

**Linguistics 2051**  
TR 11:10-12:30

**Analyzing the Sounds of Language**  
Baker System 285

Instructor: **Dr. Becca Morley**  
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Ohio Stadium East  
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Office Hours: TBA

To get to my office: Come in through the glass doors in between Gates 22 and 24 of the Stadium (it will say Linguistics Dept.). Go up one set of stairs to first floor. Take the left branch of the hallway. My office is about halfway down on the left side.

Course Description:

This is neither a phonetics course nor a statistics course. In the first instance, we will not be covering everything that you would need to know to be able to say that you have a solid introduction to phonetics. (For that, I recommend either Linguistics 4100 or Speech & Hearing 3320). However, this is a class offered through the Linguistics Department, to many students who have no phonetics or phonology background, therefore we will not be able to cover in depth all the material that you would encounter in a devoted statistics course (such as Statistics 1450, or Psych 2220).

This class will cover basic concepts and principles in probability theory, data analysis and experimental design. We will introduce some of the quantitative analytical tools that are used in the phonetic sciences (and elsewhere). Through discussion of the results of experimental work you will be exposed to both the methodology as well as the content of phonetics research.

How This Course Works:

If you're hoping for an easy way to fill a GE this class is not for you. We will cover topics that are very challenging – for everyone. And I expect you to work hard. I also expect you to think – as opposed to just memorizing facts. I am, however, also willing to give you as much help as you need. Lack of experience or skill with any of the concepts in this class is not an insurmountable obstacle. I grade on effort and improvement. You are only limited by how much effort you're willing to put in.

Course Goals:

Courses in Quantitative and Logical Skills: Data Analysis are intended to develop students' quantitative literacy and logical reasoning, including the ability to identify valid arguments, use mathematical models, and draw conclusions and critically evaluate results based on data. The Expected Outcomes for this course include basic computational skills, understanding of concepts in probability and statistics, and improvement in logical argumentation. These goals are expected to be achieved through explicit instruction in the concepts of probability, and the use of the R software package for performing statistics.

Additionally, students will be asked to apply these concepts to certain areas of linguistics, and to evaluate experimental design and interpret experimental results.

### Texts:

I haven't found a single textbook I really like, so we will be reading selections from a number of different books. These will all be available on Carmen.

Hand, David J., *Statistics: A Very Short Introduction* (Oxford, 2008; online edn, Very Short Introductions online, Sept. 2013), <http://dx.doi.org.proxy.lib.ohio-state.edu/10.1093/actrade/9780199233564.001.0001>

Klein, Grady, and Alan Dabney. *The cartoon introduction to statistics*. Hill and Wang, a Division of Farrar, Straus and Giroux, 2013.

O'Neill, Cathy. *Weapons of Math Destruction: How big data increases inequality and threatens democracy*. Crown: NY. 2106

Rugg, Gordon. *Using Statistics : A Gentle Introduction*, McGraw-Hill Education, 2007. ProQuest Ebook Central, <http://ebookcentral.proquest.com.proxy.lib.ohio-state.edu/lib/ohiostate-ebooks/detail.action?docID=332691>.

Smith, Bridget J., Beckman, Mary E., and Foltz, Anouschka (2016). *Analyzing the sounds of languages*. Ohio State University. <http://hdl.handle.net/1811/77848>

Stirzaker, David. *Probability and random variables: a beginner's guide*. Cambridge University Press, 1999.

### Responsibilities/Grading (percentages subjects to adjustment)

- 20%: Participation (in-class exercises + discussion + R practice)
- 5% : LOC
- 20%: Homework assignments (4): you will have 1 week to complete each homework assignment. I encourage you to work in groups. But **everyone will turn in their own assignment**.
- 40% : Labs (4): you will have 2 weeks to complete every lab. I will be assigning you randomly to groups of 3-4 people<sup>1</sup>. **You will turn in 1 assignment for the group.**
- 15%: Final Lab. TO BE DONE INDEPENDENTLY

Hard copies of all homeworks and labs are to be turned in at the beginning of the class period<sup>2</sup>.

