Sensation & Perception

(PSYC 4074)

(“L2” stands for “Lecture 2” etc.)

L2 Optics and the Eye

Videos

Links to videos shown in the lecture:

The Nature of Light

http://archive.org/details/1005_Nature_of_Light_The_09_58_53_15

Start at about 5' 00“ for image formation in cameras.

How the Eye Functions

http://archive.org/details/HowtheEy1941

START VIDEO at about 4' 30” to get good convergence of rays on fovea part.

END about 7' 00“, where convergence section begins (although that's great, too).

PUPIL opening and closing animation: about 10' 00”.

How You See It

http://archive.org/details/HowYouSe1936

1' 15“ Illustration (of a Chevy car) showing that image on retina is upside down, but brain perceives it upright.

Dissection of the Eyeball

http://archive.org/details/0055-0000-7117-0000-0-0000-0000-0

LENS: about 5' 20” start.

About 5' 35“, lens cut out with scissors!

Behind the Lens

http://archive.org/details/Behindth1940

Title shown at beginning of film (about 0' 15”):

“A CAMERA GOES TO COLLEGE”

It's wearing a mortarboard.

Websites

Website links for more information on topics from the lecture.

Rayleigh scattering

https://en.wikipedia.org/wiki/Rayleigh_scattering

Explains why the sky is blue.

Visual limitations based on the eye's location in the head

http://visionlab.harvard.edu/members/patrick/ScleraTalk/index.htm

Lights from beyond the visual field are not seen.

L3 Retina

Websites

Retinal physiology

Tutis Vilis' *Physiology of the Senses*

Section on the eye, including the retina:

http://www.tutis.ca/Senses/L1Eye/L1eye.swf

Link to main page where you can download PDF and other versions of this material:

http://www.tutis.ca/Senses/

Webvision website

Section on photoreceptors, with many great micrographs:

http://webvision.med.utah.edu/book/part-ii-anatomy-and-physiology-of-the-retina/photoreceptors/

Light and dark adaptation

https://en.wikipedia.org/w/index.php?title=Adaptation_(eye)

https://en.wikipedia.org/w/index.php?title=Daylight

http://www.engineeringtoolbox.com/light-level-rooms-d_708.html

https://en.wikipedia.org/w/index.php?title=Lux

https://en.wikipedia.org/w/index.php?title=Purkinje_effect

Research articles

Brainard, D. H., Roorda, A., Yamauchi, Y., Calderone, J. B., Metha, A., Neitz, M., … Jacobs, G. H. (2000). Functional consequences of the relative numbers of L and M cones. Journal of the Optical Society of America A, 17(3), 607. http://doi.org/10.1364/JOSAA.17.000607

http://www.ncbi.nlm.nih.gov/pubmed/10708042

Hurley, J. B. (2002). Shedding Light on Adaptation. The Journal of General Physiology, 119(2), 125–128.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2233798/

L4 Retinal Information Processing

Websites

Retinal physiology

Tutis Vilis' *Physiology of the Senses*

Section on the eye, including the retina:

http://www.tutis.ca/Senses/L1Eye/L1eye.swf

(Today we will begin at the section corresponding to the “Fovea” link at bottom.)

Webvision website

Section on horizontal cells and lateral inhibition:

http://webvision.med.utah.edu/book/part-ii-anatomy-and-physiology-of-the-retina/oute-plexiform/

Another section with nice diagrams illustrating the spatial arrangement of photoreceptors that belong to the same retinal ganglion cell center-surround receptive field:

http://webvision.med.utah.edu/book/part-iii-retinal-circuits/midget-pathways-of-the-primate-retina-underly-resolution/

Especially Fig. 17 of this section.

Sensation and Perception textbook online resources:

http://sites.sinauer.com/wolfe4e/wa02.05.html

Interactive demo of the difference between sensitivity and acuity produced by rod and cone receptive fields.

Contrast and brightness illusions

From Michael Bach's wonderful Optical Illusions & Visual Phenomena website:

http://www.michaelbach.de/ot/lum-MachBands/index.html

http://www.michaelbach.de/ot/lum-inducedGrating/index.html

http://www.michaelbach.de/ot/lum-inducedContrastAsym/index.html

http://www.michaelbach.de/ot/lum-adelsonCheckShadow/index.html

http://www.michaelbach.de/ot/lum-contrastAdapt/index.html

From Dale Purves' lab website:

http://purveslab.net/see-for-yourself/

From a recently published journal article:

http://journal.frontiersin.org/article/10.3389/fnhum.2014.00999/full

Wonderful animated demos that illustrate the independence of the magno- and parvocellular pathways for motion and color vision.

Scroll down towards the bottom to find links to the videos.

L5 Representation of the Retina in the brain

Videos

Discovery of V1 receptive fields

http://wn.com/hubel_and_wiesel_cat_experiment

Competition for ocular dominance of V1 neurons during development

http://www.ophthobook.com/videos/pediatric-ophthalmology-video

Section on amblyopia from unbalanced ocular dominance begins at about 13' 20“.