International Symposium of Monolingual and Bilingual Speech
7 – 10 September 2015 – Chania (Crete)

Pronunciation and prosody in French learners of German

Jane Wottawa*, Martine Adda-Decker*, Frédéric Isel#
*LPP, UMR 7018 CNRS - U. Paris 3 / Sorbonne Nouvelle,
MoDyCo, UMR 7114 CNRS - Université Paris Ouest Nanterre La Défense

Introduction

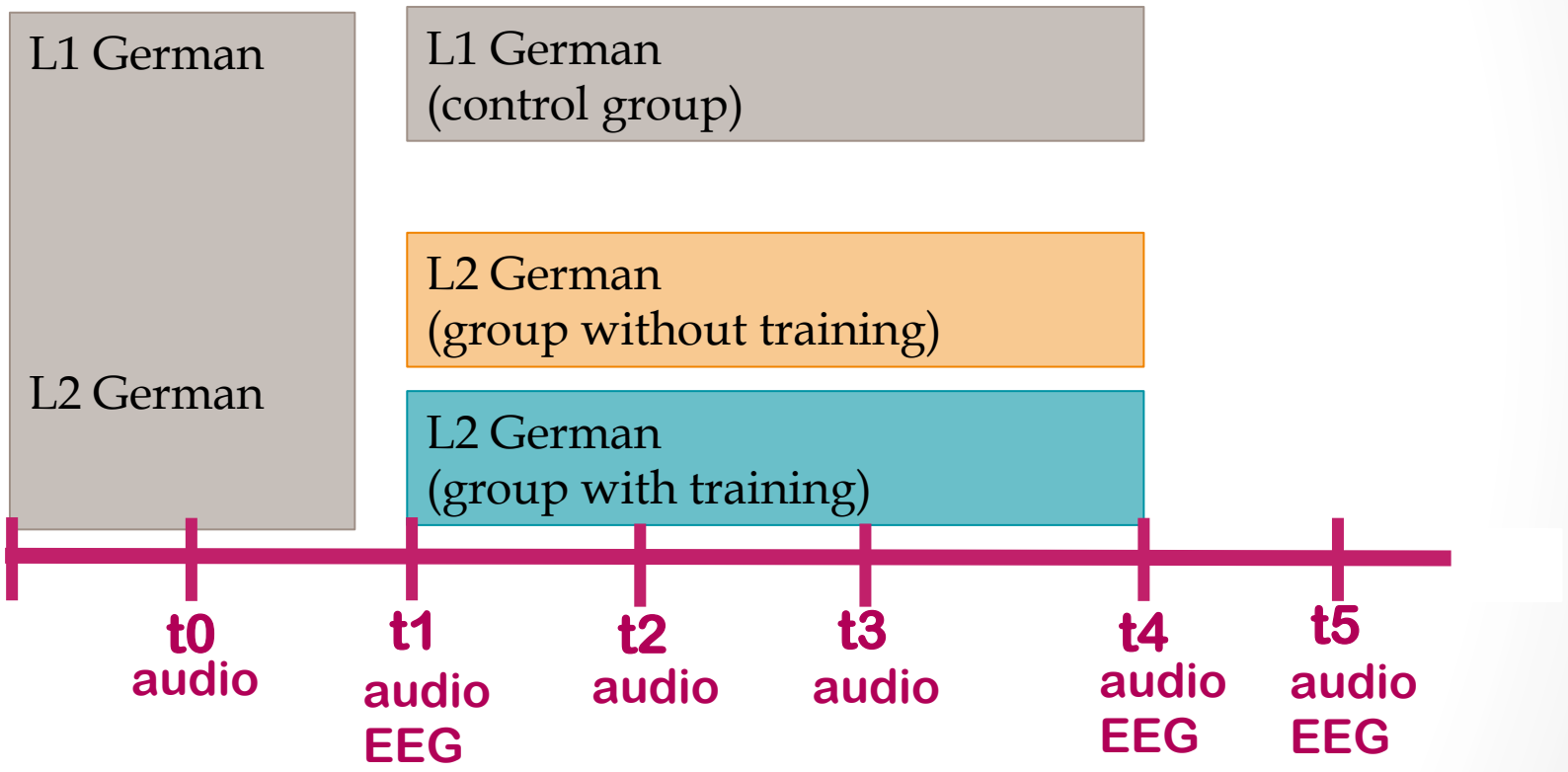
- Pronunciation of foreign languages (L2) is conditioned by the phonological system of the mother tongue (L1)
- Mastering the phonological system of the L2 improves the communication with native speakers
- German and French differ on
  - phonological &
  - prosodic levels
- German = *stress-timed language*
  - → word stress: duration ↗ and f0 ↗
- French = *syllable-timed language*
  - → phrase-final accent

Research Question

Do detailed knowledge/awareness/practice of
a) phonological and
b) prosodic differences between L1 and L2
help learners to improve their L2 pronunciation?

Long and short vowels	*prahlen* ['pra:lən]/*prallen* ['pralən] *Kehle* ['ke:lə] /*Kelle* ['kɛlə] *Beet* ['be:t] /*Bett* ['bɛt] *Hüte* ['hy:tə]/*Hütte* ['hʏtə] *Rose* ['ro:zə]/*Rosse* ['rɔsə]
Word stress position	*Horizont* [hori'tsɔ̯nt] *bedrängen* [bə'drɛŋən] *elementarisches* [elemɛn'ta:rɪʃəs]
German phonemes absent in French	*hindurchgehen* [hɪn'dʊrçge:ən] *sicherlich* ['zɪçɐlɪç] *geklungen* [gə'klʊŋən]

Research protocol and populations

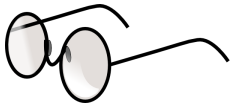


Research protocol and populations

- Check previously cited difficulties in L2 production
- Design specific phonological and prosodic training sessions (and EEG protocols) for French native learners of German

Corpus

- Recording:
  - *French Learners Audio Corpus of German Speech* (FLACGS)
  - 30h of speech (~15h/~15h)
  - 40 speakers
    - 20 GG (German natives (controls))
    - 20 FG (French L1, German L2, Level of competence: A2-C2)
- 3 oral tasks of increasing production complexity:
  - Oral repetition of words embedded in a carrier sentence
  - Reading aloud of two texts:
    Nordwind und Sonne, Die Buttergeschichte
  - Image description

