

# Language, Mind & Brain

## LING/COGST 2264

instructor: Dr. John Hale  
office hours: listed at <http://courses.cit.cornell.edu/jth99/>  
course number: LING 1100-101  
meeting time: Tuesdays and Thursdays 10:10am–11:25am  
room: Morrill Hall 102  
book: Kemmerer (2015) indicated by ‘K’ below (in bookstore)  
wiki: find on <http://confluence.cornell.edu> under space key `lmbfall2016`

### What this course is about

Language, Mind & Brain is a survey of neurolinguistics. Viewing the mind as a computer, we ask how the thing inside our skull gives us the ability to converse so freely. This investigation naturally involves ideas from many different subfields of linguistics, not to mention brain imaging, neuropsychology and artificial intelligence.

Students from all backgrounds are welcome; there are no prerequisites. Successful students emerge with an ability to understand scientific results at the forefront of this exciting area.

### Tentative Schedule

**August 23** language: when we use it, our brains compute  
READINGS Language Files 1.1 and 1.2

**August 30th, September 1st** what’s in there: lobes and neurons  
READINGS K chapter 1

**Sept 6th,8th** how neuroimaging works  
READINGS K chapter 2 especially pages 34–35 and 44–54

**Sept 13th** CMRIF tour

**Sept 15,20** aphasia syndromes  
READINGS K chapter 3. Excerpts from Ackerman.

**Sept 22** lateralization  
READINGS K chapter 9

**Sept 27th,29th** dual streams model of speech perception  
READINGS K chapter 5 especially pp111–114

**Oct 4th,6th** phonetic coding as an example representation in cognitive science  
READINGS K pp56–60, pp114–116, Mesgarani et al. (2014), excerpt from Marr (1982)

Fall Break

**Oct 13th** reading and the visual wordform area  
READINGS READINGS K chapter 8 through page 226

**Oct 18th** syntax in comprehension  
Language File 5.2 see also K pp392–395

**Oct 20th** parsing algorithms

**Oct 25th,27th** a brain network for comprehension  
READINGS K chapter 15 through page 429

**Nov 1st,3rd** naturalistic listening  
READINGS Fyshe et al. (To Appear) and Huth et al. (2016)

**Nov 8th,10th** ambiguity resolution across languages  
READINGS K pages 60–63 then 459–469

Jon Brennan speaks in the Cornell Cog Sci Colloquium (obligatory)

**Nov 15** NO CLASS

**Nov 17th** decoding composed representations  
READINGS K pp54-55 then Frankland and Greene (2015)

**Nov 22** catching brain regions in action  
READINGS Bemis and Pykkänen (2011, 2013)

**Nov 29st,Dec 1st** controversy over Broca's  
READINGS Zaccarella and Friederici (2015); Rogalsky et al. (2015)

## Grades

25 &	participation	degree of engagement during in-class activities and discussion
25 %	quizzes	brain anatomy, grammar, parsing
25 %	essays	two-page essays arguing one side or another of a scientific controversy
25 %	final exam	mix of essay and quiz -type questions

## Academic Integrity

Participants shall abide by the Cornell Code of Academic Integrity as described at

<http://cuinfo.cornell.edu/aic.cfm>

## References

Douglas K. Bemis and Liina Pykkänen. Simple composition: A magnetoencephalography investigation into the comprehension of minimal linguistic phrases. *The Journal of Neuroscience*, 31(8): 2801–2814, 2011. doi: 10.1523/JNEUROSCI.5003-10.2011.

Douglas K. Bemis and Liina Pykkänen. Basic linguistic composition recruits the left anterior temporal lobe and left angular gyrus during both listening and reading. *Cerebral Cortex*, 23(8): 1859–1873, 2013. doi: 10.1093/cercor/bhs170.

- Steven M. Frankland and Joshua D. Greene. An architecture for encoding sentence meaning in left mid-superior temporal cortex. *Proceedings of the National Academy of Sciences*, 112(37):11732–11737, 2015. doi: 10.1073/pnas.1421236112.
- Alona Fyshe, Leila Wehbe, and Brian Murphy. Decoding language from the brain. In Aline Villavicencio and Thierry Poibeau, editors, *Language, Cognition and Computational Models*. Cambridge University Press, To Appear.
- Alexander G. Huth, Wendy A. de Heer, Thomas L. Griffiths, Frédéric E. Theunissen, and Jack L. Gallant. Natural speech reveals the semantic maps that tile human cerebral cortex. *Nature*, 532(7600):453–458, 04 2016. doi: 10.1038/nature17637.
- David Kemmerer. *Cognitive Neuroscience of Language*. Psychology Press, 2015.
- Language Files. *Language Files: Materials for an Introduction to Language and Linguistics*. Ohio State University Press, 12<sup>th</sup> edition edition, 2016.
- David Marr. *Vision: A computational investigation into the human representation and processing of visual information*. W.H. Freeman and Company, 1982.
- Nima Mesgarani, Connie Cheung, Keith Johnson, and Edward F. Chang. Phonetic feature encoding in human superior temporal gyrus. *Science*, 343(6174):1006–1010, 2014. doi: 10.1126/science.1245994.
- Corianne Rogalsky, Diogo Almeida, Jon Sprouse, and Gregory Hickok. Sentence processing selectivity in broca’s area: evident for structure but not syntactic movement. *Language, Cognition and Neuroscience*, 30(10):1326–1338, 2015. doi: 10.1080/23273798.2015.1066831.
- Emiliano Zaccarella and Angela D. Friederici. Merge in the human brain: A sub-region based functional investigation in the left pars opercularis. *Frontiers in Psychology*, 6:1818, 2015. doi: 10.3389/fpsyg.2015.01818.