LING 492/792 Neurolinguistics, Fall 2017

Jonathan Brennan

- **Time** 11:30 to 1:00 pm, Tuesdays and Thursdays
- **Location** 473 Lorch Hall
- **Website** Via Canvas
- **Office Hours** Tues & Weds 1:30 - 3:00 pm @ 414 Lorch Hall (click for appt)
- **Email** jobrenn@umich.edu

Course Description

This course introduces the neural machinery behind our ability to speak and understand language. Topics discussed include the brain bases of speech perception and reading, lexical processing, syntax, and semantics. We will draw on a range of state-of-the-art functional neuroimaging techniques, as well as the study of neurological and developmental language disorders. Special attention will be given to how theories of linguistic computations and representations can inform, and be informed by, our understanding of the brain.

Course Goals

To introduce the basic principles of the cognitive neuroscience of language, and to develop skills to connect neural data with linguistic theory and analysis.

Expectations

To do well in this course you need to *participate throughtfully* in class discussions and *apply the skills* that we develop through the course.

Skills are developed both in the form of semi-weekly in-class laboratory sessions, and in the form of three take-home examinations spaced throughout the term. Participation comes in the form of in-class discussions and presentations.Students are expected to come to class having done the readings so they can be active participants. Class discussions are facilitated by questions posted to the online forum based on the reading for that day.

Readings

In the first half of the term, we will use the book Reading in the Brain by Stanislas Dehaene. Other readings will be adapted from textbooks, handbooks, and original research articles. All articles will be made available via Canvas.

> Dehaene, Stanislas (2009) *Reading in the brain: the new science of how we read.* Penguin. ISBN: 9780143118053 (required) (website, library entry)

Assignments & Grading

Readings, Forum & Participation (40%)

There will be weekly readings. To facilitate discussion students must post at least one substantive question or comment to the Canvas discussion forums *one hour prior to class*. These questions will help to shape in-class discussions. Your comment may connect to the class readings, follow-up on class discussion, build on a post by another student, or raise a new question or issue.

You may skip posting a question up to three times during the semester without penalty.

Labs (30%)

Labs will be in-class assignments that develop neurolinguistics skills. These will include using software tools to explore brain regions, to analyze different kinds of neural data, and to explore different experimental protocols.

Exams (30%)

There will be three exams throughout the term. The first will test technical knowledge about brain anatomy and neuroimaging tools. The others focus on critically engaging with the theories, data, and conclusions discussed in class. and will involve mostly short-answer and essay questions. Exams are "take-home": they are completed via Canvas within the indicated 24-hour window.

Grads Only

In addition to the three exams, **students enrolled at the graduate level (LING792) will write a short *Research Proposal* (about 6 pages, or 3000 words) in which they design an original experiment.** Students are encouraged to start thinking about topics as soon as possible. A successful proposal will have a clear research question backed by suitable background literature and well-motivated hypotheses and predictions. The proposal should provide detailed methods and procedures which address the target question and will include a discussion of possible outcomes and how they might be interpreted.

The Research Proposal will count towards half of the "Exams" grade.

Grading Scale

	A	B	C	D	F
+	97-99	87-89	77-79	67-69	
	93-96	83-86	73-76	63-67	<60
-	90-92	80-82	70-72	60-62	

Schedule

Readings come from the assigned book or else are posted on Canvas. (Articles are also accessible via links embedded in the schedule below.) *The schedule may change during the term. Be sure to check Canvas for updates!*

Unit 1: Tools

- **Sep 5** Introduction
  - *Optionally read* Marr's General Introduction and Chapter 1 on different levels of description in the cognitive sciences
- **Sep 7** Brain anatomy
  - *Read* Kemmerer on The human brain
- **Sep 12** Anatomy LAB
  - You can preview the lab 1 assignment here. If you plan to use your own computer, make sure that the relevant software has been installed and tested.
- **Sep 14** Methods: MRI
  - *Read* Kemmerer Ch. 2, 29–56 on neuroimaging methods
- **Sep 19** Methods: Electrophysiology
  - *Read* Kemmerer Ch. 2, 56–67 on electrophysiology methods
- **Sep 21** Methods LAB
  - You can preview the lab 2 assignment here. If you plan to use your own computer, make sure that the relevant software has been installed and tested.
  - Post a question or comment to the discussion board relating to neurolinguistic methods

