



Prosodic characteristics of Bulgarian-accented German

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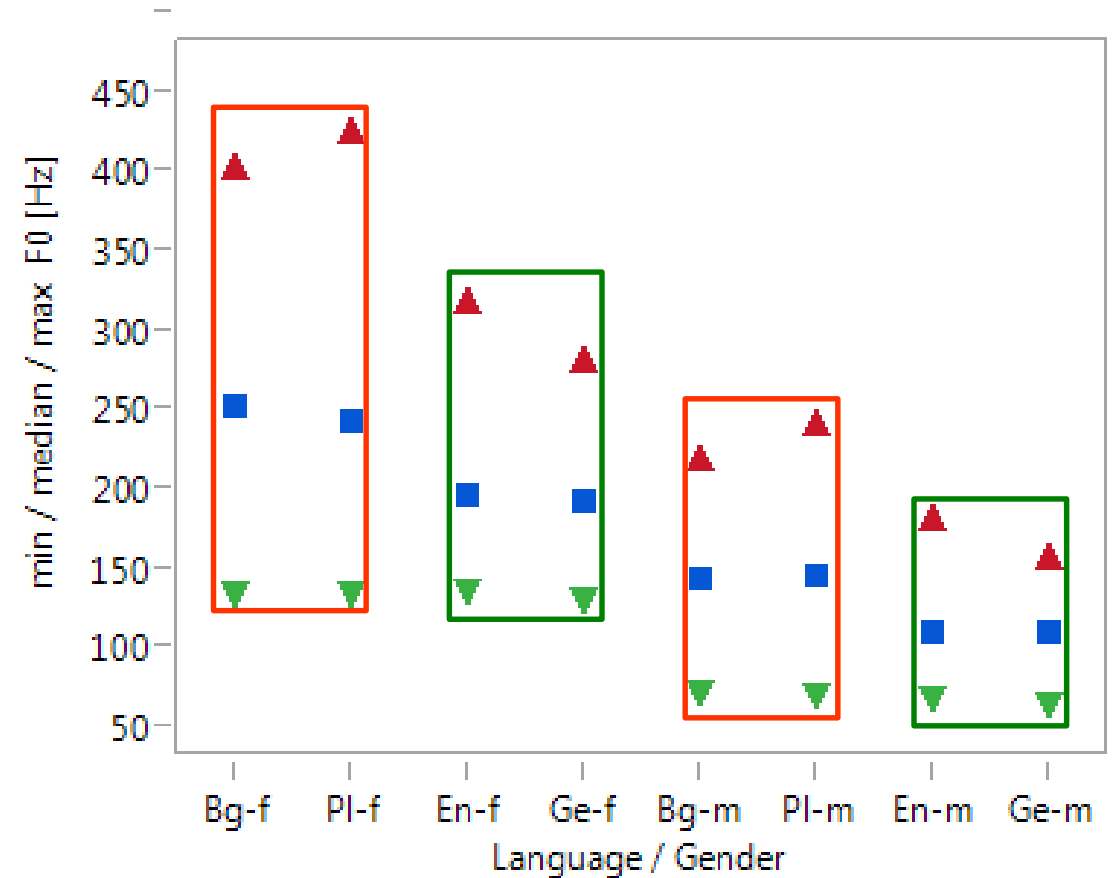
Research into second-language prosody (Trouvain & Braun 2020):

- temporal characteristics
 - speech rate
 - the duration of segments, syllables, intonational phrases and pauses
- fundamental frequency-related features
 - use of specific pitch patterns or contours
 - placement of pitch accents and their phonetic realization
 - pitch range and pitch level variation

Background



Bulgarian and Polish have a higher median and max F0 than English and German, and therefore a larger F0 span.



