

Cognitive Neuroscience of Language

LIN6796-15430

Class Periods: W9-11 (4:05 PM - 7:05 PM)

Location: CBD 210

Academic Term: Spring 2020

Instructor:

Edith Kaan

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Office Hours: W 3:00-3:50; R 1:00-1:40pm, TUR 4127 and by appointment

Course Description

Overview and critical evaluation of brain imaging techniques and issues in language and brain research, covering speech perception, word recognition, reading, syntax, discourse processing, production, language acquisition, and bilingualism. This is a 3-credit course.

Course Pre-Requisites / Co-Requisites

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

Course Objectives

- To learn how brain imaging techniques can be applied to psycholinguistic research, and the potential pitfalls of doing so (reading and discussing original research articles, writing a research proposal)
- To learn to evaluate brain imaging studies of language in terms of their scientific and methodological aspects (reading and discussing original research articles, debate, writing summaries and a literature review)
- To improve oral presentation skills (oral summaries of papers, classroom discussions)

Course Assignments

- **Discussions:** All students are expected to read the discussion papers and to post at least 1 discussion question on the course website before the deadline posted. Students are also expected to actively participate in in-class discussions.
- **Paper summaries:** Students are expected to pick three papers over the course of the semester related to a specific topic (TBA) and write a summary of 2-4 double-spaced pages long, excluding references. The papers should be peer-reviewed journal articles that report an **original study** related to the topic, and that elaborates upon what has been addressed in class. These papers should **not** be overview papers, unpublished materials, or theses, or any of discussion papers listed on the reading list.
- **Debate:** Students will be required to participate in a debate. Specific details will be provided on Canvas and discussed in class.
- **Conference highlights:** Sections of an abstract book from a recent conference will be provided. Students will be asked to form groups and assess the abstracts quantitatively (e.g. what are the questions/areas getting the most attention?), and qualitatively (e.g. which abstracts appear the most interesting to you and why? Are any of them especially relevant to the current unit?) Groups will present and discuss their finding in class, and each student will submit an individual paper (250-500 words) that summarizes their findings.
- **Research paper:** Students are expected to write a literature review and a short research proposal on a selected topic related to cognitive neuroscience of language. The report should be about 15 pages long, double spaced, including references. Over the course of the semester students will be asked to

hand in a topic, and outline and the paper itself. Students will receive feedback on the paper and will need to respond to each comment as if they were revising a journal article. The revised version of the paper and the response to the comments need to be handed in at the end of the semester. In addition students are expected to present their ideas in class.

Course Schedule and Readings

See last pages of this syllabus. Readings can be obtained from the UF library website (e-journals). Where indicated, the reading is available through the course website. In some cases, a hardcopy will be made available for you to xerox. Background readings pertain to the lecture and are optional; Discussion readings are required.

Attendance Policy, Class Expectations, and Make-Up Policy

- 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.
- There will be no make-up exams or assignments without a documented excuse.
- If you are absent for more than one class, or miss more than 15 minutes of more than three 50-minute class periods without a documented medical or academic excuse, one point will be deducted from your final score for each additional time you are absent, leave early, or come late. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Paper presentations	100 each	20%
Critical summaries (3)	100 each	20%
Debate	100	10%
Conference highlights	100 each	10%
Final written assignment	100	35%
Active participation and timely posting of discussion items	100	5%

Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 – 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 – 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33

63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Overview of the course (subject to change!!!)

Date	Topic	Assignments	Discussion papers (numbered) and required readings	Optional background readings
INTRODUCTION AND METHODS				
(1) Jan 8	Introduction to brain and methods of cognitive neuroscience		Syllabus	Ward (2006, 2010, 2015) chapters 1-5 (hardcopy available for xeroxing)
(2) Jan 15	Electrophysiology		Boroditsky (2019), Hagoort (2019)	Kaan (2007)
(3) Jan 22	Hemodynamic and lesion techniques	Sign up for paper presentations	Kutas and Hillyard (1980)	
(4) Jan 29	Hemodynamic and lesion techniques		1. Lau, Phillips, and Poeppel (2008)	
SPEECH PERCEPTION AND PRODUCTION				
(5) Feb 5	Speech perception and production	Summary 1 due	2. Näätänen, Lehtokoski, and Lennes (1997) 3. Mesgarani et al. (2014)	Scott (2019)

