

L2PHROL- Turin (Italy)

The role of formal instruction:
The case of production & perception
of /h/ in L2 German by French learners

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Introduction

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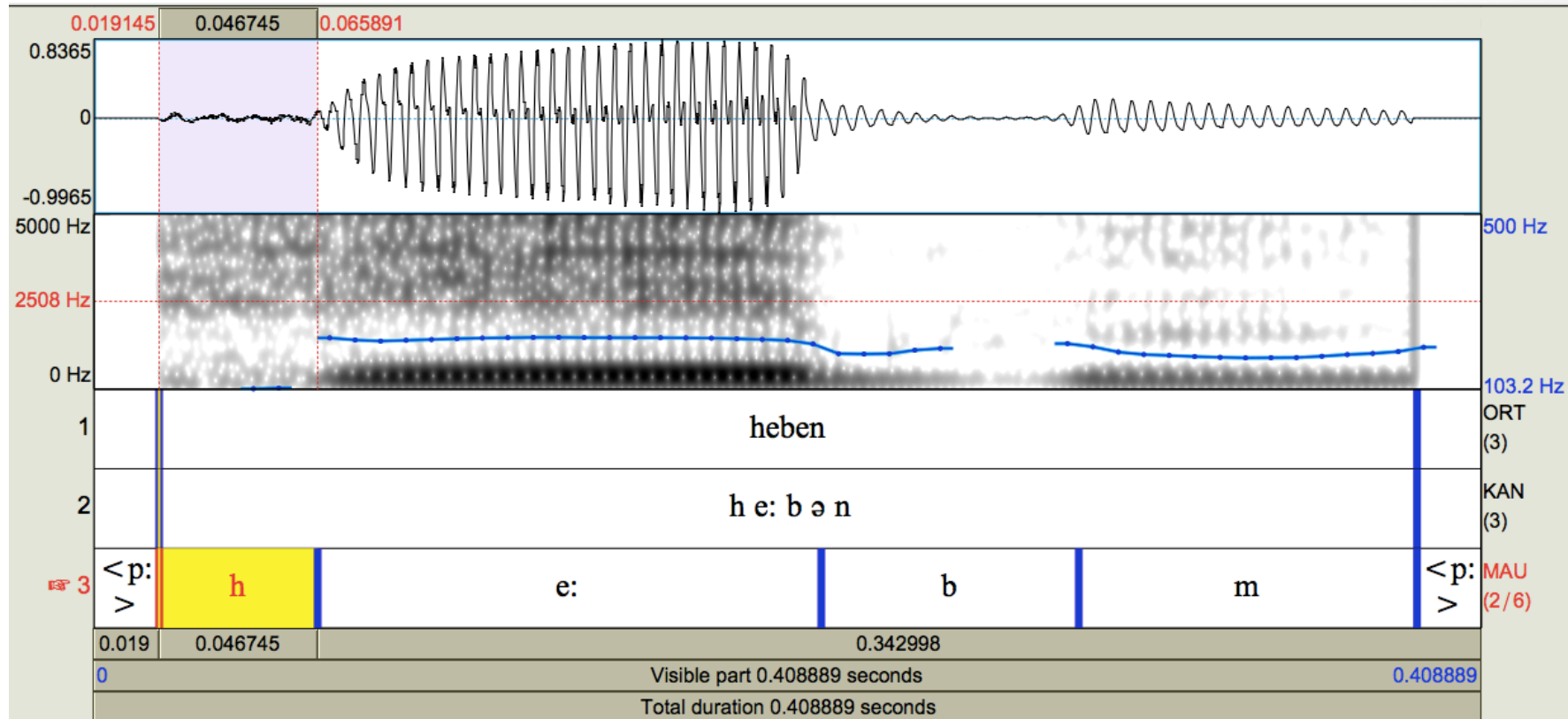
- L2 German – L1 French
- one segmental difficulty (among others): /h/
 - frequent phone in German
 - in French, /h/ is not part of the phonemic system
- Flege's *Speech Learning Model*
 - “new” phones → easy to learn
 - “similar” phones → difficult to learn
- German /h/ has no counterpart in French, thus it can be considered as a “new” phone and should be easy to learn

Introduction

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- Kamiyama et al. (2011)
 - French learners of English
 - read speech (spectral analyses and articulatory analyses)
 - /h/-deletions and their various realizations
 - frequent “hard vowel onsets” (glottal stops or glottalized vowels)
 - only few empty or null onsets
- Zimmerer and Trouvain (2015)
 - French learners of German
 - read speech (acoustic analyses)
 - French learners of German tend to produce longer [h] than German native speakers
 - production strategies:
 - over 50% uttered as [h] onset (unvoiced, few voiced)
 - substitutions: little amount of empty onsets, more glottal stops

German [h]



- syllable initial:
heben [h^he:bən] (to lift); *gehoben* [gə^hhobən] (to lift participle)
- stressed syllables

