

Psychology 221: Sensation and Perception

Fall, 2009

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Class Meetings: Tuesday, 10:00 am – 1:00 pm
Glass Conference Room, 5th floor, McGill Hall

Office Hours: By appointment

Text: “Levine and Shefner’s Sensation & Perception”, 3rd edition
Michael W. Levine, Oxford University Press (2000)
Available at the University Bookstore

Other Required Reading: 19 Journal Articles (~15 of which will be presented by students)

Other recommended books:

For more introductory text:

- T.N. Cornsweet, *Visual Perception*, Academic Press (1970)
- D. Hubel: *Eye, Brain & Vision*, Scientific American Library (1988)

For more advanced text to clarify difficult points or enhance your understanding:

- B.A. Wandell: *Foundations of Vision*, Sinauer Associates (1995)

For text that focuses more on the underlying neurophysiological mechanisms:

- A. Valberg & B.B. Lee (eds.): *From Pigments to Perception*, Plenum Press (1991)
- L. Spillman & J.S. Werner (eds.): *Visual Perception: The Neurophysiological Foundations*, Academic Press (1990)

Aims and Scopes:

The goal of this course is to understand sensory perception in terms of underlying mechanisms, using both psychophysical and neural evidence. In some cases, the neural basis for a particular perceptual phenomenon is well understood. In other cases, only hypothetical or conceptual mechanisms are addressed.

The majority of this course will concentrate on *visual* perception, however, we will also cover *auditory* perception as well as discussing the ways in which visual and auditory signals work in unison. The particular journal articles for this course were chosen to span a wide range of topics and techniques, so that students can receive a well-rounded introduction to Sensation and Perception.

Format:

1) *My Lecture:* Each week, I will give a lecture on that week’s topic. The lecture will take between 1.5 – 2 hours. The format of this lecture is meant to be somewhat interactive, thus students are encouraged to ask questions. I send you the lecture notes as an attachment each week, sometimes on the morning of the lecture.

2) *Journal Article Presentation:* At the end of my lecture, one or two students will present the journal article(s) of the week (30-40 minute presentation). If the article is too extensive and complicated for a 30-40 minute presentation, present the sections that you best understand, and emphasize and expand upon those ideas. If the article is not substantial enough, research the topic and expand your discussion of the topic. In either case, you are encouraged to read other material (e.g., from one of the recommended books) in order to increase your background knowledge of the subject. The final product should be a 30–40 minute presentation (expecting interruptions and group discussion), where everyone walks away understanding the main goal, results and conclusions of the journal article.

3) *Essay Exams Each Week.* By NOON on Wednesday of each week, I will email you a *take-home essay exam*, which contains 2 questions that cover that week’s topic (you pick which one to answer). Turn in the exam (as a WORD document sent as an attachment) by that Friday at 5 pm. (More info below).

Grading: Essay Questions: 70% Journal Article Presentation: 20% Discussion: 10%

Syllabus
Psychology 221, Fall 2009
Instructor: Karen Dobkins

Week 1 (Sept 29): Introduction, Psychophysics and Neurophysiology

Readings:

Book Chapter 1: Introduction
Book Chapter 2: Psychophysics

Journal Article:

NONE, but read handout on Neurophysiology called: "week 1-physio handout"

Week 2 (Oct 6): Light and Eye

Readings:

Book Chapter 3: Light and the Eye
Book Chapter 4: The Retina
Book Chapter 5: Retinal Ganglion Cells and Lateral Antagonism

Journal Article:

Williams, 1985: Aliasing in human foveal vision

Week 3 (Oct 13): Primary Visual Areas/ Functional Architecture

Readings:

Book Chapter 7: The Primary Visual Areas of the Brain
Book Chapter 8: Architecture of Vision in the Cortex

Journal Article:

#1: Fregnac et al., 1988: A cellular analogue of visual cortical plasticity.
#2: Ferster et al., 1996: Orientation selectivity of thalamic input to simple cells of cat visual cortex

Week 4 (Oct 20): Notions of Modularity & Spatial Frequency Processing (Guest Lecturer: Dr. David Peterzell, Ph.D.)

Readings:

Book Chapter 9: Spatial Frequency Representation

Journal Article:

Peterzell et al., 1995: Individual differences in contrast sensitivity functions: longitudinal study of 4-, 6- and 8-month-old human infants.

Week 5 (Oct 27): Form & Depth

Readings:

Book Chapter 10: Form Perception
Book Chapter 11: Depth Perception

Journal Article:

Neri, 2005. A Stereoscopic look at visual cortex. J Neurophysiology, 93: 1823-1826

Week 6 (Nov 3): Color

Readings:

Book Chapter 14: Color Vision

Journal Article:

#1: Nathans, 1989: The genes for color vision.
#2: Winderickx et al., 1992: Polymorphism in red photopigment underlies variation in colour matching.