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<sup>1</sup> This is not an attempt to destroy your soul. The groups are designed to make things easier for you, not harder. You are required to make a genuine effort to a) arrange at least one physical meeting with your group members, b) contribute to collaborative discussion of the lab questions. If your schedule is insane and you can't make it work, do your own assignment, with your own name on it – AND LET YOUR GROUP KNOW. If your group mates are slackers who don't return emails, fail to show up to arranged meetings, or expect you to do all the work, do your own assignment, with your own name on it – AND LET YOUR GROUP KNOW.

1. There will be a number of exercises that we do together as a class. I will sometimes collect these and they will count towards your grade. Additionally, I expect all of you to be active participants in classroom discussion. I'm serious about this. So serious, in fact, that I will call on you. Don't think I won't. I may also assign weekly practice in R; these will be very short and simple exercises designed to familiarize you with scripting.
2. During the quarter, you must earn 2 credits in Linguistics Outside the Classroom (LOC) activities. To earn each credit, you must either attend an LOC-designated talk or complete an LOC experiment, and then complete a short questionnaire to demonstrate your participation. You may attend two talks, complete two experiments, or attend one talk and complete one experiment to earn your 2 credits.

Website to sign up for experiments (timeslots will constantly be posted over the course of the quarter): <http://www.ling.ohio-state.edu/research/experiments/>

Website to find out about scheduled talks (just show up for these):  
<http://www.ling.ohio-state.edu/courses/201/talks.html>

The above percentages are only estimates. I take improvement into account, and I grade on a non-penalty curve<sup>3</sup>. Therefore, it is hard for me to provide grade estimates in the middle of the semester. However, if you are concerned about your standing in the class you are welcome to email me and we can discuss how you are faring.

For the most part I do not lecture from powerpoint, and I do not teach directly from the text. I will usually provide you with handouts, but you are still responsible for taking notes in class. Good note taking is an acquired skill, but one that will serve you well. If I start going too fast for you to write everything down, or you need terminological or technical clarification **let me know**.

#### Questions:

I expect you to ask questions if you have them. I rely on you to let me know when what I'm saying doesn't make sense. I will probably slip up and use a term that you don't know from time to time. Ask in class. Come to office hours. Email me if you can't make office hours. Additionally, there will be a discussion forum on Carmen for each homework assignment. Post questions there and I will answer them – within a day, and in most cases within a few hours<sup>4</sup>.

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<sup>2</sup> Unless you have made prior arrangements with me, the following are not acceptable: homework handed in to my mailbox during class, homework handed in halfway through the class. These will both be considered late. See my policy regarding late homework under Late Work.

<sup>3</sup> However, I can, and have, failed people before. I allot such a large percentage to in-class work in part to give students a better chance of succeeding. This cuts the other way too, however. If you consistently fail to show up, you are sacrificing about 20% of your grade.

<sup>4</sup> Seriously. This is habitually under-utilized. I will answer just about anything here. And if I won't I might even let a classmate of yours answer it. Of course, it does require you to actually start on the homework before 6:00 pm the day before it's due...

### Thinking:

I expect you to think for yourself in this class. I expect you to try things before we read about them. There will be ambiguity. This is scary. I know. Do your best to get over it<sup>5</sup>. Trust me; by the end of the class you will feel like you've actually learned something<sup>6</sup>.

### Absences:

If you miss class it is your responsibility to track down the material you missed. I recommend contacting a fellow classmate. All handouts will be available online on the Carmen site for this class.

### Late Work:

**Late work is not accepted except in rare instances.** If a health or family related situation arises, let me know and arrangements can be made. Otherwise, if you know you will need to miss class for any reason then you may turn in homework early, and schedule an appointment to go over the missed in-class exercises. This is only an option for unavoidable absences that YOU LET ME KNOW ABOUT AHEAD OF TIME. You should know that I will not be sympathetic to appointments that you suddenly remember the day of class.

### Ethics:

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct* ([oaa.osu.edu/coam/home.html](http://oaa.osu.edu/coam/home.html)), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* may constitute "Academic Misconduct."

### Accommodation:

**LET ME KNOW NOW – NOT HALFWAY THROUGH THE SEMESTER**

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12<sup>th</sup> Avenue.

