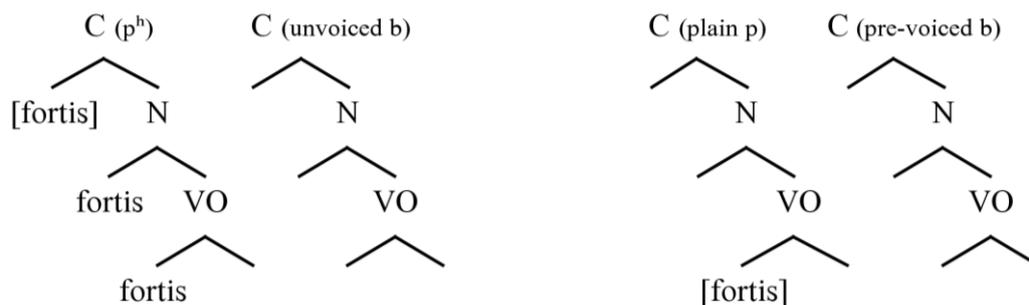


Fortis stops in ‘voicing’ languages – evidence from Polish and Polish-accented English  
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Laryngeal Realism (LR; Honeybone 2005; Beckman et al. 2013), based on privative [voice] and [spread glottis] features in voicing and aspiration languages, respectively, may be seen as the dominant theoretical perspective on laryngeal systems with two series of consonants. Nevertheless, LR may be challenged with respect to ample evidence that voicelessness is often phonologically active in voicing languages. Many authors attribute this evidence to binary voice specification (Rubach 1996; Wetzels & Mascaró 2001; Bennett & Rose 2017). An alternative interpretation using Onset Prominence (OP) representations is offered by Schwartz (2017), for whom the plain vs. aspirated distinction is a function at the representational level at which a single [fortis] feature is assigned. Thus, voicelessness, or fortisness, is the active phonological feature in both aspiration and voicing systems (cf. Cyran 2014; van der Hulst 2015), while pre-voicing does not reflect the presence of a feature [voice], but rather constitutes part of an acoustic carrier signal as envisioned in Traummüller’s (1994) Modulation Theory. This is shown in the representations in (1). [Fortis] assignment at the Closure (C) level yields aspiration, which is absent with [fortis] assignment at the Vocalic Onset (VO) level.

(1) Two-series laryngeal systems (Schwartz 2017) – aspiration (left) vs. voice languages



These representations have a number of implications for the phonetics of laryngeal phonology that are addressed in this presentation.

1. VO-level specification predicts increased weight of cues at vowel onset, including  $f_0$  (Kirby & Ladd 2016) and F1 transition (Stevens & Klatt 1974), in the acoustic and perceptual makeup of laryngeal contrasts in true voice languages, since the phonological distinction is localized in the early portion of the vowel following stop release.
2. The identical representations of /bdg/ in both voice and aspiration systems predict an asymmetry in cross-linguistic influence in the speech of L2 learners and bilinguals, by which ‘equivalence classification’ (Flege 1987) between L1 and L2 should be more robust in the case of /bdg/ than /ptk/.

This presentation will summarize a set of acoustic and perceptual experiments on Polish and Polish-accented English aimed at investigating these implications. Experiments that have been completed have obtained the following results.

- In a discrimination task with 31 Polish listeners, participants perceived the lenis-fortis contrast with an accuracy rate of higher than 93% when pre-voicing was absent from /bdg/ in the stimuli. Acoustic analysis of the unvoiced lenis stimuli revealed that the contrast was most robustly realized in terms of F1 onset frequency.
- In production studies of VOT in L2 speech, Polish learners of English were more successful at producing target-like L2 aspirated fortis stops than they are at suppressing Polish-style pre-voicing to produce target-like lenis stops without pre-voicing. This result

suggests equivalence classification effects between English and Polish for /bdg/ but not /ptk/.

