

Prosodic variation of phrase-final and utterance-final lengthening: a production and perception study

Christine Mooshammer¹, Oksana Rasskazova^{1,2}, Malte Belz¹

¹Institut für deutsche Sprache und Linguistik, Humboldt-Universität zu Berlin, Germany

²Leibniz-Zentrum für Allgemeine Sprachwissenschaft, Berlin, Germany

Phrasal structure within utterances is signaled by tonal variation, pauses, phrase-initial strengthening and final lengthening. The latter has been seen as localized speech rate reduction, slowing down at the end of a phrase [1]. For German two kinds of phrase boundaries are generally assumed, namely the intermediate phrase (ip) and intonational phrase (IP) boundaries. Following [2, 3], for both, phrase-final position (see (2)) and utterance-final position (3), the same IP boundary is hypothesized. Alternatively, a level above the intonational phrase, the utterance level, has been suggested by [4]. In this study we compare perceptual ratings, acoustical measures and kinematic characteristics of pre-pausal segments in phrase-final vs. absolute utterance-final boundaries. In our view, a difference in final lengthening between phrase-final and utterance-final levels could be expected for several reasons: Firstly, there could be a difference in planning an utterance that might affect final lengthening. In phrase-final position the speaker is already planning the next utterance which could delay the upcoming phrase and therefore lengthen the final gesture (see [5] for an overview on prosodic planning). The second possibility comes from turn-taking but might also have some bearing for reading situations: speakers signal when they have completed their utterance and therefore exhibit a larger degree of final lengthening compared to the phrase-final position [6]. Thirdly the assumption of a stronger boundary in utterance final position due to a higher constituent level (e.g. utterance level) might also lead to more extensive lengthening.

By means of EMA articulatory movements of 8 native speakers of German were recorded while reading aloud. Three types of prosodic boundaries were elicited: phrase-medial (1), phrase-final (2) and utterance-final (3) with 4 minimal pairs differing in tenseness (*Bahn – Bann, Beet – Bett, Ruhm – Rum, Stiel – still*).

- (1) phrase-medial: [Ich fuhr mit der **Bahn** am Donnerstag.]IP [Am Mittwoch wurde noch gestreikt.]
I took the train on Thursday. On Wednesday, there was still a strike.
- (2) phrase-final: [Ich fuhr mit der **Bahn**.] IP [Am Donnerstag wurde noch gestreikt.]
I took the train. On Thursday, there was still a strike.
- (3) utterance-final: [Ich fuhr mit der **Bahn**.] IP
I took the train.

Acoustic durations, f₀ contours and kinematic parameters such as closing, constriction and opening durations, closing displacement and peak velocity were measured semi-automatically. Additionally, functional versions of a PCA were calculated for distinguishing the shape of the velocity profile of final closing gesture (see [7]). Statistical significance was tested by Linear Mixed Models.

Confirming previous results (e.g. [8, 9]), there was a robust difference between phrase-medial vs. phrase + utterance-final position with the most extensive lengthening closer to the boundary (see Fig 1) and small and inconsistent spatial parameters. The difference between phrase-final and utterance-final position, however, was more marginal with longer constriction phases, longer opening movements and flatter and less peaked velocity profiles only for a subset of the target words. These results were not robust enough for confirming or rejecting either the planning or boundary strength hypothesis. The most robust effect was a lower baseline in the final part of the f₀ contour for utterance-final condition compared to phrase-final condition. Ongoing experiments with rating of perceived finality will test whether this tonal difference is a salient cue for listeners.

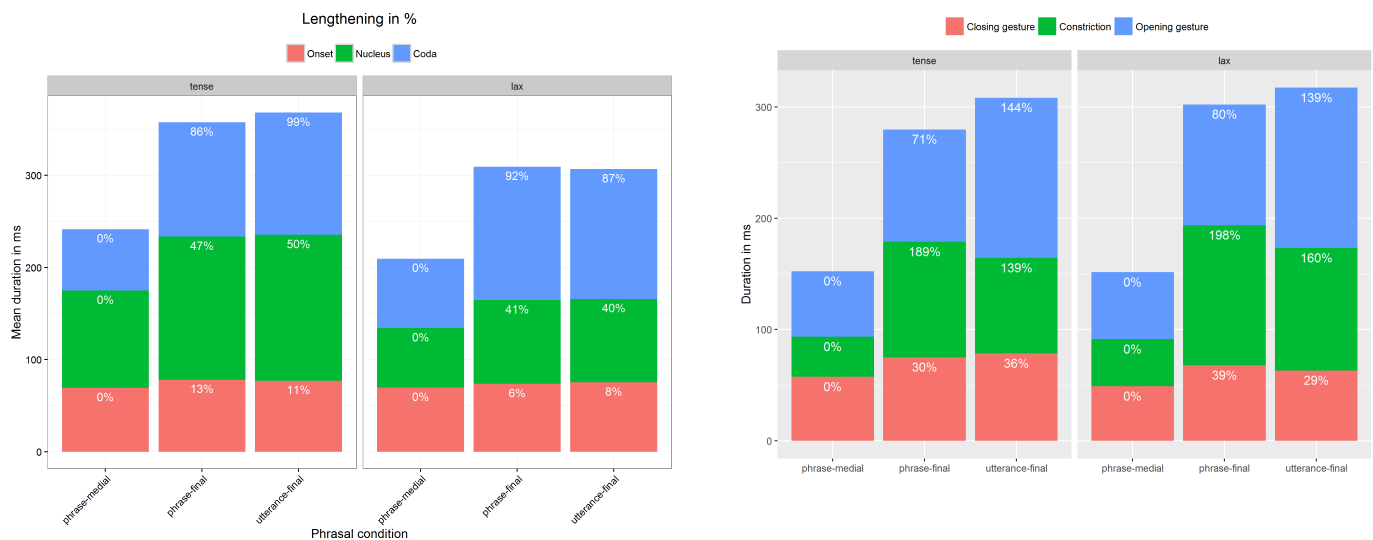


Figure 1. *Acoustic (left) and articulatory (right) durations in [ms] and relative to phrase-medial position in percent.*

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