

Associated Canadian Theological Schools

LIN 576: Acoustic Phonetics

Dr. Rod Casali
Fall 2010
3 credit hours
Prerequisites: None
TA: Holly Higgins

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Office: CanIL 120
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M W F
10:00 – 10:50 am
Classroom: CanIL 208

I. Course Description

This course introduces students to fundamental principles of acoustics that are relevant to the study of human speech sounds. Students will gain a basic understanding of properties of speech sound waves and learn how to investigate these properties instrumentally using acoustic analysis software. There will be extensive practice interpreting acoustic displays such as waveform graphs, fundamental frequency graphs, and spectrograms. A major focus of the course is the effective use of these displays as an aid to correctly transcribing speech sounds and understanding their phonetic properties in the context of descriptive phonetic and/or phonological fieldwork. Significant attention is also given to the complex interrelationships among acoustic, articulatory, and perceptual correlates of speech sounds.

II. Objectives

By the end of this course, each student should:

- 1) understand basic properties of sound waves and their role in speech transmission.
- 2) understand the source-filter theory of speech production and its application to spectral analysis.
- 3) be able to use speech analysis software effectively to make measurements of basic acoustic properties of sound recordings, including duration, formant frequencies, voice onset time, and fundamental frequency.
- 4) be able to effectively use spectrographic and waveform displays as an aid to identifying speech sounds.
- 5) be able to employ digital audio recording equipment to make high quality sound recordings.

- 6) understand the complex nature of the relationships among abstract phonological, articulatory, acoustic, and perceptual entities.
- 7) appreciate the limitations of speech analysis software and be able to appropriately balance use of such software and reliance on traditional impressionistic phonetics in analyzing the sounds of a language.
- 8) gain a greater appreciation for the beauty and complexity of language and for the Designer who created it.

III. Course Textbooks

Students are not required to purchase a textbook. Rather, readings will be assigned from a variety of sources (see Section III below).

The following book is highly recommended as a resource for those planning to do phonetic & phonological analysis in the field:

Ladefoged, Peter. 2003. *Phonetic data analysis*. Malden, Massachusetts and Oxford: Blackwell.

It is available at www.amazon.ca from about \$50 - \$60 (\$40 - \$50 for a used copy).

IV. Course Assignments

Readings will be assigned throughout the course. See Section VII below for more detail.

Students are expected to attend class and participate in class discussion.

Homework exercises will be assigned throughout the course. Some exercises will involve use of speech analysis software to carry out analytical tasks on digitized speech samples. Instructions for the homework assignments will be available on MyCourses.

Tentative homework assignments and due dates:

Assignment 1: Properties of sound waves	Monday 9/20
Assignment 2: Harmonics	Monday 9/27
Assignment 3: Measuring segment duration	Monday 10/4
Assignment 4: Source-Filter Theory	Wednesday 10/13
Assignment 5: Vowel Formant Measurements and Plot	Monday 10/18
Assignment 6: TBA	Monday 11/1
Assignment 7: Word-initial alveolar flaps in Kikuyu	Monday 11/8
Assignment 8: Spectrographic Investigation of Dialect Differences	Monday 11/15
Assignment 9: Tafi Pitch Transcription	Monday 11/22

There will be a mid-term exam on Monday, October 25, and a comprehensive final exam.

Student grades will be determined as follows:

Task:	Value:
Homework exercises	30%
Mid-term exam	30%
Final exam	40%

Grading Scale

A+ 97-100 B+ 87-89 C+ 77-79 F 0-69

A 93-96 B 83-86 C 73-76

A- 90-92 B- 80-82 C- 70-72

V. Miscellaneous Notes/Policies

Submitting homework assignments

Homework assignments may be submitted either electronically (by e-mail to Holly) or on paper.

Late Assignment Policy

All homework assignments are due at the beginning of the class period on the indicated date. Unexcused late assignments will incur grading penalties as described below.

- For assignments less than 5 calendar days late, 15% will be deducted from the grade.
- For assignments more than 5 calendar days late, 25% will be deducted from the grade.

If because of exceptional circumstances you realize that it is not going to be possible to turn in assigned work when it is due, please make every reasonable effort to discuss this with me *before* the assignment due date.