Pronunciation teaching

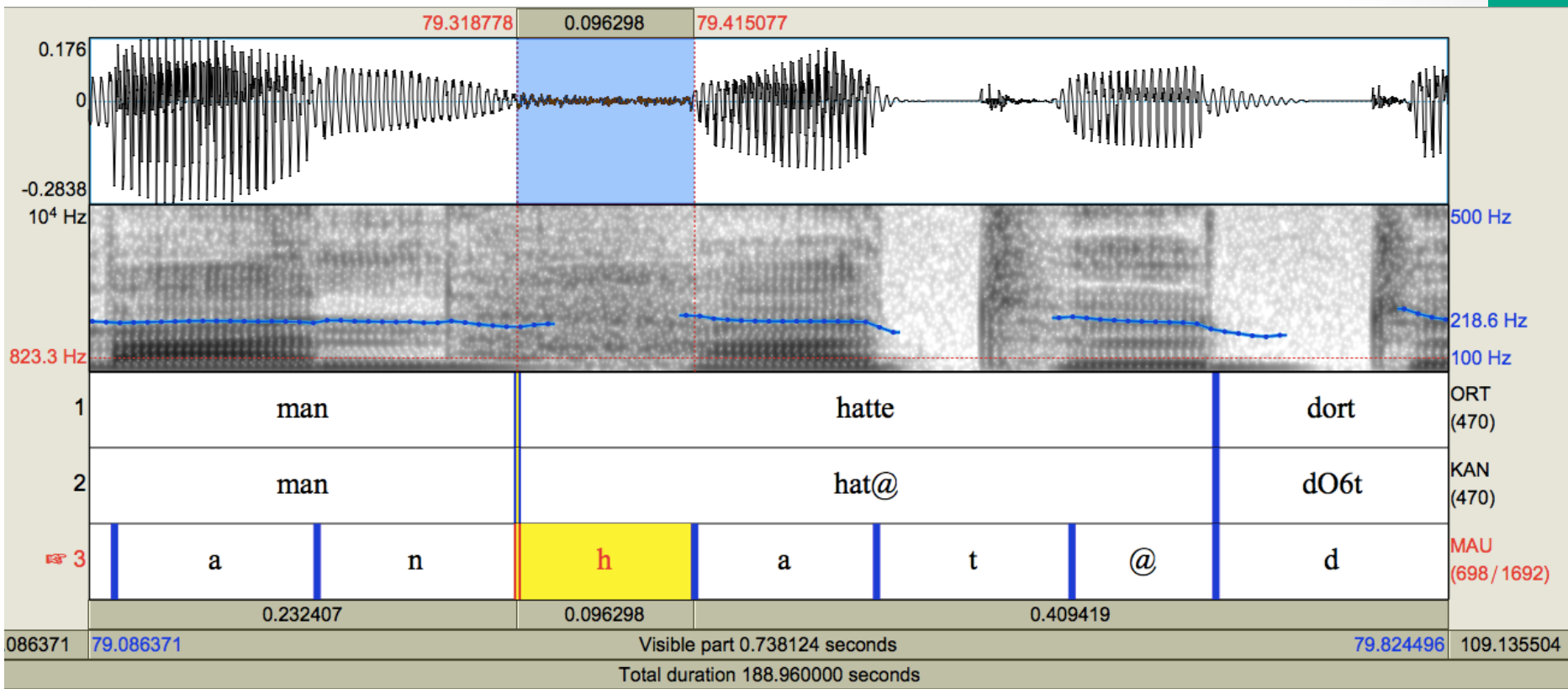
- informs learners of difficulties they might encounter with second language pronunciation
- content transmission: phonological rules, phonetic variants etc.
- often form-focused instruction and exercises
 - this knowledge leads to increased awareness
- Gattegno (1976):
“awareness provides the dynamics that scan the field to be known and is, therefore, both a condition and a means of knowing”

What role plays awareness in German L2 /h/ production and perception?

