Hand and Brain

Introduction and Course requirements

This course concerns the relationship of hand and brain from many different perspectives including structure, function, evolution and neural control. Two introductory chapters by Hollerbach and three primary books constitute the main reading. The books include: Human Hand Function, Lynette A. Jones and Susan J. Lederman, Oxford University Press, 2006; The Hand, Frank R. Wilson. Vintage, 1999 (paperback edition), and Hands, John Napier. Princeton Science Library. Additional reading includes 20 research articles. Laboratory demonstrations of hand function and motor adaptation will also be part of the course.

Each class will begin with a 90 minute lecture. After a 20 minute break, the class will resume with presentations and discussions of two of the reading papers. Two students will present and lead discussion of one of the papers and two other students will present the other paper. The entire class will participate in asking questions and discussing the papers. Over the semester each student will have participated in presenting two papers. There will be a brief 10 minute quiz at the end of each class.

The goal of the course is to give you a broad comprehensive knowledge of human hand function from biomechanics, and neuromuscular control to cognitive representation. The format is a combination of lecture and seminar.

Grading will be based on participation in class discussions, presentations of papers in class, the regular quizzes, and the final exam.

SYLLABUS

Jan 17  Introduction

Jan 24  Hands – John Napier
        Fundamentals of Motor Behavior – John Hollerbach
        Planning of Arm Movements – John Hollerbach

        Chapter 1: Dawn
        Chapter 2: The hand-thought-language nexus
        Chapter 3: The arm we brought down from the trees

        Chapter 4: Puppet lesions from Alexandria and Dusseldorf
        Chapter 5: Hand, eye and sky
        Chapter 6: The grip of the past

        Chapter 7: The twenty-four-karat thumb
        Chapter 8: The right hand knows what the left hand just did
        Chapter 9: Bad boys, polyliths, and the heterotechnic revolution

        Chapter 10: The articulate hand
Chapter 11: In tune and evolving prestissimo
Chapter 12: Lucy to Lulu to Rose

Mar 7  
Chapter 13: Tough, tender, and tenacious
Chapter 14: Hidden in the hand
Chapter 15: Head for the hands

Mar 14  
Midterm

Mar 21  
*Human Hand Function,* Lynette A. Jones and Susan Lederman
Chapter 1: Historical Overview and General Introduction
Chapter 2: Evolutionary Development and Anatomy of the Hand

Mar 28  
Lab Demos

Apr 4  
*Human Hand Function,* Lynette A. Jones and Susan Lederman
Chapter 3: Neurophysiology of Hand Function
Chapter 4: Tactile Sensing

Apr 18  
*Human Hand Function,* Lynette A. Jones and Susan Lederman
Chapter 5: Active Haptic Sensing
Chapter 6: Prehension

Apr 25  
*Human Hand Function,* Lynette A. Jones and Susan Lederman
Chapter 7: Non-prehensile Skilled Movements
Chapter 8: End-effector Constraints

May 2