Week 7 (Nov 10): Motion

Book Chapter 13: The Perception of Movement
Albright, 1993: Cortical processing of visual motion.

Journal Article:

- #1: Lu & Sperling, 1995: Attention-generated apparent motion.
- #2: Newsome et al., 1989: Neural correlates of a perceptual decision.

Week 8 (Nov 17): Parallel Processing Streams

Readings:

- #1: Livingstone & Hubel, 1988: Segregation of form, color, movement, and depth: Anatomy, physiology and perception.
- #2: (optional) Merigan & Maunsell, 1993: How parallel are the primate visual pathways?

Journal Article:

Dobkins, 2009: Does Visual Modularity Increase over the Course of Development? *Optometry & Vision Science*, 86, 583-588.

Week 9 (Nov 24): Hearing and Sound Localization

Readings:

- Book Chapter 15: The Structure of the Auditory System
- Book Chapter 16: Frequency Coding in the Auditory System (*read only* “The Basilar Membrane as a Frequency Analyzer”)
- Book Chapter 17: Perception of Loudness and Space (*read only* “Auditory Space Perception”)
- Konishi et al., 1988: Neurophysiological and anatomical substrates of sound localization in the owl. (*focus on* auditory maps and mechanisms, as opposed to names and connections between auditory areas).

Journal Article:

- #1: Knudsen et al, 1984: Monaural occlusion alters sound localization during a sensitive period in the barn owl.
- #2: Knudsen, 1983: Early auditory experience aligns the auditory map of space in the optic tectum of the barn owl.

Week 10 (Dec 1): Sound and Vision

Readings:

- Knudsen & Brainard, 1995: Creating a unified representation of visual and auditory space in the brain.

Journal Article:

- #1: Knudsen & Knudsen, 1989: Visuomotor adaptation to displacing prisms by adult and baby barn owls.
- #2: Knudsen & Brainard, 1991: Visual instruction of the neural map of auditory space in the developing optic tectum.

NO FINAL EXAM

Information about Take-Home Essay Exams

Purpose: The ability to convey ideas clearly through writing is a very important skill, one for which most undergraduates do not receive training. The goal is to improve your writing skills throughout the course. I will give you feedback on each exam (typed directly inside the word file).

Every week, I will circulate the essay with the highest grade (anonymously) so you can see what I think is an example of good writing and the feedback that I gave (although I will not include the grade they got). This should help you in the following essays for the course.

Open-Book: These essay exams are *completely* open-book. You may look at the text book (or any other book) or your notes.

The Honor System: *When you get the exam, and until everyone has handed theirs in to me, do not discuss any part of the exam or course material with anyone!! I want to see how you can think and write on your own.*

Format: Each exam will have 2 questions (a or b). Pick and answer one. Type in the week number (1, 2, etc.) and the question you are answering 'a' or 'b' (e.g., "Question 3b") at the top of the document. You do not need to write out the question. Please type your name at the top too.

Answer Limit: Each answer should be limited to:

Number of pages:	1
Spacing:	1.5 lines
Margins:	0.7 inch (all sides)
Font:	Times 12

These limits were chosen to maximize the total number of words fitting on one page. You can, however, go *under* the limit by using larger spacing (e.g., double-spaced), larger margins (e.g., 1 inch), larger font (e.g., Helvetica), or by writing *less than* one page.

Send the exam to me as an attachment labeled like this "Karen.1a" i.e., your name followed by the week number and the question (a or b) that you answered.

Some Tips:

1) Answer Format: I prefer that your answers be in *essay* form, although there may be places where you find it more appropriate to use an *outline* form. I will leave that to your discretion. Note: If you choose to present *part of your answer in outline form*, you can use *single spacing* for that part.

2) Diagrams: You may use *diagrams* to enhance your answers. (Sometimes it is required). *The diagrams are not part of the 1 page limit, and can be put onto a separate page!*

3) Details or Broad Understanding? Of course, it is great to include both your knowledge of the details as well as your basic understanding of the topic. Most importantly, get your points across as concisely and clearly as possible. I want to see that you can present details while understanding the broader issues as well. It is best if you can draw right into the WORD file.

4) Vague Questions: Some of the questions are intentionally vague, to allow you to create your own thought-out and cohesive picture on a topic.

5) Finding Answers: When answering a question, do not just use your notes from a *single* week. Sometimes answers to the questions are spread out across the different weeks/topics. Also, don't forget to use your *book* as a resource, as well as examples from the *journal articles*.

6) What Level to Pitch it?: Answers should be written as though the reader were very smart but fairly ignorant of that topic. Don't write the answer expecting that I, the professor, will "know what you're talking about". But don't define every term as though the reader were totally ignorant, e.g., if you are writing something about how the image of an object is projected onto the "retina", you don't need to write "The retina, the neural tissue in the back of the eye that contains the neurons for capturing light".

7) Grading: I will be grading you on both your basic and detailed knowledge of the topic as well as on your ability to convey clearly what you know (in one page or less).