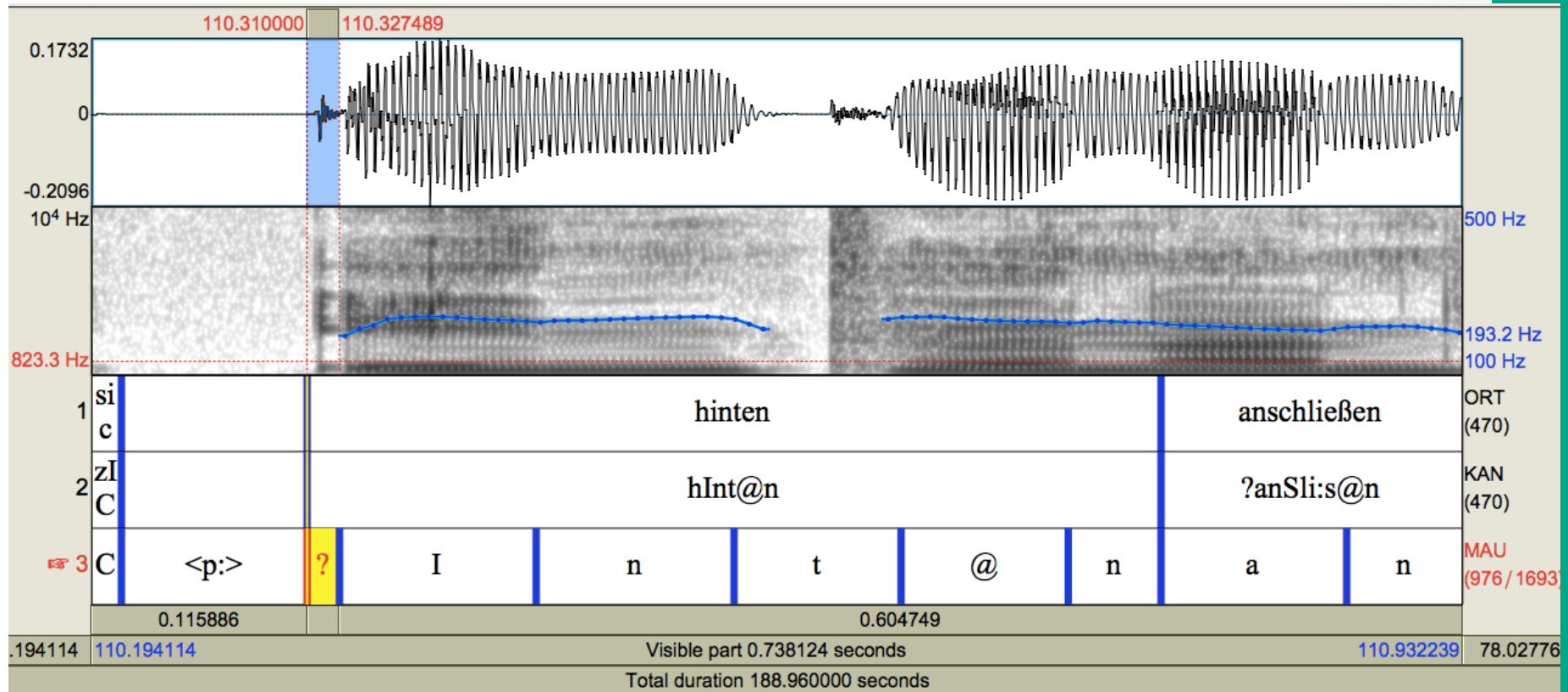
A cross task investigation

I. SPEECH PRODUCTION

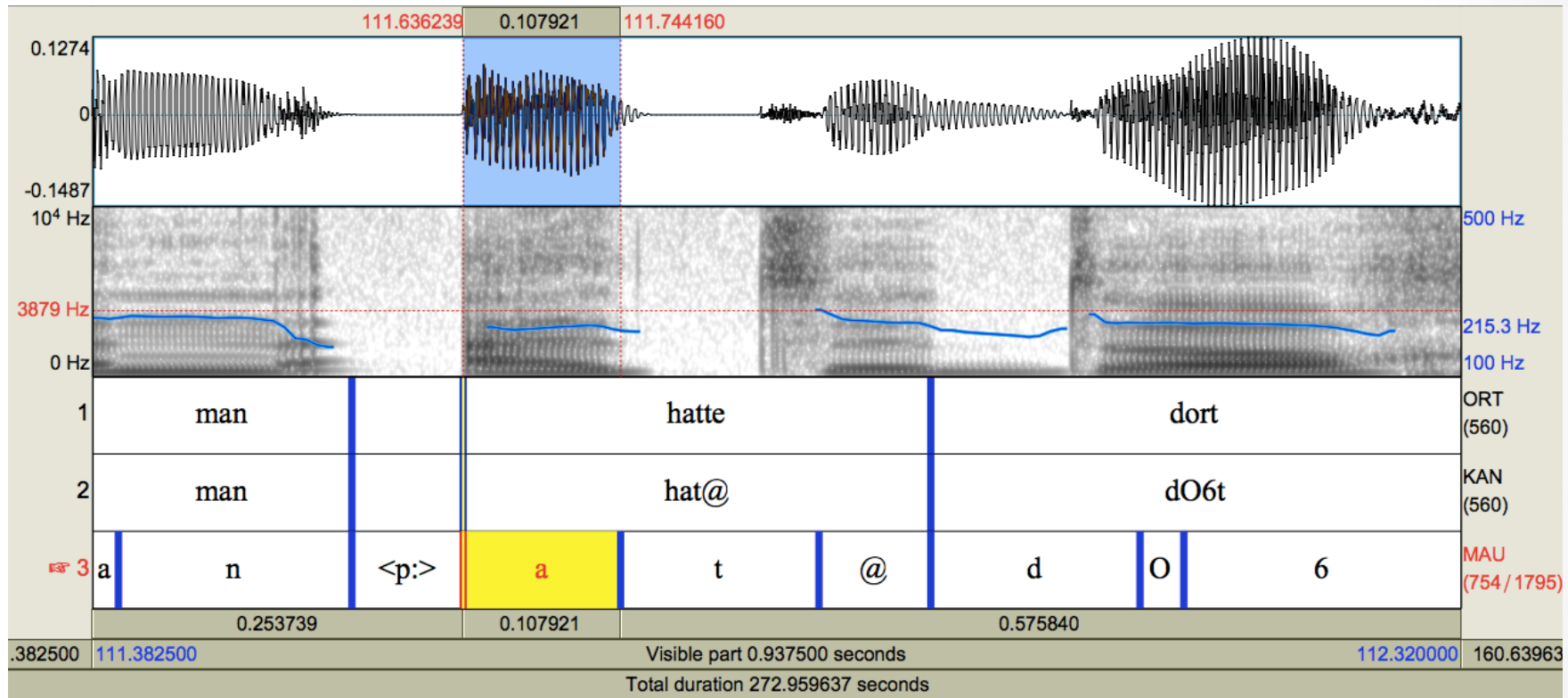
[h] onset (German L2 speaker)