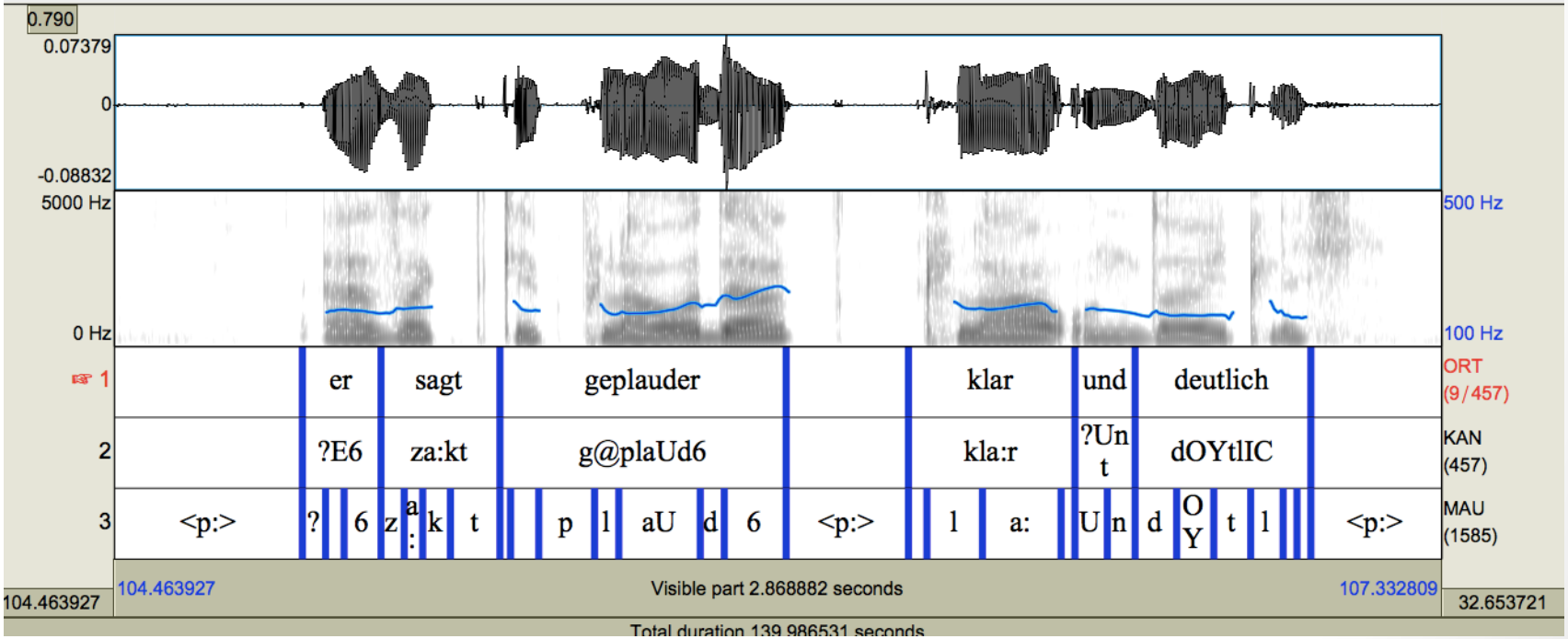


Methods

Transcription & alignement

- Manual transcription – German orthography
- Automatic alignment with le *Munich Automatic Speech Segmentation* (MAUS) web-service

https://clarin.phonetik.uni-muenchen.de/BASWebServices/#/services



Manual checking of labelling and boundaries

- Manual phoneme boundary adjustments of targeted words
- Manual pronunciation adjustments (e.g. graph to phone translations were adjusted)
- 1 min of automatic aligned speech
  = 2 min of manual adjustments

Acoustic analysis

- PRAAT – standard parameters
  http://www.fon.hum.uva.nl/praat/
- Extraction of acoustic parameters each 5ms from the *.wav-file
  - f0, the four formants, voicing, energy
- Extraction of start and end time of each phoneme of the TextGrids

→ In this study, only duration measurements are used

→f0 is neither a cue for

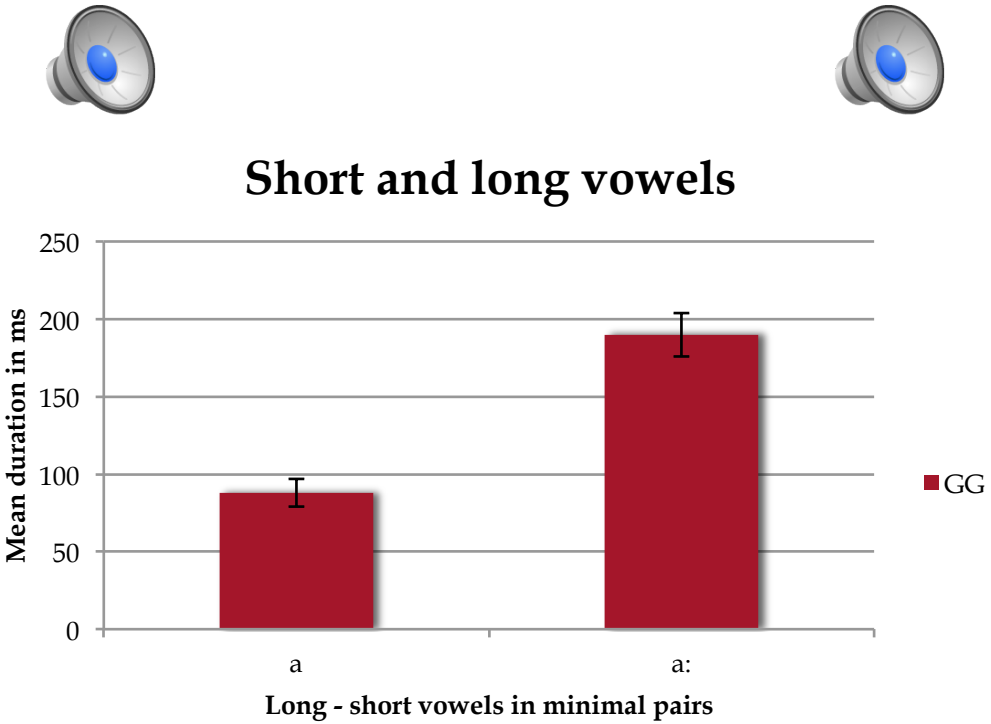
→ vowels: long/short contrast

→/h/-onset: present or absent

Results

Short and long vowels

- German natives produce the phonologically short and long vowels in minimal pairs by acoustic duration (and vocalic timbre, i.e. formants differences)
- Duration contrast is absent in French

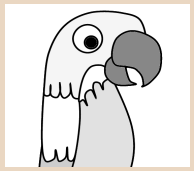


Question 1

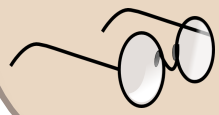
Do GG speaker make duration distinctions for all vowel pairs? Some better than others?

