Articulatory Phonetics
LSA Summer Institute 2015
Wieboldt (WB) 408
MTh 10:30a-12:20p

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location: Cobb 215

Prerequisite(s): This course assumes knowledge of phonetics appropriate for an undergraduate introductory course in phonetics.

Course description: The goal of this course is to provide students with broad training in the nomenclature, theory, and practice of articulatory phonetics. Students in this course will learn about the organs of the vocal tract used in speech production, the muscles controlling them, and their coordination. We will also discuss factors thought to affect speech articulation, including speaker-internal factors (e.g. aerodynamics, coarticulation, speech rate), speaker-external factors (e.g. social information), as well as other factors, such as syllable structure and prosody. Along the way, students will learn about some of the techniques available for quantifying articulation, as well as what methods exist for analyzing those data. Students will design and be assessed on a proposal for novel research related to this topic.

Course goals: The goals of this course are to prepare students for future coursework and research on topics relating to speech production and articulation. By the end of the course, you should be able to:

- understand the basic articulatory components of speech.
- read and evaluate contemporary research in the field of articulatory phonetics.
- ask informed questions about speech articulation.
- decide what experimental techniques are most appropriate for investigating these questions.

Readings: Required readings, as well as recommended and supplementary readings, are indicated in the Course schedule. These readings will be made available to you through Google Drive. If you will not have access to the internet or to a device on which you can download and read the readings, or if you are idealistically opposed to Google, please contact me to make alternative arrangements.

Recommended textbooks for further study:

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons; ISBN-13: 978-1405193207
- Johnson, K. (2003). *Acoustic and Auditory Phonetics*. Blackwell, Oxford, 2nd edition; ISBN-13: 978-1405194662
- Raphael, L. J., Borden, G. J., and Harris, K. S. (2007). *Speech science primer: Physiology, acoustics, and perception of speech*. Lippincott Williams & Wilkins; ISBN-13: 978-0781771177

Course requirements and policies: Each student taking the course for credit is required to fulfill the following requirements.

- Regular attendance in class – your attendance grade will be docked 1 point (of 5) for each class you are absent from without an excuse[1].
- Homework assignments, which will consist of answering questions related to readings, as well as working with related data (3 total at 20 points each).
- A fourth homework assignment which will be either a brief (500 words) project proposal for research related to speech articulation, or a critical summary of a related journal article.

Considering time constraints, you are allowed (encouraged) to confer with other students to complete and discuss assigned readings and homework. If you do complete assignments as a team, please indicate all members of the team who should receive credit. Due to the accelerated pace of this course, late homework will not be accepted, but incomplete homework will certainly be accepted.

Point and grade distribution:

Attendance	10
Homework 1-3	60
Homework 4	30
Total	100

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

All grades above F are considered passing.

Assessment: You will be assessed on four homework assignments. These will be due by 5:00p, and you may either turn in your homework electronically via email, or physically in person. If you choose to email your assignments, please use the subject line "Articulatory Phonetics HW#: [your name]" to ensure it does not get overlooked. Due dates:

1. Monday 7/13
2. Monday 7/20
3. Monday 7/27
4. Friday 7/31

Three of the four assignments will consist of questions related to lectures and required readings. These will be worth 20 points each. The fourth and final assignment will be worth 30 points, and you will either:

- write a brief (roughly 500 words) prospectus for a research project that draws upon some aspect of the course, and ideally, your own research interests. –or–
- read one of the recommended readings from the syllabus and write a critical summary.

A note for advanced students: If at any point, you find that the readings or homework assignments are not challenging enough, just let me know. I am happy to recommend and assess additional work!

[1] Yes, that means you can miss all 8 class sessions and still earn 2 attendance points, but where's the fun in that?

Class schedule

Airflow and aerodynamics: 7/6-7/9
Speech, as a sensory stimulus, is carried by sound. In most speech situations, the medium for this sound is air. During these sessions, we learn about the combination of physics and human anatomy that allows humans to initiate and control airflow for speech production.

Required readings

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons – chapter 5
- Ohala, J. J. (1983). The origin of sound patterns in vocal tract constraints. In *The production of speech*, pages 189–216. Springer, New York

Recommended and supplementary readings

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons – chapters 4 & 6
- Dart, S. N. (1987). An aerodynamic study of Korean stop consonants: Measurements and modeling. *The Journal of the Acoustical Society of America*, 81(1):138–147 [air pressure, airflow]
- Garellek, M. and Keating, P. (2011). The acoustic consequences of phonation and tone interactions in Jalapa Mazatec. *Journal of the International Phonetic Association*, 41(02):185–205 [acoustics]
- Shosted, R. K. (2011). An articulatory–aerodynamic approach to stop excrescence. *Journal of Phonetics*, 39(4):660–667 [EPG, airflow]
- Smith, C. L. (1997). The devoicing of /z/ in American English: effects of local and prosodic context. *Journal of Phonetics*, 25(4):471–500 [airflow]
- Whalen, D. H. and Levitt, A. G. (1995). The universality of intrinsic f0 of vowels. *Journal of Phonetics*, 23(3):349–366

