

Cognitive Neuroscience of Language

LIN6796-30192

Class Periods: W8-10 (3:00 PM - 6:00 PM)

Location: AND 32

Academic Term: Spring 2022

Instructor:

Edith Kaan

Kaan@ufl.edu; 352 294 7453

Office Hours:

T 3:00-3:50pm; W 1:55-2:45pm and by appointment.

You may attend my office hours in person in TUR 4127 (during which you are expected to wear a mask) or via Zoom. My office hours Zoom link is password protected and can be accessed on our class Canvas page.

Course website: on Canvas: <http://elearning.ufl.edu>

COVID-19 policies:

In light of new guidance from the Centers for Disease Control and Prevention, we expect everyone to wear a mask at all times when inside any UF facility, even if you are vaccinated. This includes our students, faculty, staff, vendors and visitors. Recent studies and guidance from the CDC state that both unvaccinated and vaccinated individuals can transmit the current COVID-19 variant to unvaccinated persons.

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

- **Paper presentations** Students are expected to give an oral summary of 1-3 required discussion papers over the course of the semester, one paper per presenter per session. These summaries are about 15 minutes (powerpoint), followed by a group discussion. The number of presentations over the entire course depends on enrollment.
- **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.

- **Written 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.
- **In class-assignments** (e.g. conference highlights): Throughout the semester we have several in-class assignment. An example is an exercise in which sections of an abstract book from a recent conference are 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.
- **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.
- Attendance is mandatory. If you are absent for more than two classes, you will get a warning. If absences persist the instructor can prohibit further attendance and assign a failing grade for excessive absences.
- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/
- For more information on grading policies, see <https://gradcatalog.ufl.edu/graduate/regulations/#text>

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Paper presentations	100 each	20%
written summaries (3)	100 each	20%
Debate	100	10%
In class assignments	100 each	5%

Final written assignment	100	40%
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

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (<https://disability.ufl.edu/students/get-started/>) 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 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>

Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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 and readings (subject to change!!! Number of discussion papers may change depending on enrollment)

Date	Topic	Assignments	Discussion papers (numbered) and required readings	Optional background readings
INTRODUCTION AND METHODS				
(1) Jan 5	Introduction to brain and methods of cognitive neuroscience		Syllabus	Ward (2006, 2010, 2015) chapters 1-5 (hardcopy available for xeroxing)
(2) Jan 12	Electrophysiology		Boroditsky (2019), Hagoort (2019)	Kaan (2007) Prat et al. (2016)
(3) Jan 19	Hemodynamic and lesion techniques	Sign up for paper presentations	Kutas and Hillyard (1980)	
(4) Jan 26	Hemodynamic and lesion techniques		1. Lau, Phillips, and Poeppel (2008)	Deluca et al. (2019)
SPEECH PERCEPTION AND PRODUCTION				
(5) Feb 2	Speech perception and production	Summary 1 due	2. Näätänen, Lehtokoski, and Lennes (1997) 3. Mesgarani et al. (2014)	Scott (2019)

(6) Feb 9	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 16	Syntax	Topic of research paper due	6. Brennan et al. (2016) 7. Ding et al. (2016)	Brennan (2016), Pykkänen (2019) Matchen & Hickok (2020)
(8) Feb 23	Syntax and cognitive control		8. Leiken and Pykkänen (2014)	Key-DeLyria and Altmann (2016), Gordon and Lowder (2012)
INDIVIDUAL DIFFERENCES/COGNITIVE CONTROL				
(9) Mar 2	Bilingualism and cognitive control	Outline of research paper due Summary 2 due	9. Anderson et al. (2018)	Bialystok, et al. (2012), Hervais-Adelman et al. (2011); Prat (2011)
Mar 9: SPRING BREAK - NO CLASS				
(11) Mar 16	Bilingualism and language control Morphology, Vis world form		10. Peeters (2020)	
READING				
(12) Mar 23	TBA	Prepare debate	TBA	TBA
(13) Mar 23	Visual word form area	Debate: Is there a VWFA?	TBA	Dehaene and Cohen (2011)
SOCIAL ASPECTS AND SEMANTICS				
(14) Apr 6	Social aspects	Research paper due	11. Pérez et al. (2019) 12. Verga & Kotz (2019)	Schoot, Hagoort, and Segaert (2016) Li and Jeong (2020)
(15) Apr 13	Embodied cognition; Event- semantics	Summary 3 due	13. Solomon et al. (2015)	TBA
(16) Apr 20	Wrap-up	Project presentations;		
Apr 27	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.
- Deluca, V., Rothman, J., & Pliatsikas, C. (2018). Linguistic immersion and structural effects on the bilingual brain: a longitudinal study. *Bilingualism: Language and Cognition*, 22(5), 1160-1175. <https://doi.org/10.1017/S1366728918000883>
- 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. Pylkkanen. 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.
- Li, P., and Jeong, H. (2020). The social brain of language: grounding second language learning in social interaction. *npj Science of Learning*, 5(1), 8. <https://doi.org/10.1038/s41539-020-0068-7>

- Matchin, W., and Hickok, G. (2020). The Cortical Organization of Syntax. *Cerebral Cortex*, 30(3), 1481-1498. <https://doi.org/10.1093/cercor/bhz180>
- 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>.
- Prat, C. S., Yamasaki, B. L., Kluender, R. A., & Stocco, A. (2016). Resting-state qEEG predicts rate of second language learning in adults. *Brain and Language*, 157-158, 44-50. <https://doi.org/https://doi.org/10.1016/j.bandl.2016.04.007>
- Prat, C. S. (2011). The Brain Basis of Individual Differences in Language Comprehension Abilities [<https://doi.org/10.1111/j.1749-818X.2011.00303.x>]. *Language and Linguistics Compass*, 5(9), 635-649. <https://doi.org/https://doi.org/10.1111/j.1749-818X.2011.00303.x>
- 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.
- Verga, L., & Kotz, S. A. (2019). Spatial attention underpins social word learning in the right fronto-parietal network. *NeuroImage (Orlando, Fla.)*, 195, 165-173. <https://doi.org/10.1016/j.neuroimage.2019.03.071>
- 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.