[?] onset (German L2 speaker)



empty onset (German L2 speaker)



Corpus

- ProFee-FLACGS Corpus
(Progression and Feedback –
French Learners Audio Corpus of German Speech)
 - assesses improvement over one University semester
 - four recordings per student (1 per month)
 - two learner groups, German native control group
 - tasks: reading, picture description
 - what does improvement in L2 speech look like?
 - what features?
 - ceiling effects?

ProFee-FLACGS Corpus

Input:
Audio & Visual (AV)

Input:
Audio Only (AO)

Reading

Description

Reading

Description

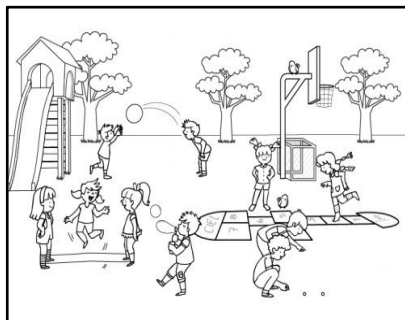
Sep.

Oct.

Nov.

Dec.

**Willkommen
und
Abschied**
J.W. Goethe



**Letztendlich
sind wir dem
Universum egal**
David Levithan



Teaching Period (one semester)

Feedback Groups

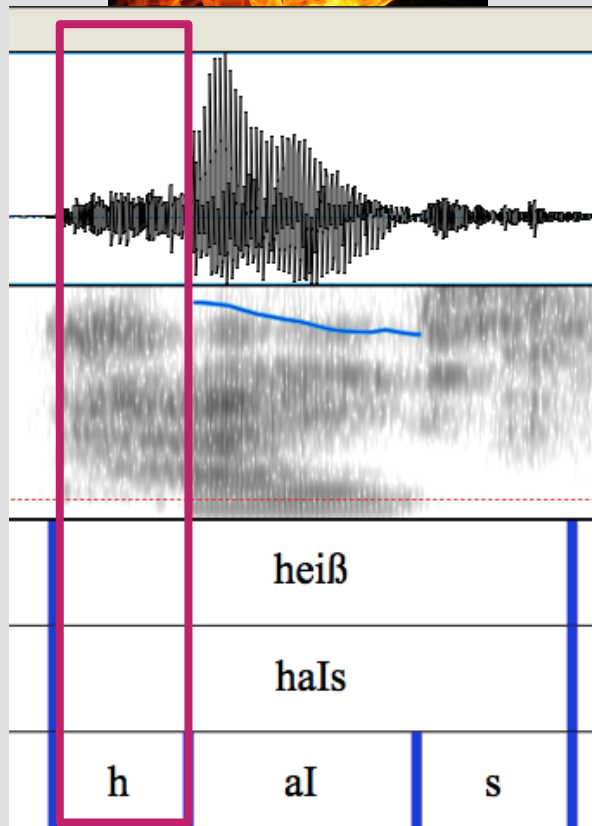
F
E
E
D
B
A
C
K

- Individualized feature-grid for each submitted homework
- General pronunciation feedback in class
 - general pronunciation errors that appeared in the last assignment
 - audio of a German native speaker

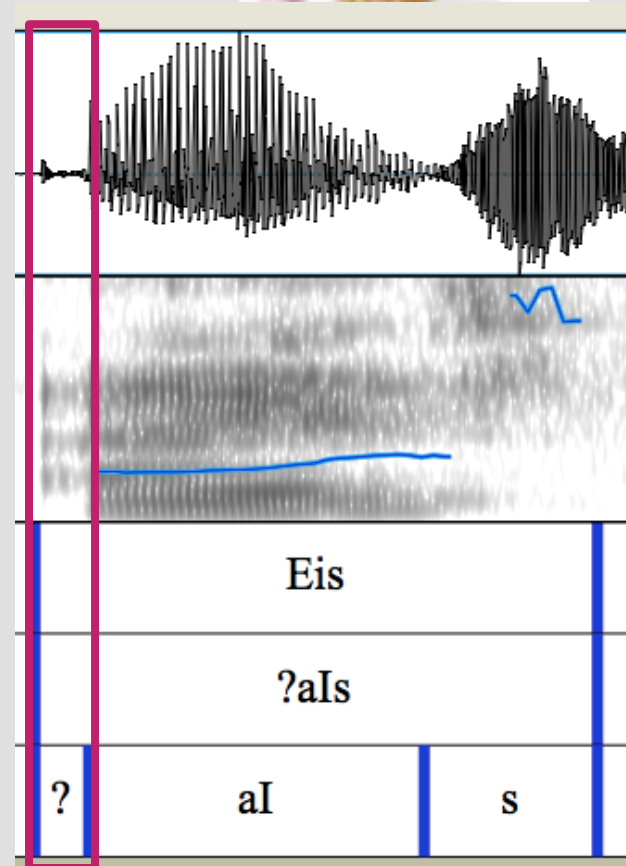
F
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+
S

