

COGNITIVE NEUROSCIENCE I

PSYCH3BN3

Course Outline For Fall 2007

Course Objectives

This course will survey cognitive neuroscience methods such as brain imaging, neural network modelling, and behavioural testing of neuropsychological patients, toward an understanding of the neurocognitive mechanisms underlying behaviour. Lectures will cover both textbook chapters and 24 selected readings from the current literature. Students are expected to develop an appreciation for the range of techniques used by cognitive neuroscientists, when they are applicable and what they can tell us about cognitive and brain functions, as well as an ability to evaluate critically the scientific literature.

During the first two weeks, introductory material will be covered in a traditional lecture format. In subsequent weeks, for each of the 6 major topic areas, there will be a one-hour introductory lecture given by the instructor followed by four hours of paper presentations and discussions, with the papers presented by students, and the instructor directing and facilitating the discussions.

Materials and Fees

1. Course text: Cognitive Neuroscience: The Biology of the Mind, 2nd Edition, By M.S. Gazzaniga, R.B. Ivry and G.R. Mangun, NY: W.W. Norton & Company, 2002.

2. 24 articles from the recent literature (see final version of syllabus online).

To promote a high quality of in-class discussion, students are expected to have at least skimmed every paper before class, and to have read in great detail the 3 or more papers for which they are writing critiques.

The readings are freely available electronically from the McMaster library web pages (accessible from any on-campus computer), with links to these articles from the following password-protected

READINGS WEB PAGE:

<http://www.science.mcmaster.ca/psychology/psych3bn3/lecturenotes/papers/index.html> The course userid and password can be obtained from your instructor or TA.

Assessment

Participation	10%
Three 2-page critiques of papers	30%
One 20-30 minute oral presentation	20%
One final take-home exam	40%

Marks for participation are based on 1) providing feedback to other students on their presentations, by filling out a very brief evaluation form at the end of each presentation, and 2) contributing to the class discussions of the 24 papers. The participation mark will be calculated as follows:

- Feedback: 1 mark for submitting 1-5 feedback forms with informative and helpful feedback, 2 marks for 6-10 forms, 3 marks for 11-15, 4 marks for 16-20, and 5 marks for 21 or more.
- Contribution to discussions: 1 mark for contributing in a substantial way (not just asking clarification type questions) to 1 paper discussion, 2 marks for 2-3, 3 marks for 4-7, 4 marks for 8-15, 5 marks for 16 or more.

For the critiques, students will each be randomly assigned 6 papers covering all 6 topic areas. Of those, they can choose at least 3 papers to critique. If more than 3 critiques are turned in, only the best 3 scores will be counted. Critiques are due at the start of class on the day the paper is being presented.

Late critiques submitted after the paper has been presented in class cannot be accepted.

Please read the guidelines for presentations and critiques on [this link](#).

The assignment of critiques and paper presentation dates to students can be found at [this link](#).

An example of a well written critique by a student who previously took Psych3BN3 can be found on [this link \(pdf file\)](#).

The marking scheme for presentations can be found on [this link](#).

Sample final exam questions from previous years can be found on [this link](#).

Lecture topics, readings, and links to lecture outlines

Introductory Lectures

Sept 6, 10, 12, 13, 17, 19: Introduction to the nervous system, and cognitive neuroscience methods.

Links to lecture outlines:

[Lecture 1 \(pdf file\)](#)

[Lecture 2 \(pdf file\)](#)

[Lecture 3 \(pdf file\)](#)

[Lecture 4, chapter 4, part I \(pdf file\)](#)

[Lecture 5, chapter 4, part II \(pdf file\)](#)

[Lecture 6, chapter 4, part III \(pdf file\)](#)

Readings:

- Chapters 1 through 4 in Gazzaniga textbook.

Topic 1: Learning and memory

[Link to lecture outline \(pdf file\)](#)

Readings:

- **Sept 20 (lecture)**

Chapter 8 in Gazzaniga book.

- **LM1 Sept 24**

Robert E. Clark, Nicola J. Broadbent, Stuart M. Zola, and Larry R. Squire (2002), Anterograde Amnesia and Temporally Graded Retrograde Amnesia for a Nonspatial

Memory Task after Lesions of Hippocampus and Subiculum *Journal of Neuroscience* 22:4663-4669.

[Link to Erin and Anna's presentation \(PDF\)](#)

- **LM2 Sept 26**

Rosenbaum, R.S., Winocur, G. and Moscovitch, M. (2001), New views on old memories: re-evaluating the role of the hippocampal complex. *Behavioural Brain Research*, 127:183-197.

[Link to Zack and Andrew's presentation \(PDF\)](#)

- **LM3 Sept 27**

Baddeley A, Vargha-Khadem F, Mishkin M. (2001), Preserved recognition in a case of developmental amnesia: implications for the acquisition of semantic memory? *Journal of Cognitive Neuroscience* 13(3):357-69.

