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Office Hours: Wed. after class (or by appt)

**FUNDAMENTALS OF HUMAN NEUROPSYCHOLOGY**

Exposition of research and theory in neuroscience with an emphasis on the use of the neural imaging techniques (EEG, evoked potentials, MEG, PET, fMRI) for exploring sensation, perception, and cognition in the healthy, intact brain.

1. Readings will be assigned every week and students will be asked to email questions to me on Monday by 12 noon (20%). There will be a penalty for late questions. I will then distribute an entire list to class members via email, to facilitate class discussion

2. After the introductory classes, students will be assigned a class in which they will lead the discussion (20%). Two to four people will start each session with a 5-10 minute presentation identifying issues that they find particularly important or interesting. I will highlight student-generated questions for the discussants that they should consider in their reading/discussion.

3. All students will be expected to actively participate in all seminar discussions (10%).

4. A term paper (10 pages in length) will be due on the last day of class. There will also be a classroom presentation consisting of a 10-minute powerpoint discussion of this paper. Proposed project titles and a brief description (no more than one page) for your paper topic are due by October 25th. The final paper should take the form of a proposal for an experimental investigation of any aspect of the seminar material or related readings. The proposal should contain a short but coherent introduction and a detailed method section. A brief description of the expected results and their implications for the hypothesis must be included. Papers must be written in accordance with the APA Publication Manual (5th edition). (Paper 30%)

5. The seminar series will culminate in two oral presentation sessions where students will take turns in summarizing their final papers with powerpoint presentations (20%).

**SYLLABUS**

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| September 6 | Introduction and overview, explanation of requirements. |
| September 13 | REVIEW OF BASIC NEUROANATOMY AND PHYSIOLOGY |
| September 20 | 1) EEG, BASIC VISUAL FUNCTION (ERPS) |
| September 27 | 2) MRI, MEG AND HIGHER VISUAL PROCESSING (FACES) |
| October 4 | 3) AUDITORY PROCESSING, MISMATCH NEGATIVITY |
| October 11 | 4) LANGUAGE 1 |
| October 18 | 5) LANGUAGE 2 |
| October 25 | 6) ATTENTION |
| November 1 | 7) MEMORY |
| November 8 | 8) EMOTION |
| November 15 | 9) LATERALIZATION AND GENDER DIFFERENCES |
| November 22 | THANKSGIVING HOLIDAY - NO CLASS |
| November 29 | POWERPOINT PRESENTATIONS 1 |
| December 6 | POWERPOINT PRESENTATIONS 2<br>FINAL PAPER DUE. LAST CLASS |

READINGS FOR "**FUNDAMENTALS OF NEUROPSYCHOLOGY"**
Preliminary list (note these are subject to change based on class experience, etc)

## REVIEW OF BASIC NEUROANATOMY AND PHYSIOLOGY

Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY.
1) Organization of the Nervous System. pp. 58 to 73.
2) The structure and electrical activity of Neurons. pp. 75 to 77; pp.84 to 98.

## EEG RECORDING, BASIC VISUAL ERPS

1) Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY. pp. 150 to 157
2) Skrandies, W. (2003) Evoked Potentials of Visual Information Processing. In: *The cognitive Electrophysiology of Mind and Brain*. A. Zani and A. A. Proverbio (Eds.) pp. 71 to 79, Academic Press, NY.
3) Heravian SJ, Douthwaite WA, Jenkins TC. (1999)
Acuity predictions from visually evoked potential to checkerboard pattern reversal stimuli: the effect of reversal rate. *Clinical and Experimental Optometry* 82, 244-249.
4) Supplementary materials to enhance comprehension of above readings.

## MRI, MEG AND HIGHER VISUAL PROCESSING (FACES)

1) Introduction to Meg: (Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY. p.157 )

2) Introduction to MRI:(Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY, pp. 165 to 169).

3) de Haan, Humphreys, and Johnson (2002) Developing a Brain specialized for Face Perception: A converging methods approach. *Developmental Psychobiology* 40(3), 200-212.

