Production and Perception of Language
PSYC G4232y, Spring Term, 2019
Tuesday, 6:10-8:00 P. M.
Office Hours: T 2-3 P. M. and by appointment

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About the Production and Perception of Language

First, think of something poetic to say. Then, find the words and syntax to convey the message with clarity and wit. To give voice to the words, speak them as a series of consonants and vowels, but use your own dialect and idiolect. Don't worry about acoustic propagation—the compliance of the atmosphere will accomplish that, conveying the effects of vocalization to the listener. A conversational partner who shares your language will find acoustic attributes within the signal that distinguish consonants and vowels, will reprise the segmental series cognitively, and, from this, will apprehend the words, syntax and meaning of your utterance. ("Tell me, O Muse…")

These phenomena of language have framed and fueled a century of neuroscience. Researchers have sought to understand how, by hearing sounds that a talker makes, a listener perceives a message, and not simply the articulatory causes of the hisses, clicks, whistles, buzzes and hums which compose speech. Spoken communication is dependent on a linguistic as well as a physical medium, and in *Production and Perception of Language* we will expose the classic and contemporary research conducted in this vein. We will start with several comprehensive reports and reviews; we will sample a variety of accounts, some based on the models of psychophysics and others on less rarefied circumstances (speech perception on the corner); and, we will spotlight several recent and promising manifestations of the classic themes. In every case, we will read the work of the scientists themselves, as they reported the evidence and proposed interpretations.

About Psychology G4232y

Each week, a pair of students will be designated as *leader* and *rapporteur* of a discussion of assigned reading. The leader will present a summary and a critique of the reading, and propose questions to guide the discussion by the seminar. The discussion will be chronicled by the rapporteur, and posted on the website of the seminar as a record of our intellectual work. Each member will take turns leading the group and reporting the discussion over the course of the semester; your instructor will take a few turns, too. One or more readings will be assigned each week from a collection of monographs, journal articles and conference reports.

Learning Objectives

By completing this course, you will learn:

- to describe the cognitive functions by which communicative goals take linguistic form expressed in an utterance;
- to explain the specific productive and perceptual challenges posed by the resolution of linguistic form and personal attributes conveyed in an utterance;
- to evaluate the quality of evidence offered in studies of linguistic communication;
- to explain language phenomena according to several rival contemporary accounts;
- to link explanations of perception and language to general scientific principles.

Chronicles

Within a week of leading a session, the *rapporteur* will post a brief, written chronicle of the discussion on the seminar website. A chronicle will summarize the research that launched the discussion, the key questions identified by the leader, and the contributions made in discussion with members of the seminar.

Grades

Each student will prepare an original paper appraising an empirical project in the light of the scientific themes of the seminar. The topic of the paper may be freely chosen from the technical literature on the perception and production of language. A student's grade in the course will be based on participation as leader, as rapporteur, as discussant within the seminar, and on the final

paper project. The course grade will indicate the student's achievement as discussion leader (30%), as rapporteur (20%), as a participant in weekly discussions (20%) and as the author of the paper project (30%).

How to get into this course

The number of places in the seminar is limited. Permission of the instructor is required to enroll. Class standing (graduate, post-baccalaureate, undergraduate senior, junior, major concentration, etc.) will be considered in determining eligibility. Additionally, a prerequisite of a course in Psychology above the 1000 level pertinent to the perceptual or linguistic topics of G4232y will also be considered. In some circumstances, relevant courses in Biology, Computer Science, Engineering, or Philosophy may be acceptable preparation.

Readings

Week 1: January 22, 2019: General Overview and Organizational Meeting.

Levelt, W. J. M. (1989). The speaker as information processor. From *Speaking* (pp. 1-28). Cambridge, Massachusetts: MIT Press.

Pardo, J. S., & Remez, R. E. (2006). The perception of speech. In M. Traxler and M. A. Gernsbacher (Eds.), *The Handbook of Psycholinguistics, 2nd ed.* (pp. 201-248). New York: Academic Press.

Week 2: January 29, 2019: Articulatory and Acoustic Basis of Segmental Contrasts: Consonants.

Goldstein, L., & Fowler, C. (2003). Articulatory phonology: A phonology for public language use. In Meyer, A. & Schiller, N., *Phonetics and Phonology in Language Comprehension and Production: Differences and Similarities* (pp. 159-207). New York: Mouton.

Raphael, L. J. (2005). Acoustic cues to the perception of segmental phonemes. In D. B. Pisoni and R. E. Remez (Eds.), *The Handbook of Speech Perception* (pp. 182-205.). Oxford: Blackwell.