(6)Feb 12	Motor Theory		4. Meister et al. (2007) 5. Pulvermüller et al. (2006)	Dehaene-Lambertz (2017), Venezia and Hickok (2009) Ganushchak, Christoffels, and Schiller (2011)
SYNTAX				
(7)Feb 19	Syntax	Topic of research paper due	6. Brennan et al. (2016) 7. Ding et al. (2016)	Brennan (2016), Pylkkänen (2019)
(8)Feb 26	Syntax and cognitive control		8. Leiken and Pylkkänen (2014)	Key-DeLyria and Altmann (2016), Gordon and Lowder (2012)
SPRING BREAK; NO CLASS				
COGNITIVE CONTROL				
(10)Mar 11	Bilingualism and cognitive control	Outline of research paper due Summary 2 due	9. Anderson et al. (2018)	Bialystok, Craik, and Luk (2012), Hervais-Adelman, Moser-Mercer, and Golestani (2011)
(11) Mar 18	Bilingualism and language control		10. Peeters (2020)	
READING				
(12) Mar 25	TBA	Prepare debate	TBA	TBA
(13) Apr 1	Visual word form area	Debate: Is there a VWFA?	TBA	Dehaene and Cohen (2011)
SOCIAL ASPECTS AND SEMANTICS				
(14) Apr 8	Social aspects	Research paper due	11. Pérez et al. (2019)	Schoot, Hagoort, and Segaert (2016)
(15) Apr 15	Embodied cognition; Event-semantics		12. Solomon et al. (2015)	TBA
(16) Apr 22	Wrap-up	Project presentations; Summary 3 due		
Apr 28, 11:59pm	Revision of research paper due			

Reading list

Anderson, John A. E., Ashley Chung-Fat-Yim, Buddhika Bellana, Gigi Luk, and Ellen Bialystok. 2018.

"Language and cognitive control networks in bilinguals and monolinguals." *Neuropsychologia* 117:352-363. doi: <https://doi.org/10.1016/j.neuropsychologia.2018.06.023>.

Bialystok, E., F. I. M. Craik, and Gigi Luk. 2012. "Bilingualism: consequences for mind and brain." *Trends in Cognitive Sciences* 16 (4):240-250. doi: 10.1016/j.tics.2012.03.001.

