LIN 6796-18B8**: COGNITIVE NEUROSCIENCE OF LANGUAGE**
**SYLLABUS - SPRING 2014**

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| **CLASSROOM:** | MAT 3 |
| **TIME:** | M 8-10th : 3-6 pm |
| **Instructor:** | Dr. Edith Kaan<br>Office: 4127 Turlington Hall.<br>Office Hours (subject to change): M 1:55-2:45; R 12:50-2:45pm and by appointment |
| **Contact info**: | kaan@ufl.edu |
| **Course website:** | on Sakai, lss.at.ufl.edu |

**Prereqs:**
LIN graduate core course, or equivalent in other disciplines. Please contact the instructor for permission.

**Aims of this course:**
- To learn how brain imaging techniques can be applied to research on language processing and acquisition, and the potential pitfalls of doing so
- To learn to evaluate brain imaging studies of language in terms of their scientific and methodological aspects
- To improve oral presentation skills

**Assignments:**
Your grades will be based on: on paper presentations (20 %), active participation in class and timely postings of discussion questions (5 %), three critical summaries (30 %), and a final written assignment (45 %).

**Paper presentations:**
- Approximately 15 minutes; one paper per presenter per session. The number of presentations over the entire course depends on enrollment.
- Powerpoint; put PPT or Prezi file on a memory key, put on Dropbox, or bring your own computer;
- Last slide has points for discussion, including questions from classmates (see below)
- Will be followed by a 10-15 minute group discussion
- Mail a copy of your slides to kaan@ufl.edu before or right after class.
- Please do not hesitate to contact Dr. Kaan if you have questions when preparing your presentation

**Active participation:**
- Contributing to discussion in class
- Posting at least one critical question/discussion point for **each paper** on the "Discussion" page on Sakai by 8pm the night before class (preferably sooner).

**Summaries:**
- Summaries are due on these three topics:
  Summary i: brain imaging methods, N400, speech perception or visual word form area
  Summary ii: morphology, syntax, motor theory, or production

Summary iii: second-language lexicon, second-language sentence processing, or cognitive control

- For each of these topics:
  (1) write a critical summary of one of the required readings (this needs to be a different reading from the one you presented in class)
  (2) write a summary of an article that is one link away from this or another required reading on that topic, i.e., a paper that cites this required reading or is cited by this required reading.
- Summaries should include how the articles relate to each other and what we can learn from considering the studies together.
- Please use your own words, and minimize direct quotes to a phrase or less. Reference other work appropriately, preferably using APA guidelines.
- To be handed in through Sakai, on or before: February 10, March 17, and April 17.

**Final written assignment:**

- About 15 pages long, double spaced, including references
- APA formatting
- Structured like a grant proposal
- Contains an overview of the literature on a selected psycho/neurolinguistic topic
- Contains a proposal for a new, original experiment using the brain imaging methods discussed in class, or patients with brain damage, to investigate language in the brain.
- Topic should be chosen before March 17 (each will meet with Dr. Kaan around that time)
- Draft handed in before April 7 (Sakai).
- Final version due: April 28, 2013 (Sakai)
- Students will give a brief presentation of their proposals in the last class

**Grading**:

A = 90-100 B = 80-83.9 C = 70-73.9 D = 60-63.9
A- = 87-89.9 B- = 77-79.9 C- = 67-69.9 D- = 57-59.9
B+ = 84-86.9 C+ = 74-76.9 D+ = 64-66.9 E = < 56

For UF grading policies for assigning grade points, see:
http://gradcatalog.ufl.edu/content.php?catoid=5&navoid=1054#grades.

**Policies:**

- Please turn off all cell phones.
- Students are required to hand in all assignments and tests *before the class period* they are due. Please contact the instructor *in advance* if you need to skip a class, or cannot make a deadline. Please also make sure you have at least one external backup of the assignments you make for this class. Computer problems will not be considered a valid excuse for missing deadlines.
- If you are *absent for longer than 15 minutes of more than three class periods* without a documented medical or academic excuse, one point will be deducted from your final score for each additional absence. There will be no make-up exams or assignments without a documented medical excuse
- Academic Honesty: See the University of Florida Honor Code and the academic honesty guidelines at http://gradcatalog.ufl.edu/content.php?catoid=5&navoid=1054#Academic_Honesty

**Accommodations for students with disabilities:**

Students requesting classroom accommodation must first register with the Dean of Students Office: http://www.dso.ufl.edu/drc/. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. The Disability Resource Center is located in 001 Building 0020 (Reid Hall). Their phone number is 392-8565.