Week 3: February 5, 2019: Articulatory and Acoustic Basis of Segmental Contrasts: Vowels.

Purcell, D. W., & Munhall, K. G. (2006). Adaptive control of vowel formant frequency: Evidence from real-time formant manipulation. *Journal of the Acoustical Society of America*, 120, 966–977.

Ladefoged, P. & Broadbent, D. E. (1957). Information conveyed by vowels. *Journal of the Acoustical Society of America*, 29, 98-104.

Week 4: February 12, 2019: A General Account of Phonetic Sensitivity.

Harris, C. M. (1953a). A study of the building blocks of speech. *Journal of the Acoustical Society of America*, 25, 962-969.

Harris, C. M. (1953b). A speech synthesizer. *Journal of the Acoustical Society of America*, 25, 970-975.

Iacoboni, M., Woods, R. P., Brass, M., Bekkering, H., Mazziotta, J. C., & Rizzolatti, G. (1999). Cortical mechanisms of human imitation. *Science*, 286, 2526-2528.

Liberman, A. M., & Mattingly, I. G. (1985). The motor theory of speech perception revised. *Cognition*, 21, 1-36.

Lotto, A. J., Hickok, G. S., & Holt, L. L. (2008). Reflections on mirror neurons and speech perception. *Trends in Cognitive Science*, 11, 110-114.

Week 5: February 19, 2019: Perception in the Psychophysics Laboratory.

Liberman, A. M., Harris, K. S., Hoffman, H. S., & Griffith, B. C. (1957). The discrimination of speech sounds within and across phoneme boundaries. *Journal of Experimental Psychology*, 54, 358-368.

Costa, A., Cutler, A., & Sebastián-Gallés, N. (1998). Effects of phoneme repertoire on phoneme decision. *Perception & Psychophysics*, 60, 1022-1031.

Kraljic, T., Samuel, A. G., & Brennan, S.E. (2008). First impressions and last resorts: How listeners adjust to speaker variability. *Psychological Science*, 19, 332-338.

Week 6: February 26, 2019: Perception and Production as Information Processing.

Dahan, D., Drucker, S. J., & Scarborough, R. A. (2008). Talker adaptation in speech perception: Adjusting the signal or the representations? *Cognition*, 108, 710-718.

Goldinger, S. D. (1998). Echoes of echoes? An episodic theory of lexical access. *Psychological Review*, 105, 251–279.

Luce, P. A., Pisoni, D. B., & Goldinger, S. D. (1990). Similarity neighborhoods of spoken words. In G. T. M. Altmann (Ed.), *Cognitive Models of Speech Processing: Psycholinguistic and Computational Perspectives* (pp. 122-147). Cambridge: MIT Press.

Pisoni, D. B. (1973). Auditory and phonetic memory codes in the discrimination of consonants and vowels. *Perception & Psychophysics,* 13, 253-260.

Pisoni, D. B. (1975). Auditory short-term memory and vowel perception. *Memory & Cognition*, 3, 7-18.

Week 7: March 5, 2019: Production, Perception and Neural Oscillators.

Greenberg, S. (1999). Speaking in shorthand — A syllable-centric perspective for understanding pronunciation variation. *Speech Communication*, 29, 159-176.

Luo, H., &, & Poeppel, D. (2007). Phase patterns of neuronal responses reliably discriminate speech in human auditory cortex. *Neuron*, 54, 1001-1010.

Morrill, R. J., Paukner, A., Ferrari, P F., & Ghazanfar, A. A. (2012). Monkey lipsmacking develops like the human speech rhythm. *Developmental Science* 15, 557–568.

Peelle, J. E., Gross, J., & Davis, M. H. (2013). Phase-locked responses to speech in human auditory cortex are enhanced during comprehension. *Cerebral Cortex*, 23, 1378-1387.

Week 8: March 12, 2019: Speech Perception on the Corner, Part 1: Pragmatic Context.

Bradlow, A. R., & Bent, T. (2002). The clear speech effect for non-native listeners. *Journal of the Acoustical Society of America*, 112, 272-284.

Clarke, C. M., & Garrett, M. F. (2004). Rapid adaptation to foreign-accented English. *Journal of the Acoustical Society of America*, 116, 3647-3658.

Clopper, C. G., & Pierrehumbert, J. B. (2008). Effects of semantic predictability and regional dialect on vowel space reduction. *Journal of the Acoustical Society of America*, 124, 1682-1688.

Eisner, F., & McQueen, J. M. (2006). Perceptual learning in speech: Stability over time. *Journal of the Acoustical Society of America*, 119, 1950–1953.

There is no meeting of the seminar on March 19, 2019.

