CLPS1570 Perceptual Learning
Spring–2013
Seminar
Instructor: Professor Takeo Watanabe

Course Description

This course will focus on perceptual learning and visual plasticity. The goal of this course is to understand the mechanisms of visual perceptual learning and visual and brain plasticity. Perceptual learning is defined as long-term performance improvement as a result of visual experiences.
1) We will understand perceptual learning from psychophysical, physiological and computational viewpoints.
2) We will understand not only visual mechanisms but also the mechanisms of multiple areas that are related to perceptual learning.
3) We will understand the roles of attention, reward and memory in perceptual learning and visual plasticity.
4) We will understand the role of sleep in perceptual learning and visual plasticity.
5) By reading and discussing significant papers, we will learn how to use brain imaging.

Prerequisites

There are no prerequisites. However, it is strongly recommended that students take one of the following courses prior to registration:

Ecological Approach to Perception and Action (formerly COGS 1380)
Computational Vision (formerly COGS 1200)
Computational Cognitive Science (formerly COGS 1280)

Class Data

Lectures by Dr. Watanabe

Course dates 3:00 – 5:30 PM on Fridays

Place TBA

Office Hours 5:00 – 6:00 PM on Thursdays

E-mail
Takeo_Watanabe@Brown.EDU

Office
Room 253, Metcalf

Presentation of Papers

Students must give presentations on the summary of selected chapters of the book or selected journal articles using a projector.

Grade Policy

Final exam 30%
Activity in the class (presentation, discussion) 40%
Participation (attendance) in the class 30%

Attendance will be taken in each class. If you cannot attend a class, you will have to let me know that as soon as possible.

Grades

90-100% A
80-90% B
70-80% C

Class Schedule

Backgrounds of perceptual learning and visual plasticity:

Week 1 Review on perceptual learning
(Gold and Watanabe, 2010; Sasaki et al., 2010; Sasaki and Watanabe, 2012)
Week 2 Review on visual plasticity
(Sagi, 2011; Hensch, 2005; Dan and Poo, 2006)

Where does perceptual learning occur? Psychophysics:

Week 3 Classic papers
(Ball and Sekuler, 1987; Karni and Sagi, 1991, 1993; Ahissar and Hochstein, 1997, 2004)
Week 4 Double training
(Xiao et al., 2008; Yotsumoto et al., 2009; Zhang et al., 2010a; Zhang et al., 2010b; Beste et al., 2011; Wang et al., 2011)
Week 5 Reweighting models
(Bejjanki et al.; Dosher and Lu, 1998; Petrov et al., 2005; Gold et al., 2009)

Where does perceptual learning occur? Physiology:

Week 6 Low-level involvements by single-unit recordings
(Schoups et al., 2001; Ghose et al., 2002; Ghose, 2004; Yang and Maunsell, 2004; Adab and Vogels, 2011)
Week 7 Low-level involvements by fMRI
(Schwartz et al., 2002; Furmanski et al., 2004; Yotsumoto et al., 2008)
Week 8 higher-level involvements by single-unit recordings
(Chowdhury and DeAngelis, 2008; Law and Gold, 2008; Kahnt et al., 2011; Gilbert and Li, 2012; Gu et al., 2012)
Week 9 higher-level involvements by fMRI
(Lewis et al., 2009; Kahnt et al., 2011; Shibata et al., 2011)

Roles of attention and reinforcement signals in perceptual learning:

Week 10 Roles of attention

(Ahissar and Hochstein, 1993; Sigman et al., 2005; Watanabe et al., 2001; Watanabe et al., 2002; Seitz and Watanabe, 2003)
Week 11 Roles of reinforcement
(Seitz et al., 2005; Tsushima et al., 2006; Tsushima et al., 2008; Law and Gold, 2009; Seitz et al., 2009)

Roles of sleep and consolidation in perceptual learning:

Week 12 (Stickgold et al., 2000; Stickgold et al., 2001; Stickgold, 2005; Stickgold and Walker, 2005; Walker and Stickgold, 2006; Mednick et al., 2002; Mednick et al., 2003; Yotsumoto et al., 2009)

Reference

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