Subtle morpho-phonetic differences in English stems and word-final /s/ influence listeners' comprehension

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Background

Stems

Production

Pseudo-**stems** of monomorphemic words vs. **stems** of complex words show durational differences in production [1, 2]

daze vs. ***day***s
/deɪ/ /deɪ/

Word-Final /s/

Production

Different types of **word-final /s/**, e.g. non-morphemic, suffix, and clitics, show durational differences in production [3, 4, 5, 6]

Can listeners **perceive** these differences?

Can listeners make use of these differences in **comprehension**?

Research Questions

Stems

Perception

Can listeners perceive durational differences between **the same strings of segments** in complex and simplex words?

Word-Final /s/

Perception

Can listeners perceive durational differences between **different types of word-final /s/** in complex and simplex words?

Perception

Which differences can be perceived?

Do listeners show a variable pattern in that some can perceive the differences and some cannot?

Comprehension

Are listeners affected in their lexical processing when they are exposed to a form with a stem-suffix mismatch?

Method

Manipulation of stems: *daze* / *days*

- A: unmanipulated, original length
- B: stem duration **+10 ms**
- C: stem duration **+25 ms**
- D: stem duration **+50 ms**
- E: stem duration **+75 ms**

Manipulation of /s/: *bo*[k**s**] / *step*[**s**]

- A: prototypical length
- B: non-morphemic /s/ **-10 ms**; plural /s/ **+10 ms**
- C: non-morphemic /s/ **-20 ms**; plural /s/ **+20 ms**
- D: non-morphemic /s/ **-35 ms**; plural /s/ **+35 ms**
- E: non-morphemic /s/ **-75 ms**; plural /s/ **+75 ms**

