

INTRODUCTION TO NEUROPSYCHOLOGY
Psychology 246: Fall 2003

Meeting Time and Location: Monday 1:00-3:30 Davie Hall 302

Instructor: Dr. Marilyn Hartman
256 Davie Hall, Psychology Dept. CB # 3270
962-3987 or hartman@email.unc.edu

Office Hours: By appointment

This course provides an introduction to neuropsychology, the study of brain-behavior relationships. The goal of this course is to provide a background for students interested in either clinical neuropsychology or research in the areas of clinical and cognitive neuropsychology. The course will provide a foundation for practicum and internship training in neuropsychology, for conducting neuropsychological research, and for reading the neuropsychological literature.

The first part of the course covers basic principles and methods in neuropsychology and an overview of the functional organization of the central nervous system. Following this introduction, the bulk of the course will concentrate on the neuropsychology of cognitive processes in each of the major domains. Because clinical neuropsychology is concerned primarily with patients with neurological disorders, these patients will form the heart of our discussions, although at times we will also study healthy individuals and review findings derived from animal models. The course will also provide an introduction to clinical neuropsychological tests, as well as research tasks and electrophysiological and imaging techniques.

Course Requirements

The class meetings will involve a combination of lecture and discussion. You are expected to read and *study* the assigned pages ahead of time. Warning: Do not expect to be able to read the assignments at one sitting! Further, if you wish to master the material, you will need to review the information multiple times!

Exams. There will be an in-class *midterm* and a *cumulative final exam* that include short answer questions as well as essays. Each of these counts for 40% of your grade.

Neuroanatomy quiz. Because basic neuroanatomical terminology will be needed throughout the course, it is important that you master this material at the beginning of the semester. In order to ensure your mastery of basic neuroanatomy, there will be a take-home, closed book 'self-quiz' that that you should take and grade for yourself before the third class. I urge you to aim for 85% or better, so try to master the material **before** taking the quiz. Timely completion of the self-quiz is a course requirement, and I will collect them to record the grades. The first website listed below may be a helpful resource for mastering this material, because it contains self-quizzes. This quiz comprises 5% of your grade.

Written reviews of journal articles. Each student will be required to write brief (2 page) reviews of three journal articles other than those assigned for the whole class. Each student will be asked to find one article. Students will be divided up so that we will have a representation of each of three types of article, with approximately 5 of each type: functional neuroimaging studies, group studies of neurological patients, or detailed case studies. All the articles must be related to the cognitive domains covered in class, and they must be relatively recent empirical articles.

After we have assembled these articles, they will all be made available to the entire class, and students can then choose which of articles to use for their reviews, with the restriction that one review must be based on one of each type of article listed above. Each review should focus on the contribution (or lack of clear contribution) the article makes to our knowledge of neuropsychology. In order to do so, provide a short summary but devote the majority of the review to a critique with respect to the rationale for the study, the methods, results and interpretation. To the extent possible, integrate the review with related material covered in the textbook and other assigned readings.

The citation and abstract of each article must be submitted for my approval by Oct. 27. Once approved, I will arrange to have the articles scanned and made available to the whole class by Nov. 3. The reviews will be due Nov 10, Nov 24, and the last one by 5 PM on December 10. My goal is to provide you feedback on each review before you write the next one. These reviews will comprise 15% of your grade.

To find appropriate articles, consider the following journals (arranged alphabetically). You are not limited to these journals, of course.

- Brain
- Brain and Cognition
- Brain and Language
- Cognitive Neuropsychology
- Cortex
- Journal of Clinical and Experimental Neuropsychology
- Journal of Cognitive Neuroscience
- Journal of the International Neuropsychological Society
- NeuroImage
- Neuropsychologia
- Neuropsychology
- Science

Readings:

1. Banich, M. T. (2004). *Cognitive neuroscience and neuropsychology*. New York: Houghton Mifflin. This is available in the bookstore. See schedule for page assignments.
2. Additional required readings will be available via PDF files or on the door to my office.
3. Two books that provide a wealth of information about clinical neuropsychological tests. They are not required, but you may find them useful to refer to or to add to your personal library. You may borrow them overnight from me or find them in the library.
 - a. Lezak, M. (1995). *Neuropsychological assessment (3rd Ed.)*. New York: Oxford Press. This is the neuropsychologist's 'bible.' It is unsurpassed in its coverage.
 - b. Spreen, O., & Strauss, E. (1998). *A compendium of neuropsychological tests: Administration, norms, and commentary (2nd Ed.)*. New York: Oxford Press.
4. Neuroanatomy atlases are also available on the web. Here are a few that you might find useful:
 - (a) <http://sig.biostr.washington.edu/projects/da/> This shows excellent views of the brain. It includes 3-D images of various structures. You can click on structures to find the name or quiz yourself on your knowledge. Highly recommended!
 - (b) <http://www.med.harvard.edu/AANLIB/home.html> This is a large site with views of brains using MRI and PET from different views. It also illustrates changes in the brain with a variety of clinical conditions, such as brain tumors and AIDS dementia.
 - (c) <http://www.neuropat.dote.hu/> This site has many components: neuroanatomy, neuropathology, etc.
 - (d) I also recommend the following book: DeArmond, S. J., Fusco, M. M., & Dewey, M. M. (1989). *Structure of the human brain: A photographic atlas (3rd Ed.)*. New York: Oxford University. The book has photographs accompanied by labeled diagrams and views of the brain for many different sections. You may borrow the book from me or find it in the library.

SCHEDULE OF CLASSES

September 8 Introduction to Neuropsychology

Wilson, B. A., & Wearing, D. (1995). Prisoner of consciousness: A state of just awakening following herpes simplex encephalitis. In R. Campbell & M. A. Conway (Eds.), *Broken memories* (pp. 14-28). Cambridge, MA: Blackwell.

Banich: Chapter 1 (pp. 3-39). Make a first pass at this chapter, reading it for overall comprehension and then starting to learn what it says about topics listed on the study guide for class #1. We'll come back to this chapter again next week.

Study guide #1

September 15 Principles of Brain Organization.

Banich: Chapter 1 (pp. 3-39). A second pass.

Kolb, B. & Wishaw, I. Q. (1996). Part of Chapter 24: pp. 165-177. *Fundamentals of human neuropsychology* (4th Edition), New York: W. H. Freeman.

Banich: Chapter 3 (pp. 61 – 79)

September 22 Principles of Brain Organization

Neuroanatomy self-quiz is due at 1 PM

I. Methods: Neurological Patients and Direct Measures of Brain Neuroanatomy

II. Brain hemispheric specialization

Banich: Chapter 3 (pp. 79 - 109)

Banich: Chapter 4 (pp. 113 – 133; 140 – 141)

September 29 Motor and Visual Functions

Banich: Chapter 5 (pp. 146-170; 178-182)

Banich: Chapter 6 (pp. 185-194)

Martin, A., Haxby, J. V., Lalonde, F. M., Wiggs, C. L., & Ungerleider, L. G. (1995).

Discrete cortical regions associated with knowledge of color and knowledge of action. *Science*, 270, 102-105.

October 6 Object and Face Recognition

Banich: Chapter 6 (pp. 194 - 218)

Tippett, L. J., Blackwood, K., & Farah, M. J. (2003). Visual object and face processing in mild-to-moderate Alzheimer's disease: from segmentation to imagination.

Neuropsychologia, 41, 453-468

De Renzi, E., & Di Pellegrino, G. (1998). Prosopagnosia and alexia without object agnosia. *Cortex*, 34, 403-415.

October 13 Midterm

October 20 Spatial Perception

Banich: Chapter 7 (pp. 222 – 249)

James, T. W., Culham, J., Humphrey, G. K., Milner, A. D., & Goodale, M. A. (2003).

Ventral occipital lesions impair object recognition but not object-directed grasping: An fMRI study. *Brain*, 126.

October 27 Spatial Attention

- Banich: Chapter 8 (pp. 253 – 283). Also review Chapter 7 (pp. 243-245)
- Pavese, A., Coslett, H. B., Saffran, E., & Buxbaum, L. (2002). Limitations of attentional orienting: Effects of abrupt visual onsets and offsets on naming two objects in a patient with simultanagnosia. *Neuropsychologia*, *40*, 1097-1103.
- Mapstone, M., Weintraub, S., Nowinski, C., Kaptanoglu, G., Gitelman, D. R., & Mesulam, M-M. (2003). Cerebral hemispheric specialization for spatial attention: Spatial distribution of search-related eye fixations in the absence of neglect, *Neuropsychologia*, *41*, 1396-1409.