Andreeva et al. (2014, 2015)

Aims



- to investigate to what extent L2 speakers deviated from or adopted the language-appropriate pitch range values of the target language
- to provide data on speech and articulation rate in L1 Bulgarian and compare it with similar data for L1 and L2 German



- read speech, The North Wind and the Sun

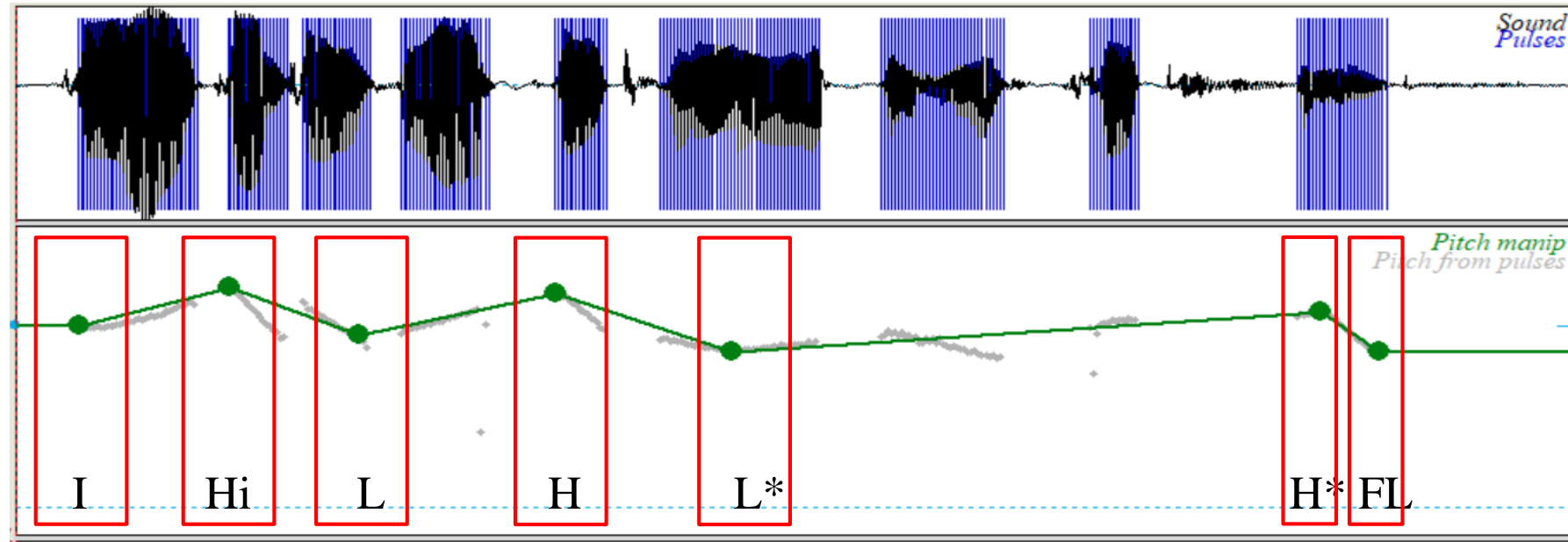
data set	speaker	language proficiency
BG_L1	10 f	native
DE_L2	10 f	B2
DE_L1	10 f	native

Method: Annotation



- Intonation Phrase (IP) boundaries
- pauses
- lexically stressed syllables
- accented syllables
- linguistically relevant tonal landmarks (Patterson 2000, Mennen et al. 2012)

Method: Annotation



Method: F0-related parameters (pitch profiles)



- automatic F0 estimation with ESPS *get_f0* (Talkin 1995)
 - samples with irregular voicing (e.g. laryngealization) excluded
- pitch profile measures (per IP) in semitones relative to 1 Hz
 - pitch level: mean and median F0
 - pitch span
 - pitch variation: standard deviation (SD)

Method: F0-related parameters (linguistic measures)



- in semitones
 - prominent phrase-initial peaks (H^*i)
 - prominent non-initial peaks (H^*)
 - non-prominent initial peaks (H_i)
 - non-initial non-prominent peaks (H)
 - prominent valleys (L^*)
 - non-prominent valleys (L)
 - phrase-final lows (FL) and phrase-final highs (FH)

Method: Temporal characteristics



- durations of the Ips and pauses
- mean duration of accented syllables
- accented/unaccented syllable duration ratios
- speech rate (SR, the number of canonical syllables divided by the duration of the respective recording)
- articulation rate (AR, the number of canonical syllables divided by the sum of IP durations per recording)



- For the duration-related parameters: LMMs
 - dependent variable: the respective log-transformed measure
 - random factor: speaker
 - fixed factors: language
 - Tukey post-hoc tests
- For the F0-related parameters: Kruskal-Wallis
 - Dunn's pairwise tests with Bonferroni adjustment