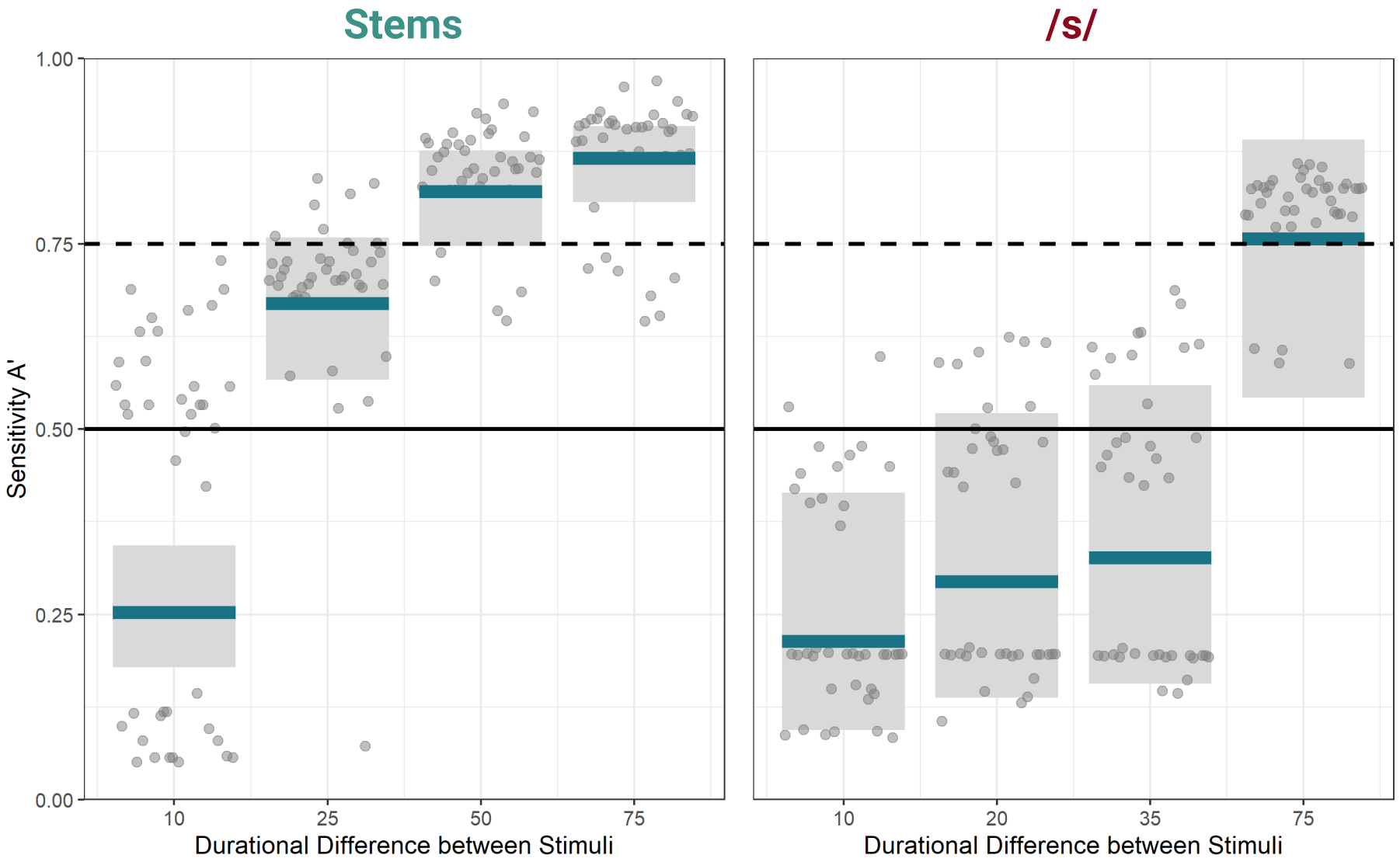
Stimuli for stems

Pair	Same / Different	Durational Difference
A vs. B	Different	+10 ms
A vs. C	Different	+25 ms
A vs. D	Different	+50 ms
A vs. E	Different	+75 ms
A vs. A	Same	none
B vs. B	Same	none
C vs. C	Same	none
D vs. D	Same	none
E vs. E	Same	none

Stimuli for /s/

Pair	Same / Different	Durational Difference
A vs. B	Different	±10 ms
A vs. C	Different	±20 ms
A vs. D	Different	±35 ms
A vs. E	Different	±75 ms
A vs. A	Same	none
B vs. B	Same	none
C vs. C	Same	none
D vs. D	Same	none
E vs. E	Same	none

Overall Sensitivity



Method

- participants listened to an audio stimulus and were shown 2 options on the screen
  - stems: monomorphemic or plural (e.g. *days* vs. *daze*)
  - word final /s/: singular or plural ('one' vs. 'two or more')
- they were asked to click with their mouse on the option that they think they heard
- mouse-tracks were recorded, then analysed using quantile generalized additive mixed models
- expectation: mouse-tracks should differ by condition

