

## The role of non-voicing correlates in the laryngeal contrast of obstruents in a “voicing” language

G. Kiss, Zoltán (Eötvös Loránd University in Budapest)

Based on the classical, VOT-based classification, Hungarian is a “voicing” language in which the laryngeal contrast of word-initial stops is based on the difference between zero VOT vs. negative VOT. The voicing nature of Hungarian initial stops is also manifested “actively” in their voicing capabilities in regressive voicing assimilation (RVA). According to the traditional literature (e.g., Siptár & Törkenczy 2000), this voicing assimilation completely neutralises the laryngeal contrast, i.e., an underlyingly voiced obstruent is phonetically and phonologically indistinguishable from a voiced obstruent that is the outcome of regressive voicing assimilation (and similarly, an underlyingly voiceless obstruent is indistinguishable from a devoiced obstruent). Although for the laryngeal contrast of fricatives VOT does not play a role, Hungarian fricatives are said to behave the same way as stops with respect to their phonological voicing specification and RVA (i.e., their laryngeal contrast is also completely neutralized in regressive voicing assimilation contexts).

We will show that the situation in Hungarian is much more nuanced than what is suggested by the classical typology and the traditional literature. Our phonetically-grounded model assumes that phonetics plays a direct role in phonological contrast and RVA: laryngeal contrast is not only signalled by phonetic voicing but many other concomitant acoustic correlates (Kohler 1994; Lisker 1986; Kingston & Diehl 1994; Port & Dalby 1982; Janson 2004). They include durational, intensity-related and low-frequency spectral features ( $f_0/F_1$ ). We will show that these “redundant” features play an important role when neutralisation is likely: when phonetic voicing is lost (before another obstruent or in utterance-final position), they step up to maintain the contrast. Durational correlates have been shown to play an important role in contrast preservation in aspirating languages like English. The talk will argue that they play a crucial role in Hungarian, a non-aspirating language, too to uphold phonological contrast.

We will show the results of an acoustic/production experiment that investigated the contrast of /k/–/g/, /s/–/z/, and /kt/–/gd/, /st/–/zd/ in (i) utterance-final position, (ii) word-finally before a (voiceless/voiced) obstruent (RVA), and (iii) before sonorants/intervocally. The results show that the phonetic voicing difference between voiceless–voiced obstruents disappears in positions that are “unfavourable” for phonetic voicing. For instance, underlyingly voiced fricatives were largely voiceless in position (i) (a novel result as Hungarian is not known to be a “final-devoicing” language). But the contrastive segments were statistically significantly different with respect to durational correlates, and so there is no complete neutralisation. In (iii), durational correlates did not play an important role because phonation as the primary correlate did not disappear (there was no “need” for secondary cues). It has also been found that stops and fricatives display different patterns in laryngeal neutralisation, which can be linked to their laryngeal phonetics (for example, due to aerodynamic factors, fricatives resist voicing more than stops). This was manifested in the RVA context too: fricatives did not become fully voiced before a voiced stop. We will argue that laryngeal contrast is better understood if all potential phonetic correlates are taken into account, even those that have been analysed as phonologically “redundant” for contrast (because they are predictable). These phonetic correlates of the laryngeal contrast can be ranked as to their role in contrast maintenance depending on the phonetic position where the contrast occurs. We will also show the result of a pilot experiment which indicated that durational acoustic correlates (especially the vowel-to-fricative duration ratio) are perceptual cues too that help uphold laryngeal contrast in phonetically unfavourable positions, such as the RVA context. When the amount of phonetic voicing in a fricative is at a borderline value to be categorized as “voiced”, vowel-to-fricative duration ratios higher than 1 resulted in the perception of a voiced fricative, that is, very long vowels can elicit a voiced response even with little phonetic voicing. However, if the fricative contains around 50% voicing, this in itself is sufficient to induce a

voiced response independently of vowel length, indicating that phonetic voicing is a primary cue, while the durational cue is only made use of when the primary cue is weak or absent.

## References

- Jansen, W. 2004. Laryngeal contrast and phonetic voicing: A laboratory phonology approach to English, Hungarian, and Dutch. Doctoral dissertation. Rijksuniversiteit Groningen.
- Kingston, J. and R. Diehl. 1994. Phonetic knowledge. *Language* 70. 419–454.
- Kohler, K. 1984. Phonetic features in phonology: The feature fortis–lenis. *Phonetica* 41. 150–174.
- Lisker, L. 1986. “Voicing” in English: A catalogue of acoustic features signalling /b/ vs. /p/ in trochees. *Language and Speech* 29. 3–11.
- Lisker, L. and A. Abramson 1964. A cross-linguistic study of voicing in initial stops: Acoustical measurements. *Word* 20. 384–422.
- Port, R. F. and Dalby, J. 1982. C/V ratio as a cue for voicing in English. *Perception and Psychophysics* 2. 141–152.
- Siptár, Péter and Miklós Törkenczy. 2000. *The phonology of Hungarian*. Oxford: OUP.