

Vowel shortening in German as a function of syllable structure

Schmitz, Dominic¹, Cho, Hae-Eun¹, Niemann, Henrik¹

¹Universität zu Köln, Institut für Linguistik – Phonetik

dschmit5@smail.uni-koeln.de, hae-eun.cho@smail.uni-koeln.de, henrik.niemann@uni-koeln.de

We investigated vowel duration in German pseudowords as a function of coda complexity (cf. Peters & Kleber, 2014), number of syllables (Vayra et al., 1999) and whether vowel height correlates with inherent vowel length (Maddieson, 1997). We tested three hypotheses: (1) an increase in coda complexity in monosyllabic pseudowords leads to shortening of the vowel, i.e. CV > CVC > CVCC, (2) in disyllabic pseudowords the second syllable leads to vowel shortening in the first syllable, i.e. CV > CV.CV and CVC > CVC.CV, and (3) low vowels are longer than mid vowels which in turn are longer than high vowels, i.e. /a: > e:, o: > i:, u:/. In a production experiment, ten native speakers of German were asked to read the sentence /nax [target word] vɪl kɪm di: raɪzə maxən/ ‘Kim wants to travel to [target word]’ with a rising nuclear pitch accent on the target word. Our targets had the structure /mV/, /mVm/, /mVms/, /mV.la/ and /mVm.la/. The vowel V varied in one of the tense vowels /i:, e:, a:, o:, u:/.

Mixed-effects model analyses (Bates et al., 2016, R Core Team, 2016) supported all three hypotheses. As shown in Fig. 1, vowels are longest in CV syllables and become significantly shorter with increasing coda complexity. These findings add to the results of Peters & Kleber (2014) who presented similar results for CVC and CVCC syllables. Fig. 2 shows a decrease in vowel duration from monosyllabic to disyllabic pseudowords. These findings are in line with those by Vayra et al. (1999) who found similar results for syllable induced shortening in Italian. We also found support for hypothesis (3): As can be seen in Fig. 3, the low vowel, i.e. /a:/, was significantly longer than mid and high vowels, i.e. /e:, o:, u:, i:/, in all contexts. In addition, mid vowels, i.e. /e:, o:/, were significantly longer than high vowels, i.e. /u:, i:/. These findings seem to indicate that the dependency between vowel height and duration, which is considered to be universal (Maddieson, 1997), is not affected by coda or syllable induced vowel shortening.

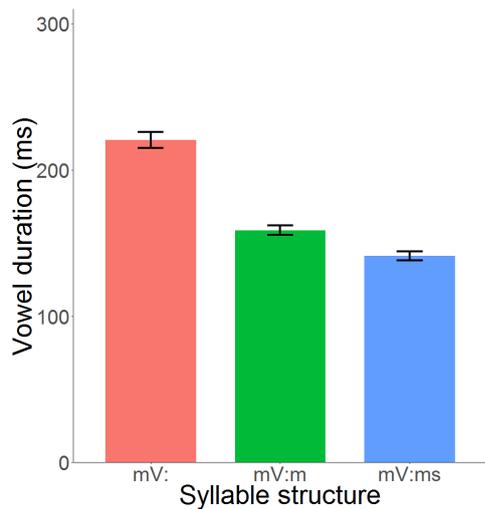


Fig. 1 Vowel duration in monosyllables as a function of coda complexity. V = /i:, e:, a:, o:, u:/. Error bars represent standard errors.

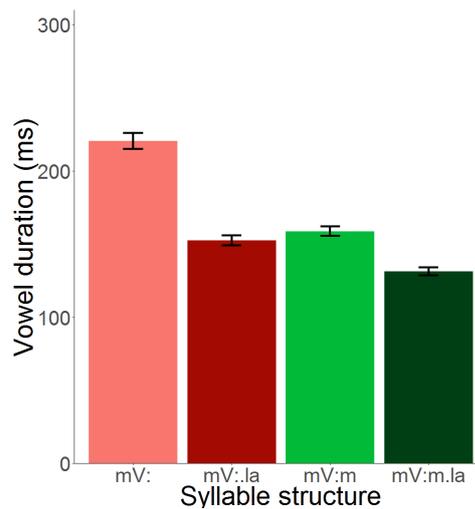


Fig. 2 Vowel duration as a function of number of syllables. V = /i:, e:, a:, o:, u:/. Error bars represent standard errors.

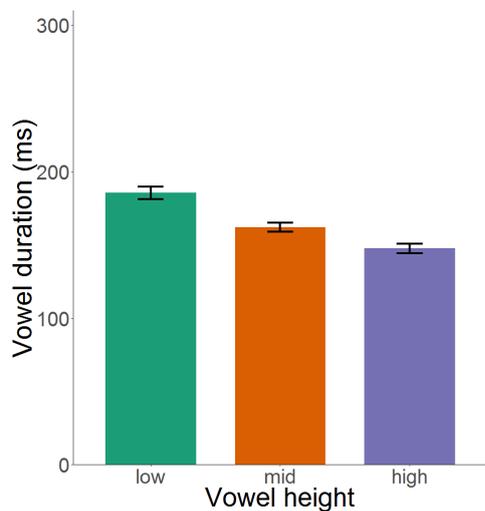


Fig. 3 Vowel duration as a function of syllable structure and vowel type. Low = /a:/, mid = /e:, o:/, high = /i:, u:/. Error bars represent standard errors.

References

- Bates, D., Maechler, M., Bolker, B., Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1), 1-48.
- Maddieson, I. (1997). Phonetic Universals. In: William J. Hardcastle & John Laver (eds.). *The Handbook of Phonetic Sciences* (pp. 619-639). Oxford and Cambridge: Blackwell.
- Peters, S., & Kleber, F. (2014). Articulatory mechanisms underlying incremental compensatory shortening in German. *International Seminar on Speech Production*, Cologne, 316-319.
- RStudio Team (2016). RStudio: Integrated Development for R. RStudio, Inc., Boston, MA. <http://www.rstudio.com/>.
- Vayra, M., Cinzia A. & Fowler, C. (1999). On the phonetic bases of vowel consonant coordination in Italian: A study of stress and „compensatory shortening“. Proceedings of the *International Conference on Phonetic Sciences*, San Francisco, 495-498.