

Syllabus

Linguistics 333 (Moreton)*

2019 January 9 (W)

<i>Time:</i>	MWF 12:20–1:10	<i>Instructor:</i>	Elliott Moreton
<i>Place:</i>	Dey 304	<i>Office:</i>	Smith 101
<i>Textbook:</i>	None	<i>Office hours:</i>	W 10–12(?), or appointment
<i>Sakai:</i>	LING333.001.SP19	<i>Email:</i>	moreton@unc.edu
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1 Description

Linguistic theory asks why human language is the way it is, and not some other way. This course explores a range of “other ways” found in nature. We will compare human language with the communication systems used by other animals, with special focus on natural acoustic communication in humans, birds, and non- and pre-human primates.

The first part of the course will concentrate on the *anatomy* of the sound-producing organs in these species, and on the acoustics of the sounds produced by them. Students will learn how to record, manipulate, and measure sound files using the Praat software (freeware used in phonetics labs around the world), and the basics of interpreting sound spectrograms. We will read research papers in which the principles covered in this section are used to reconstruct the vocal abilities of extinct human relatives, such as Neanderthals, from fossils.

Next, we will turn to the *structure* of communication systems. Some species have a small, fixed vocal repertoire; others, like humans, titi monkeys, and Bengalese finches, can produce a very large number of utterances by combining smaller units according to rules. What are these rules like in other species, and how do they compare with the rules used in human language? We will approach this question using concepts from formal language theory.

The last part of the course focuses on how the different systems convey meanings, and how these systems are acquired by their users. We will look especially closely at two controversial and intertwined questions, the *innateness* and *evolution* of communication systems.

A textbook for this course has yet to be written. We will rely instead on chapters from textbooks in linguistics, zoology, and other fields, combined with original research reports. Readings will be available through Sakai or the World Wide Web.

To get direct experience of what we’re reading about, the course will include a substantial lab and field component consisting of homework assignments and a major semester project.

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The project will involve making and analyzing field recordings of the song of the American Robin.

2 Curricular requirements fulfilled by this class

This course is a General Education course, and fulfills the Social Science (SS) and Quantitative-Intensive (QI) requirements.

3 Prerequisites

The only prerequisite for this class is Linguistics 101, Introduction to Language, or the equivalent. A knowledge of high-school algebra is assumed.

4 Course requirements

Final grades for the course will be calculated as follows:

- 10% *Attendance and participation.* Students are supposed to come to class, do the assigned readings on time, and participate in class activities and discussion. Missing classes will make it hard to keep up. It will also lower your participation grade (unless due to illness or other unavoidable events, which it is your responsibility to document).
- 35% *Homework.* Homework includes problem sets and labs, of which there will be about 6. As is often the case in linguistics courses, the homework may be meant as preparation for the class, not the other way around. Students may have to figure out how to do things which they have not yet been shown how to do.
- 30% *Exams.* There will be two midterms and one final, all in-class, all cumulative from the beginning of the course. Each will count for 10% of the final grade.
- 25% *Final field project.* To get direct experience of animal-communication research, we will investigate the combinatorial structure of the song of the American Robin (*Turdus migratorius*). Robins are common around Chapel Hill, easy to recognize, and voluble. Their song is complex enough to be interesting but not so complex as to be unmanageable in a semester project. Best of all, very little is known about it. We will formulate a research question, then design, execute, and analyze a field experiment to answer it, and finally present the question and the results to the class. This will take place in several steps, and I'll be giving details as each one comes up.

Numeric grades will be converted to UNC's letter-grade system by mapping the numeric range from 60 to 100 onto the 10 passing letter grades from D to A, with four numeric points per step (except that A has 5 points, 96 to 100). It is possible to do well in this class and still get a grade other than A.

5 Policies

Attendance. If you miss a class, it is your responsibility to get missed materials from me or other students. Always check the website if you have been absent.

Reading. Students are expected to come to class having done the readings. If I start getting the impression that people aren't doing the readings, I'm going to institute pop quizzes. These are annoying because they waste class time, but coming to class without having done the reading wastes even more class time.

