

Do nonwords induce convergence?

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Background: Speech convergence

Speakers **converge**, or shift their productions, towards the model speech that they have heard when shadowing words and nonwords (e.g., Goldinger, 1998, Shockley et al. 2004, Kwon 2019).

- English speakers spontaneously imitate extended VOTs of voiceless stop, and the convergence effect is **generalized to the unheard words** obtaining the similar voiceless stop (e.g., Nielsen 2011).

English /p/
with longer VOT



English /p/ and /k/
with longer VOT
in unheard words

- The convergence effect is influenced by **the lexical frequency**: low-frequency words show a stronger convergence effect than high-frequency ones after shadowing those words (e.g., Goldinger, 1998).

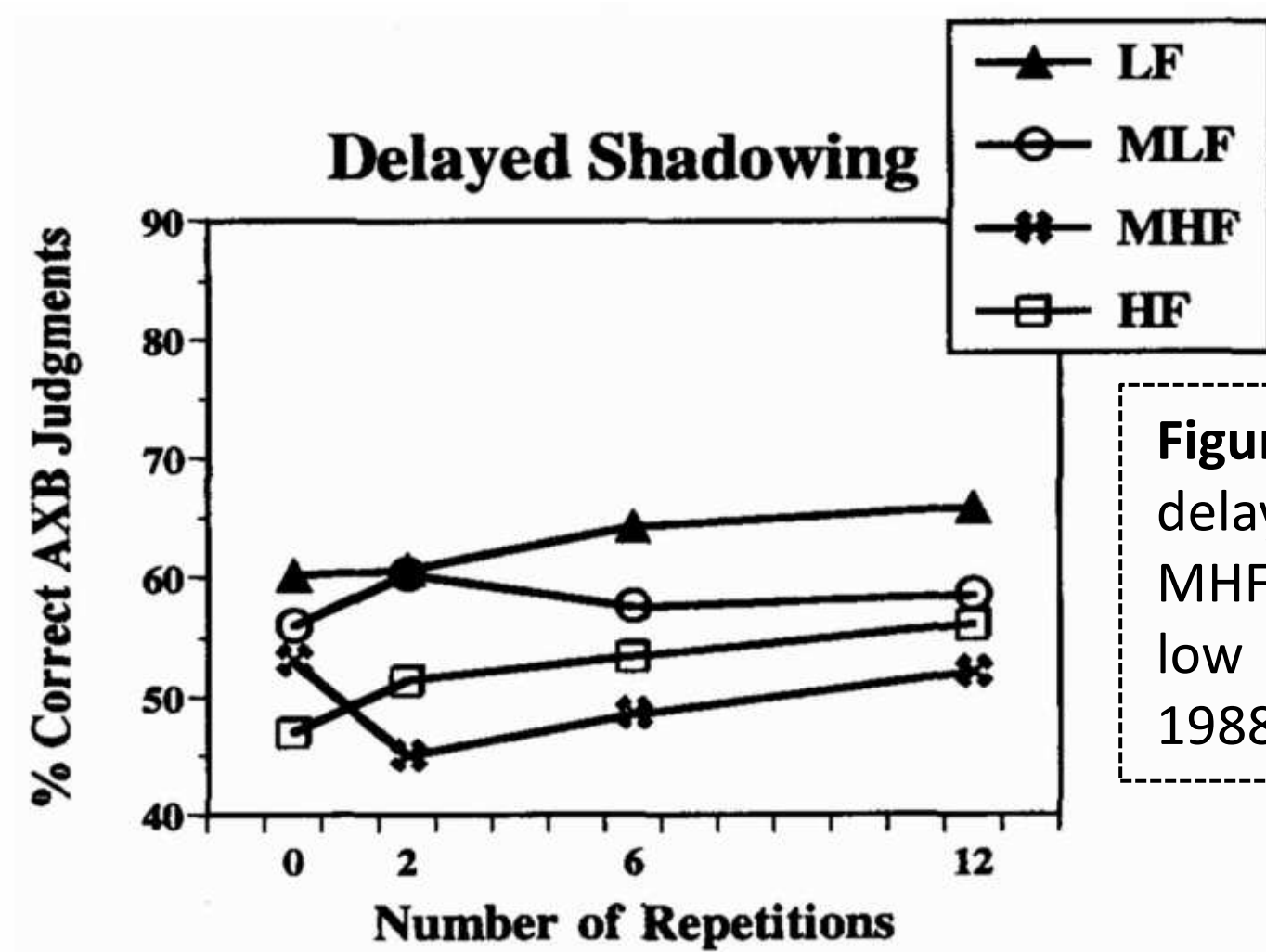


Figure 4. Percentage correct AXB classification for delayed-shadowing tokens, HF= high frequency; MHF = medium high frequency; MLF = medium low frequency; LF = low frequency (Goldinger 1988:258)

Research questions

1. Does shadowing nonwords induce the convergent changes in real words?

nonwords starting with /p/
- with longer VOT



real words starting with /p/
longer VOT?