- **Individualized feature-grid + individual TextGrid**
 - Manual transcription of the sound files + automatic alignment
- **General pronunciation feedback in class + Spectrograms**
 - general pronunciation errors that appeared in the last assignment
 - audio and **spectrograms** of a German native speaker

Example of a slide



[h] vs [ʔ]



Corpus collection and annotation

- Speech production task (text, picture) to realize outside of the classroom
- Audio files were mailed to the teacher

- Manual transcription – German orthography
- Automatic alignment with the web-service of *Munich Automatic Speech Segmentation* (MAUS)
<https://clarin.phonetik.uni-muenchen.de/BASWebServices/#/services>
- Manual checking of the MAUS alignment

Results

1/3

Deleted [h]

- rate of deleted /h/ of the two learner groups

<i>rate in %</i>	September		Reading	November		Reading
Group	AO	AV		AO	AV	
deleted /h/	6.4	18.9		3.5	12.2	
TOKENS	171	190		198	230	

Results

1/3

Deleted [h]

- rate of deleted /h/ of the two learner groups

<i>rate in %</i>		October			December	
Group	Picture description	AO	AV	Picture description	AO	AV
deleted /h/		3	8.2		1.1	4.7
TOKENS		165	130		94	85

Results

1/3

Deleted [h]

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deleted /h/	6.4	18.9	3	8.2	3.5	12.2	1.1	4.7
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Reading

Description

Reading

Description

Both learners' groups delete less /h/ over time

The differences between both groups decrease over time

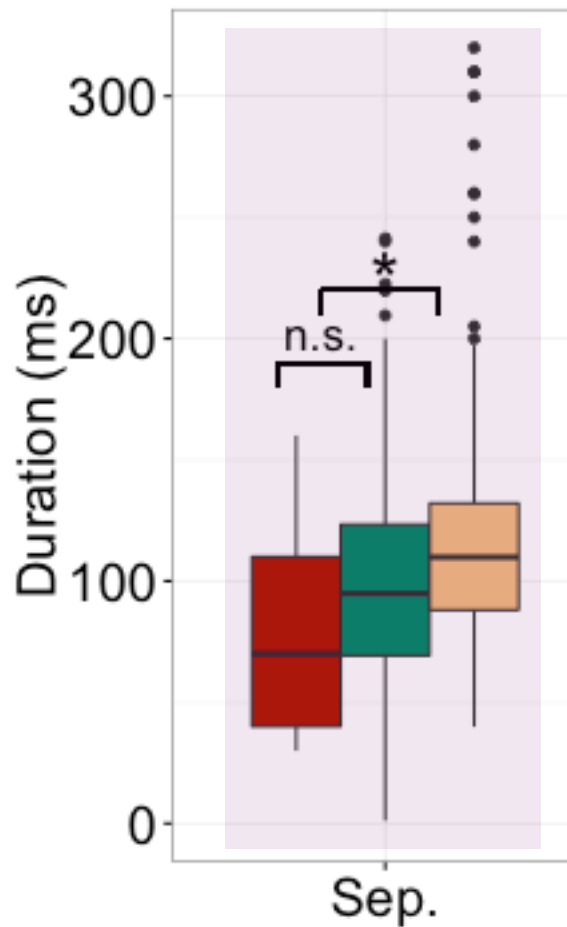
In reading more /h/ are deleted compared to picture description

{ 18 }

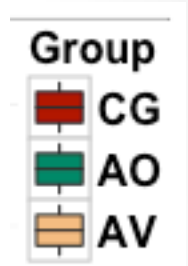
Results

2/3

Duration of canonical [h]



