

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



LabPhon 16, Lisboa, Portugal

Introduction

Research questions: Do speakers of German distinguish between phrase-final and utterance-final prosodic boundaries?

Final Lengthening

- Most segments lengthen at or near a prosodic boundary [1, 2, 3, 4, 5, 6].
- Stronger lengthening for consonants in phrase final position for:
 - the articulatory closing gesture
 - the plateau duration [7, 8]
- Lengthening is sensitive to boundary strength: more lengthening at higher boundaries ip < IP [9 for an overview]

phrase-final vs. utterance-final

- many studies on ip vs. IP
- utterance-final position?
- higher levels than intonation phrase:
 - no higher levels: Beckman & Pierrehumbert (1986) [10] and others
 - utterance level: Nespor & Vogel (1986) [11]
 - recursion: Cho (2016), Krivokapić & Byrd (2012) [12,13]

- Question 1:** Do German speakers mark utterance-final boundaries with more pronounced lengthening than phrase-final but utterance-internal position?
→ Production study with EMA
- Question 2:** Do German listeners distinguish between phrase-final and utterance-final sentences for judging upcoming continuation?
→ Perception study with rating experiment

Method

Stimuli

IP-final positions within an utterance = **phrase-final**
[Ich fuhr mit der **Bahn**.]IP [Am Donnerstag wurde noch gestreikt.]
'I took the train. On Thursday, there was still a strike.'

IP-final positions at the end of an utterance = **utterance-final**
[Ich fuhr mit der **Bahn**.]IP
'I took the train.'

Control condition: IP-medial positions within a phrase = **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.'

Task:
• reading aloud, 5 repetitions
• Target words Bahn, 'train', Bann, 'ban', Beet, 'flower bed', Bett, 'bed', Ruhm, 'glory', Rum, 'rum'

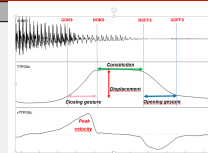
Method and Subjects

Production: 8 German speakers, 23–28 y.
• Tongue movement data via EMA (AG 501, Carstens Electronics) and acoustic data.

Perception: 33 female and 21 male listeners, 27 tested in the lab, 27 online
• Rating: Do you think that the speaker will continue to speak?
• 7 levels: 1 (no) – 7 (yes)
• utterances cut to end of test word with ramped down intensity
• criteria for selection: no hesitation, intonation closest to speaker's average
• Software: Percy (Draxler 2017[14])

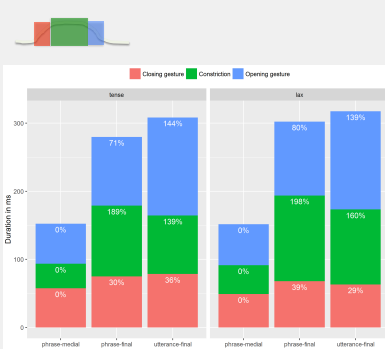
Data Analysis

- Acoustic measures:
• onset, nucleus and coda durations
• f0 contours (using Praat and EMU [15, 16])
- Articulatory measures for final consonant (e.g. /n/ in Bahn):
• durations of Closing gesture, Constriction and Opening gesture using a 20 % threshold criterion
• displacement and peak velocity of the closing gesture
- Statistics:
• production: linear mixed effects models with speaker as random factor and acoustic and articulatory measures as dependent variables, split per word.
• ratings: cumulative link mixed model fitted with Laplace approximation

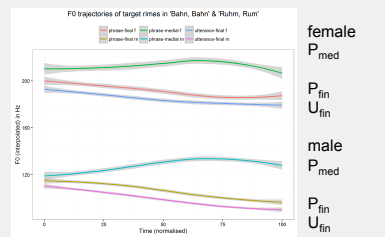


Results

Production

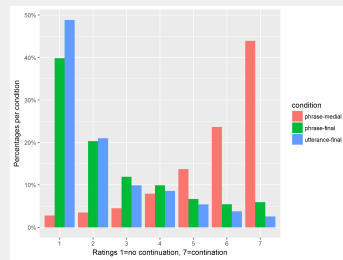


- Gestural durations**
- phrase-medial vs. final positions
 - closing gesture: n.sig. *Beet*
 - constriction: all sig, except for *Beet*
 - opening gesture (only for > 1 mm): all sig., except for *Beet*
 - phrase-final vs. utterance-final
 - closing gesture: n.sig.
 - constriction: n.sig, except for *Rum/Ruhm* ($P_{fin} > U_{fin}$)
 - opening gesture: n. sig., except for *Bann* ($P_{fin} < U_{fin}$)
 - also n.sig. or inconsistent for peak velocity and displacement

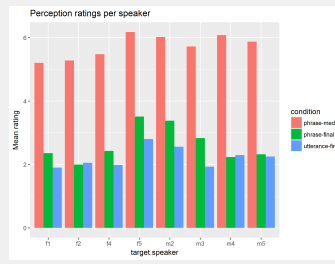


- Acoustic duration**
- similar to gestural durations
- f0 contours**
- f0 contours during the rimes for sonorant codas only
 - lower f0 in utterance-final compared to phrase-final position

Perception



- Ratings:
 - clear difference between phrase medial and final positions → listeners understood the task
 - for phrase-final position listeners were less certain compared to utterance-final position (sig. $p < 0.001$, CLMM)
 - listeners were less certain in the lab condition than online (not shown here)



- Speaker effect:
 - rating differences not consistent for all speakers
 - Relationship with production:
 - no f0 differences for f2 and m5

Conclusion

- In production we could not find consistent differences between phrase-final and utterance-final position for articulatory measures and acoustic durations.
- Listeners were able to distinguish between phrase-final and utterance-final position, but mainly for the speakers who produced the difference.
- This confirms earlier results by Krivokapić and Byrd (2012): (1) a graded prosodic phrase structure that is speaker-specific and (2) a close production-perception link, i.e. listeners are sensitive to subtle cues
- In the future: more controlled perception experiment for investigating specific cues for finality.

Referenzen

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