**Course website**
Class lectures and other useful information will be made available on the course website (lss.at.ufl.edu). An interactive atlas for brain anatomy can be found at: http://www9.biostr.washington.edu/da.html.

**Readings:**
The list of readings can be found below. Readings can be obtained from the UF library website (e-journals). In some cases, readings are available through e-reserves, or a hardcopy will be made available for you to xerox. Background readings pertain to the lecture and are optional; Discussion readings are required. NOTE: READINGS AND SCHEDULE BELOW ARE SUBJECT TO CHANGE!

Overview of the course (subject to change)

| **Week/ date** | **Discussions and required readings** | **Lecture** | **Background readings related to lecture**<br>* highly recommended |
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| W1 – *Jan6* | *Syllabus* | *Introduction to methods of cognitive neuroscience; brain anatomy* | *Ward, J. (2006, 2010)The student's guide to cognitive neuroscience. New York: Psychology Press, chapters 1-5 (on course reserves) |
| W 2 – *Jan 12* | | *Introduction to methods of cognitive neuroscience- continued*<br>*Sign up for presentations* | Gratton, G. & Fabiani. M. (2001) Shedding light on brain function: the event-related optical signal. *Trends in Cognitive Sciences*, 5(8) 357-363.<br>Tse, C-Y, et al. (2007) Imaging cortical dynamics of language processing with the event-related optical signal. *PNAS* 104(43) 17157-17162.<br>Démonet, J.-F., Thierry, & G. Cardebat, D., (2005), Renewal of the neurophysiology of language: Functional neuroimaging. *Physiological Review*, 85, 49-95. Especially pp 49-57.<br>*Kaan, E. (2007). Event-Related Potentials and language processing: A brief overview. *Language and Linguistics Compass, 1*(6), 571-591.<br>*Lau, E.F., Phillips, C. & Poeppel, D. (2008) A cortical network for semantics: (De)constructing the N400. *Nature Reviews Neuroscience, 9,* 920-933. |
| Wk3 | *NO CLASS. MLK day* | | |
| W 4 – *Jan 27* | *Example presentation: N400*<br>1. Kutas, M. and Hillyard, S.A. (1980). Reading senseless sentences: Brain potentials reflect semantic incongruity. *Science, 207*, 203-205.<br><br>*Other required readings:*<br>2. Simos, P. G., Basile, L. F. H., & Papanicolaou, A. C. (1997). Source localization of the N400 response in a sentence-reading paradigm using evoked magnetic fields and magnetic resonance imaging. *Brain Research, 762*, 29–39.<br><br>3. Gough, P. M., Nobre, A. C. & Devlin, J. T. (2005). Dissociating linguistic processes in the | *Tips for giving presentations;*<br>*Perception of Speech* | The recognition of spoken words. Chapter 5 from: Whitney, P. (1998). *The psychology of language.* Boston, MA: Houghton Mifflin Company. Pages 141-159. (hardcopy available for xeroxing)<br>*Phillips, C. (2001). Levels of representation in the electrophysiology of speech perception. *Cognitive Science, 25*, 711-731.<br>Näätänen, R. (2001). The perception of speech sounds by the human brain as reflected by the mismatch negativity (MMN) and its magnetic equivalent. *Psychophysiology, 38* (1), 1-21. |