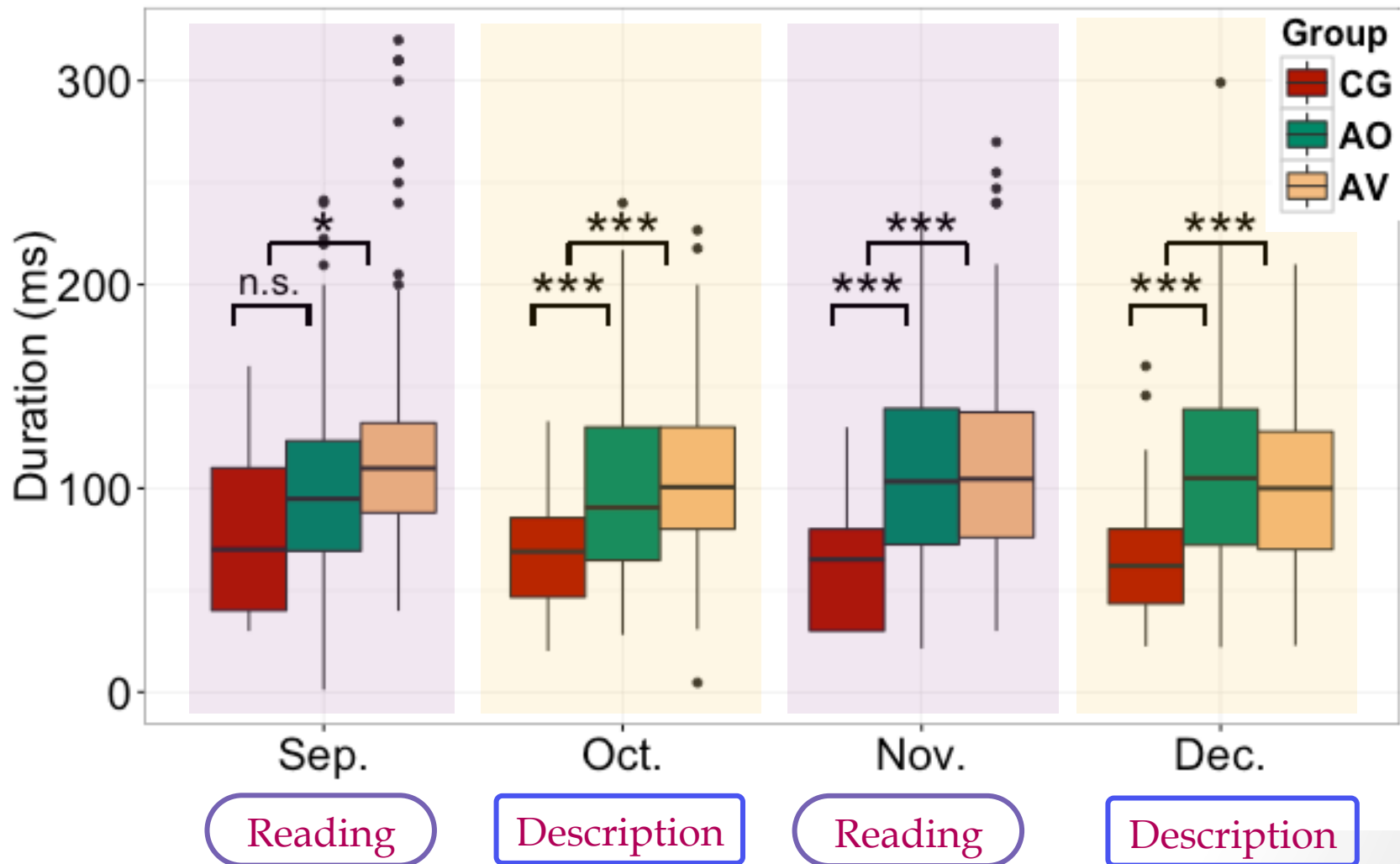
Reading



Results

2/3

Duration of canonical [h]



Results

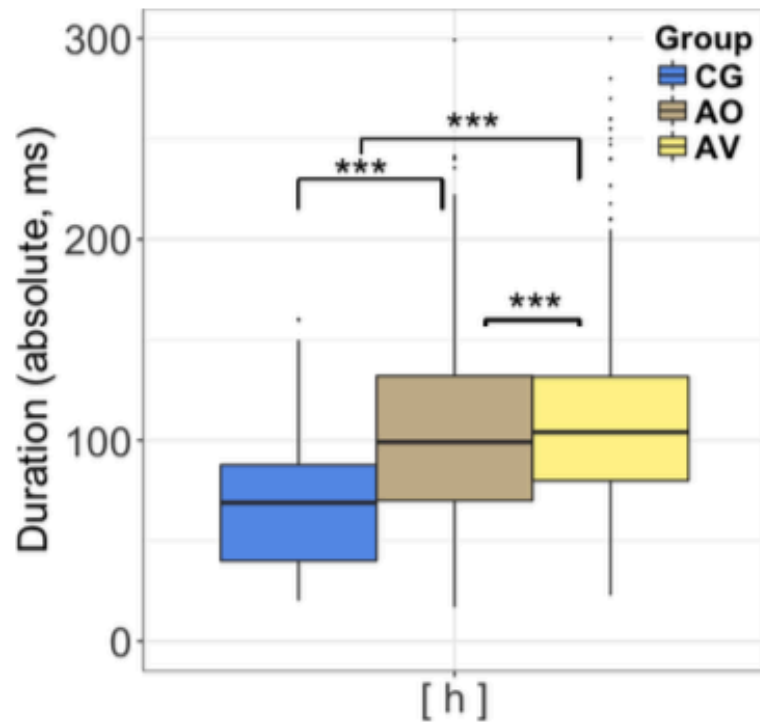
3/3

Main effect Group:

CG ($M = 74.0$ ms, $SD = 86.4$ ms)

AO ($M = 105.0$ ms, $SD = 53.3$ ms)

AV ($M = 143.5$ ms, $SD = 166.5$ ms)

