

## Voicing, devoicing or contrast enhancement? Russian homorganic nasal-stop sequences in a devoicing context

Mayuki Matsui<sup>1</sup>, Silke Hamann<sup>2</sup>

<sup>1</sup>National Institute for Japanese Language and Linguistics/ JSPS/ UvA, <sup>2</sup>University of Amsterdam

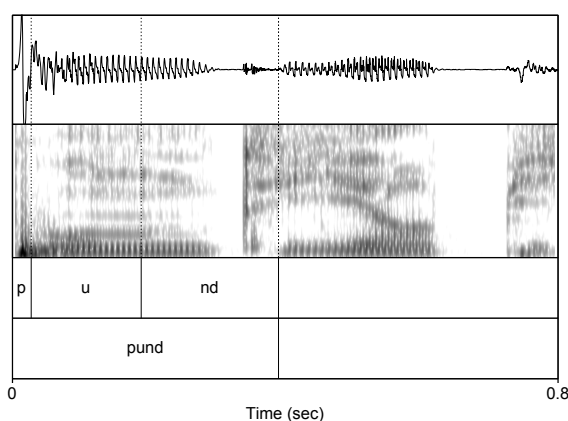
*Introduction:* Homorganic nasal-stop (NT) sequences have been attracting considerable attention both from phonologists and phoneticians over the decades, since the voicing pattern in NT sequences exhibit cross-linguistic variation. However, little investigated is how the phonetic nature of the NT sequence, which includes a preference for voicing (e.g. Solé 2012) and contrast enhancement (see Hamann & Downing 2017 for an overview), interacts with other phonological/phonetic processes, such as *devoicing* in word-final position. The present study thus examines NT sequences in a *devoicing* context in Russian. By doing this, the present study offers phonetic insights on the current NT typology and on incomplete neutralization in the context of word-final devoicing.

*Background:* Russian is a language with a two-way voicing contrast in obstruents, and the contrast is maintained in the NT sequences. Previous phonological accounts of Russian have assumed that voiced obstruents are devoiced in word-final position, resulting in neutralization of the voicing contrast (e.g. Halle 1959). However, later careful instrumental studies have shown that even though vocal fold vibration might be absent, other acoustic differences are still distinguishing between “neutralized” obstruents (see e.g. Kharlamov 2014). Similar findings of “incomplete neutralization” have been reported for other languages (e.g. Port & O’Dell 1985 and Roettger et al. 2014 for German). The phonetics of the NT sequence provides insights in the neutralization pattern; if word-final devoicing has priority, the nasal might get devoiced together with the following stop, and vocal fold vibration might cease already during its oral closure. On the other hand, the preceding nasal might block the stop from getting completely neutralized and might itself stay voiced throughout. In addition, the post-nasal voicing contrast might get enhanced by utilizing other phonetic cues, including a long-distance coarticulatory effect of voicing on the vowel duration (see e.g. Chen 1970). An acoustic study was conducted to test these possibilities.

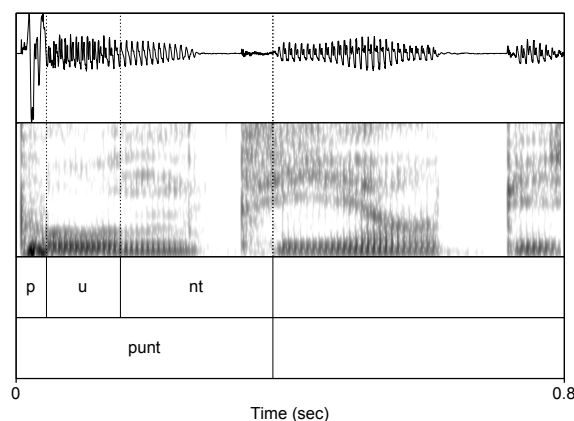
*Data:* 11 native Russian speakers produced nonce words containing /nd/ and /nt/ sequences in an utterance-medial word-final position (e.g. /pnd/ vs. /pnt/), followed by a sonorant ([j]). The speech materials were elicited using a declension task with auditory stimuli (see e.g. Roettger et al. 2014 for a similar methodology). We measured temporal properties, *inter alia*, the duration of the preceding vowel, nasal and non-nasal, oral closure, and burst. Additionally, the harmonics-to-noise ratio (HNR) of each interval was considered to assess contrast enhancement along the spectral dimension (see e.g. Downing & Hamann 2018 for Tumbuka).

*Results and Discussion:* Our findings include that (i) the post-nasal stops showed partial voicing for /nd/ but also for /nt/ (Figs. (a) and (b) respectively); (ii) the sonorants (vowel + nasal) preceding /d/ were longer than those preceding /t/ (compare Figs. (a) with (b)), showing incomplete neutralization. However, the vowel itself did not show significant difference, suggesting that a long-distance coarticulatory effect of the final stop on the vowel is questionable in a devoicing context. (iii) The HNR trajectories of the nasal interval were different, depending on the voicing in the following stop. Taken together, the results offer a complex case of incomplete neutralization, interacting with competing phonetic constraints for the NT sequence. The broader implications of these findings for speech perception and NT typology will be addressed during the presentation.

## Figures



(a) An example of the word-final (non-utterance-final) /nd/ sequence in /pund/ [pund].



(b) An example of the word-final (non-utterance-final) /nt/ sequence in /punt/ [punt].

## References

- Chen, M. 1970. Vowel length variation as a function of the voicing of the consonant environment. *Phonetica* 22: 129–159.
- Downing, L. J., Hamann, S. 2018. The phonetics of NCh in Tumbuka and its implications for diachronic change. *Papers in Historical Phonology* 3: 77–95.
- Halle, M. 1959. *The Sound Pattern of Russian*. Hague: Mouton.
- Hamann, S., Downing, L. 2017. \*NT revisited again: An approach to postnasal laryngeal alternations with perceptual cue constraints. *Journal of Linguistics* 53: 85–112.
- Kharlamov, V. 2014. Incomplete neutralization of the voicing contrast in word-final obstruents in Russian: Phonological, lexical, and methodological influences. *Journal of Phonetics* 43: 47–56.
- Port, R., O'Dell, M.L. 1985. Neutralization of syllable-final devoicing in German. *Journal of Phonetics* 13: 455–471.
- Roettger, T. B., Winter, B., Grawunder, S. 2014. Assessing incomplete neutralization of final devoicing in German. *Journal of Phonetics* 43: 11–25.
- Solé, M-J. 2012. Natural and unnatural patterns of sound change? In M-J. Solé and D. Recasens (eds.), *The Initiation of Sound Change: Perception, Production, and Social Factors*, 123–145. Amsterdam: John Benjamins.