- Boroditsky, Lera. 2019. "Language and the brain." *Science* 366 (6461):13. doi: 10.1126/science.aaz6490.
- Brennan, Jonathan. 2016. "Naturalistic Sentence Comprehension in the Brain." *Language and Linguistics Compass* 10 (7):299-313. doi: 10.1111/lnc3.12198.
- Brennan, Jonathan R., Edward P. Stabler, Sarah E. Van Wagenen, Wen-Ming Luh, and John T. Hale. 2016. "Abstract linguistic structure correlates with temporal activity during naturalistic comprehension." *Brain and Language* 157-158:81-94. doi: <https://doi.org/10.1016/j.bandl.2016.04.008>.
- Dehaene-Lambertz, Ghislaine. 2017. "The human infant brain: A neural architecture able to learn language." *Psychonomic Bulletin & Review* 24 (1):48-55. doi: 10.3758/s13423-016-1156-9.
- Dehaene, Stanislas, and Laurent Cohen. 2011. "The unique role of the visual word form area in reading." *Trends in Cognitive Sciences* 15 (6):254-262.
- Ding, Nai, Lucia Melloni, Hang Zhang, Xing Tian, and David Poeppel. 2016. "Cortical tracking of hierarchical linguistic structures in connected speech." *Nature Neuroscience* 19 (1):158-164. doi: 10.1038/nn.4186.
- Ganushchak, Lesya, Ingrid Christoffels, and Niels Schiller. 2011. "The Use of Electroencephalography in Language Production Research: A Review." *Frontiers in Psychology* 2 (208). doi: 10.3389/fpsyg.2011.00208.
- Gordon, Peter C., and Matthew W. Lowder. 2012. "Complex Sentence Processing: A Review of Theoretical Perspectives on the Comprehension of Relative Clauses." *Language and Linguistics Compass* 6 (7):403-415. doi: 10.1002/lnc3.347.
- Hagoort, Peter. 2019. "The neurobiology of language beyond single-word processing." *Science* 366 (6461):55. doi: 10.1126/science.aax0289.
- Hervais-Adelman, Alexis Georges, Barbara Moser-Mercer, and Narly Golestani. 2011. "Executive control of language in the bilingual brain: Integrating the evidence from neuroimaging to neuropsychology." *Frontiers in Psychology* 2. doi: 10.3389/fpsyg.2011.00234.
- Kaan, Edith. 2007. "Event-Related Potentials and Language Processing: A Brief Overview." *Language and Linguistics Compass* 1 (6):571-591. doi: 10.1111/j.1749-818X.2007.00037.x.
- Key-DeLyria, Sarah E., and Lori J. P. Altmann. 2016. "Executive Function and Ambiguous Sentence Comprehension." *American Journal of Speech-Language Pathology* 25 (2):252-267. doi: 10.1044/2015_AJSLP-14-0111.
- Kutas, Marta, and S. A. Hillyard. 1980. "Reading senseless sentences: brain potentials reflect semantic incongruity." *Science* 207:203-205.
- Lau, Ellen F., Colin Phillips, and David Poeppel. 2008. "A cortical network for semantics: (de)constructing the N400." *Nature Reviews Neuroscience* 9 (12):920-933. doi: 10.1038/nrn2532.
- Leiken, K., and L. Pykkänen. 2014. "MEG evidence that the LIFG effect of object extraction requires similarity-based interference." *Lang Cogn Process* 29 (3):381-389. doi: 10.1080/01690965.2013.863369.
- Meister, Ingo G., Stephen M. Wilson, Choi Deblieck, Allan D. Wu, and Marco Iacoboni. 2007. "The Essential Role of Premotor Cortex in Speech Perception." *Current biology : CB* 17 (19):1692-1696. doi: 10.1016/j.cub.2007.08.064.
- Mesgarani, Nima, Connie Cheung, Keith Johnson, and Edward F. Chang. 2014. "Phonetic Feature Encoding in Human Superior Temporal Gyrus." *Science* 343 (6174):1006. doi: 10.1126/science.1245994.
- Näätänen, Risto, Anne Lehtokoski, and Mietta Lennes. 1997. "Language-specific phoneme representations revealed by electric and magnetic brain responses." *Nature* 385:432-434. doi: 10.1038/385432a0.
- Peeters, David. 2020. "Bilingual switching between languages and listeners: Insights from immersive virtual reality." *Cognition* 195:104107. doi: <https://doi.org/10.1016/j.cognition.2019.104107>.

- Pérez, Alejandro, Guillaume Dumas, Melek Karadag, and Jon Andoni Duñabeitia. 2019. "Differential brain-to-brain entrainment while speaking and listening in native and foreign languages." *Cortex* 111:303-315. doi: <https://doi.org/10.1016/j.cortex.2018.11.026>.
- Pulvermüller, Friedemann, Martina Huss, Ferath Kherif, Fermin Moscoso del Prado Martin, Olaf Hauk, and Yury Shtyrov. 2006. "Motor cortex maps articulatory features of speech sounds." *Proceedings of the National Academy of Sciences* 103 (20):7865-7870. doi: 10.1073/pnas.0509989103.
- Pylkkänen, Liina. 2019. "The neural basis of combinatorial syntax and semantics." *Science* 366 (6461):62. doi: 10.1126/science.aax0050.
- Schoot, Lotte, Peter Hagoort, and Katrien Segaert. 2016. "What can we learn from a two-brain approach to verbal interaction?" *Neuroscience & Biobehavioral Reviews* 68:454-459. doi: <https://doi.org/10.1016/j.neubiorev.2016.06.009>.
- Scott, Sophie K. 2019. "From speech and talkers to the social world: The neural processing of human spoken language." *Science* 366 (6461):58. doi: 10.1126/science.aax0288.
- Solomon, Sarah H., Nicholas C. Hindy, Gerry T. M. Altmann, and Sharon L. Thompson-Schill. 2015. "Competition between Mutually Exclusive Object States in Event Comprehension." *Journal of Cognitive Neuroscience* 27 (12):2324-2338. doi: 10.1162/jocn_a_00866.
- Venezia, Jonathan H., and Gregory Hickok. 2009. "Mirror Neurons, the motor system and language: From the Motor Theory to embodied cognition and beyond." *Language and Linguistics Compass* 3 (6):1403-1416. doi: 10.1111/j.1749-818X.2009.00169.x.
- Ward, Jamie. 2006. 2010, 2015. *The Student's Guide to Cognitive Neuroscience*: Psychology Press.