Week 9: March 26, 2019: Speech Perception on the Corner, Part 2: Language and Thought.

Boroditsky, L (2001). Does language shape thought? Mandarin and English speakers conceptions of time. *Cognitive Psychology*, 43, 1-22.

January, D., & Kako, E. (2007). Re-evaluating evidence for linguistic relativity: A reply to Boroditsky (2001). *Cognition*, 104, 417-426.

Kay, P. (1996). Intra-speaker variability. In J. J. Gumperz and S. C. Levinson (Eds.), *Rethinking Linguistic Relativity* (pp. 97-114). Cambridge: Cambridge University Press.

Week 10: April 2, 2019: Perceptual Organization of Speech.

Eimas, P. D., & Miller, J. L. (1992). Organization in the perception of speech by young infants. *Psychological Science*, 3, 340-345.

Remez, R. E. (2008). Sine-wave speech. In E. M. Izhikovitch (Ed.), *Encyclopedia of Computational Neuroscience* (pp. 2394). (*Scholarpedia*, 3, 2394.) http://www.scholarpedia.org/article/Sine-wave_speech

Shannon, R. V., Zeng, F.-G., Kamath, V., Wygonski, J., & Ekelid, M. (1995). Speech recognition with primarily temporal cues. *Science*, 270, 303-304.

Smith, Z. M., Delgutte, B. & Oxenham, A. J. (2002). Chimaeric sounds reveal dichotomies in auditory perception. *Nature*, 416, 87-90.

Week 11: April 9, 2019: Multimodal Speech Perception, Part 1.

Bertelson, P., Vroomen, J., & de Gelder, B. (2003). Visual recalibration of auditory speech identification: A McGurk aftereffect. *Psychological Science*, 14, 592–597.

McGurk, H., & McDonald, J. (1976). Hearing lips and seeing voices. *Nature*, 264, 746-748.

Sumby, W. H., & Pollack, I. (1954). Visual contribution to speech intelligibility in noise. *Journal of the Acoustical Society of America*, 26, 212-215.

Vatikiotis-Bateson, E., Eigsti, I.-M., Yano, S., Munhall, K. G. (1998). Eye movement of perceivers during audiovisual speech perception. *Perception & Psychophysics*. 60, 926-940.

Week 12: April 16, 2019: Multimodal Speech Perception, Part 2.

Fowler, C. A., & Dekle, D. J. (1991). Listening with eye and hand: Cross-modal contributions to speech perception. *Journal of Experimental Psychology: Human Perception and Performance*, 17, 816-828.

Remez, R. E., & Rubin, P. E. (2016). Perceptual organization and lawful specification. *Ecological Psychology*, 28, 160-165.

Remez, R. E., Dubowski, K. R., Ferro, D. F., & Thomas, E. F. (2017). Primitive audiovisual integration in the perception of speech. Technical Report, Speech Perception Laboratory, Department of Psychology, Barnard College.

Sekiyama, K. (1997). Cultural and linguistic factors in audiovisual speech processing: The McGurk effect in Chinese subjects. *Perception & Psychophysics*, 59, 73-80.

Week 13: April 23, 2019: Concurrent Identification of Words and Talkers.

Krauss, R. M., Freyberg, R., & Morsella, E. (2002). Inferring speakers physical attributes from their voices. *Journal of Experimental Social Psychology*, 38, 618-625.

Nygaard, L. C., Sommers, M. S., & Pisoni, D. B. (1994). Speech perception as a talker-contingent process. *Psychological Science*, 5, 42-46.

Perrachione, T. K., Chiao, J. Y., & Wong, P. C. M. (2010). Asymmetric cultural effects on perceptual expertise underlie an own-race bias for voices. *Cognition*, 114, 42–55.

Remez, R. E., Fellowes, J. M., & Rubin, P. E. (1997). Talker identification based on phonetic information. *Journal of Experimental Psychology: Human Perception and Performance*, 23, 651-666.

Week 14: April 30, 2019: The Problem of Veterinary Models.

Holt, L. L. & Lotto, A. J. (2008). Speech perception within an auditory cognitive science framework. *Current Directions in Psychological Science*, 17, 42-46.

Kluender, K. R, Diehl, R. L., & Killeen, P. R. (1987). Japanese quail can learn phonetic categories. *Science*, 237, 1195-1197.

Kuhl, P. K., & Miller, J. D. (1975). Speech perception by the chinchilla: Voiced-voiceless distinction in alveolar plosive consonants. *Science*, 190, 69-72.

Trout, J. D. (2001). The biological basis of speech: What to infer from talking to the animals. *Psychological Review*, 108, 523-549.