Question 2

Are FG speakers able to make duration distinctions? What is the impact of the different tasks?

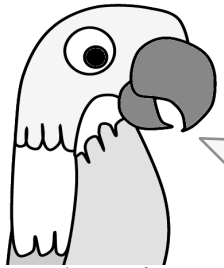


Do FG hear the difference and if so, do they reproduce exactly?

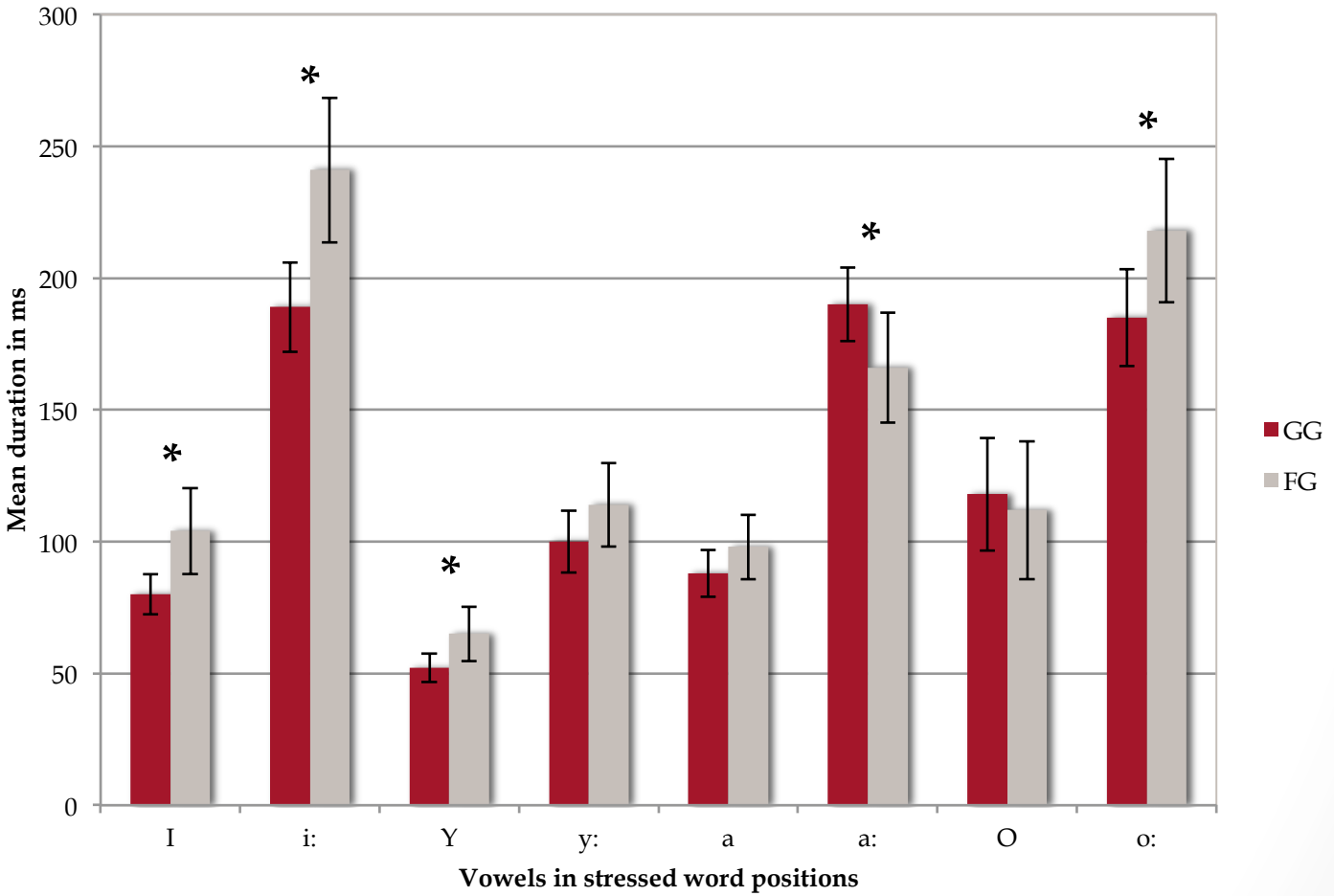


Do FG make the difference between long and short vowels in reading (without auditory input)?

Long and short vowels
Repetition task

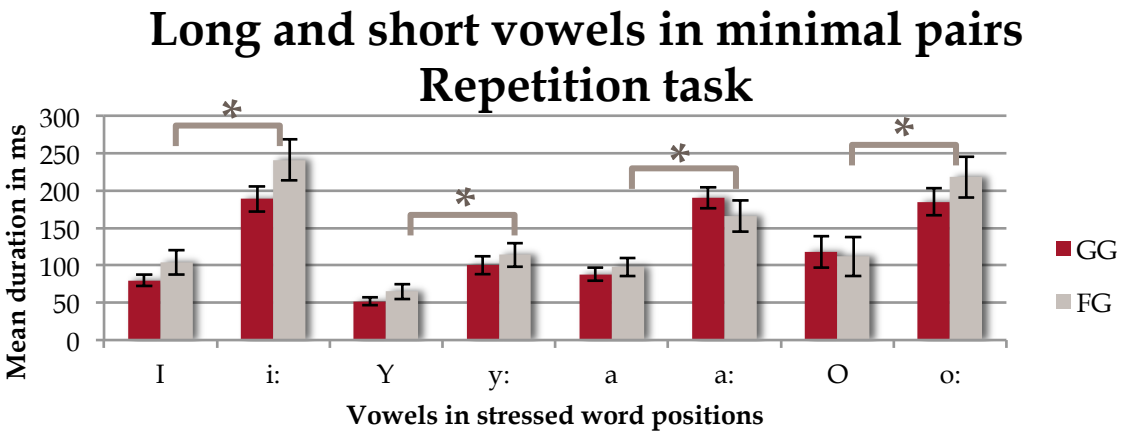


All speakers repeated the same words!