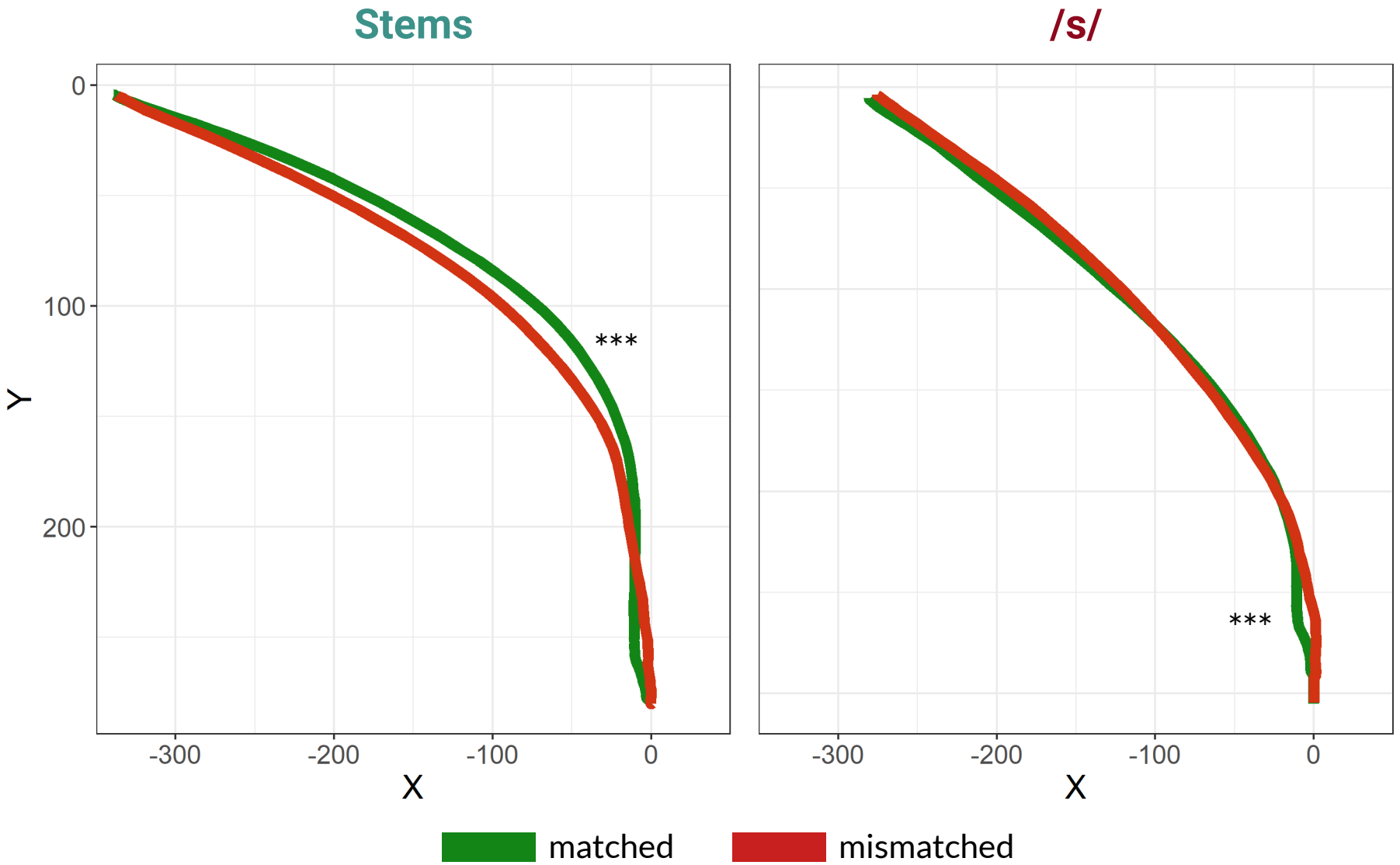
Stimuli for stems

Condition	Example	/z/
matched	*daze* [deɪ] + *daze* [z]	mono-morphemic
mismatched	*days* [deɪ] + *daze* [z]	mono-morphemic
matched	*days* [deɪ] + *days* [z]	plural
mismatched	*daze* [deɪ] + *days* [z]	plural

Stimuli for /s/

Condition	Example	Stem
matched	*corpse* [kɔːp] + *corpse* [s]	mono-morphemic
mismatched	*corpse* [kɔːp] + *steps* [s]	mono-morphemic
matched	*steps* [stɛp] + *steps* [s]	plural
mismatched	*steps* [stɛp] + *corpse* [s]	plural

Mouse-Tracks



Conclusion

- listeners can perceive subtle durational differences in **stems** and **word-final /s/**
- listeners show varying sensitivity

  → some can hear durational differences earlier than others

  → durational differences are more easily perceived in **stems** than in **word-final /s/**
- listener comprehension is significantly influenced by mismatched durational information for both, **stems** and **word-final /s/**
- such morpho-phonetic effects are unexpected and unexplained in most extant models of language perception and comprehension [7, 8, 9]
- our results call for more adequate models of perception and comprehension

Thank you!

References

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