November 3 Language

- Banich: Chapter 9 (pp. 286-320)

November 10 Language

First journal review due

- Price, C. J., Mummary, C. J., Moore, C. J., Frackowiak, R. S. J., & Friston, K. J. (1999). Delineating necessary and sufficient neural systems with functional imaging studies of neuropsychological patients. *Journal of Cognitive Neuroscience*, *11*, 371-382.
- Boatman, D., Gordon, B., Hart, J., Selnes, O., Miglioretti, D., & Lenz, F. (2000). Transcortical sensory aphasia: Revisited and revised. *Brain*, *123*, 1634-1642.
- Shapiro, K., & Caramazza, A. (2003). Grammatical processing of nouns and verbs in left frontal cortex? *Neuropsychologia*, *41*, 1189-1198.
- Hagoort, P., Wassenaar, M., & Brown, C. (2003). Real-time semantic compensation in patients with agrammatic comprehension: Electrophysiological evidence for multiple-route plasticity. *Proceedings of the National Academy of Science*, *100*, 4340-4345.

November 17 Memory

- Banich: Chapter 10 (pp. 323 – 362)

- Brewer, J. B., Zhao, Z., Glover, G. H., & Gabrieli, J. D. E. (1998). Making memories: Brain activity that predicts whether visual experiences will be remembered or forgotten. *Science*, *281*, 1185-1187.

November 24 Memory

Second journal review due

Fleischman, D. A., Vaidya, C. J., Lange, K. I., Gabrieli, J. D. (1997). A dissociation between perceptual explicit and implicit memory processes. *Brain and Cognition*, 35, 42-57.

Poldrack, R. A., & Gabrieli, J.D. E. (2001). Characterizing the neural mechanisms of skill learning and repetition priming: Evidence from mirror reading. *Brain*, 124, 67-82.

Kensinger, E. A., Clarke, R. J., & Corkin, S. (2003). What neural correlates underlie successful encoding and retrieval? A functional magnetic resonance imaging study using a divided attention paradigm. *Journal of Neuroscience*, 23, 2407-2415.

(optional) Cabeza, R., Anderson, N. C., Locantore, J. K., & McIntosh, A. T. (2002). Aging gracefully: Compensatory brain activity in high-performing older adults.

NeuroImage, 17, 1394-1402.

December 1 Executive Functioning

Banich: Chapter 11 (pp. 366-391)

Duncan, J., Burgess, P., & Emslie, H. (1995). Fluid intelligence after frontal lobe damage. *Neuropsychologia*, 33, 261-268.

Duncan, J., Seitz, R. J., Kolodny, J. Bor, D., Herzog, H., Ahmed, A., Newell, F. N., & Emslie, H. (2000). A neural basis for general intelligence. *Science*, 289, 457-460.

D'Esposito, M. et al. (1995). The neural basis of the central executive of working memory. *Nature*, 378, 279-281.

December 8 Executive Functioning

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

Wagner, A. D., Maril, A., Bjork, R. A., & Schacter, D. L. (2001). Prefrontal contributions to executive control: fMRI evidence for functional distinctions within lateral prefrontal cortex. *NeuroImage*, 14, 1337-1347.

Sylvester, C-Y. C., Wager, T. D., Lacey, S. C., Hernandez, L., Nichols, T. E., Smith, E. E., & Jonides, J. (2003). Switching attention and resolving interference: fMRI measures of executive functions. *Neuropsychologia*, 41, 357-370.

Bechara, A., Damasio, H., Tranel, D., & Damasio, A. R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science*, 275, 1293-1295.

Bechara, A., Damasio, H., Tranel, D., & Anderson, S. W. (1998). Dissociation of working memory from decision making within the human prefrontal cortex. *Journal of Neuroscience*, 18, 428-437.

***** December 10 at 5 PM – Deadline for Submitting Final Critique*****

***** December 17 at Noon -- Final Exam *****