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| | left inferior frontal cortex with transcranial magnetic stimulation. *Journal of Neuroscience, 25,* 8010–8016. | | |
| W 5 – *Feb 3* | *Discussion: Speech perception*<br>1. Näätänen, R., Lehtokoski, A., Lennes, M., Cheour, *et al.* (1997). Language-specific phoneme representations revealed by electric and magnetic brain responses. *Nature, 385,* 432-4.<br>*And*<br>Cheour, M., Ceponiene, R., Lehtokoski, A., Luuk, A., *et al.* (1998). Development of language-specific phoneme representation in the infant brain. *Nature Neuroscience, 1,* 351-353.<br><br>2. Chang, E. F., Rieger, J. W., Johnson, K., Berger, M. S., Barbaro, N. M., & Knight, R. T. (2010). Categorical speech representation in human superior temporal gyrus. *Nature Neuroscience, 13,* 1428-1432. | *Processing written words* | *Price, C.J., Devlin, J.T. (2011). The interactive account of ventral occipitotemporal contributions to reading. *Trends in Cognitive Science, 15,* 246-253.<br>*Dehaene, S. & Cohen, L. (2011) The unique role of the visual word form area in reading. *Trends in Cognitive Science, 15,* 254-262.<br>Visual word recognition. Chapter 6 from: Whitney, P. (1998). *The psychology of language.* Boston, MA: Houghton Mifflin Company. (hardcopy available for Xeroxing) |
| W 6 – *Feb 10* | *Discussion: written words*<br>1. Cohen, L. et al. (2002) Language-specific tuning of visual cortex? Functional properties of the visual word form area. *Brain, 125,* 1054–1069.<br><br>2. Twomey, T. et al. (2011) Top-down modulation of ventral occipitotemporal responses during visual word recognition. *Neuroimage, 55,* 1242–1251. | *Morphology;*<br>*Summary I due* | McClelland, J. L., & Patterson, K. (2002). Rules or connections in past-tense inflections: what does the evidence rule out? *Trends in Cognitive Sciences, 6*(11), 465-472.<br>*Ullman, M. T. (2001). A neurocognitive perspective on language: The declarative/ procedural model. *Nature Reviews Neuroscience, 2,* 717-726.<br>Pinker, S., & Ullman, M. T. (2002). The past and future of the past tense. *Trends in Cognitive Sciences, 6*(11), 456-463.<br>Marslen-Wilson, W. and Tyler, L.K. (1998). Rules, representations, and the English past tense, *Trends in Cognitive Sciences,* 2(11), 428-435.<br>Bozic, M., & Marslen-Wilson, W. (2010). Neurocognitive contexts for morphological complexity: Dissociating inflection and derivation. *Language and Linguistics Compass, 4,* 1063-1073. |
| W 8 – *Feb 24* | *Discussion: morphology*<br>1. Devlin, J. T., Jamison, H. L., Matthews, P. M., & Gonnerman, L. M. (2004). Morphology and the internal structure of words. | *Syntax* | Kaan, E., & Swaab, T. Y. (2002). The neural circuitry of syntactic comprehension. *Trends in Cognitive Sciences, 6,* 350-356.<br>Hagoort, P (2005). On Broca, brain, and binding: a new framework *Trends in Cognitive Sciences, 9,* 416-423. |