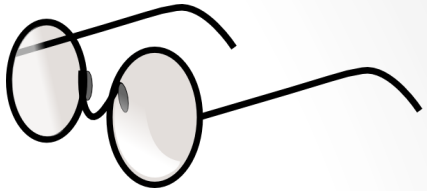
Long and short vowels Repetition task

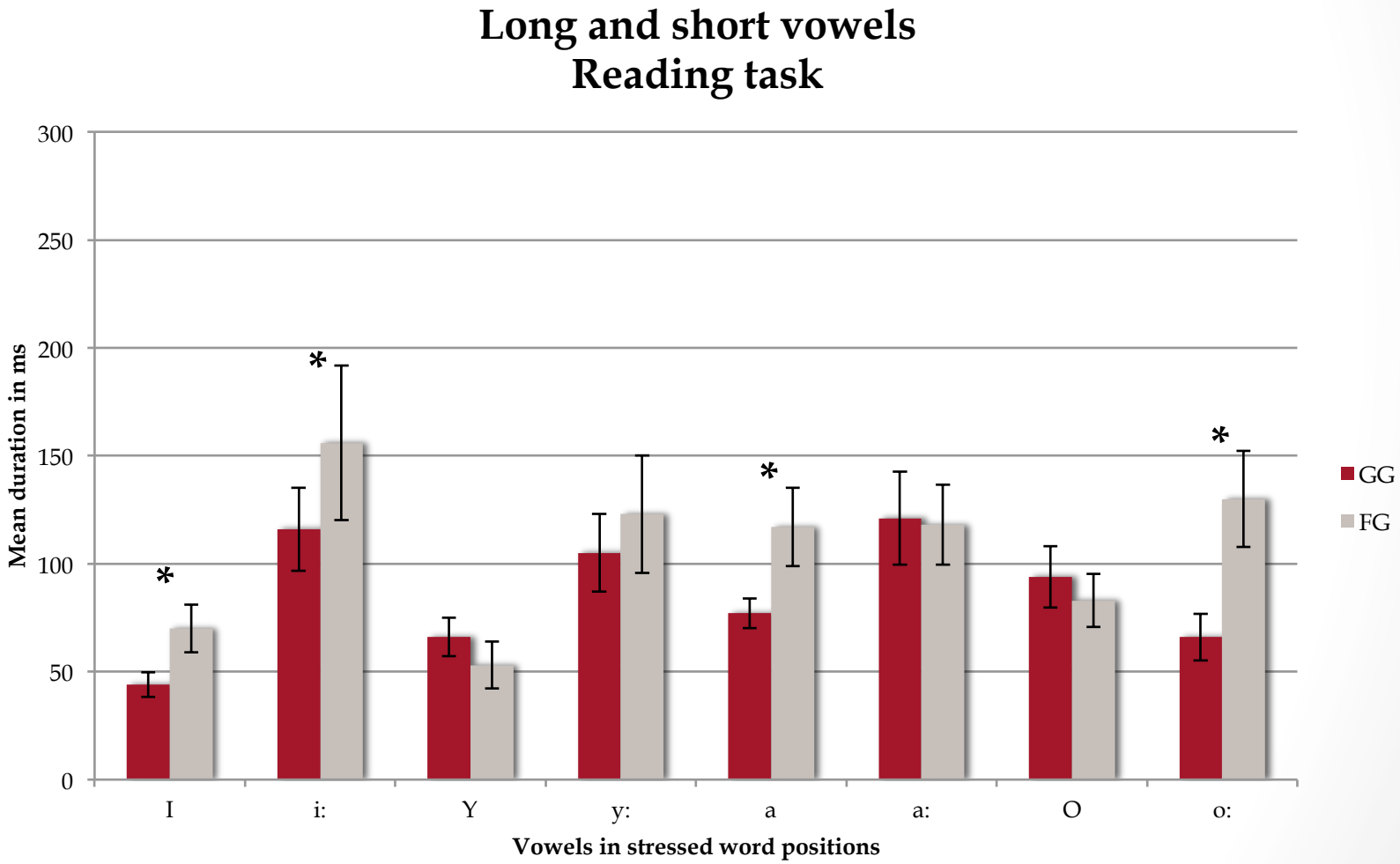
All speakers repeated the same words!



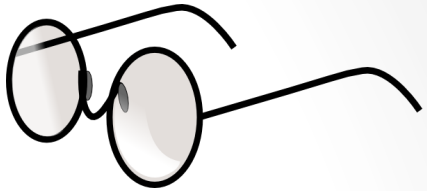
- FG are quite successful in imitating GG speakers' duration oppositions
- FG produce some vowels with different (in general longer) durations as compared to the GG vowels (except /y:/ & /a/)
- Statistical significant duration differences between long and short vowel pairs in FG and GG