- In a study of L1 phonetic drift (cf. Chang 2012; Herd et al. 2015), Polish learners of English produced Polish /ptk/ with VOT essentially identical to that of a monolingual control group. However, the /bdg/ of the learner group showed L2-induced drift by which only 77% of the items were produced with pre-voicing, while the monolingual controls produced fully pre-voiced /bdg/ in 96% of the items. Again, this result suggests equivalence classification between /bdg/ but not /ptk/.
- In an acoustic study of word-initial /bdg/ and /ptk/ produced by 30 Polish speakers, significant effects of laryngeal category were found for both f<sub>0</sub> (mean difference of 11Hz) and F1 (mean difference of 0.37 Bark) at vowel onset.

In addition to summarizing phonetic data, this presentation will consider further phonological implications of the representations in (1), which may be summarized as follows.

- Various aspects of laryngeal phonology, including the data described here, are compatible with a structural view of segmental representation in which stops are taken apart into their component phases (closure, burst, transition; cf. Steriade 1993, Inkelas & Shih 2017)
- Binary [voice] is not necessary for describing phonologically active voicelessness in non-aspiration systems. Indeed, the feature [voice] may be eliminated altogether. Voicing does not modulate the acoustic carrier signal. Rather, voicing *is* the carrier signal.
- In the absence of a feature [voice], cases of voice assimilation may be analyzed with regard to structural aspects of the positions in which they are observed. In essence, regressive voice assimilation in languages like Polish or Dutch reflects the emergence of the carrier signal when there is no carrier modulation induced by a fortis consonant. In other words, regressive voicing should not be thought of as ‘phonological spreading’.

Beckman, J., M. Essen & C. Ringen. 2013. Evidence for laryngeal features: Aspirating vs. true-voice languages. *Journal of Linguistics* 49(2), 259–284.

Bennett, W. & Rose, S. 2017. Moro voicelessness dissimilation and binary [voice]. *Phonology* 34, 473–505.

Chang, C. 2012. Rapid and multifaceted effects of second-language learning on first-language speech production. *Journal of Phonetics* 40, 249–268.

Cyran, E. 2014. *Between phonology and phonetics – Polish voicing*. Berlin: Mouton de Gruyter.

Flege, J. 1987. The production of ‘new’ and ‘similar’ phones in a foreign language: evidence for the effect of equivalence classification. *Journal of Phonetics* 15, 47–65.

Herd, W., Walden, R., Knight, W., & Alexander, S. (2015). Phonetic drift in a first language dominant environment. *Proceedings of Meetings on Acoustics* 23.

Honeybone, Patrick. 2005. Diachronic evidence in segmental phonology: the case of obstruent laryngeal specifications. In Marc van Oostendorp & Jeroen van de Weijer (eds.), *The internal organization of phonological segments*, 317–352. Berlin: Mouton de Gruyter.

van der Hulst, H. 2015. The laryngeal class in RcvP and voice phenomena in Dutch. Caspers, J., Chen, Y., Heeren, W., Pacilly, J., Schiller, N. & van Zanten, E. (eds.), *Above and beyond the Segments: Experimental Linguistics and Phonetics*. John Benjamins Publishing Company, Amsterdam, pp. 323–349.

Inkelas, S., & Shih, S. 2016. Re-representing phonology: consequences of Q Theory. *Proceedings of NELS* 46.

Kirby, J. & R. Ladd. 2016. Effects of obstruent voicing on vowel F<sub>0</sub>: evidence from ‘true-voice’ languages. *JASA* 140 (1), 2400–2411.

Rubach, J. 1996. Nonsyllabic analysis of voice assimilation in Polish. *Linguistic Inquiry* 27, 69–110.

Schwartz, G. 2017. Formalizing modulation and the emergence of phonological heads. *Glossa: a journal of general linguistics* 2 ( 1 ), 81 .

Stevens, K. & D. Klatt. 1974. Role of formant transitions in the voiced-voiceless distinction for stops? *JASA* 55, 653–659.

Steriade, D., 1993. Closure, release, and nasal contours. In: Huffman, M., Krakow, R., (Eds.), *Nasals, nasalization, and the velum*. Academic Press, San Diego, pp. 401–470.

Traunmüller, H. 1994. Conventional, biological, and environmental factors in speech communication: A modulation theory. *Phonetica* 51, 170–183.

Wetzels, W.L. & Mascaró, J. The typology of voicing and devoicing. *Language* 77, 207–244.