VI. Tentative Course Outline

Week	Dates	Topic
1	9/10	Acoustic phonetics overview
2	9/13-9/17	Speech analysis software intro and overview, Sound waves and speech transmission, Acoustic categorization and analysis of sounds
3	9/20-9/24	Acoustic categorization and analysis of sounds, Harmonics and spectra
4	9/27-10/1	Source-filter theory of speech production
5	10/4-10/8	Source-filter theory of speech production, Acoustic analysis of vowels
6	10/11-10/15 ¹	Acoustic analysis of vowels
7	10/18-10/22	Acoustic analysis of vowels, Spectrogram reading
8	10/25-10/29	Mid-term exam (10/25) , Spectrogram reading
9	11/1-11/5	Spectrogram reading
10	11/8-11/12 ²	Spectrogram reading, Acoustic analysis of tone and intonation
11	11/15-11/19	Acoustic analysis of tone and intonation, Acoustic analysis and speech perception
12	11/22-11/26	Acoustic analysis and speech perception
13	11/29-12/3	TBA
14	12/6-12/8	TBA, review for final exam
	TBA	Final Exam

VII. Tentative Readings and Approximate Dates

Week 1 & 2:

Borden, Gloria J., Katherine S. Harris & Lawrence J. Raphael. 1994. Speech science primer: Physiology, acoustics, and perception of speech. Baltimore: Williams & Wilkins. Read Chapter 1, pp. 37-39.

Denes, P.B. & Pinson, E.N. 1993. The speech chain. 2nd edition. New York: W.H. Freeman. Read Chapter 1, pp. 17-29, 32-44.

¹ Thanksgiving holiday 10/11 (no class)

² Reading break 11/12 (no class)

Backus, John. 1969. The acoustical foundations of music. New York: W. W. Norton. Read pp. 32-44.

Week 3:

Possible reading TBA

Week 4:

Fry, D.B. 1979. The physics of speech. Cambridge: Cambridge University Press. Read Chapters 6-8.

Lieberman, Philip & Sheila E. Blumstein. 1988. Speech physiology, speech perception, and acoustic phonetics. Cambridge: Cambridge University Press. Read Chapter 4.

Weeks 5 & 6:

Ladefoged, Peter. 2003. Phonetic data analysis. Malden, Massachusetts and Oxford: Blackwell. Read Chapter 5.

Baart, Joan. 2002. Acoustic Phonetics. MS, SIL. Read pp. 44-61.

Week 7: No new reading (mid-term)

Week 8:

Fujimura, Osamu & Donna Erickson. 1997. Linguistic phonetic descriptions. The Handbook of Phonetic Sciences, ed. by William J. Hardcastle & John Laver, 65-115. Oxford, and Cambridge Massachusetts: Blackwell. Read pages 65-83.

Ladefoged, Peter. 2003. Phonetic data analysis. Malden, Massachusetts and Oxford: Blackwell. Read Chapter 6.

Week 9-10:

Everett, Caleb. 2008. Locus equation analysis as a tool for linguistic fieldwork. Language Documentation & Conservation 2: 185-211.
<http://scholarspace.manoa.hawaii.edu/handle/10125/4351>.

Ladefoged, Peter. 2003. Phonetic data analysis. Malden, Massachusetts and Oxford: Blackwell. Read pp. 75-90.

Bart, Joan L. D. 2001. A field manual of acoustic phonetics. MS, SIL. Read Section 5.2.

Week 11:

Himmelman, Nikolaus P. and D. Robert Ladd. 2008. Prosodic description: An introduction for fieldworkers. *Language Documentation & Conservation* 2: 244-274.
<http://scholarspace.manoa.hawaii.edu/handle/10125/4345>. Read Section 5.5.

Optional but recommended: Connell, Bruce & D. Robert Ladd. 1990. Aspects of pitch realisation in Yoruba. *Phonology* 7:1-29.

Week 12:

Beckman, Mary E. 1986. Stress and non-stress accent. Dordrecht: Foris Publications. Read pp. 141-144.

Bladon, Anthony. 1986. Phonetics for hearers. In *Language for Hearers*, ed. by Graham McGregor, 1-24. Oxford: Pergamon Press.