Results: Temporal characteristics



	BG	DE
syllables	200	180
content words	55	52
function words	36	56

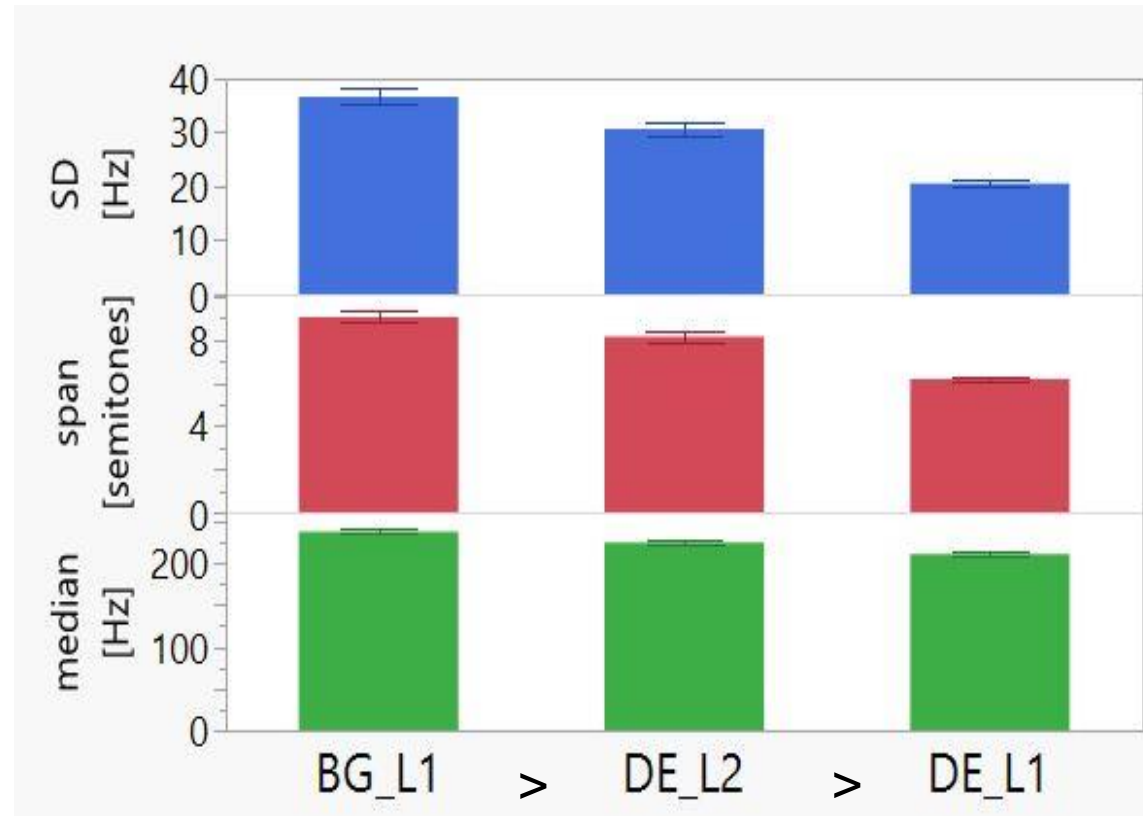
parameter	BG_L1	DE_L2	DE_L1
IP duration	1602.68 (856,02)	1598.37 (803.07)	1660.99 (675.54)
Nr. IPs	20.5	27.1	18.9
pause duration	460.87 (305.73)	494.18 (339.36)	424.14 (262.64)
Nr. pauses	15.4	20.6	12.1
Nr. acc. syllables	54.4	74.5	50.8

Results: Temporal characteristics



Parameter	BG_L1	DE_L2	DE_L1
mean acc. σ dur.	218.3 (31.4)	300.2 (63.5)	235.5 (17.6)
acc./unacc. ratio	1.6 (0.1)	1.5 (0.2)	1.6 (0.1)
articulation rate	6.2 (1.1)	4.3 (0.8)	5.8 (0.5)
speech rate	5.1 (0.8)	3.5 (0.7)	5.0 (0.5)