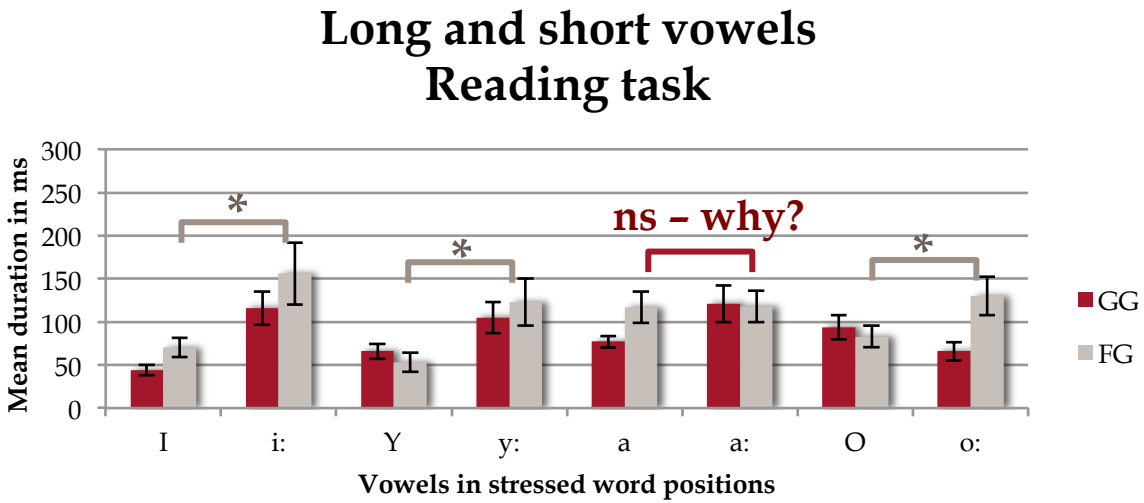
Long and short vowels
Reading task





Long and short vowels Reading task





- Statistical significant differences are made by the FG for all long-short vowel pairs – except the /a/ - /a:/ contrast
- The /ɔ/ - /o:/ contrast regarding the duration pattern is better performed by the FG
  - → Existing contrast in French
  - → Vowel duration can be influences by the sentence position of the word

Long and short vowels
Results

- Duration is used to differentiate between LV and SV
  - GG ✓
  - FG ✓

    →FG are sensitive to duration variations in vowels
- Task effect?
-  FG behave native-like in contrasting minimal pairs

-  visual input:
  - SV are followed by doubled consonants e.g. *sollte*
  - LV are followed by a graphic "h" e. g. *früh*
-  no duration difference between /a/ and /a:/for FG

/h/- onset

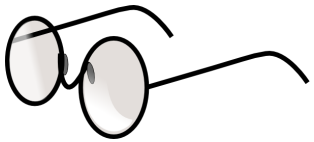
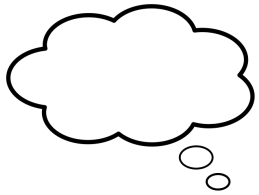
- The French language does not have a phonological /h/
- French speakers of foreign languages are known to omit producing /h/ - onsets in words


"vor einem **Haus**"
-/h/ onset GG, f

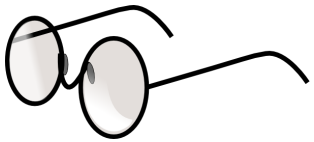
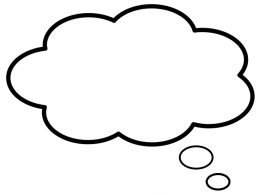

"vor einem **Haus**"
- empty onset FG, f

- Predictions:
  - FG will replace /h/ - onsets with empty onsets
  - FG will replace some of the /h/-onsets by using /ʔ/ - onsets
  - If /h/ - onsets are produced, their duration is smaller than in GG
  - The production of /h/ onset should decrease the more complex the production task

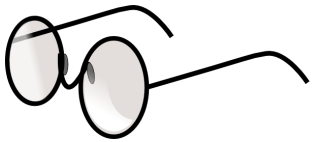
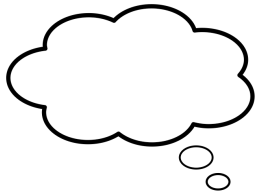
/h/ onsets in the different tasks

			
/h/ onset	85%	78%	75%
/ʔ/ onset	1%	20%	9%
empty onset	14%	2%	16%
/h/-onsets tokens	**77**	**104**	**71**

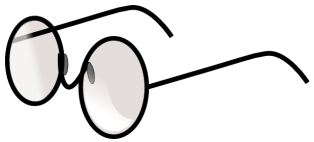
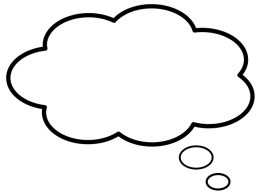
/h/ onsets in the different tasks

			
/h/ onset	85%	78%	75%
/ʔ/ onset	1%	20%	9%
empty onset	14%	2%	16%
/h/-onsets tokens	**77**	**104**	**71**