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| | *Proceedings of the National Academy of Sciences of the United States of America, 101*, 14984-14988.<br><br>2. Bozic, M., W. D. Marslen-Wilson, E. A. Stamatakis, M. H. Davis, and L. K. Tyler. 2007b. Differentiating morphology, form, and meaning: neural correlates of morphological complexity. *Journal of Cognitive Neuroscience, 19*, 1464–75. | | *Friederici, A. D. (2011). The brain basis of language processing: from structure to function. *Physiological reviews, 91*, 1357-1392.<br>Stowe, L.A., Haverkort, M. & Zwarts, F. (2005). Rethinking the neurological basis of language, *Lingua 115*, 997-1042.<br>*Kuperberg, Gina R. (2007). Neural mechanisms of language comprehension: challenges to syntax. *Brain Research, 1146*, 23–49. |
| W 7 – *Feb 17* | *Discussion: syntax*<br>1. Hahne, A., & Friederici, A. D. (1999). Electrophysiological evidence for two steps in syntactic analysis: Early automatic and late controlled processes. *Journal of Cognitive Neuroscience, 11*, 194-205.<br><br>2. Santi, A., & Grodzinsky, Y. (2010). fMRI adaptation dissociates syntactic complexity dimensions. *Neuroimage, 51*, 1285-1293. | *Motor theory of speech perception* | Rizzolatti & Craighero (2004). The mirror-neuron system. *Annual Review of Neuroscience, 27*. 169–192.<br>Galantucci, Fowler, & Turvey. (2006). The motor theory of speech perception reviewed. *Psychonomic Bulletin & Review, 13*, 361–377.<br>Lotto, A. J., Hickok, G. S., & Holt, L. L. (2009). Reflections on mirror neurons and speech perception *Trends in Cognitive Sciences, 13*, 110-114.<br>*Venezia, J. H., & Hickok, G. (2009). Mirror Neurons, the motor system and language: From the Motor Theory to embodied cognition and beyond. *Language and Linguistics Compass, 3*, 1403-1416. |
| W9 | *SPRING BREAK NO CLASS* | | |
| W 10 – *Mar 10* | *Discussion: motor theory*<br>1. Meister, I. G., Wilson, S. M., Deblieck, C., Wu, A. D., & Iacoboni, M. (2007). The Essential Role of Premotor Cortex in Speech Perception. *Current Biology , 17*, 1692-1696.<br><br>2. Pulvermüller, F., Huss, M., Kherif, F., Moscoso del Prado Martin, F., Hauk, O., & Shtyrov, Y. (2006). Motor cortex maps articulatory features of speech sounds. *Proceedings of the National Academy of Sciences, 103*, 7865-7870. | *Language production* | Indefrey, P, and Levelt, W.J.M. (2004). Spatial and temporal signatures of word production components. *Cognition, 92*(1-2), 101-144.[especially pp 101-111]<br>*Jansma et al (2004) Electrophysiological studies of speech production. In Pechmann & Habel (eds.) *Multidisciplinary approaches to language production*. Berlin/New York: Mouton de Gruyter. PP 361-395 (e-*reserves)*<br>Rodriguez-Fornells, A., Schmitt, B.M., Kutas, M. and Münte, T.F. (2002). Electrophysiological estimates of the time course of semantic and phonological encoding during listening and naming. *Neuropsychologia, 40*, 778-787.<br>Ganushchak, L. Y., Christoffels, I. K., & Schiller, N. O. (2011). The use of electroencephalography in language production research: a review. *Frontiers in Psychology, 2* (Article 208), 1-6. |
| W 11 – *Mar 17* | *Discussion: Production*<br>1. Van Turennout, M., Hagoort, P., and Brown, | *Second-language lexicon* | *Van Heuven, W.J.B. & Dijkstra, T. (2010). Language comprehension in the bilingual brain: fMRI and ERP support for psycholinguistic |