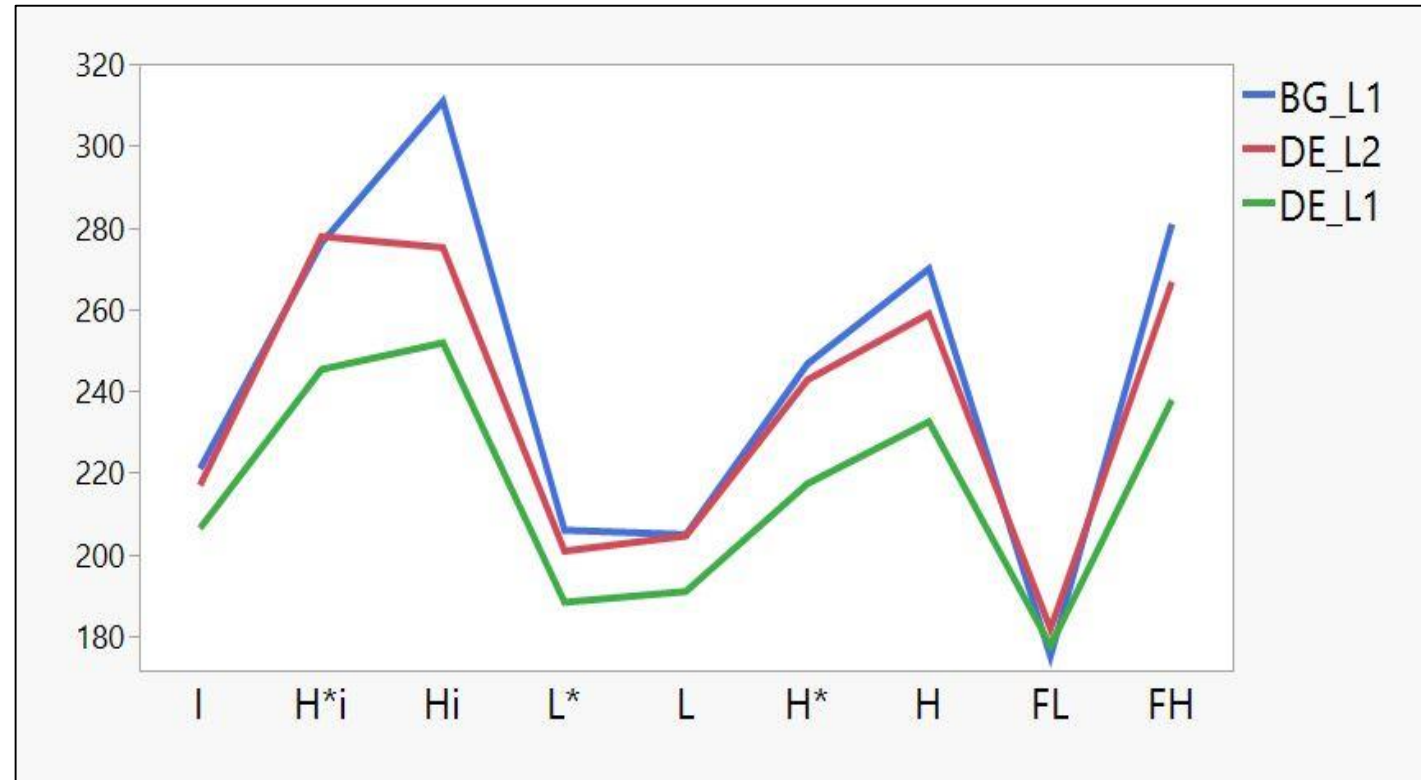
Results: Pitch profiles



Results: Linguistic Measures



tonal landmark	significant differences
I	BG_L1 > DE_L1
H*i	BG_L1 = DE_L2 > DE_L1
Hi	BG_L1 = DE_L2 > DE_L1
L*	BG_L1 > DE_L2 > DE_L1
L	BG_L1 = DE_L2 > DE_L1
H*	BG_L1 = DE_L2 > DE_L1
H	BG_L1 = DE_L2 > DE_L1
FL	n.s.
FH	BG_L1 > DE_L2 > DE_L1



Discussion: Temporal characteristics



- Bulgarian speakers of DE_L2 used slower articulation rate, more IPs and pauses than the native speakers.
- We found more accented syllables in DE_L2.
- However, durational variation due to different L2 proficiency levels is also worth further investigation.

Discussion: F0-related parameters



- Pitch profiles: All F0-related parameters in DE_L2 were lower than in BG_L1 but higher than those in DE_L1.
- Linguistic measures: The majority of the linguistically relevant targets in DE_L2 are very similar to those in BG_L1.
- There is transfer of F0-related characteristics from the L1.

Vielen Dank für Ihre Aufmerksamkeit!

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