1. If so, does the lexical frequency influence the magnitude of convergence induced by nonwords?

nonwords starting with /p/
- with longer VOT



real words: differences in VOT
between high vs. low freq.?

Methods

- Participants:** 23 native speakers of American English (19F/4M)
- Stimuli:** 80 English words and 30 nonwords; all targets with initial stress

stimuli type	target words examples (reading)	target items examples (shadowing)
High-freq.	pain; payment; personal	pude [pud] passock ['pæsək]
Low-freq.	Pall; peacock; panama	perjetal ['pɜ:ʒətɪ]

Reading list:

- 40 /p/-initial words (20 high-freq. 20 low-freq.) with 40 sonorant-initial fillers

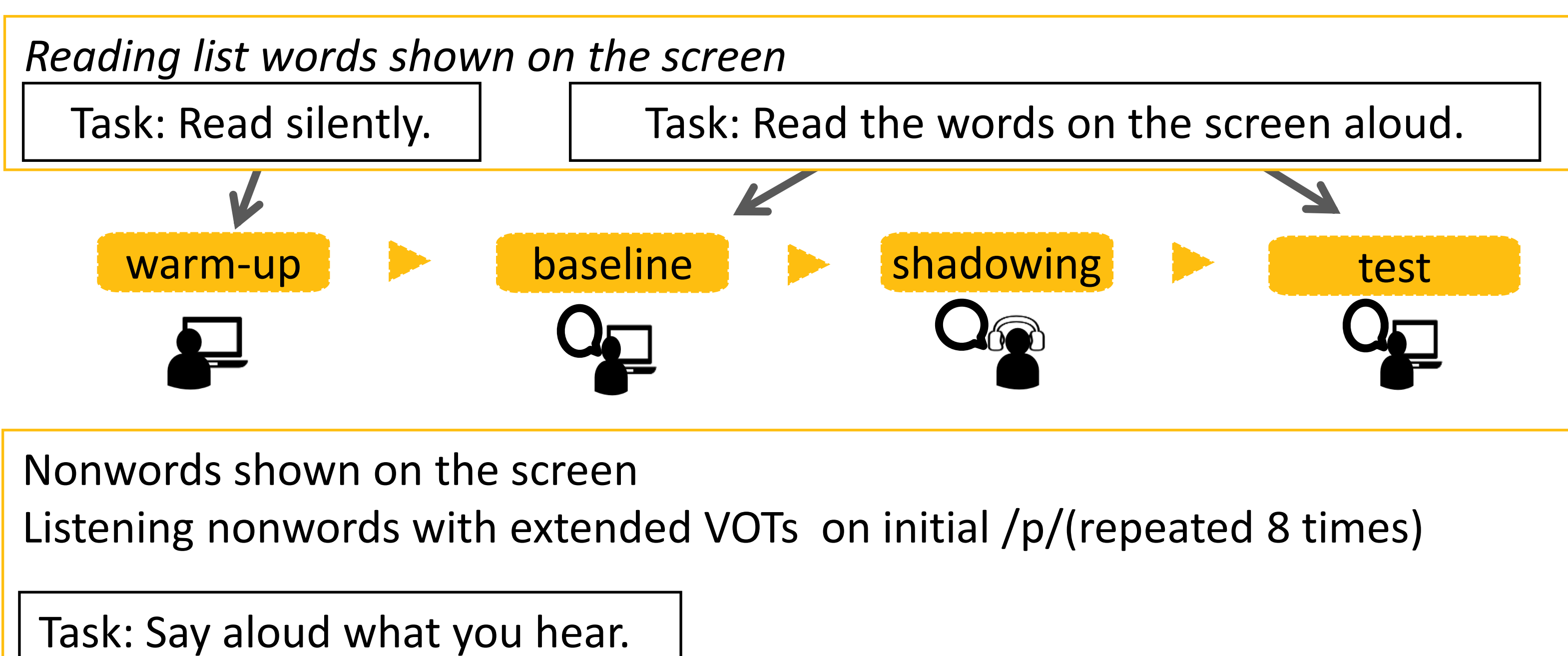
Shadowing list:

