

1. Course Title, style, and credit

The Verbal Cognitive System

Lecture

1 Credit

2. Appropriate grade level and Eligible Departments

All Departments

For Department of Physiological Sciences, D1, 2 (obligatory), D3-5

3. Instructor

Norihiro Sadato, MD, PhD

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NIPS (Myodaiji area, 4F)

4. Schedule

10:00~12:00 on Fridays

2017

Jan 6, 13, 20, 27

Feb 3, 10, 17, 24

Mar 3

5. Location

1F Lecture room in Myodaiji building of NIPS

The lectures will be delivered by the remote lecture system.

6. Organization

Basic knowledge of neuroscience and psychology are preferable but not mandatory. Students should submit application form to Graduate Student Affairs Section (TEL 7139). The class will be taught in lecture style. The instructor will lecture in English.

7. Description

Imaging technologies that use light and other forms of electromagnetic radiation to visualize biological processes in humans have paved the way for progress in the modern medical sciences. Magnetic resonance imaging (MRI) scanning, one of the most advanced clinical methods, is an application of

computed tomography (CT) that has improved dramatically in recent years. MRI scans can produce detailed images of brain structures; moreover, local changes in intracranial blood flow can be visualized by parametrization of neural activities. Thus, MRI provides a safe means for observing human brain functions without the risk of injuring the subject (hence, “functional MRI” or fMRI). The volume of research on human brain activities that utilizes MRI and other non-invasive imaging techniques is expanding exponentially. Such research will bridge the knowledge gap between humanities and neuroscience. This course will introduce the principles and quantitative analytical methods for non-invasive functional brain imaging, and discuss recent imaging-based approaches for exploring the mechanisms of language-related social skill development. Students will be exposed to, and come to understand, cutting-edge neuroscience.

8. COURSE GOALS

Students will learn the non-invasive methods for the visualization of human higher brain functions, based on a combination of experimental psychology approaches and techniques for visualizing brain activities. Students will apply such methods to the development of social competence and other skills, and thereby develop an appreciation of the state of the art of systems neuroscience.

9. COURSE TOPICS

This course will focus on the development of language-based social skills and its neural substrates from the viewpoint of neuroscience. Specifically, we will discuss the biological basis for the acquisition of social coping strategies, starting from imitation of others' behaviors to the development of prosocial behaviors. This course will consist of 9 units (sessions), which will deal with the following topics:

- 1) Methodology, #1: Non-invasive visualization of the brain's activities (2017/1/6 10:00-12:00)
- 2) Methodology, #2: Functional MRI and statistical approach (2017/1/13 10:00-12:00)
- 3) Motor control and imitation (2017/1/20 10:00-12:00)
- 4) Self-recognition and self-consciousness (2017/1/27 10:00-12:00)
- 5) Joint attention and language development (2017/2/3 10:00-12:00)
- 6) Theory of mind and empathy (2017/2/10 10:00-12:00)
- 7) Pragmatics (2017/2/17 10:00-12:00)
- 8) Polysensory integration, learning, and plasticity involved in face-to-face communication (2017/2/24 10:00-12:00)
- 9) Neural substrates for prosocial behaviors (2017/3/3 10:00-12:00)

All lectures will be given by Norihiro Sadato (NIPS).

10. READING MATERIALS

Non-verbal communication and brain: Link between self and others (in Japanese). M Iwata & M

Kawamura eds. Igaku Shoin, Tokyo.

Bear (2016) Neuroscience Exploring the Brain Fourth edition, Wolters Kluwer, Philadelphia

Friston (2007) Statistical Parametric Mapping. The analysis of functional brain imaging, Academic Press, Amsterdam

Huettel (2009) Functional Magnetic Resonance Imaging 2nd edition Sinauer, Sunderland, MA

1 1. GRADING

Students will be graded on project reports (pass over 59 with full score of 100).

1 2. SPECIAL COMMENTS BY INSTRUCTOR

None.