Homework. You'll get detailed information about each one when it's assigned, but there are some general points that apply to all of them. When you hand in homework, it can

be handwritten, word-processed, or even typewritten, but it has to be (1) neat, (2) legible, (3) on paper, and (4) well-organized. Homeworks handed in on time will be graded on a scale from 1 to 3 in a way that will be explained along with each assignment using a device called a *grading rubric*. The 1–3 scale will map linearly onto an *approximately* 60–100 scale in computation of the final grade. Other homeworks will receive a zero. Hence, a 0 is *much* worse than a 1.

Late assignments. As a general rule, NO LATE ASSIGNMENTS WILL BE ACCEPTED FOR CREDIT. Exceptions *may* be made if

- You got *advance* permission (by asking me *before* the due date) to hand in an assignment late, or
- You couldn't come to campus on the day the assignment is due because of a serious illness or other unexpected emergency. You need to get the assignment in at the earliest possible opportunity with a *written explanation* of the situation. Email is best.

Collaboration, citation, and outside sources. It is a really good idea to discuss assignments with others in the class and solve the problems together. However, each person should write up their solution alone.

The library and the World Wide Web are full of information, and you are encouraged to use them to supplement the class materials. If the explanation of some topic in the class reading leaves you puzzled, it can be very helpful to track down a different explanation elsewhere. HOWEVER, you should remember that HOMEWORK AND EXAM PROBLEMS ARE FOR SOLVING, NOT FOR LOOKING UP THE ANSWERS TO. If your assignment is to figure out the song syntax of a particular bird species, it is emphatically not OK to look up articles which discuss the song of that particular species!

If you collaborate or consult out-of-class sources on an assignment, you need to acknowledge them in the writeup, to give credit where it is due.

The Carolina Honor Code is in effect in this class, and I will treat violations seriously. You should review it at <http://instrument.unc.edu>. If you have questions about interpretation, you should bring them to me. **Every assignment you hand in must be accompanied by a signed statement that you have complied with the Code requirements in everything related to that work**, e.g., “I completed this assignment in full compliance with the Honor Code.”.

Audio and video recording of class. Permission to make audio or video recordings of class will be given only in special circumstances (e.g., to students with hearing impairments). As the note at the bottom of p. 1 implies, I as the copyright holder do not grant permission to repost course documents to other websites.

Midterm dates are still tentative at this point; they may move a couple of class days in either direction. You'll have at least two weeks' notice of the date, and will receive a midterm syllabus (a study guide) one week before the midterm. Individual exceptions will not be allowed without an extraordinarily compelling reason.

6 Partnerships

Most of the assigned work in this class will be done with a partner, for a shared grade (unless otherwise specified). There are several reasons for this.

One is purely practical. The final project is going to take more work than one person can reasonably be asked to do, so you will have to work with someone in order to finish the project on time and do a good job. But, the final project shouldn't be the first time you and your partner work together. Collaboration on homeworks during the first part of the semester gives you the opportunity to get the bugs out of the partnership.

Another reason is pedagogical. Again and again throughout the semester, each of you is going to find yourself having to explain something to your partner. Both of you will understand it better as a result.

Finally, this is how real research is done! You work with other people, share the ideas, share the labor, spot opportunities or mistakes that the other person overlooked, present the results together, and share the credit (or ignominy). It's none too early to start getting used to this aspect of research culture.

I will be assigning partners, on the basis of questionnaires, to insure that there is a fair distribution of skills and backgrounds among the partnerships. It is your job to insure that there is a fair distribution of work within each partnership. For the final project, this is mandatory: your project proposal must include an account of how you have agreed to divide up the work. Explicit agreements are not required for the homework, but informal ones are a darn good idea. Partners will work together on the homeworks and the final project, but not on the in-class exams. Partners are jointly responsible for handing in the assignment; that is, if it doesn't show up on time, it counts against both people.

7 Equipment and software

Audio equipment: Many assignments (including the "reading" assignments) will involve listening to audio files, either from Sakai or on the Web. You'll hear better if you have a pair of headphones or earphones. The kind used with portable MP3 players are fine. The headphones will plug into the headphone or speaker jack on your laptop or desktop computer.

