

Higher Level Cognition Proseminar (PSYC 5815)

<http://psych.colorado.edu/~munakata/teaching/prosem07/>
WF 11:00 - 12:40, Spring 2007, Muenzinger D156

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Goals: The objective of this proseminar is to introduce graduate students to fundamental issues in the study of higher level cognition. We will start with origins (evolutionary and developmental) and basic mechanisms (e.g., active maintenance, inhibition, and symbols). We will bring these perspectives to understanding a range of topics in the study of higher level cognition (e.g., intelligence, reasoning, decision-making, and morality), as investigated through a variety of methods (e.g., behavioral, neuroimaging, neurophysiological, and computational).

The course is a module in the six-module proseminar sequence for beginning graduate students in cognitive psychology. It is organized around assigned readings and student presentations.

Readings: Course readings are available at the class web site; the list appears at the end of the syllabus.

Evaluation: Final grades will be based largely on a take-home essay exam, and leading and participating in class discussion:

Final exam	50%
Class participation	15%
Discussion leading	15%
Reading reactions	10%
Discussion-leading feedback	5%
Student-submitted exam questions	5%

Final exam: A take-home essay exam will be distributed on Friday 5/4 (the last class meeting). The exam will be due in my mailbox by 5:00 pm on Friday 5/11. Students must complete the exam individually – no communication between class members about the exam will be permitted. This exam will be counted toward fulfillment of the Preliminary Exam requirements.

Class participation: This seminar is discussion-oriented. Your preparation, participation, and cooperation as a group is essential for this format to work. You are expected to read the readings the week they are assigned and to come to class prepared to ask questions and actively participate in discussion. 50% of your participation grade will be a shared grade for the group, and 50% will be individual.

To support and encourage effective discussions, in the first class we will discuss “What makes a discussion bad (and what we can do about it).” Throughout the term, we will evaluate the effectiveness of our discussions, and I will welcome suggestions on how to improve them to help us get the most out of them.

Discussion leading: You will be asked to lead discussion in 1-2 class sessions. Such session leading may include very brief presentation of key points from the readings, posing of questions for discussion, and moderating of discussion/debate. Discussion leaders will also be expected to prepare by reading additional relevant papers and to use knowledge gained from these papers to help the class consider the topic of the day. We have provided Optional readings on the web site as possible additional papers, but these are just

suggestions – you should not feel obligated to use these or constrain yourself to them. Discussion leaders should also read students’ reading reactions (see below) in preparation.

Reading reactions: For each set of readings (except for the ones that you are leading discussion on), you will be asked to email a few sentences with your reactions. These reactions should include comments or questions that are relevant to the readings and may provide a useful direction for the class discussion. These reading reactions are designed to ensure that you are prepared for discussion, and have provided information about your perspective. Reading reactions should be emailed to the class mailing list (prosem07@grey.colorado.edu) by the evening before each class (6:00 pm deadline).

Discussion-leading feedback: Students who are not leading discussion will provide feedback to discussion leaders, following the method pioneered by Lew Harvey. After each discussion (before the next class meeting), students should email us with at least 3 “Strong Points” and 3 “Weak Points” for that discussion-leading. We will compile these comments, and give them to each discussion-leader anonymously and privately. Students should strive for improvement on their second discussion-leading.

Student-submitted exam questions: Each student will submit (email to us) two possible questions for the take-home essay exam. The best questions will encourage integration across topics. The major incentive to write good questions is that your own question (or some variant thereof) might appear on the final exam. The questions will be due Monday 4/30.

Grading Policy: Grades are not curved; they are based on percentages:

97-100	A+	87-89	B+	77-79	C+	67-69	D+
93-96	A	83-86	B	73-76	C	63-66	D
90-92	A-	80-82	B-	70-72	C-	60-62	D-

Schedule

3/14/07 **Origins: Evolutionary**

A mind fit for mating. Chapter 4 from Miller, G. F. (2000). *The mating mind: How sexual choice shaped the evolution of human nature*. New York: Doubleday.

3/16/07 **Origins: Developmental**

Scerif & Karmiloff-Smith (2005). The dawn of cognitive genetics? Crucial developmental caveats. *Trends in Cognitive Sciences*, 9, 126-135.

pp. 458-472 of Diamond, A. (2002). A model system for studying the role of dopamine in prefrontal cortex during early development in humans. In M. H. Johnson, Y. Munakata & R. O. Gilmore (eds.), *Brain Development and Cognition* (pp. 441-493). Oxford: Blackwell Publishers.

3/21/07 **Prototype: Prefrontal cognitive review**

Duncan, J. and Owen, A. M. (2000). Common regions of the human frontal lobe recruited by diverse cognitive demands. *Trends in Neurosciences*, 23(10):475-483.

3/23/07 Basic Mechanisms: Active maintenance

Miller, E.K. and Cohen, J.D. (2001) An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24:167-202.

