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:
  - higher levels: Beckman & Pierrehumbert (1986) [10] and others

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.] [Am Donnerstag wurde ich gestreikt.]
1 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.] [Am Donnerstag wurde ich gestreikt.]
1 took the train.
Control condition: IP-medial positions within a phrase = phrase-medial
[Ich fuhr mit der Bahn am Donnerstag.] [IP Am Mittwoch wurde ich noch gestreikt.]
1 took the train on Thursday. On Wednesday, there was still a strike.

Task:
• reading aloud, 5 repetitions
• Target words: Bahn, train, Bann, Joan, Beet, flowerbed, 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: on-set, nucleus and coda durations
- f0 contours (using Praat and EMU [15, 16])
Articulatory measures for final consonant (e.g. /l/ 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-final 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<.01)
  - opening gesture: n.sig, except for Bann (P<.001)

Acoustic duration
- similar to gestural durations
- f0 contours during the nimes 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
- 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.

References
[1-16]