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| | C.M. (1998). Brain Activity During Speaking: From Syntax to Phonology in 40 Milliseconds. *Science, 280*, 572-574.<br><br>2. Strijkers, K., Holcomb, P. J., & Costa, A. (2011). Conscious intention to speak proactively facilitates lexical access during overt object naming. *Journal of Memory and Language, 65*, 345-362. | *Summary II due*<br><br>*You should have determined a topic for your final paper at this time* | models. *Brain Research Reviews*, 64, 104-122.<br>Kroll, J.F., & Tokowicz, N. (2005). Models of bilingual representation and processing. In: Kroll, J.F., De Groot, A.M.B. (Eds.), Handbook of Bilingualism: Psycholinguistic Approaches. Oxford University Press, Oxford, pp. 531–553. (*e-reserves*). |
| W 12 – *Mar 24* | *Discussion: Second-language lexicon*<br>1. Rodriguez-Fornells, A., Van Der Lugt, A., Rotte, M., … Münte, Th.F. (2005). Second language interferes with word production in fluent bilinguals: brain potential and functional imaging evidence. *Journal of Cognitive Neuroscience, 17* .422–33.<br><br>2. Van Heuven, W. J., Schriefers, H., Dijkstra, T., & Hagoort, P. (2008). Language Conflict in the Bilingual Brain. *Cerebral Cortex, 18*, 2706-2716 | *Second- language sentence processing*<br><br>*Select topic for TBA sessions* | *Stowe, L. A., & Sabourin, L. (2005). Imaging the processing of a second language: Effects of maturation and proficiency on the neural processes involved. *International Review of Applied Linguistics, 43*, 329-353.<br>*Steinhauer, K., White, E.J. and Drury, J.E. (2009). Temporal dynamics of late second-language acquisition: evidence from event-related brain potentials. *Second Language Research* 25(1), 13-41.<br>Perani, D. (2005). The neural basis of first and second language processing. *Current Opinion in Neurobiology, 15(2)*, 202-206.<br>Clahsen, H. and Felser, C. (2006) How native-like is non-native language processing? *Trends in Cognitive Science, 10* (12), 564-570.<br>*McLaughlin, J., Tanner, D., Pitkänen, I., Frenck-Mestre, C., Inoue, K., Valentine, G., et al. (2010). Brain potentials reveal discrete stages of L2 grammatical learning. *Language Learning, 60*, 123-150. |
| W 13– *Mar31* | *Discussion: Second-language sentence processing*<br>1. Rossi, S., Gugler, M.F., Friederici, A.D., & Hahne, A. (2006). The impact of proficiency on syntactic second-language processing of German and Italian: evidence from event-related potentials. *Journal of Cognitive Neuroscience*, 18, 2030-2048.<br><br>*2.* Rüschemeyer, S-A., Fiebach, C.J., Kempe, V. & Friederici, A.D. (2005). Processing lexical semantic and syntactic information in first and second language: fMRI evidence from German and Russian. *Human Brain Mapping 25*, 266-286 | *Cognitive control and language processing* | *Novick, et al. (2005). Cognitive control and parsing: Reexamining the role of Broca's area in sentence comprehension. *Cognitive, Affective & Behavioral Neuroscience*, 5(3), 263-281.<br>*Harvais-Adelman, A. G., Moser-Mercer, B., & Golestani, N. (2011). Executive control of language in the bilingual brain: integrating the evidence from neuroimaging to neuropsychology. *Frontiers in Psychology*, *2*, 234.<br>Crinion, J., Turner, R., Grogan, A., Hanakawa, T., Noppeney, U., Devlin, J. T., et al. (2006). Language control in the bilingual brain. *Science, 312*, 1537-1540. |

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| W 14–<br>*Apr 7* | *Discussion: Cognitive control*<br>1. January, D., Trueswell, J. C., & Thompson-Schill, S. L. (2009). Co-localization of Stroop and syntactic ambiguity resolution in Broca's area: Implications for the neural basis of sentence processing. *Journal of Cognitive Neuroscience, 21,* 2434-2444.<br>2. Abulalebi, J., Della Rosa, P.A., Green, D.W., …Costa, A. (2012). Bilingualism tunes the Anterior Cingulate Cortex for conflict monitoring. *Cerebral Cortex, 22*, 2076-2086. | *Language and genes;*<br><br>*Draft of paper due* | Marcus, G. F., & Fisher, S. E. (2003). FOXP2 in focus: What can genes tell us about speech and language? *Trends in Cognitive Sciences, 7*, 257-262.<br>Attia, J., Ioannidis, J.P.A., Thakkinstian, A., … Guyatt, G.,(2009). How to use an article about genetic association: A: background concepts. *Journal of the American Medical Association*, 301, 74-81.<br>Bishop, .D.V. (2009) Genes, cognition, and communication: insights from neurodevelopmental disorders. Annals of the New York Academy of Science, 1156, 1–18. |
| W15 –<br>*Apr 17* | *Discussion: Genes*<br>*1.* Kos, M., Van den Brink, D., Snijders, T.M., … Hagoort, P. (2012). CNTNAP2 and language processing in healthy individuals as measured with ERPs. *PLOS ONE*, 7 (10) e46995. doi:10.1371/journal.pone.0046995<br><br>*2.* Folia V., Forkstam C., Ingvar M., Hagoort P., Petersson, K.M. (2011) Implicit artificial syntax processing: genes, preference, and bounded recursion .*Biolinguistics*, 5, 105–132.<br><br>*Project presentations* | *Project presentations* | |
| W 16–<br>*Apr 21* | *Project presentations* | *Summary III due;*<br>*Project presentations* | |
| *Apr 28* | *Final version of paper due* | | |