

# LING 492/792 *The Neural Bases of Composition*, Winter 2019

Jonathan R. Brennan

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- **Time** Tues, Thurs 1 – 2:20 pm
  - **Location** 473 Lorch Hall
  - **Website** Via Canvas
  - **Instructor Office Hours**
    - Wednesdays 12-1pm
    - @ 414 Lorch Hall
    - [Click here for appt](#)
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## Course Description

Language is *generative*: with finite means we can express an infinite number of thoughts. This course introduces our current understanding of how the brain carries out this remarkable feat. In exploring this question, we will become familiar with a range of state-of-the-art functional neuroimaging techniques (fMRI, EEG, MEG, ECoG) as well as the study of language disorders. Classwork includes lots of discussion, in-class labs, three short examinations, and a term paper. Special attention will be given to how theories of linguistic computations and representations can inform, and be informed by, our understanding of the brain.

There is *a lot* of exciting work going on in this domain, and students will be in the driver's seat deciding which specific questions, methods, and findings we delve into. This course is appropriate for students who have taken *Introduction to Neurolinguistics*, and also students with no prior neuroscience experience (necessary background will be introduced as needed).

## Readings

All course readings are available via the University of Michigan Library, or are posted onto Canvas under "Files".

## Assignments & Grading

### Readings, Forum & Participation (30%)

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 (20%)

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. The exact exam dates are: Feb 1, Mar 12, and Apr 18.

### Term Paper (20%)

Students 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.

A **rough draft** will be due on Mar 20 and a **final draft** will be due on Friday April 26.

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### Grading Scale

	A	B	C	D	F
+	97-99	87-89	77-79	67-69	
	93-96	83-86	73-76	63-67	<60

	A	B	C	D	F
-	90-92	80-82	70-72	60-62	

## Schedule & Topics

There are many possible directions this class can go, and students decide which paths we take. Below I sort some of the foundational readings into a few categories to guide our thinking, and also rough out a general course of study for the term.

*The schedule will change during the term. Be sure to check Canvas for updates!*

### Reviews, meta-commentary

- Pylkkänen and Brennan (2019)
- Hagoort and Indefrey (2014)
- Sprouse and Hornstein (2016)
- Osterhout et al. (2012)
- Zaccarella and Friederici (2017)
- Friederici (2012)
- Ding, Melloni, Tian, et al. (2017)
- Embick and Poeppel (2015)
- Poeppel and Embick (2005)
- Marantz (2005)

### Sentences vs. Lists

- Mazoyer et al. (1993)
- Pallier et al. (2011)
- Humphries et al. (2006)
- Rogalsky and Hickok (2009)
- Brennan and Pylkkänen (2012)
- Matchin et al. (2016)
- Blank et al. (2016)
- Matchin et al. (2018)

### Simple Composition

- Pylkkänen (2016) (review paper)
- Bemis and Pylkkänen (2011)
- Bemis and Pylkkänen (2012)
- Bemis and Pylkkänen (2013)
- Pylkkänen et al. (2014)
- Westerlund et al. (2015)
- Zhang and Pylkkänen (2015)
- Lau and Liao (2018)

- Zaccarella et al. (2017)
- Zaccarella and Friederici (2015)

### **Naturalistic Composition**

- Brennan (2016) (review paper)
- Brennan, Nir, et al. (2012)
- Brennan, Stabler, et al. (2016)
- Brennan and Pyllkkänen (2017)
- Brennan and Hale (2019)
- Hale et al. (2018)
- Bhattasali et al. (2018)
- Lopopolo et al. (2017)
- Henderson et al. (2016)
- Nelson et al. (2017)

### **Dependencies**

- Matchin et al. (2014)
- Phillips et al. (2005)
- Amici et al. (2007)
- Caramazza and Zurif (1976)

### **Predictive Processing**

- Van Petten and Luka (2012) (review)
- Chow et al. (2016) (Review)
- DeLong et al. (2005)
- Nieuwland et al. (2018) (contra DeLong 2005)
- DeLong et al. (2012) (on aging)
- Dikker et al. (2014)
- Dikker and Pyllkkänen (2012)
- Dikker et al. (2010)
- Kim and Osterhout (2005) (“Semantic” P600)
- Chow and Phillips (2013) (Contra “semantic” P600)
- S Momma Dissertation TBD
- Meyer et al. (2018) (oscillatory mechanisms)

### **Syntactic Deficits**

- Wilson (2017) (review)
- Dronkers et al. (2004)
- Wilson et al. (2016)
- Wilson et al. (2014)
- Wilson et al. (2012)
- Wilson et al. (2011)
- Chang et al. (2018)

