

# 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](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.

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## Websites

Website links for more information on topics from the lecture.

## Rayleigh scattering

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

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# 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=Adaptation_(eye))

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

[http://www.engineeringtoolbox.com/light-level-rooms-d\\_708.html](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](https://en.wikipedia.org/w/index.php?title=Purkinje_effect)

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## 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/>

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# 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/>

[Fig. 9](#) of this section illustrates horizontal cell dendrites and axons.

[Fig. 17](#) illustrates the tight coupling among a cone and the dendrites of the bipolar and horizontal cells with which it forms synapses.

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 website ([Optical Illusions & Visual Phenomena](#)):

<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.

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# L5 Representation of the Retina in the brain

## Videos

## Discovery of V1 receptive fields

[http://wn.com/hubel\\_and\\_wiesel\\_cat\\_experiment](http://wn.com/hubel_and_wiesel_cat_experiment)

## Competition for ocular dominance of V1 neurons during development

<http://www.opthobook.com/videos/pediatric-ophthalmology-video>

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

<http://www.michaelbach.de/ot/mot-feetLin/index.html>

<http://www.michaelbach.de/ot/mot-mib/index.html>

<http://www.michaelbach.de/ot/mot-snakes/index.html>

<http://www.michaelbach.de/ot/mot-adaptSpiral/index.html>

<http://www.michaelbach.de/ot/mot-bounce/index.html>

<http://www.michaelbach.de/ot/mot-Ternus/index.html>

<https://people.stanford.edu/pjkohler/mips>

[http://whitneylab.berkeley.edu/old\\_research\\_and\\_demos/motiondistortion/motiondistortion.html](http://whitneylab.berkeley.edu/old_research_and_demos/motiondistortion/motiondistortion.html)

<http://www.fss.uu.nl/psn/vandersmagt/demos-OF.html>

[http://graphics.cs.brown.edu/research/exploratory/freeSoftware/repository/edu/brown/cs/exploratories/applets/fft1DApp/1d\\_fast\\_fourier\\_transform\\_guide.html](http://graphics.cs.brown.edu/research/exploratory/freeSoftware/repository/edu/brown/cs/exploratories/applets/fft1DApp/1d_fast_fourier_transform_guide.html)

[http://www.sciencedirect.com/science?\\_ob=MiamiCaptionURL&\\_method=retrieve&\\_eid=1-s2.0-S0042698999000966&\\_image=1-s2.0-S0042698999000966-gr1.jpg&\\_cid=271122&\\_explode=defaultEXP\\_LIST&\\_idxType=defaultREF\\_WORK\\_INDEX\\_TYPE&\\_alpha=defaultALPHA&\\_ba=&\\_rdoc=1&\\_fmt=FULL&\\_issn=00426989&\\_pii=S0042698999000966&md5=9e4115d0f302a1a8fbb72173424731d5](http://www.sciencedirect.com/science?_ob=MiamiCaptionURL&_method=retrieve&_eid=1-s2.0-S0042698999000966&_image=1-s2.0-S0042698999000966-gr1.jpg&_cid=271122&_explode=defaultEXP_LIST&_idxType=defaultREF_WORK_INDEX_TYPE&_alpha=defaultALPHA&_ba=&_rdoc=1&_fmt=FULL&_issn=00426989&_pii=S0042698999000966&md5=9e4115d0f302a1a8fbb72173424731d5)

[http://www.nature.com/neuro/journal/v6/n6/fig\\_tab/nn1057\\_F1.html](http://www.nature.com/neuro/journal/v6/n6/fig_tab/nn1057_F1.html)

<https://www.youtube.com/watch?v=e9ASH8IBJ2U>

<http://www.michaelbach.de/ot/fcs-SpatFreqComposites/index.html>

<http://www.michaelbach.de/ot/ang-fraser/index.html>

<http://www.michaelbach.de/ot/ang-tiltedTable/index.html>

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update: 2019/05/22 16:08 teaching:sensationandperception <https://www.wiki.anthonycate.org/doku.php?id=teaching:sensationandperception&rev=1518097741>

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[http://156.56.17.197/people/faculty/candy/what\\_can\\_a\\_baby\\_see.html](http://156.56.17.197/people/faculty/candy/what_can_a_baby_see.html)

<http://anstislab.ucsd.edu/2012/11/20/peripheral-acuity/>

<http://www.psy.ritsumei.ac.jp/~akitaoka/ECVP2015.html>

From:  
<https://www.wiki.anthonycate.org/> - **Visual Cognitive Neuroscience**

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