Vocal tract shape: 7/13-7/16
Beyond airflow, speech production involves manipulation of the shape of the vocal tract. In addition to controlling and directing the flow of air, the shape of the vocal tract creates unique acoustic signatures that are reflected in the acoustics. During these sessions, we learn how vocal tract shape influences the resonant structures of acoustics. We also learn about the anatomical infrastructure which allows humans to create unique vocal tract shapes.

Required readings

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons – chapter 8
- Raphael, L. J. and Bell-Berti, F. (1975). Tongue musculature and the feature of tension in English vowels. *Phonetica*, 32(1):61–73

Recommended and supplementary readings

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons – chapter 9
- Johnson, K. (2003). *Acoustic and Auditory Phonetics*. Blackwell, Oxford, 2nd edition – chapters 2, 6, 9
- Perkell, J. S., Matthies, M. L., Svirsky, M. A., and Jordan, M. I. (1993). Trading relations between tongue-body raising and lip rounding in production of the vowel /u/: A pilot "motor equivalence" study. *The Journal of the Acoustical Society of America*, 93(5):2948–2961 [EMMA, palate tracings]
- Stevens, K. N. (1989). On the quantal nature of speech. *Journal of Phonetics*, 17:3–45
- Stone, M. (1990). A three-dimensional model of tongue movement based on ultrasound and x-ray microbeam data. *The Journal of the Acoustical Society of America*, 87(5):2207–2217[x-ray, ultrasound]
- Zhou, X., Espy-Wilson, C., Boyce, S., Tiede, M., Holland, C., and Choe, A. (2008). A magnetic resonance imaging-based articulatory and acoustic study of "retroflex" and "bunched" American English /r/. *Journal of the Acoustical Society of America*, 103(6):4466–4481 [MRI, 3D-modeling]

Speech organ control: 7/20
During this session, we learn how speech articulators are controlled during speech – what happens in the body to make the speech organs move? We also read about articulatory overlap – what phonetic and phonological processes cause overlap to occur, and what happens when it does.

Required readings

- Krakow, R. (1999). Physiological organization of syllables: a review. *Journal of Phonetics*, 27:23–54

Recommended and supplementary readings

- Gick, B., Wilson, I., and Derrick, D. (2012). *Articulatory Phonetics*. John Wiley & Sons – chapters 3 & 11
- Byrd, D., Tobin, S., Bresch, E., and Narayanan, S. (2009). Timing effects of syllable structure and stress on nasals: A real-time MRI examination. *Journal of Phonetics* [MRI]
- Houde, J. F. and Chang, E. F. (2015). The cortical computations underlying feedback control in vocal production. *Current Opinion in Neurobiology*, 33:174–181

Factors in production and variation: 7/23-7/27
During these sessions, we cover some of the factors that may influence speech articulation, including sociolinguistic factors, L2 status, speech rate, lexical frequency and predictability, among others.

Required readings

- Munhall, K. and Löfqvist, A. (1992). Gestural aggregation in speech-laryngeal gestures. *Journal of Phonetics*, 20(1):111–126 [endoscopy]

Recommended and supplementary readings

- Lawson, E., Scobbie, J. M., and Stuart-Smith, J. (2013). Bunched /r/ promotes vowel merger to schwar: An ultrasound tongue imaging study of Scottish sociophonetic variation. *Journal of Phonetics*, 41(3):198–210 [ultrasound]
- Lin, S., Beddor, P. S., and Coetzee, A. W. (2014). Gestural reduction, lexical frequency, and sound change: A study of post-vocalic /l/. *Laboratory Phonology*, 5(1):9–36 [ultrasound]
- Ménard, L., Toupin, C., Baum, S. R., Drouin, S., Aubin, J., and Tiede, M. (2013). Acoustic and articulatory analysis of French vowels produced by congenitally blind adults and sighted adults. *The Journal of the Acoustical Society of America*, 134(4):2975–2987 [ultrasound, video]
- Wilson, I. and Gick, B. (2014). Bilinguals use language-specific articulatory settings. *Journal of Speech, Language, and Hearing Research*, 57(2):361–373 [ultrasound, EMA]

Methods & loose ends: 7/30
During our final session, we will survey the (many) different ways in which researchers measure articulation, and how to choose the right data for your project. We'll also leave some time to discuss remaining loose ends.

There are no assigned readings for this session; see tagged readings in the other sections for examples of research using specific techniques.