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<sup>5</sup> I'm here for you. Your classmates are here for you. Walk towards the light.

<sup>6</sup> Provided you've followed the guidelines below.

### Basic Etiquette:

Here are some things I never thought I would have to teach anyone.

- 1) Do not text in class
  - a. Do not text under the desk (not subtle)
  - b. Do not text while sitting the front row and participating in class discussion (even less subtle)
- 2) Do not address your professor by their first name unless you are given explicit permission. I am now giving you explicit permission to call me Becca. Your other options include the following:
  - a. Dr. Morley
  - b. Um, excuse me?
- 3) Show up to class on time, and if you can't, do not come in late and then come to sit in the front row.

Here are some more things I really never thought I'd have to teach anyone!

- Things that are my job
  - Doing what I can – within reason – to help you learn the material
  - Making my expectations clear
  - Providing feedback on your performance
  - Being consistent and coherent
  - Being responsive to requests and complaints
- Things that are not my job
  - Providing you with up-to-the-minute calculations of your grade
  - Going out of my way to enable you to pass without actually attending class
  - Assisting you to exert the exact minimum amount of effort you need to pass the class
  - Answering basic questions about assignments the night before they are due
- Things That will Seriously Diminish Your Chance of Passing this Class
  - Scheduling work hours during class meeting times
  - Scheduling other classes during class meeting times
  - Attending for the first half of the semester and then assuming you know the drill and don't need to keep coming.

### Obstacles To Success: Common Misconceptions & Maladaptive Strategies:

- Questions should only be asked as an absolute last resort<sup>7</sup>
- Being wrong is the worst thing that could ever happen to me
- Office Hours are for the weak – and should only be utilized once I have bombed on 4 assignments
- Since I can't figure out how to do every problem, and even though I sort of think I know what #4 is about, I'm probably wrong, so I should just not turn anything in.
- Probably everyone else totally knows what's going on, so I should just keep my mouth shut.
- Working in groups is for the lazy. Plus, everyone knows that in the real world I will never have any contact with other humans, so I might as well get used to it now.
- The fact that there is no single right answer means that there is no wrong answer.

### Technical Details:

#### Software:

We will be using the R statistical and graphing software. This is available for free, and should already be downloaded onto all the computers in the classroom. I recommend that you obtain a copy for your own computer, or the computer that you will be using to do work for this class. You can get R for both Mac and PC here: <http://www.r-project.org/>

#### Note:

Running R on a Mac will be different than running R on a PC. Here is two important differences (see tutorial for others):

	Mac	PC
Changing working directory:	Misc::Change Working Directory	File::Change Working Directory
Creating a new plotting window:	quartz()	window()

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<sup>7</sup> This is the kind of class where you will probably feel much, much better about things if you ask questions. I like it when you ask questions. Scientists are supposed to ask questions. YOUR GRADE WILL BE BETTER IF YOU ASK QUESTIONS.

Week	Date	Topics	Readings	Assignments
Week 1	8/22 (T)	Introduction: a little linguistics a little (linguistic) data a little bit of scripting a little bit of probability theory		
	8/24 (R)	review of functions, algebra/variables, notation	Introduction to R (just skim) <u>Weapons of Math Destruction:</u> Profiling; bottom of page 24-27; pp.84-87; bottom of page 91-top 94; bottom of page 100- top 103	
Week 2	8/29 (T)	Samples vs. Populations Random Variables Basic Probability coins, cards, other games		
	8/31 (R)		<u>Statistics: A Very Short Introduction:</u> Ch 4. Probability pp 55-71	
Week 3	9/5 (T)	[Practice with R] <i>-arithmetic</i> <i>-sample()</i> <i>-creating variables</i> <i>-creating script from command line</i>	<u>Probability and Random Variables: a beginner's guide.</u> Ch1: pp. -16	
	9/7 (R)			
		Marginal and Conditional Probabilities		
Week 4	9/12 (T)	<u>Some Linguistics:</u>		<i>HW 1 due</i>
	9/14 (R)	<u>Phones, Phonemes &amp; Phonotactics</u> The International Phonetic Alphabet		
Week 5	9/19 (T)	<u>Phoneme Inventories:</u> Types of data; Population Properties:	<u>Statistics: A Very Short Introduction:</u> Ch.2 Simple Descriptions	<i>HW 2 Due</i>