Exam 1 is due by the end of the day on **Friday, 9/22**

Unit 2: Reading

- **Sep 26** Reading: Psycholinguistic background
  - *Read* Dehaene Ch. 1
  - *Do* two short experiment activities
- **Sep 28** Reading: Neural bases

  - *Read* Dehaene Ch. 2
- **Oct 3** Reading: Neuronal recycling
  - *Read* Dehaene Ch. 3
- **Oct 5** Reading: Dyslexia
  - *Read* Dehaene Ch. 6
- **Oct 10** fMRI LAB, part 1
  - You can preview the lab activities here. If you plan to use your own computer, make sure that the relevant software has been installed and tested.
- **Oct 12** fMRI LAB, part 2
- **Oct 17 Fall BREAK**

Unit 3: Speech

- **Oct 19** Reading revisited
  - *Read* your notes from Sep 26 – Oct 12
  - *Write* short responses to prompt questions
- **Oct 24** Speech: Acoustic analysis and coding
  - *Read* Talavage et al. 2004 on tonotopy
  - *Optionally read* Barton et al. 2012 Roberts et al., 2000
- **Oct 26** Speech: Temporal windows of integration
  - *Read* Poeppel et al. 2008 on converting acoustic information to phonological information
  - *Optionally read* Seberi & Perrot 1999 Saoud et al. 2012
- **Oct 31** Speech: Phonological encoding
  - *Read* Scharinger et al., 2011 on vowel maps in the brain
  - *Optionally read* Mesgarani et al., 2014; Eulitz & Lahiri, 2004
- **Nov 2** Speech impairments
  - *Post* review questions to discussion board
  - *Optionally Read* Edgar et al. 2015

Exam 2 is due by the end of the day on **Sunday, 11/5**

Unit 4: Sentences

- **Nov 7** Sentences and ERPs LAB (Jon away)
  - * You can preview the lab activities here. If you plan to use your own computer, make sure that the relevant software has been installed and tested.
- **Nov 9** Sentences and ERPs LAB continued (Jon away)
- **Nov 14** Sentences and prediction
  - *Read* Kutas et al., 2014 on violated expectations
  - *Optionally read* **TBD**
- **Nov 16** Sentences: Hierarchical structure
  - *Read* Bemis & Pylkkänen, 2011 on building simple phrases
  - *Optionally read* Brennan et al. 2016, Nelson et al., 2017
- **Nov 21** Sentences: More on structure
  - *Optionally read* Brennan 2016

  - **Grads Only**: Rough drafts for your experimental proposals are due by the end of the day
- **Nov 24 Thanksgiving BREAK**

Unit 5: Representations and multilingualism

- **Nov 28** Conceptual representations and composition
  - *Read* Patterson et al., 2007
  - *Optionally read* Pylkkänen, 2016
- **Nov 30** Multilingual representations
  - *Read* Crinion et al., 2006
- **Dec 5** Sentences and dependencies
  - *Read* Matchin et al., 2014 on prediction and long-distance dependencies
  - *Optionally read* **TBD**
- **Dec 7** Catch-up and wrap-up
  - *Read* **TBD**

Exam 3 is due by the end of the day on **Friday, 12/8**

There is no final examination for this course. **Grads Only: Final paper drafts** are due on **Thursday December 14th**.

Email Policy

The best place to ask questions is via the Canvas Forum where I and fellow students may post a reply. This open forum allows for easy follow-up discussion and makes your contribution available to other students who may have similar questions. I will monitor the forum to ensure answers are clear and accurate. **E-mail should only be used for personal concerns that cannot be addressed in person before/after class and in office hours.** I aim to respond to emails within 24 hours on weekdays. I am not available on email after business hours or on weekends.

LSA Community Standards of Academic Integrity

The LSA undergraduate academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. The College holds all members of its community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the College promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty and misconduct. Academic dishonesty may be understood as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. Conduct, without regard to motive, that violates the academic integrity and ethical standards of the College community cannot be tolerated. The College seeks vigorously to achieve

compliance with its community standards of academic integrity. Violations of the standards will not be tolerated and will result in serious consequences and disciplinary action. (http://www.lsa.umich.edu/academicintegrity/, Dec 21, 2012)

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate academic accommodations. SSD (734-763-3000; http://ssd.umich.edu) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.