3/26/07-3/30/07 Spring Break**4/4/07 Basic Mechanisms: Inhibition**

Anderson, M.C. (2005). The role of inhibitory control in forgetting unwanted memories: A consideration of three methods. In C. MacLeod & B. Uttl (Eds.) *Dynamic Cognitive Processes*. Springer-Verlag. Tokyo. pages 159-190.

Hasegawa, R.P., Peterson, B.W., and Goldberg, M.E. (2004). Prefrontal neurons coding suppression of specific saccades. *Neuron*, 43, 415-425.

4/6/07 Basic Mechanisms: Inhibition reconsidered

MacLeod, C. M., Dodd, M. D., Sheard, E. D., Wilson, D. E., & Bibi, U. (2003). In opposition to inhibition. In B. H. Ross (Ed.), *The Psychology of Learning and Motivation*, Vol. 43 (pp. 163-214). San Diego, CA: Academic Press.

4/11/07 Basic Mechanisms: Symbols and rules

DeLoache, J. S., (2004). Becoming symbol-minded. *Trends in Cognitive Sciences*, 8, 66-70.

Rougier, N.P., Noelle, D., Braver, T.S., Cohen, J.D. & O'Reilly, R.C. (2005). Prefrontal Cortex and the Flexibility of Cognitive Control: Rules Without Symbols. *Proceedings of the National Academy of Sciences*, 102, 7338-7343.

4/13/07 Task-switching

Monsell, S. (2003) Task switching. *Trends in Cognitive Sciences*, 7, 134-140.

Reynolds, JR, Braver, TS, Brown, JW, Van der Stigchel, S. (2006). Computational and neural mechanisms of task switching. *Neurocomputing*, 69, 1332-1336.

4/18/07 Intelligence

Gray, JR, Chabris, CF, & Braver, TS (2003). Neural mechanisms of general fluid intelligence. *Nature Neuroscience*, 6, 316-322.

Conway, ARA, Kane, MJ, & Engle, RW (2003). Working memory capacity and its relation to general intelligence. *Trends in Cognitive Sciences*, 7, 547-552

4/20/07 Planning/Problem-solving

J. M. Fincham, C. S. Carter, V. van Veen, V. A. Stenger, and J. R. Anderson (2002). Neural mechanisms of planning: A computational analysis using event-related fMRI. *PNAS*, 99(5): 3346 - 3351.

Unterrainer, J.M., Rahm, B., Kaller, C.P., Ruff, C.C., Spreer, J., Krause, B.J., Schwarzwald, R., Hautzel, H., & Halsband, U. (2004). When planning fails: Individual differences and error-related brain activity in problem solving. *Cerebral Cortex*, 14, 1390-1397.

4/25/07 Reasoning

Oaksford, M., & Chater, N. (2001). The probabilistic approach to human reasoning. *Trends in Cognitive Sciences*, 5, 349-357.

Rips, LJ (2001). Two kinds of reasoning. *Psychological Science*, 12, 129-134.

4/27/07 Decision-making

McCoy, A.N. and Platt, M. L. (2005). Expectations and outcomes: decision-making in the primate brain. *J Comp Physiol A Neuroethol Sens Neural Behav Physiol*, 191, 201-211.

Maia, T. V. and McClelland, J. L. (2004). A re-examination of the evidence for the somatic marker hypothesis: What participants know in the Iowa gambling task. *Proceedings of the National Academy of Sciences*, 101, 16075-16080.

5/2/07 Morality

Greene, J.D., Nystrom, L.E., Engell, A.D., Darley, J.M., & Cohen, J.D. (2004). The neural bases of cognitive conflict and control in moral judgment. *Neuron*, 44, 389-400.

Casebeer, WD (2003). Moral Cognition and its Neural Constituents. *Nature Reviews Neuroscience*, Vol. 4, No. 10, 840-846.

5/4/07 Consciousness

Maia, T.V. & Cleeremans, A. (2005). Consciousness: Converging insights from connectionist modeling and neuroscience. *Trends in Cognitive Sciences*, 9 (8), 397-404.

Marois, R., Yi, DJ, Chun, MM (2004). The neural fate of consciously perceived and missed events in the attentional blink. *Neuron*, 41: 465-472.

The University of Colorado requests inclusion of the following policies on syllabi.

CU Policy for Students with Disabilities

If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, or <http://www.Colorado.EDU/disabilityservices>.

CU Sexual Harrassment Policy

The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty. Sexual harassment is unwelcome sexual attention. It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combination of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall. Any student, staff or faculty member who believes s/he has been sexually harassed

should contact the Office of Sexual Harassment (OSH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the OSH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at: <http://www.colorado.edu/sexualharassment>.

CU Religious Observance Policy

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please notify the instructor of anticipated conflicts as early in the semester as possible so that there is adequate time to make necessary arrangements. See policy details at http://www.colorado.edu/policies/fac_relig.html.

CU Classroom Behavior Policy

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which students express opinions. See policies at <http://www.colorado.edu/policies/classbehavior.html> and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code.

CU Honor Code

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Additional information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode>.