4) D'Esposito M, Detre JA, Aguirre GK, Stallcup M, Alsop DC, Tippet LJ, Farah MJ. (1997) A functional MRI study of mental image generation. *Neuropsychologia*. 35(5):725-30.

## AUDITORY PROCESSING, MISMATCH NEGATIVITY

1) Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY. pp. 184 to 188. Auditory receptors and pathways.

2) Näätänen, Brattico and Tervaniemi (2003) Mismatch Negativity: A probe to auditory perception and cognition in basic and clinical research. *The Cognitive Electrophysiology of Mind and Brain* (ed. Zani, A., and Proverbbio, A.M.) Academic Press. pp. 343 to 355.

3) Gaser C, Schlaug G. (2003) Gray matter differences between musicians and nonmusicians.Ann N Y Acad Sci.999:514-7.

4) Yetkin FZ, Roland PS, Mendelsohn DB, Purdy PD. (2004) Functional magnetic resonance imaging of activation in subcortical auditory pathway.Laryngoscope. 114(1):96-101.

## LANGUAGE COMPREHENSION

Either Kolb and Wishaw chapter on language or chapter from J. W. Kalat (2004) *Biological Psychology* (8th Ed). Thomson/Wadsworth

## LANGUAGE COMPREHENSION

1) Federmeier, Kluender, and Kutas (2003) Aligning Linguistic and Brain Views on Language Comprehension. *The Cognitive Electrophysiology of Mind and Brain* (ed. Zani, A., and Proverbbio, A.M.) Academic Press. pp. 143 to 168.

2) Kim, K. H. S., Relkin, N. R., Lee, K.-M., and Hirsch, J. (1997) Distinct Cortical Areas Associated with Native and Second Languages. *Nature*, 388, 171-174, 10 July

3) Binder JR, Frost JA, Hammeke TA, Cox RW, Rao SM, Prieto T. (1997) Human brain language areas identified by functional magnetic resonance imaging. *J Neurosci*. Jan 1;17(1):353-62.

4) Friederici AD, Meyer M, von Cramon DY. (2000) Auditory language comprehension: an event-related fMRI study on the processing of syntactic and lexical information. *Brain Lang.* Dec;75(3):289-300.

## ATTENTION

1. Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY .pp. 578-590.

2. De Fockert, J., Rees, G., Frith, C., and Lavie, N. (2004) Neural correlates of Attentional Capture in Visual Search. *J. Cog. Neurosci.* 16: 751-759.

3. Rees, G., Russell, C., Frith, C.D., and Driver, J. (1999) Inattentional Blindness Versus Inattentional Amnesia for Fixated but Ignored Words. *Science*, 24 Dec. 286, 2504-2507.

## MEMORY

1. Kolb, B. and Wishaw, I.Q. (2003) *Fundamentals of Human Neuropsychology*. Worth Publishers, NY, pp.452 to 480.

2. Wagner et al. (1998) Building Memories: Remembering and Forgetting of Verbal Experiences as Predicted by Brain Activity. *Science*, 21 Aug. 1998, 281:1188-1190.

## EMOTION

1: Dolcos F, LaBar KS, Cabeza R. (2004) Interaction between the amygdala and the medial temporal lobe memory system predicts better memory for emotional events. *Neuron*. Jun 10;42(5):855-63.

2: Canli T, Desmond JE, Zhao Z, Gabrieli JD. (2002) Sex differences in the neural basis of emotional memories. *Proc Natl Acad Sci U S A*. Aug 6;99(16):10789-94. Epub 2002 Jul 26.

3. Phillips ML, Young AW, Senior C, Brammer M, Andrew C, Calder AJ, Bullmore ET, Perrett DI, Rowland D, Williams SC, Gray JA, David AS. (1997) A specific neural substrate for perceiving facial expressions of disgust. *Nature*. Oct 2;389(6650):495-8

## LATERALIZATION AND GENDER DIFFERENCES

Chapter from Kolb and Wishaw and selected papers