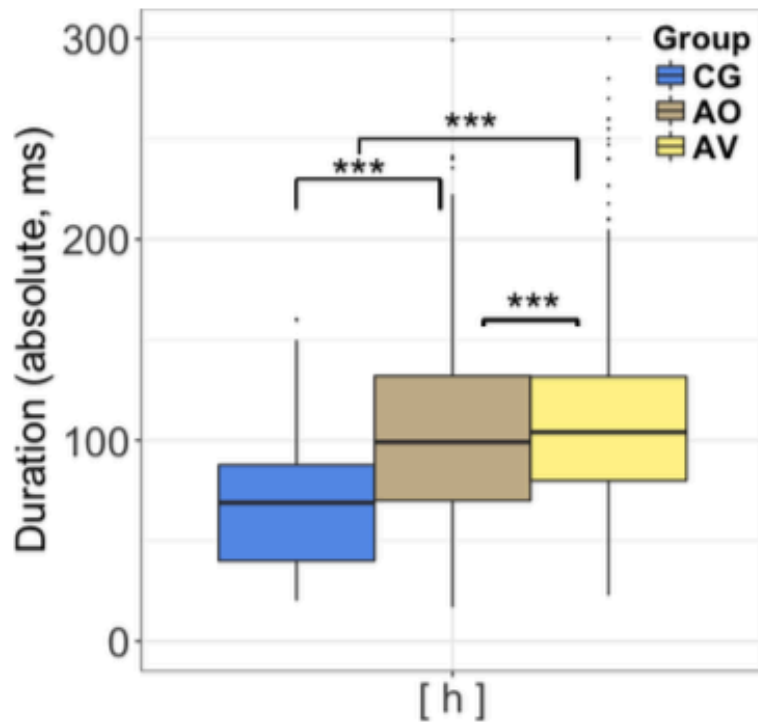


Results

3/3

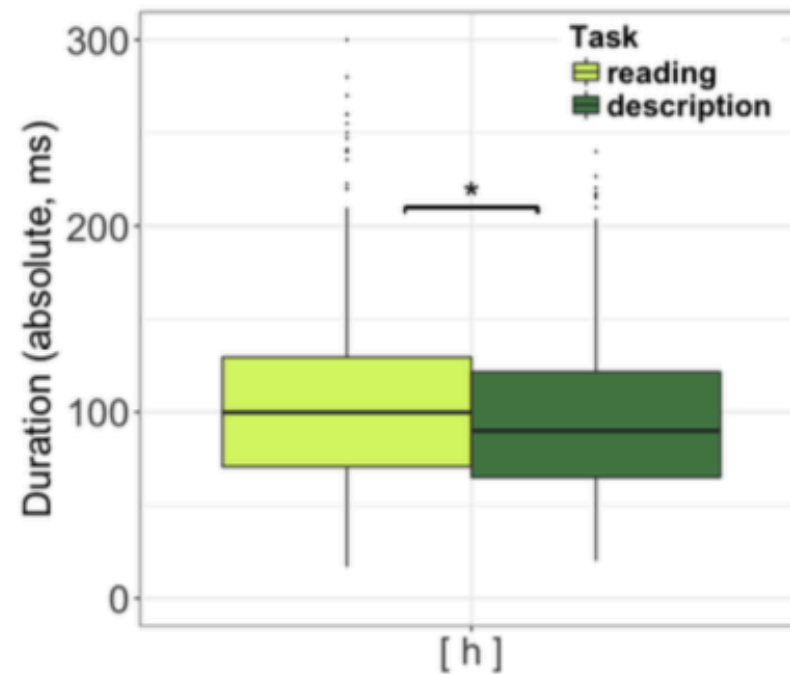
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Main effect Task:

description ($M = 96.9$ ms, $SD = 43.3$ ms)
reading ($M = 129.9$ ms, $SD = 150.1$ ms)



Conclusion speech production

- after a semester of training
 - accuracy: only little [h] deletions
 - duration:
both learner groups longer [h] than German natives
- Accuracy:
 - AV group → improvement was more spectacular
 - two possible reasons
 - the training was more effective
 - the AO group was closer to a ceiling effect?
- Reading seems more challenging
 - grapheme to phoneme correspondence?

II. SPEECH PERCEPTION

Methods

- only one student group
- five weeks of pronunciation teaching
- perceptual discrimination tests (AXB)
 - before the training started
 - after five weeks of training→ 8 students performed both tests
- perceptual discrimination test (AXB)
 - programmed with PsychoPy
 - presented minimal pairs (real German words) with
 - [h] or [ʔ] onset:
Halter [ˈhaltɐ] vs *Alter* [ˈʔaltɐ], *geheilt* [gəˈhailt] vs *geeilt* [gəˈʔailt]
 - short and long vowels
 - accuracy and reaction times

Expectations

- Results from speech production:
 - rate of /h/ deletions decreased over the semester
 - ➔ speech production benefitted from explicit pronunciation teaching
- Expectations for speech perception
 - speech perception should benefit in the same way from formal instruction
 - syllable initial /h/ should be better perceived after increased awareness

Results - accuracy

Pre-test		<i>M</i> (in %)	<i>SD</i> (in %)
word initial	[h]	56.3	19.8
	[ʔ]	43.8	15.3
word internal	[h]	48.2	21.5
	[ʔ]	46.4	19.8

Post-test		<i>M</i> (in %)	<i>SD</i> (in %)
word initial	[h]	64.6	20.8
	[ʔ]	66.7	21.8
word internal	[h]	62.5	31.4
	[ʔ]	58.9	22.2

