Phrase-final lengthening in Czech and French

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Both Czech and French are fixed-stress languages. In Czech, stress is placed on the first syllable of a lexical unit, and is realized through complex variations of fundamental frequency rather than with an increased intensity as traditionally claimed (Duběda, 2012). In French, the underlying lexical accent, inherited from Latin, is word final but is realized only when the end of the word coincides with the end of a prosodic unit. This fact led different authors to consider French as a language without stress (Rossi, 1980) or a boundary language (Vaissière, 2010). French stress is primarily of a quantitative nature, accompanied with specific tonal patterns (Delattre, 1939).

Final lengthening is a universal phenomenon but the amount of lengthening is language dependant (Lindblom 1978). Therefor although final lengthening is characteristic of both languages (Rigault, 1970), we hypothesize that it is more abundant in French than in Czech because 1. it coincides in French with a durative final stress, and 2. vowel length is phonological in Czech (Palková, 1997), opposing short and long vowels, and temporal variations on a supra-segmental level are thus expected to be limited (Flemming, 2005). The results of our inter-language acoustic study can be exploited in a phonetic teaching and learning of French as a Foreign Language by Czech learners or Czech as a Foreign Language by French learners.

Speech material and speakers: In order to study temporal variations according to a position in a word that is initial, median or final, vowels were embedded in trisyllabic nonce words CVCVCVC (V - vowels, C - consonants). In French, Vs are ten oral vowels /i, e, ε, y, o, œ, u, o, ɔ, a/ typical of Standard French (Léon, 1976) and Cs are consonants of four different places of articulation, i.e. labial, dental, palato-velar and uvular /p, t, k, R/. The logatoms were produced within carrier sentences such as “Le mot papapape peut bien coller” (The word papapap suits well.) by ten native French women (M age = 28.5) and repeated four times.

In Czech, the vowels studied are ten monophthongs /i, iː, e, εː, u, uː, o, oː, a, aː/, typical of the speakers from the Bohemia region (Šimáčková et al., 2012) embedded in labial, dental, palato-velar and glottal symmetrical contexts /p, t, k, h/. The logatoms were produced in carrier sentences such as «Slovo papapap působí divně.» (The word papapap sounds weird.) by 20 native Czech women (M age = 27), repeated four times.

Recordings and measurements: Recordings, undertaken with a headband microphone AKG C520 and a soundcard Edirol UA25, were executed in a quiet room. The sampling frequency was set at 44100 Hz, and the quantization at 16 bits. Vowels were segmented and labelled semi-automatically in Praat (Boersma and Weenink, 2015), then checked and, when necessary, adjusted manually by relying on an oscillogramme and a spectrogram. Each vowel selected corresponds to a part of an acoustic signal where the first four formants (especially F2) are clearly visible.

Results: In French, the mean duration of initial vowels is at 92 ms, that of median vowels at 93 ms and the final vowels’ duration is, on the average, at 133 ms (all consonant contexts mixed). One-factor ANOVA analysing the effect of the position within a word on the vowel duration gives a significant result: F(2, 4790) = 431, p < 0.05. A Fisher’s post hoc test
indicates that the global effect is caused by duration differences between initial/median vowels and the final vowel \((p < 0.05)\). The duration difference between initial and median vowels is non-significant \((p = 0.8)\). The vowel length ratio of initial/median/final vowels is 1: 1: 1.4.

In Czech, we have analysed, separately, phonologically short and long vowels. The mean vowel duration of short vowels in initial, median and final positions of a nonce word is at 82 ms, 86 ms and 124 ms, respectively, and that of long vowels is at 149 ms, 153 ms and 212 ms, respectively. The ANOVA analysis of vowel position effect on the duration brings a significant result \(F(29, 9469) = 413\) avec \(p < 0.05\). As in French, Fisher’s test indicates that the global effect is caused by duration differences between the initial/median vowel and the final vowel \((p < 0.05)\). The length ratio for phonologically short vowels is 1: 1.1: 1.5, and that for phonologically long vowels is 1: 1: 1.4, as in French.

**Conclusion:** Phrase-final lengthening clearly exists in both languages. Against expectations, final lengthening is not more prominent in French, where it coincides with the primary durative stress. In fact, vowel lengthening is most important in Czech phonologically short vowels and it is the same for French oral vowels and Czech phonologically long vowels.

The present findings should be verified in recordings made by male speakers and in spontaneous speech. As pointed out by one of the reviewers, vowels from final CV syllables should also be examined, as the syllable openness affects the vowel duration.

**Bibliography**