To record, you'll need a microphone. For recording humans, each partnership will be issued with a mike that plugs into your computer's sound card. For making field recordings of birds, we'll be using more sophisticated equipment which can be signed out from the Linguistics Department.

Speech analysis software: A very nice speech-analysis package called Praat is available free for download from the Institute of Phonetic Sciences in Amsterdam.¹ There are versions for PC, Mac, and Linux.

State-machine simulation software: We will be using the JFLAP simulator² to build automata which simulate the formal structure of human and non-human communication systems. It, too, is available for PC, Mac, and Linux, and I will provide instructions on how to install it when the time comes.

A mirror: Once or twice I'll ask you to bring a small mirror to class, for observing your own articulators. The best kind is the folding pocket mirror, the kind which has a regular mirror and a magnifying mirror hinged together (so you can see around corners). However, a plain old hand mirror is fine.

¹<http://www.praat.org>

²<http://www.jflap.org>

8 Tentative schedule

Week	Date	Topics and readings
1	1/9 W 1/11 F	Acoustics. Installing and using Praat software. <i>Johnson (2012, Ch. 1); Denes and Pinson (1993, Ch. 4).</i>
2	1/14 M 1/16 W 1/18 F	Source/filter theory of phonation. Resonances of a half-open uniform tube. <i>Johnson (2012, Ch. 5).</i>
3	1/23 W 1/25 F	Formants and vocal-tract length. Sexual dimorphism and its adaptive significance. <i>Fitch (2000); Fitch and Reby (2001).</i>
4	1/28 M 1/30 W 2/1 F	Human vocal anatomy. Perturbation theory. Acoustics of vowels. <i>Johnson (2012, Ch. 6); Ladefoged (2003, Ch. 11).</i>
5	2/4 M 2/6 W 2/8 F	Comparative primate vocal anatomy and physiology. Evolution of human vocal tract. Vocal capabilities of extinct human relatives. <i>Fitch et al. (2016); Boë et al. (2002).</i>
6	2/11 M 2/13 W 2/15 F	Vocal anatomy and physiology in songbirds. Midterm 1. <i>Suthers (1999).</i>
7	2/18 M 2/20 W 2/22 F 2/24	Combinatorial structure. Finite-state machines. JFLAP software. Finite-state syntax in birdsong. <i>Hockett (1960); Catchpole and Slater (2008, Ch. 8); Honda and Okanoya (1999).</i>
8	2/25 M 2/27 W 3/1 F	Structure of birdsong. First-order Markov processes. <i>Kroodtsma (2005, 255–267).</i>
9	3/4 M 3/6 W 3/8 F	Combinatorial structure in vocalizations of non-human primates. Compositional semantics. <i>Robinson (1979); Robinson (1984).</i>
SPRING BREAK		
10	3/18 M 3/20 W 3/22 F	Finite-state aspects of human language. Inadequacy of finite-state machines for human language. Context-free phrase-structure grammars, and <i>their</i> inadequacy. <i>Chomsky (1957, Ch. 3), Culy (1985).</i>
11	3/25 M 3/27 W 3/29 F	Midterm 2. Recording birds in the field.
12	4/1 M 4/3 W 4/5 F	Universal Grammar hypothesis, and the problem of innateness. Wholly innate songs in birds and primates. Tyrant flycatchers, gibbons and siamangs. Interspecies hybrids. <i>Kroodtsma (2005, 79–89); Catchpole and Slater (2008, 49–60).</i>
13	4/8 M 4/10 W 4/12 F	Sensitive periods in acquisition of birdsong and human language. <i>Newport (2002); Marler (1991).</i>
14	4/15 M 4/17 W	Inductive bias in human language acquisition. <i>Hauser (1996, 310–318); Berent et al. (2008)</i>
15	4/22 M 4/24 W 4/26 F	Inductive bias and typology: <i>Fehér et al. (2009).</i> Final-project presentations
16	4/30 T	FINAL EXAM, 12:00 noon

References

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