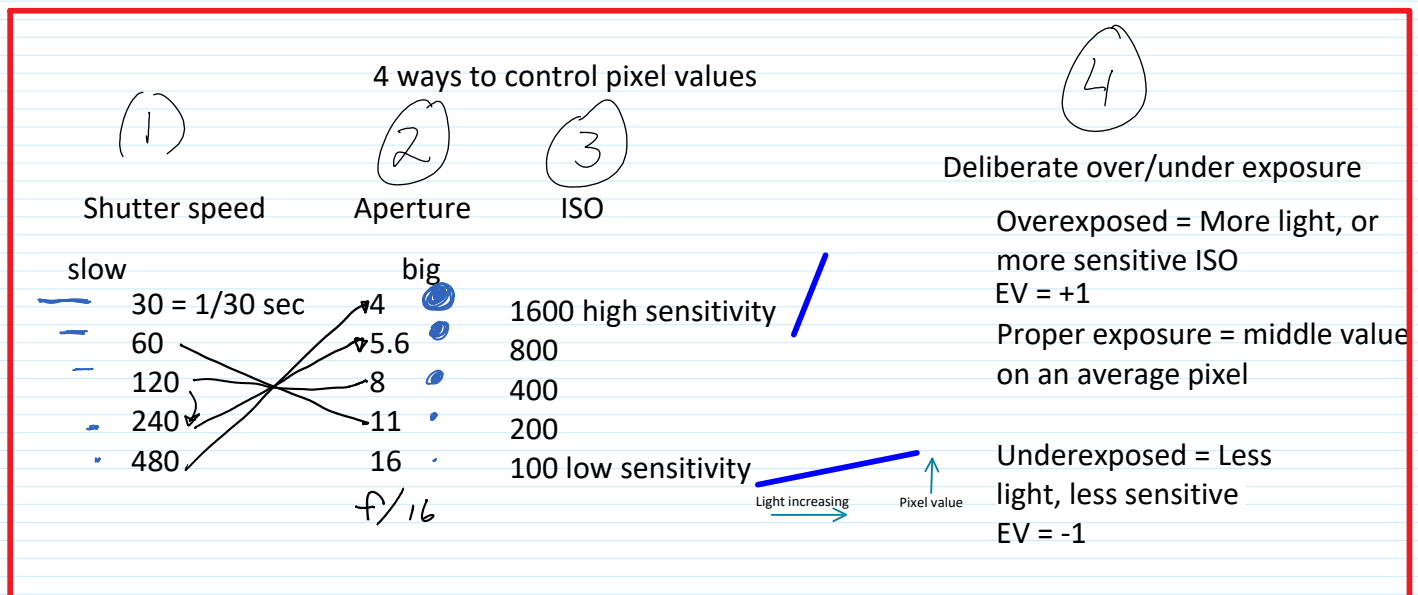
M = Manual (maybe). You choose both aperture and shutter speed. Meter will tell you if exposure is OK.



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:

Shutter speed: motion blur at slow speeds

Aperture: low depth of field at large aperture. Diffraction will reduce sharpness at small apertures

ISO: Noise at high ISO

Deliberate under/over: Camera will change one or more of the other three settings, with attendant side effects. With underexposures, get loss of detail in shadows. Worse, at high overexposure, lose detail in highlights.