/h/ onsets in the different tasks

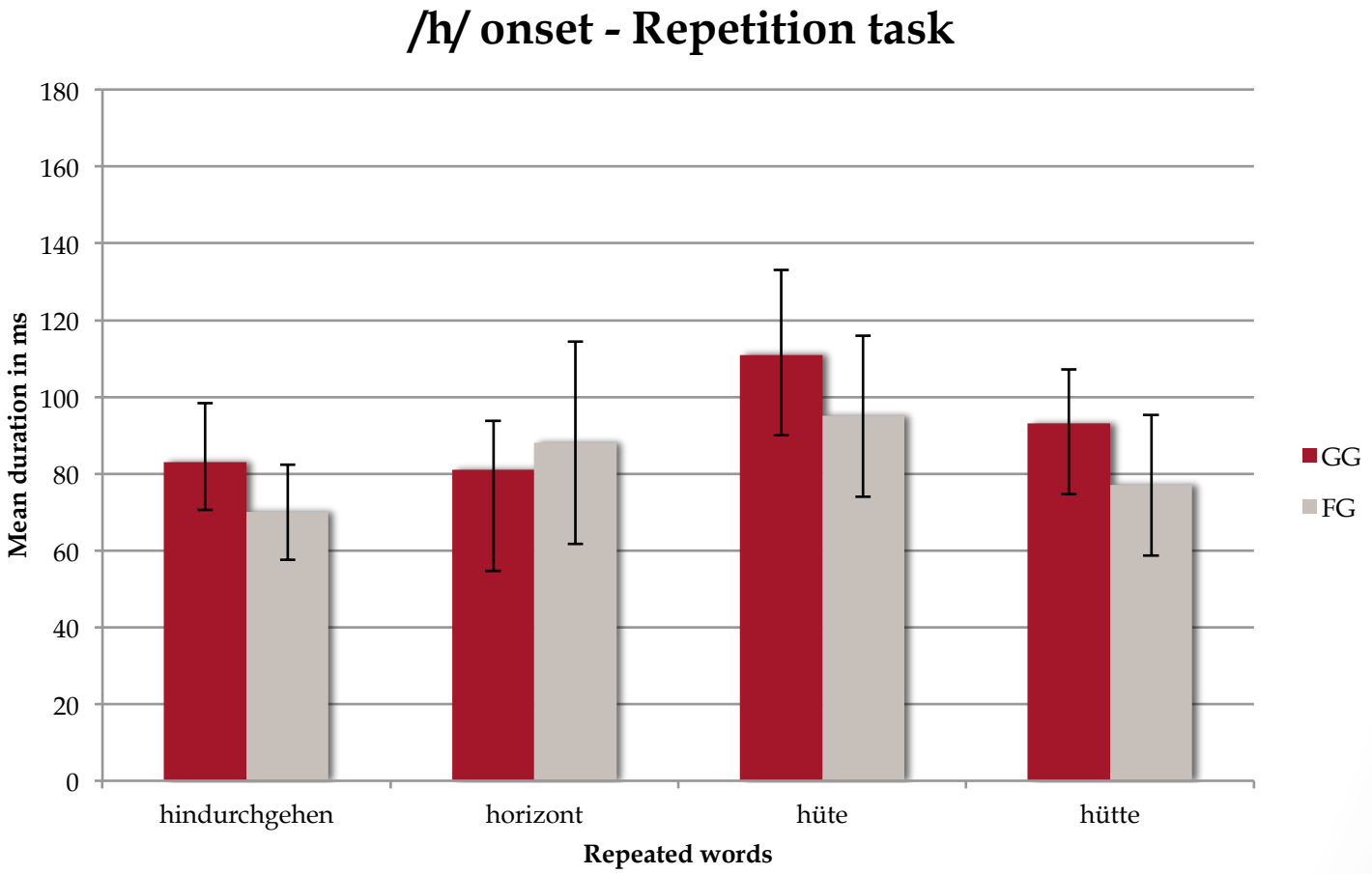
			
/h/ onset	85%	78%	75%
/ʔ/ onset	1%	20%	9%
empty onset	14%	2%	16%
/h/-onsets tokens	**77**	**104**	**71**

/h/ onsets in the different tasks

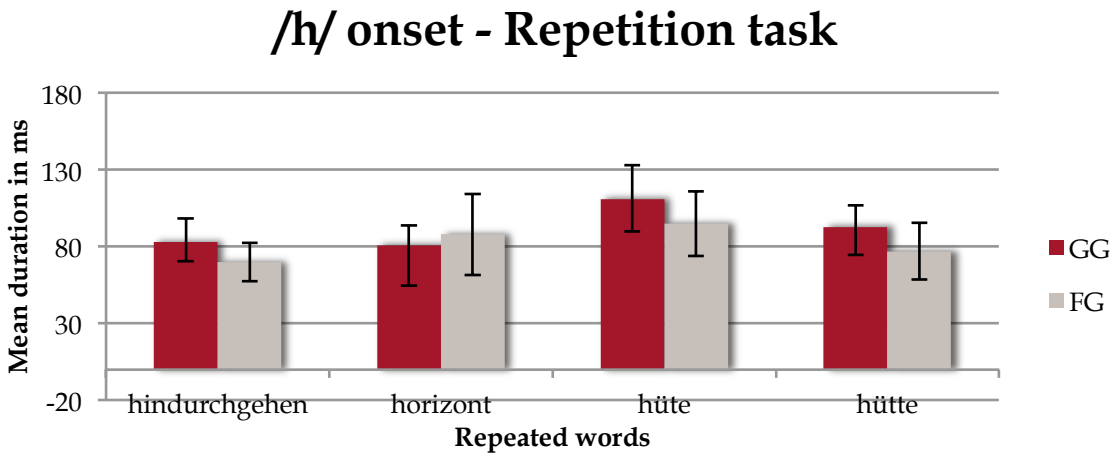
			
/h/ onset	85%	78%	75%
/ʔ/ onset	1%	20%	9%
empty onset	14%	2%	16%
/h/-onsets tokens	**77**	**104**	**71**