	9/21 (R)	Mean, Median, Mode Sample Properties: (unbiased) estimates of these parameters Graphical representations of data: Histograms	<u>Using Statistics: A Gentle Introduction:</u> Ch 1. Some Introductory Concepts	
Week 6	9/26 (T)	Sample Properties: Standard Deviation, IQR Graphical representations of data: Boxplots		<i>HW 3 due</i>
	9/28 (R)	Hypothesis Testing: The Null Hypothesis The Significance Level [based on quartiles: 5%/95% probability of x]	<u>Using Statistics: A Gentle Introduction:</u> Ch 7: Inferential Statistics	
Week 7	10/3 (T)			<i>HW due 4</i>
	10/5 (R)	<u>Experimental Design I:</u> Werker & Tees (1983) <ul style="list-style-type: none"> <li>• VOT in English v. Hindi</li> <li>• Dependent &amp; Independent Variables</li> <li>• Analysis of Results</li> </ul>	<u>Weapons of Math Destruction:</u> Proxies: pp. 141-150	
Week 8	10/10 (T)			
	10/12 (R)	<b><i>Autumn Break Day</i></b>		
Week 9	10/17 (T)	Hypothesis Testing: Asking the right question Comparing the right things Graphical Representations	<u>Weapons of Math Destruction:</u> Ch 10: Micro-Targeting	<i>Lab 1 Due</i>
	10/19 (R)			
<b><i>Test Statistics</i></b>				
Week 10	10/24 (T)	The Binomial Distribution <ul style="list-style-type: none"> <li>• Binomial Test Derivation</li> </ul>	<u>Using Statistics: A Gentle Introduction:</u> Ch 6: The sixfold paths: some observations on probability theory	
	10/26 (R)	Cumulative Probability Determining Significance		
Week	10/31 (T)	<i>-table look up</i>		



11		-graphically -numerically ( <i>dbinom()</i> )		
	11/2 (R)	Other Distributions: <ul style="list-style-type: none"> <li>○ Normal</li> <li>○ Chi-Squared</li> <li>○ Uniform</li> <li>○ Logistic</li> </ul>		
Week 12	11/7 (T)	Central Limit Theorem <ul style="list-style-type: none"> <li>• Z Test</li> </ul>	<u>The Cartoon Introduction to Statistics:</u> Ch 7: The Central Limit Theorem	<i>Lab 2 Due</i>
	11/9 (R)	Neyman-Pearson Testing <ul style="list-style-type: none"> <li>• The T-Test</li> </ul> Determining Significance -table look up -graphically -numerically ( <i>t.test()</i> )	<u>Analyzing the Sounds of Language:</u> Ch 11: T-test Statistics	
Week 13	11/14 (T)			
	11/16 (R)	<u>Experimental Design II</u> Herd, Jongman and Sereno (2010) <ul style="list-style-type: none"> <li>• Flaps and Stops in English</li> <li>• Dependent &amp; Independent Variables</li> <li>• Analysis of Results</li> </ul>		
Week 14	11/21 (T)			<i>Lab 3 Due</i>
	11/23 (R)	<b>Thanksgiving</b>		
Week 15	11/28 (T)	Expected vs. Observed <ul style="list-style-type: none"> <li>• Chi-Square Test</li> </ul> Contingency tables Determining Significance	<u>Analyzing the Sounds of Language:</u> Ch 7: Testing goodness of fit of a Null Hypothesis model	
	11/30 (R)	Variance & Covariance Linear regression		
Week 16	12/5 (T)	<ul style="list-style-type: none"> <li>• R Statistic</li> <li>• F Statistic</li> </ul> Determining Significance	<u>Using Statistics: A Gentle Introduction:</u> Ch 9: Correlations	<i>Lab 4 due</i>
<i>Finals (12/8-12/14) : Final Lab Due</i>				