### On evolution (yikes!)

- Berwick et al. (2013)
- Boeckx (2017)
- Friederici et al. (2017)
- Bornkessel-Schlesewsky et al. (2015)

### Other

- Matchin et al. (2018)
- Ding et al. (2016)
- Ding, Melloni, Yang, et al. (2017)

### Preliminaries

- **W Jan 9** Introduction
  - *Optionally read* Marr 1981 Intro & Ch. 1 (20 pp)
- **M Jan 14** Introduction continued, methods
  - *Read* Kemmerer on neurolinguistic methods (69 pp)
- **W Jan 16** How ought we study the neural bases of composition?
  - *Re-read* Kemmerer
- **M Jan 21** NO CLASS – MLK
- **W Jan 23** Composition: Overview & Scheduling
  - *Read* Pylkkänen and Brennan (2019) review on neural composition
  - *Read* Sprouse and Hornstein (2016) on syntactic theory and neurolinguistics
- **M Jan 28** Composition: major issues continued;
  - *Optionally read* Zaccarella and Friederici (2017) **UPDATE** *Skim* Embick and Poeppel (2015) instead!

### Unit 1: Composition of syntax and semantics

- **W Jan 30** SNOW DAY
  - Quiz 1 is due on **Feb 1**
- **W Feb 4** Simple composition
  - *Read* Bemis and Pylkkänen (2011)
  - *Read* Matchin et al. (2016)
- **M Feb 6** Composition continued, mechanisms
  - *Read* Ding et al. (2016) **UPDATE** re-read Bemis and Pylkkänen (2011) and Matchin et al. (2016) instead
- **W Feb 11** Composing syntax or semantics?
  - *Read* Zhang and Pylkkänen (2015)
  - *Read* Blanco-Elorrieta and Pylkkänen (2016)
- **M Feb 13** Syntax and semantics continued
  - *Skim* Baron and Osherson (2011)

## Unit 2: Deficits in composition

- **M Feb 18** Structure and primary progressive aphasia
  - *Read* Wilson et al. (2011)
  - *Read* Wilson et al. (2014)
- **W Feb 20** con't
  - *Read* Wilson et al. (2016)
- **M Feb 25** Dependencies and Broca's Area
  - *Read* Amici et al. (2007)
  - *Read* Thothathiri et al. (2012)
  - *Optional background* Caramazza and Zurif (1976)
- **W Feb 27** con't
  - *Skim* Matchin et al. (2014)
- **M Mar 4** NO CLASS – Winter break
- **W Mar 6** NO CLASS – Winter break

## In-Class EEG Analysis Labs

- **M Mar 11**
  - Quiz 2 is due on **Mar 12**
- **W Mar 13**
- **M Mar 18**
- **W Mar 20**
  - *Submit* your term paper **rough draft**

## Unit 3: Prediction and neural mechanisms

- **M Mar 25** Prediction, integration, and the N400
  - *Read* Nieuwland et al. (n.d. download under Files)
  - *Skim* Nieuwland et al. (2018)
  - *Optional background* Kutas and Hillyard (1980), Kutas and Hillyard (1984)
- **W Mar 27** N400 continued...
  - *Re-skim* the previous readings!
  - *Optionally* read this behind-this-scenes account about trying to publish Nieuwland et al. (2018)'s replication attempt
- **M Apr 1** When do we predict what?
  - *Read* Chow, Lau, et al. (n.d.)
  - *Read* Chow, Smith, et al. (n.d.)
- **W Apr 3** Prediction timing continued...
- **M Apr 8** Computational models of prediction
  - *Read* Lopopolo et al. (2017)
  - *Read* Brennan and Hale (2019)
- **W Apr 10** Computational models continued...
  - *Read* Ding et al. (2016)
- **M Apr 15** Computation continued...
  - *Optionally read* Martin and Doumas (2017)

- **W Apr 17** Research Proposal Discussion
  - Quiz 3 is open on **Apr 18–19**
- **M Apr 22** Research Proposal Discussion

There is no final examination for this course. Term papers are due on **Friday April 26**.

## Email Policy

The best place to ask questions is via the Canvas Forum where the instructor and fellow students may all engage with the question.

Posting your questions on the forum allows for easy follow-up discussion and makes your contribution available to other students who may have similar questions. The instructors will monitor the forum to ensure answers are clear and accurate.

**E-mail should only be used for personal concerns that cannot be addressed via the discussion board, in person before/after class, or in office hours.** The instructor aims 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.

## References

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