The graphic representation of /h/ in word onsets make the FG avoid empty onsets

/h/ onset
Repetition task



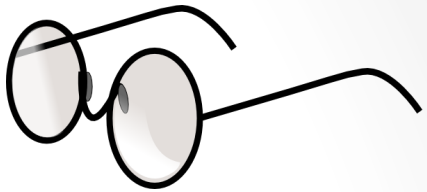
/h/ onset
Repetition task

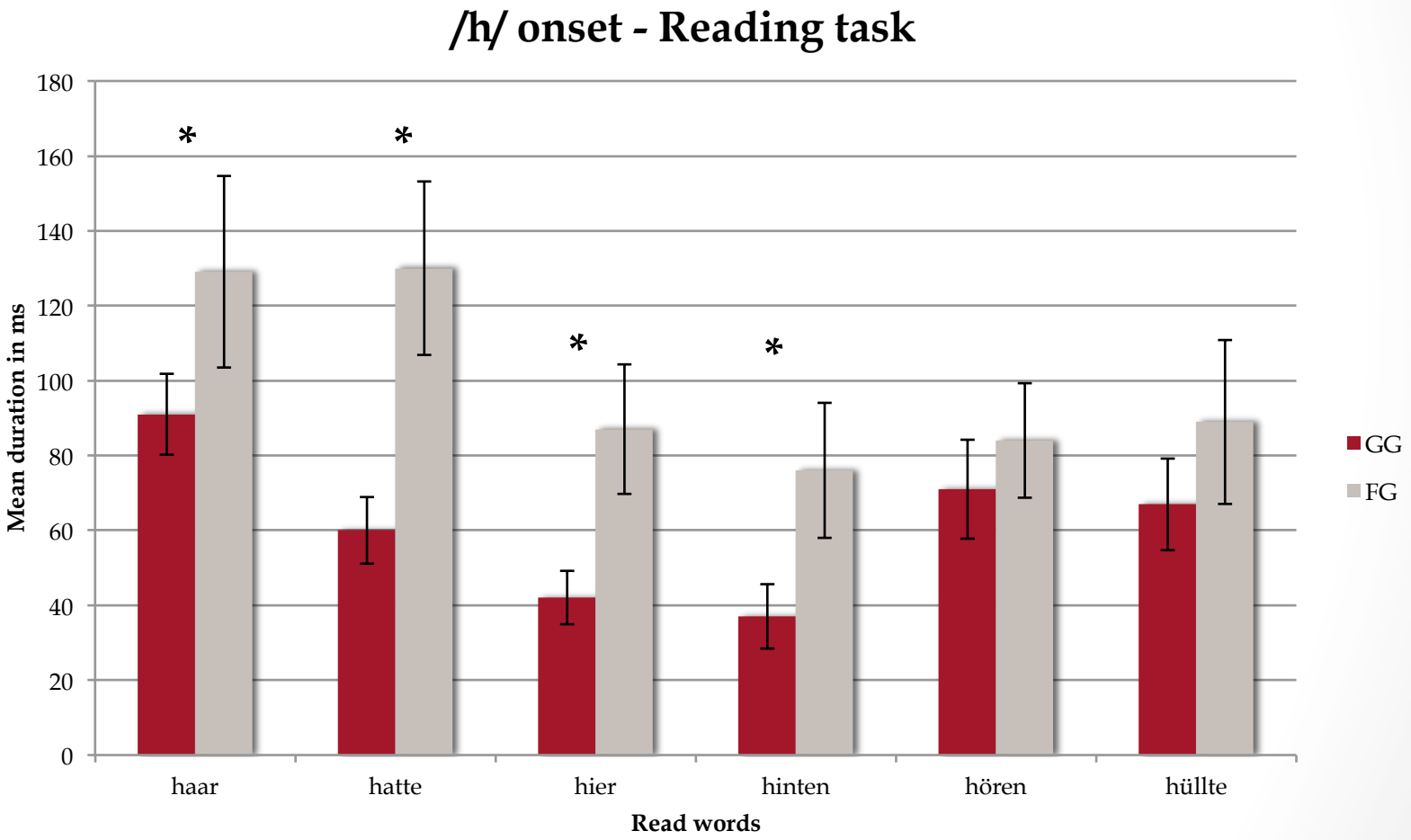


- No statistical differrence between GG and FG

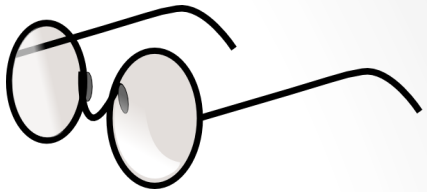
→ FG behave like natives
when they repeat the /h/ onset