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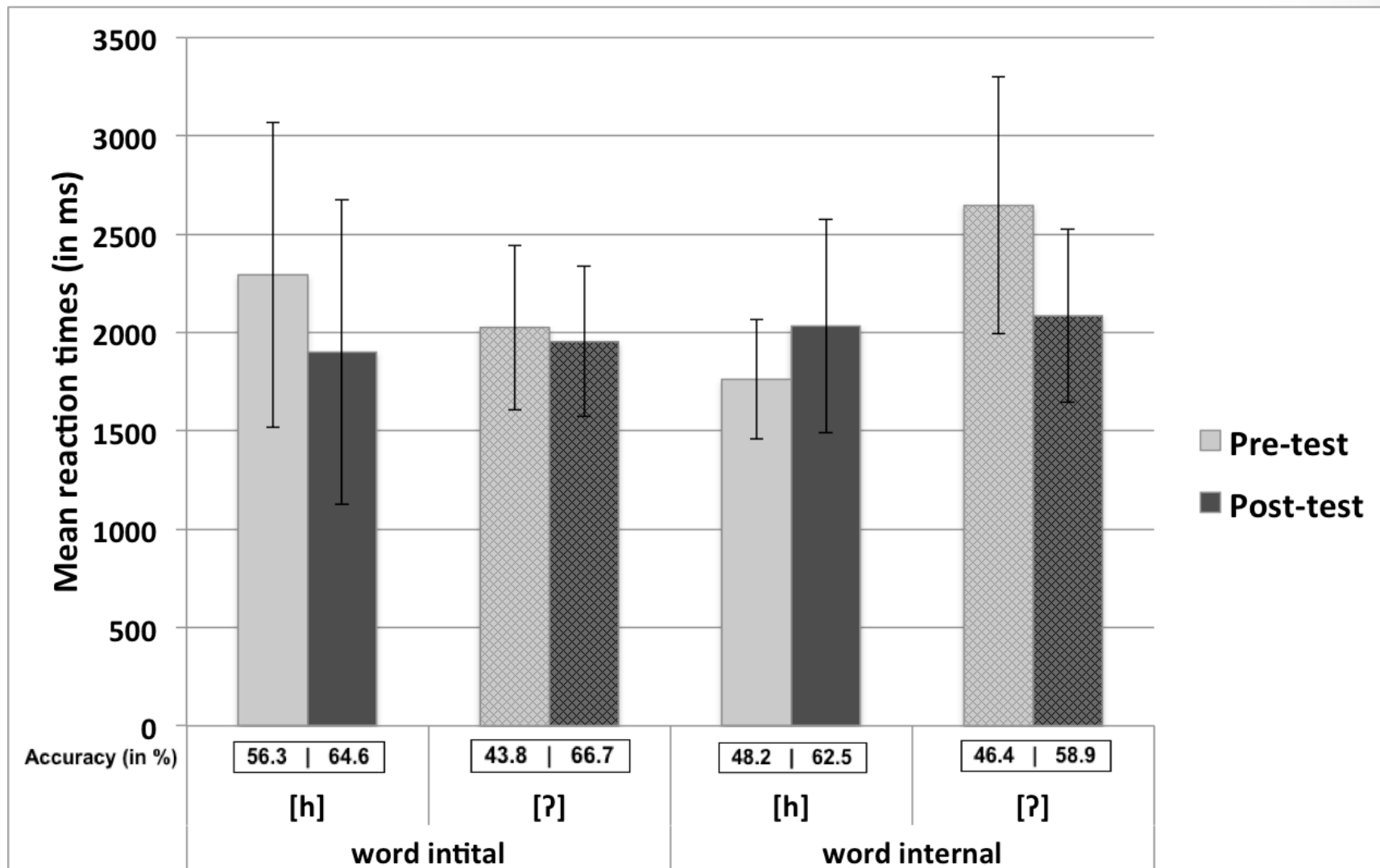


Results - accuracy

Pre-test		<i>M</i> (in %)	<i>SD</i> (in %)	t-values	p-values
word initial	[h]	56.3	19.8	$t(7) = 0.89$	$p = .40$
	[ʔ]	43.8	15.3	$t(7) = 1.16$	$p = .29$
word internal	[h]	48.2	21.5	$t(7) = 0.24$	$p = .82$
	[ʔ]	46.4	19.8	$t(7) = 0.51$	$p = .63$
Post-test		<i>M</i> (in %)	<i>SD</i> (in %)	t-values	p-values
word initial	[h]	64.6	20.8	$t(7) = 1.99$	$p = .09$
	[ʔ]	66.7	21.8	$t(7) = 2.16$	$p = .07$
word internal	[h]	62.5	31.4	$t(7) = 1.13$	$p = .30$
	[ʔ]	58.9	22.2	$t(7) = 1.14$	$p = .29$



Results - reaction times



Conclusion speech perception

- Improvement could be observed but it was not statistically significant
- It seems that for German /h/ awareness does help only little with speech perception
- Neither accuracy nor reaction times showed significant improvement

General conclusion

- Awareness seems to help more with the production of German [h] than with its perception
- Asymmetry might be explained with the properties of German [h]
 - articulatory gesture in order to produce [h] can be easily performed → production is not difficult
 - from an acoustic point of view [h] is not rich in information → perception might be difficult

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Grazie!

Thank you!

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