Psychology 724 Perception Fall 2012

Overall coordinator: Daphne Maurer

Thursdays 9:30-12:30 beginning September 13 for 12 weeks
Room 311

Vision: September 13, 20, 27
Hearing: October 4, 11, 18
Crossmodal: October 25, November 1
Faces: November 8, 15
Music: November 22, 29

Objective: Students should understand (1) the basics properties of perception and the mechanisms underlying it and (2) the methods that can be used to reveal those properties.

These methods include:
signal detection theory/psychophysics
masking/channels
ideal observer analysis
estimates of internal noise and efficiency
center/surround receptor characteristics
Bayesian approaches
Perceptual learning
Reaction time/information processing

These points will be exemplified through examination of 5 types of perception spanning vision, hearing, touch, and cross-modal perception. For each type of perception, we have chosen a sub-topic. For each subtopic, we will consider:

Measurements in adults
Mediation in adults; source of limitations
Lessons from development and aging
Lessons from abnormalities

Structure for each topic: 1- to 3-hour introductory lecture for each section by the prof, followed by student-led discussions of readings on the remaining topics.

3 weeks on basic vision
Subtopic: acuity and contrast sensitivity (lead: Daphne Maurer)

3 weeks on basic audition
Subtopic: auditory localization [Lead: Paul Faure]

2 weeks on crossmodal perception (lead: David Shore)

2 weeks on higher order vision
Subtopic: Processing of facial identity (lead: Daphne Maurer

2 weeks on higher order audition:
Subtopic: musical rhythm perception (lead: Laurel Trainor)

Assignments:

1. Read and participate in all discussions
2. Lead discussions on sub-topics
3. Choose an atypical population (e.g., Parkinson's, autism, schizophrenia, synesthesia, prosopagnosia) and write a 5-page single spaced grant proposal in NSERC format outlining a series of studies to uncover the nature of their perceptual abilities and the mechanisms underlying them. Your introductory section can be based on a few review articles. Your proposed experiments should make use of the methods described in the course and explain why they will produce evidence about underlying perceptual mechanisms. Due December 15, 2012.

There will be a workshop for graduate students organized outside classtime on how to write a successful NSERC grant proposal. Tentative date of workshop: Thursday, October 18, 3-5 P.M.

Reading list for basic vision:
Subtopic: acuity and contrast sensitivity

Week 1: September 13

Green, D. (1970). Regional variations in the visual acuity for interference fringes on the retina. *Journal of Physiology, 207.* 351-356.

Campbell, F., & Robson, J. (1968). Application of Fourier analysis to the visibility of gratings. *Journal of Physiology, 197,* 551-566.

Banks, M., Stephens, B., & Hartmann, E. (1985). The development of basic mechanisms of pattern vision: Spatial frequency channels. *Journal of Experimental Child Psychology, 50,* 501-527.

Week 2: September 20

Chung, S., & Tian, B. (2009). Spatial frequency and contrast properties of reading in central and peripheral vision, *Journal of Vision, 9(19),* 1-19.

Pelli, D., & Tillman, K. (2008). The uncrowded window of object recognition. *Nature Neuroscience, 11,* 1129-1135.

Pestilli, F., Carrasco, M., Heeger, D., & Gardner, J. (2011). Attentional enhancement via selection and pooling of early sensory responses in human visual cortex. *Neuron, 72,* 832-846.

Week 3: September 27

Banks, M., & Bennett, P. (1988). Optical and photoreceptor immaturities limit the spatial and chromatic vision of human neonates. *Journal of the Optical Society of America, 5,* 2059-2079.

Gold, J., Sekuler, A., & Bennett, P. (2004). Characterizing perceptual learning with external noise. *Cognitive Science, 28,* 167-207.

Levi, D., Klein, S., & Chen, J. (2008). What limits performance in the amblyopic visual system: seeing signals in noise with an amblyopic brain. *Journal of Vision, 8(4),* 1-23.

Reading list for basic audition
Subtopic: auditory localization

Week 1: Overview (October 4)

Middlebrooks JC, Green DM (1991) Sound localization by human listeners. Annu Rev Psychol 42:135-159

Kubke MF, Carr CE (2005) Development of the auditory centers responsible for sound localization. Springer Handbook of Auditory Research Volume 25, pp. 179-237

Grothe B (2003) New roles for synaptic inhibition in sound localization. Nature Reviews, Neuroscience 4:540-550

Konishi M (2006) Behavioral guides for sensory neurophysiology. J Comp Physiol A 192:671-676

Week 2 – Development (October 11)

Muir DW, Clifton RK, Clarkson MG (1989) Development of a human auditory localization response: a U-shaped function. Can J Psychol 43(2):199–216.

Clifton RK, Gwiazda J, Bauer JA, Clarkson MG, Held RM (1988) Growth of head size during infancy: implications for sound localization. Dev Psychol 24(4):477-483

Muir D, Hains S (2004) The U-shaped developmental function for auditory localization. J Cog Dev 5(1):123–130

Week 3 - Neural Mechanisms (October 16)

Middlebrooks JC, Clock AE, Zu L, Green DM (1994) A panoramic code for sound location by cortical neurons. Science 264:842-844

Brand A, Behrend O, Marquardt T, McAlpine D, and Grothe B (2002) Precise inhibition is essential for microsecond interaural time difference coding. Nature 417:543-547

Jercog PE, Svirskis G, Kotak VC, Sanes DH, Rinzel J (2010) Asymmetric excitatory synaptic dynamics underlie interaural time difference processing in the auditory system. PLoS Biol 28(6):e1000406

Day ML, Semple MN (2011) Frequency-dependent interaural delays in the medial superior olive: implications for interaural cochlear delays. J Neurophysiol 106:1985-1999

Reading list for crossmodal perception
TBA

Reading list for face perception
TBA

Reading list for music perception
TBA