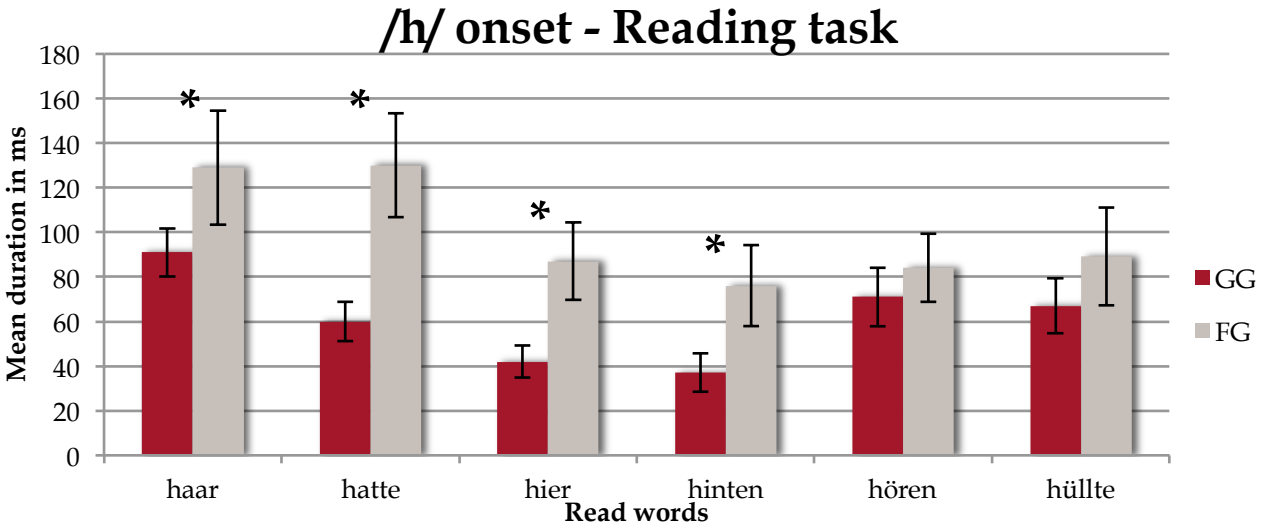
/h/ onset
Reading task





/h/ onset
Reading task



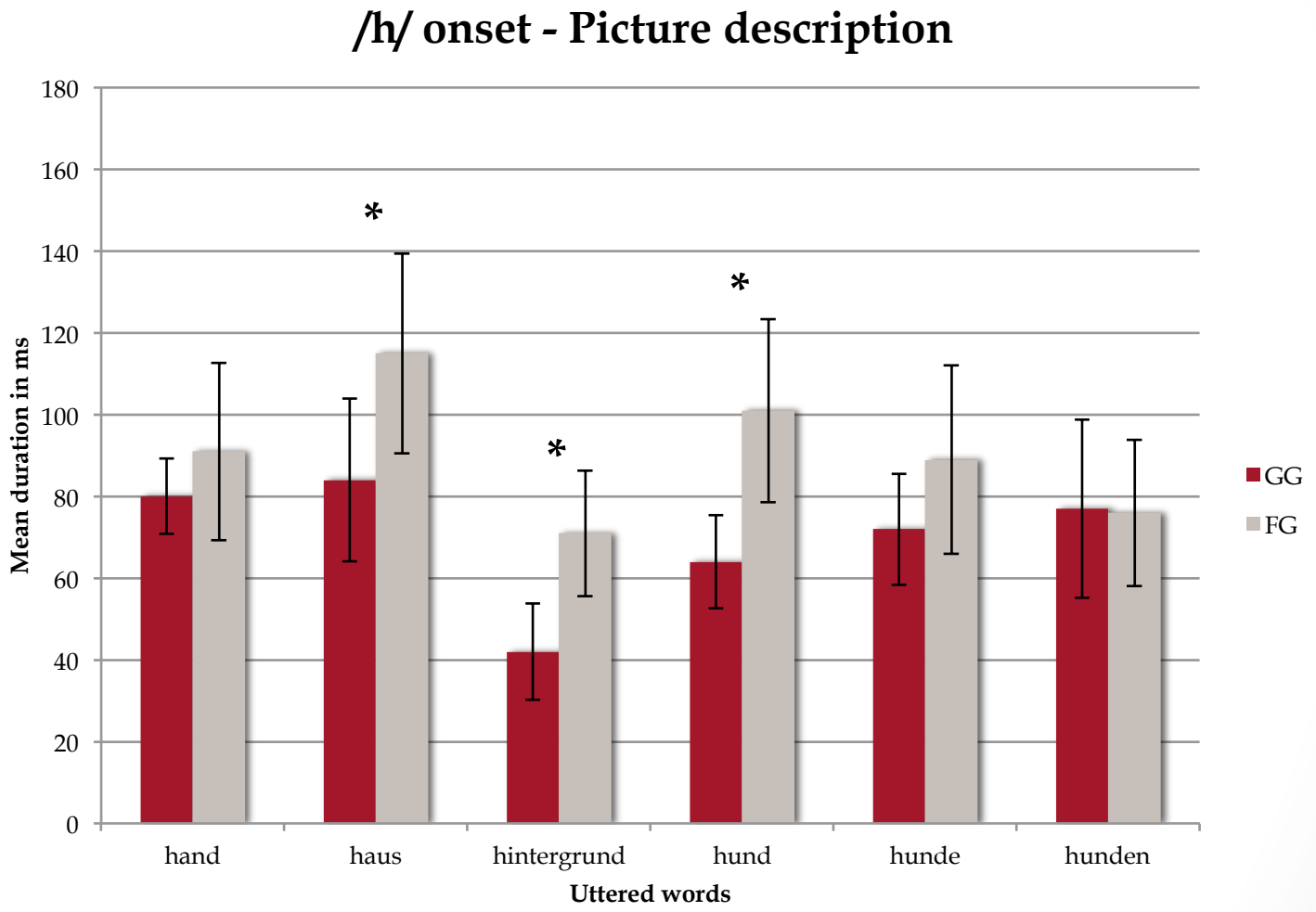


- Statistical significant difference in /h/ onset for most vowels (except in right context of rounded vowels)
- FG produce longer /h/ onsets than GG

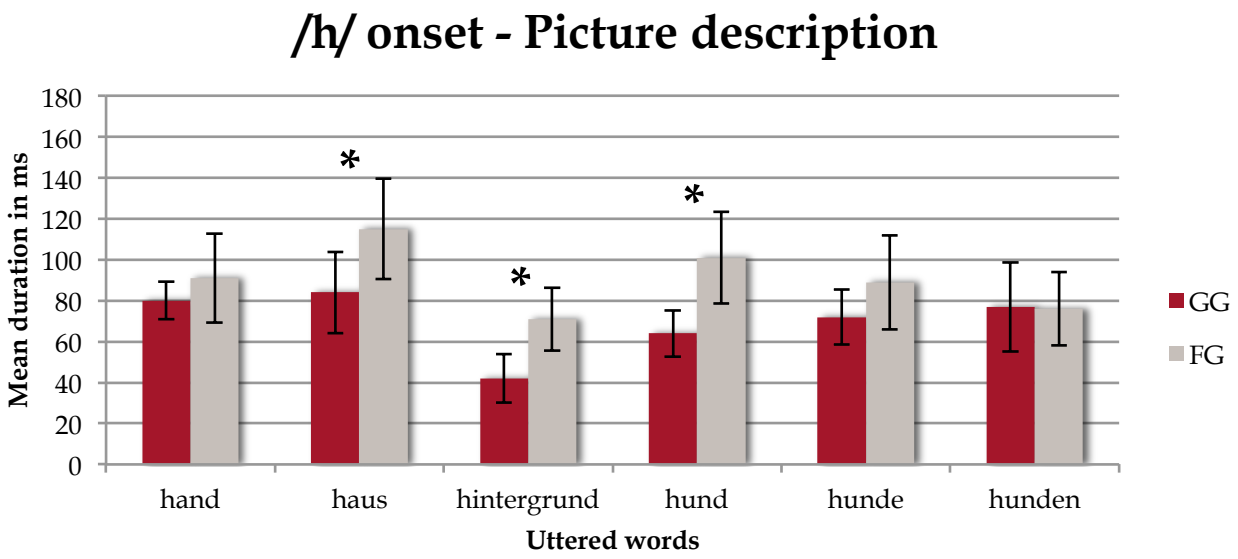
→emphasis related to production efforts or to decodig efforts

/h/ onset

Picture description



/h/ onset
Picture description



- FG produce globally longer /h/onsets
- *Hunde*n is an exception, complex morphology (plural, dative of *Hund*) – advanced learners

/h/ onset
Results

- /h/ onsets are rarely replaced by glottal stops except in reading
- Empty onsets concern about 15% of uttered words which have usually an /h/ onset

- Task effects:
-  &  either /h/ onset or empty onset
-  either /h/- onset or /ʔ/ onset
-  &  FG emphasize duration of /h/ onset comparing to GG

→ Do FG aim to be unambiguous?

Summary

- FLACGS corpus (audio)
  - FG are successful in repetition tasks for SV, LV production; difficulties for /a/-/a:/ contrast in reading
  - FG are rather successful in repetition tasks for /h/ onset (14% of omission);
    longer /h/ onset durations in the reading task + higher rates of alternative /ʔ/ productions (related to /h/ production or “h”-decoding efforts)
  - In semi-spontaneous production (picture description), FG produce longer /h/ onset durations and have, compared to the other two tasks, an increased amount of empty onsets (16%)

Perspectives

- FLACGS:
  - Analysis of formant values for LV and SV
  - Analysis of “unexpected” /h/ onsets on words with /ʔ/ onset
  - Realization of word stress (duration, f0)
- FG perception:
  - LV and SV perception (minimal pairs)
  - Perception of word stress
- FG production:
  - Recording of a more homogeneous populations (phonologically and prosodically trained and untrained)

Thank you!