

## Constraint-Based Models of Phonetic Grammar

It has long been known that the grammars of languages must regulate relatively fine details of phonetic realization, but relatively little is known about the form of the relevant component of grammar. In this seminar we will study a model based on weighted constraints (Flemming 2001), based on case studies including coarticulation (local and long distance) and the timing and realization of tones. We will also consider the relationship between phonetic and phonological grammars in light of this model.

Outline of the seminar:

1. Introduction to the constraint-based model of phonetics
  - Background: language-specific phonetics (Keating 1985).
  - Case study: consonant-vowel coarticulation (Flemming 2001).
  - Overview of the evidence for a weighted-constraint model of phonetics.
  - Working with weighted constraint models using R and Mathematica.
2. Case studies I: Local and long distance coarticulation between consonants and vowels.
  - Analyzing long-distance coarticulation, extent of coarticulatory influence and coarticulatory resistance in terms of local phonetic constraints.
  - Further issues:
    - i. How are phonetic targets derived? (Liljencrants & Lindblom 1972, Flemming 2005)
    - ii. Phonetic typology: constraints on possible constraint weights.
3. Case studies II: Tone realization and alignment between segments and tones in Korean and Mandarin Chinese (Cho 2010, Flemming & Cho 2014).
  - Analyzing tone-segment alignment under variation in speech rate.
  - ‘Over-specification’ of segments: conflicting targets for the same tone.
4. The relationship between phonetic and phonological grammar
  - Are phonetics and phonology distinct components of grammar? (Flemming 2001)
  - Implications of language-specific phonetics for phonological typology (Jun 2002, Steriade 2001).
  - Effects of phonological structure on phonetic realization (Flemming 2011).

Assignments: Readings and data-analysis exercises.

Selected references:

- Cho, Hyesun (2011) The timing of phrase-initial tones in Seoul Korean: a weighted-constraint model. *Phonology* 28, 293-330.
- Flemming, Edward & Cho, Hyesun (2014) The phonetic specification of contour tones: evidence from the Mandarin rising tone. Ms, MIT and Dankook University.
- Flemming, Edward (2011) La grammaire de la coarticulation [The grammar of coarticulation]. Mohamed Embarki and Christelle Dodane (eds.) *La Coarticulation: Des indices à la Représentation*, L’Harmattan, Paris, 189-211.
- Flemming, Edward (2005) A phonetically-based model of phonological vowel reduction. Ms, MIT.

- Flemming, Edward (2001) Scalar and categorical phenomena in a unified model of phonetics and phonology. *Phonology* 18. 7-44.
- Jun, Jongho (2002). Positional faithfulness, sympathy, and inferred input. Ms, Yeungnam University, Daegu, Korea.
- Keating, Patricia A. (1985). Universal phonetics and the organization of grammars. Victoria A. Fromkin (ed.) *Phonetic Linguistics*. New York: Academic Press, 115-32.
- Liljencrants, Johan, and Björn Lindblom (1972). Numerical simulation of vowel quality systems: The role of perceptual contrast. *Language* 48, 839-62.
- Steriade, Donca (1999). Phonetics in phonology: the case of laryngeal neutralization. *UCLA Working Papers in Linguistics* 2, 25-146.