Wright, Richard. 2001. Perceptual cues in contrast maintenance. *The Role of Speech Perception in Phonology*, ed. by Elizabeth Hume and Keith Johnson, 251-274. San Diego: Academic Press.

Supplement: Important Academic Notes from ACTS

Web Support – Student Portal <https://students.twu.ca>

All students at TWU have a TWUPass username and password. This is determined at the time of an online application or can be managed through the computing services help desk or the link on the student portal. Your student email account is also available through this student portal and is vital for communication about grades, account statements, lost passwords, sign-up instructions, etc. If you do not know your account or password, there is a link at the login area called “I forgot my password.” When you click on that link, you will be walked through the process of retrieving your account information.

Campus Closure

In the event of deteriorating weather conditions overnight or other emergency situations, every effort will be made to communicate information regarding the cancellation of classes to the radio stations CKNW (980 AM), CKWX (1130 AM), MAX (850 AM), PRAISE (106.5 FM) and KARI (550 AM) by 6:30 a.m., and an announcement will be placed on the University's switchboard as well as on the website <http://www.twu.ca/conditions/>. The first announcement regarding a closure will cover the period up to 1:00 p.m. only. If classes are to be cancelled beyond 1:00 p.m., this decision will be announced by the same means before 11:00 a.m. that day. Students and faculty should assume that all night classes will continue to operate. If the emergency continues into the evening, students and faculty may check for a closure notice on the University's switchboard and website after 3:00 p.m. that day.

Paper Formatting

Students need to adhere to Turabian format except in counselling courses, for which APA format is used.

Students are encouraged strongly to use RefWorks (available through the library home page www.twu.ca/library) as their bibliographical manager and as a tool for formatting bibliographies. They will need to be aware of the need to “clean up” most bibliographies generated by this program. Students are encouraged to view the documents on the following websites for format samples: <http://faculty.ucc.edu/egh-damerow/turabian.htm> or www.dianahacker.com/resdoc/. Note that in RefWorks the available formatting styles are those of Turabian (Notes), 6th edition, and APA – American Psychological Association, 5th edition.

Counselling students are expected to purchase the APA Publications Manual. More information found at the following website. <http://www.apastyle.org/pubmanual.html>.

CANIL students can locate this on the CANIL intranet, under the “student” side. A hard copy is given to incoming students in the fall.

Please check with your professor to see which one he/she recommends you use!!

Research Ethics

Please note that all research projects involving human participants undertaken by members of the TWU university community (including projects done by ACTS students to satisfy course or degree requirements) **MUST** be approved by the Trinity Western University Research Ethics Board. Information and forms may be found at <http://www.twu.ca/academics/research/ethics/>. Those needing additional clarification may contact the ACTS Academic Dean's office. Please allow at least three (3) weeks from the date of submission for a review of the application.

Academic Integrity and Avoiding Plagiarism at TWU

As Christian scholars pursuing higher education, academic integrity is a core value of the entire TWU community. Students are invited into this scholarly culture and required to abide by the principles of sound academic scholarship at TWU. This includes, but is not limited to, avoiding all forms of plagiarism and cheating in scholarly work. TWU has a strict policy on plagiarism (see academic calendar 2008-09, pp. 37-38). Further details on this subject are contained in the ACTS Student Handbook in section 4.12. The handbook is available online on the ACTS webpage (www.acts.twu.ca) at the following link: www.acts.twu.ca/Handbook.html.

Learning what constitutes plagiarism and avoiding it is the student's responsibility. An excellent resource describing plagiarism and how to avoid it has been prepared by TWU Librarian William Badke and is freely available for download (PPT file) or used as flash (self running) tutorials of varying lengths from:

<http://www.acts.twu.ca/lbr/plagiarism.ppt>

<http://www.acts.twu.ca/lbr/Plagiarism.swf> (14 minute flash tutorial)

http://www.acts.twu.ca/lbr/Plagiarism_Short.swf (8 minute flash tutorial)

Equity of Access

It is the responsibility of a student with a learning disability to inform the ACTS Director of Student Life of that fact before the beginning of a course so that necessary arrangements may be made to facilitate the student's learning experience. We are unable to accommodate any student who informs the Director of Student Life of a disability after the beginning of class.