PNP 201: Inquiry into Cognitive Science

SPRING 2012

Contact Information

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Overview

Our current understanding of the mind-brain has come from a number of quite different techniques and approaches. How, exactly, do these techniques and approaches work? Can they be compared, constrained, or orchestrated? How? This course offers answers to these questions through an investigation of various behavioral and biological techniques, the conclusions drawn from them, and the hopes for an integrated approach to the mind-brain.

Text

There is no single text for this class. Instead, papers, class slides, and group assignments will be made available through Telesis. Class slides will generally be made available before the relevant class, in case you want to print a copy for the purpose of taking notes. (Keep in mind that Powerpoint slides are not a substitute for coming to class!)

What to Expect

This class takes a more critical and methods-focused approach to cognitive science and cognitive neuroscience. More than anything, it will encourage you to focus on the *logic* of the techniques and experiments we will be exploring. You should always be asking: What did the researchers do, and *why*? What conclusions have they reached? Do the methods used and the data generated really support the conclusions being put forward?

I won't lie: the reading for this class can be technical and difficult. In the past, students have rating this course as being a difficulty of 7 to 8 (on a 10 point scale, with 10 as the most difficult). And though the readings will provide important details for the topics we discuss, the overarching ideas and context will come from lectures. *Thus, class attendance is mandatory.*

There is also a lot of group work required in this class. I firmly believe that one of the "unofficial" parts of your Wash. U. education is to "learn how to learn together", and to work with others to produce quality results. There are mechanisms in place to help ensure that everyone does their fair share—but, if there are any problems pertaining to group work, *please let me know immediately.*

Evaluation

Your final grade will be determined as follows:

Journal Club Reports: Five reports plus two peer evaluations, 7% each, 49%

Exams: 3 exams, 17% each, 51%

Participation: Although there is no "participation grade", participation is required. Extra credit will be given to those with perfect attendance. If you miss three classes, we will make an inquiry. If you miss four or more classes, you will fail the class unless you speak with us (and have a reasonable excuse).

Working Calendar, Unit I

Week 1: Introduction

T 1/17: "Alien Devices"

Introduction to class material and policies

Phrenology

Th 1/19: Mental taxonomy **Read**: Feinberg and Farah, "A Historical Perspective..."; Dobbs, "Fact or Phrenology"; Parssinen, "Popular Science..."

Week 2: Behavior and Information Processing 1

T 1/24: Using mazes to get at mental maps **Read:** Tolman "Cognitive Maps..."

Th 1/26: Using looking time to get at concepts **Read:** Baillargeon et. al. "Object Permanence..."

Week 3: Behavior and Information Processing 2

T 1/31: Using reaction time to get at processes. **Read:** Donders, "On the Speed on Mental Processes"

Th 2/2: Using reaction time to get at processes. **Read:** Sternberg, "Memory Scanning"

Week 4: Behavior and Processing

T 2/7: Review of brain anatomy and nomenclature

Th 2/9: Catch-up and review

Week 5a: Exam

T 2/14: Exam #1

Working Calendar, Unit II

Week 5b: Lesion Studies I

Th 2/16: Lesion studies **Read:** Scollville and Milner, "Loss of Recent…"; other readings TBA

Week 6: Lesion Studies II

T 2/21: Surgical lesion studies **Read:** SRG Chapter 3; Ungerleider and Mishkin, "Two Cortical…"

Th 2/23: Dissent: **Read:** Dunn and Kinser, Coltheart and Davies, Chater, and VanOrden and Kloos

Journal club #1 **Read**: Wilson et. al. "Neurotoxic Lesions…"

Week 7: Single Cell Recording

T 2/28: Vision and detection **Read:** SRG Chapter 6, Hubel and Wiesel, "Receptive Fields…"

Motor intention and population coding **Read:** Georgopoulos, "Neuronal Population…"

Th 3/1: Catch-up; Journal club #2 **Read:** Snyder et. al. "Coding of Intention in Posterior Parietal Cortex"

Week 8: Transcranial Magnetic Stimulation

T 3/6: TMS and virtual lesions **Read:** SRG Chapter 1; Ashbridge et. al. "Temporal aspects of visual search…"

Th 3/8: TMS and cognitive structure

Journal club #3 **Read:** Koch "Repetitive transcranial magnetic stimulation…"

March 13th-16th: Spring Break

Week 9: Catch-up and review

T 3/20: Catch-up and review

Th 3/22: Exam #2

Week 10: Brain Imaging I

T 3/27: Principles of PET. **Read:** Raichle, "Positron Emission Tomography" (also his Chapter 3 in Feinberg and Farah); Petersen et. al. "Positron Emission Tomographic Studies…"; reread Dobbs, "Fact or Phrenology"

Th 3/29: Principles of fMRI

Week 11: Brain Imaging II

T 4/3: Imaging and Epistemology **Read:** Bogen, "Functional Imaging Evidence"; Stufflebeam and Bechtel, "PET: Exploring the myth and the method"; van Orden and Papp "Functional neuroimages…"

Th 4/5: Journal club #4 **Read:** Berns et al, "Neural mechanisms of the influence…"

Week 12: Integration

T 4/10: Integrating Multiple Techniques **Read**: Bechtel, "Aligning Multiple Research Techniques"

Th 4/12: Using Skin Conductance to get at emotion **Read:** SRG Chapter 5

Week 13: Social Cognitive Neuroscience

T 4/17: "Levels" of explanation **Read:** Ochsner and Lieberman, "The Emergence…"

Th 4/19: Social cognitive neuroscience

Journal club #5 **Read:** Lieberman and Rosenthal "Why Introverts Can't Always Tell Who Likes Them"

Week 14: Mechanism

T 4/24: Explanation in Science **Read:** Machamer, Darden, and Craver, "Thinking about Mechanisms"

Mechanism and memory **Read:** Craver, "The Making of a Memory Mechanism"

Th 4/26: Putting it all together

The **Final Exam** is scheduled for **Tuesday, May 8th, 1-3 PM**