[Link to Katherine and Kelly's presentation \(PDF\)](#)

- **LM4 Oct 1**

Katharina Henke, Christian R. A. Mondadori, Valerie Treyer, Roger M. Nitsch, Alfred Buck and Christoph Hock, (2003), Nonconscious formation and reactivation of semantic associations by way of the medial temporal lobe, *Neuropsychologia* 41 (8):863-876.

[Link to Laura's presentation \(PDF\)](#)

Topic 2: Cerebral lateralization

[Link to lecture outline \(pdf file\)](#)

Readings:

- **October 3 (lecture)**

Chapter 10, Gazzaniga

- Oct 4, 10, 11, 15: paper presentations and discussions

- **CL1 October 4:**

Long, D.L. and Baynes, K. (2002), Discourse Representation in the Two Cerebral Hemispheres, *J. Cogn. Neurosci.* 2002 14: 228-242

[Link to Bailey and Briana's presentation \(PDF\)](#)

- **CL2 October 10:**

Stanley Finger, Randy L. Buckner and Hugh Buckingham (2003), Does the right hemisphere take over after damage to Broca's area? the Barlow case of 1877 and its history, *Brain and Language* 85(3)Pages 385-395

[Link to Bashar's presentation \(PDF\)](#)

- **CL3 October 11:**

Golby, A. J., Poldrack, R. A., Brewer, J. B., Spencer, D., Desmond, J. E., Aron, A. P., & Gabrieli, J. D. E. (2001) Material-specific lateralization in the medial temporal lobe and prefrontal cortex during memory encoding. *Brain* 124: 1841-1854

[Link to Michelle's presentation \(PDF\)](#)

- **CL4 October 15:**

Graae, F., Tenke, C., Bruder, G., Rotheram, M.J., Piacentini, J., CastroBlanco, D., Leite, P. and Towey, J. (1996), Abnormality of EEG alpha asymmetry in female

adolescent suicide attempters, *Biological Psychiatry* 40 (8): 706-713 OCT 15 1996.
Note: the presenter of CL4 may wish to use the following article for additional background and discussion: Weinberg, I. (2000), The prisoners of despair: right hemisphere deficiency and suicide, *Neuroscience and Biobehavioral Reviews*, 24: 799-815.

[Link to Andrew's presentation \(PDF\)](#)

Topic 3: Reward and decision-making

[Link to lecture outline \(pdf file\)](#)

Readings:

- **October 17 (Lecture)**

Chapter 12 in Gazzaniga textbook

- Oct 18, 22, 24, 25: paper presentations and discussions

- **RD1 October 18**

Alan G. Sanfey, Reid Hastie, Mary K. Colvin and Jordan Grafman (2003) Phineas gauged: decision-making and the human prefrontal cortex, *Neuropsychologia* 41(9) Pages 1218-1229.

[Link to Evan's presentation \(PDF\)](#)

- **RD2 October 22:**

Manes F, Sahakian B, Clark L, Rogers R, Antoun N, Aitken M, Robbins T. Decision-making processes following damage to the prefrontal cortex. *Brain*. 2002 Mar;125(Pt 3):624-39.

[Link to Maya's presentation \(PDF\)](#)

- **RD3 October 24 (For RD3, present/critique both articles)**

1. O'Doherty JP, Dayan P, Friston K, Critchley H, Dolan RJ (2003), Temporal difference models and reward-related learning in the human brain, *NEURON* 38 (2): 329-337 APR 24 2003.

2. Seymour, B., Daw, N., Dayan, P., Singer, T. and Dolan, R. (2007), Differential encoding of losses and gains in the human striatum *Journal of Neuroscience* 27 (18): 4826-4831 MAY 2 2007

- **RD4 October 25 (For RD4, present/critique both articles)**

1. Jensen, J., McIntosh, A.R., Crawley, A.P., Mikulis, D.J., Remington, G. and Kapur, S. (2003), Direct activation of the ventral striatum in anticipation of aversive stimuli *Neuron* 40 (6): 1251-1257 DEC 18 2003.

2. Jensen, J., Smith, A.J., Willeit, M., Crawley, A.P., Mikulis, D.J., Vitcu, I., Kapur, S. (2007), Separate brain regions code for salience vs. valence during reward prediction in humans. *HUMAN BRAIN MAPPING* 28 (4): 294-302 APR 2007

[Link to Jackie and Sarah's presentation \(PDF\)](#)

Topic 4: Emotion

[Link to lecture outline \(pdf file\)](#)

Readings:

- **October 29 (lecture):**

Chapter 13 in Gazzaniga textbook

- Oct 31, Nov 1, 5, 7 : paper presentations and discussions
- **EM1 October 31:**
Bartels, A. and Zeki, S. (2004), The neural correlates of maternal and romantic love
Neuroimage 21 (3): 1155-1166 MAR 2004.
[Link to Aaron's presentation \(PDF\)](#)
- **EM2 November 1**
Siegle GJ, Steinhauer SR, Thase ME, Stenger VA, Carter CS. (2002), Can't shake that feeling: event-related fMRI assessment of sustained amygdala activity in response to emotional information in depressed individuals. *Biol Psychiatry*. 2002 May 1;51 (9):693-707.
[Link to Sarah's presentation \(PDF\)](#)
- **EM3 November 5**
Malhi GS, Lagopoulos J, Sachdev P, et al. (2004), Cognitive generation of affect in hypomania: an fMRI study *BIPOLAR DISORDERS* 6(4):271-285.
[Link to Amrit's presentation \(PDF\)](#)
- **EM4 November 7**
Brewin, C.R. (2001). A cognitive neuroscience account of posttraumatic stress disorder and its treatment. *Behaviour Research and Therapy*, Volume 39, pages 373-393.
[Link to Nick's presentation \(PDF\)](#)

Topic 5: Development and plasticity

[Link to lecture outline \(pdf file\)](#)

Readings:

- **Nov 8**
Chapter 15 in Gazzaniga textbook
- Nov 12, 14, 15, 19: paper presentations and discussions
- **DP1 Nov 12**
Vicari S, Albertoni A, Chilosi AM, Cipriani P, Cioni G, Bates E. (2000), Plasticity and reorganization during language development in children with early brain injury. *Cortex*. 2000 Feb;36(1):31-46.----->
[Link to Lisa's presentation \(PDF\)](#)
- **DP2 Nov 14**
Mosch SC, Max JE, Tranel D (2005), A matched lesion analysis of childhood versus adult-onset brain injury due to unilateral stroke - Another perspective on neural plasticity and recovery of social functioning. *Cognitive and Behavioral Neurology* 18 (1): 5-17
[Link to Swiya's presentation \(PDF\)](#)
- **DP3 Nov 15**
Karbe H, Thiel A, Weber-Luxenburger G, Herholz K, Kessler J, Heiss WD (1998), Brain plasticity in poststroke aphasia: What is the contribution of the right hemisphere? *BRAIN AND LANGUAGE* 64 (2): 215-230 SEP 1998
[Link to Sam's presentation \(PDF\)](#)

- **DP4 Nov 19:**
Amunts K, Schleicher A, Ditterich A, Zilles K (2003) Broca's region: Cytoarchitectonic asymmetry and developmental changes. *JOURNAL OF COMPARATIVE NEUROLOGY* 465 (1): 72-89
[Link to Jon's presentation \(PDF\)](#)

Topic 6: Consciousness

[Link to lecture outline \(pdf file\)](#)

Readings:

- **Nov 21**
Chapter 15 in Gazzaniga textbook
- Nov 22, 26, 28, 29: paper presentations and discussions
- **CO1 November 22:**
P. Rainville, R. K. Hofbauer, M. C. Bushnell, G. H. Duncan, and D. D. Price (2002), Hypnosis Modulates Activity in Brain Structures Involved in the Regulation of Consciousness. *J. Cognitive Neuroscience*, August 1, 2002; 14(6): 887 - 901.
[Link to Noam's presentation \(PDF\)](#)
- **CO2 November 26**
B. Kotchoubey, A. Kibler, U. Strehl and N. Birbaumer (2002), Can humans perceive their brain states?. *Consciousness and Cognition* 11 (2002), pp. 98-113.
[Link to Nicole's presentation \(PDF\)](#)
- **CO3 November 28 (present/critique both C3 papers)**
 1. Driver, J., Vuilleumier, P, Eimer, M. and Rees, G. (2001), Functional magnetic resonance imaging and evoked potential correlates of conscious and unconscious vision in parietal extinction patients *Neuroimage* 14 (1): S68-S75 Part 2 Suppl. S, JUL 2001
 2. Kinsbourne, M. (2006), From unilateral neglect to the brain basis of consciousness *CORTEX* 42 (6): 869-874 AUG 2006

[Link to Alessia's presentation \(PDF\)](#)
- **CO4 November 29**
Srinivasan R, Russell DP, Edelman GM, Tononi G (1999), Increased synchronization of neuromagnetic responses during conscious perception. *Journal of Neuroscience* 19 (13): 5435-5448 JUL 1 1999
[Link to Kajal and Olivia's presentation \(PDF\)](#)

Missed Presentations

If a student must miss a presentation due to illness, then as per McMaster's Policy For Absence from School Due to Illness or Compassionate Reasons "... you must bring appropriate documentation to the Office of the Associate Dean of Science (Studies) within one week of the original date of the missed work, and fill out the "Information For Missed Term Work Form". For further details see <http://www.science.mcmaster.ca/~associatedean/services/exemptions.html>.

In such cases, the student will be required to schedule an individual appointment with the instructors at an alternative time to give his/her presentation.

In addition, the student is asked to email the instructor *and* the teaching assistant with as much advance notice as possible, because one of them will have to cover the student's missed presentation during the originally scheduled class time so that other students may still take part in the paper discussion.

Calculator requirement:

Calculators will not be required during tests.

Calendar Description

See http://registrar.mcmaster.ca/CALENDAR/year2007/crs_2178.htm.

Academic integrity:

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at

<http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf>.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Related courses taught by Sue Becker

Psych 2D03 - Introduction to Neuropsychology

[Psych 734 - Neural network models of learning \(graduate course\)](#)

Outline Last Revised: Sept 21, 2007.