- 20 /p/-initial with 10 sonorant-initial nonwords (Keuleers and Brysbaert 2010)
- nonwords conformed to English phonotactics and spelling regulations (produced by a male speaker of American English)

VOT manipulations:

VOT extension (+ 60ms)
mean /p/ VOT after manipulation: 119.2 ms

Procedure:



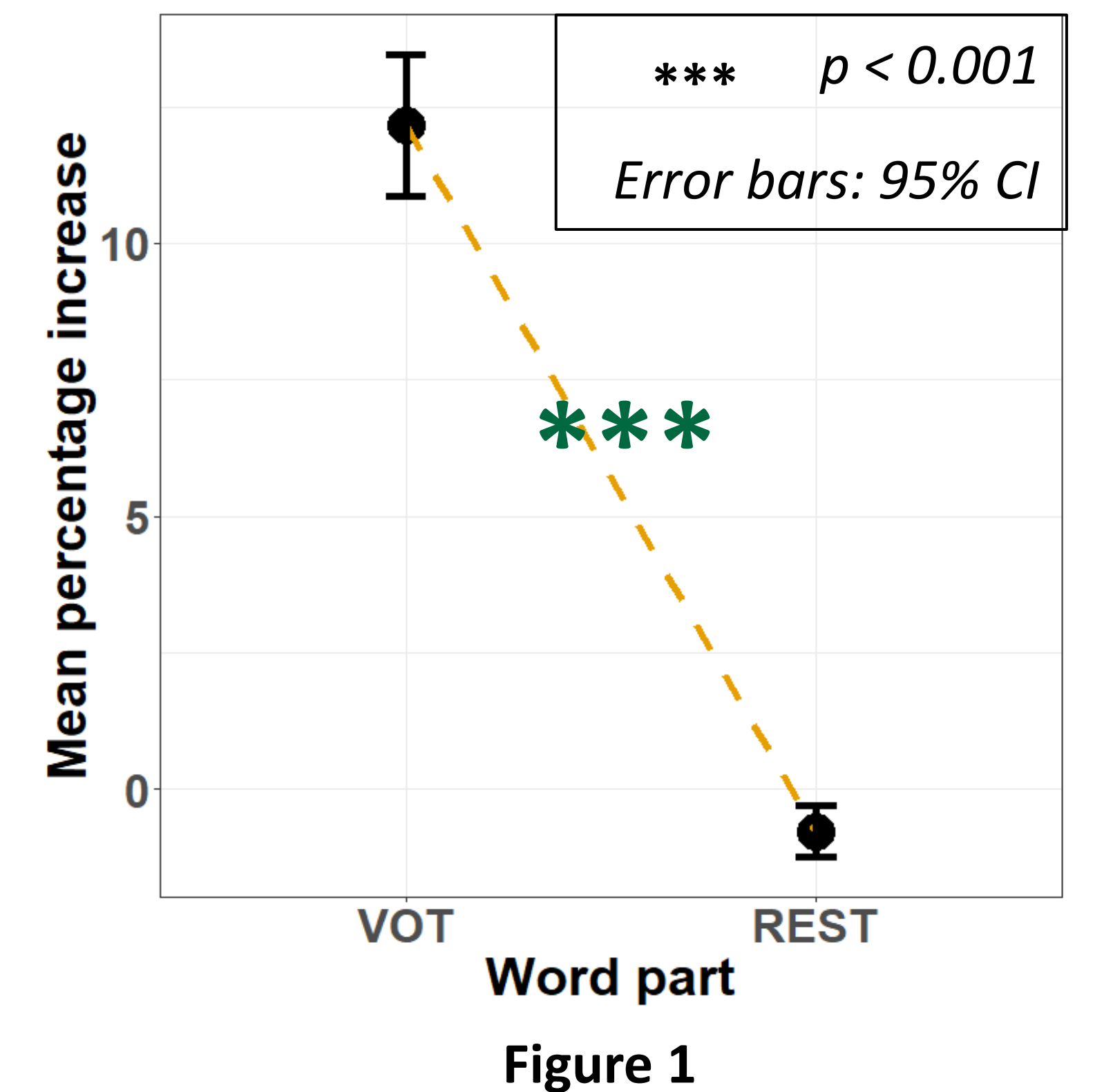
Only the **baseline** and **test** productions are analyzed in this study.

Results: Nonwords induce convergence in real words!

Percentage increase:
VOT > Rest

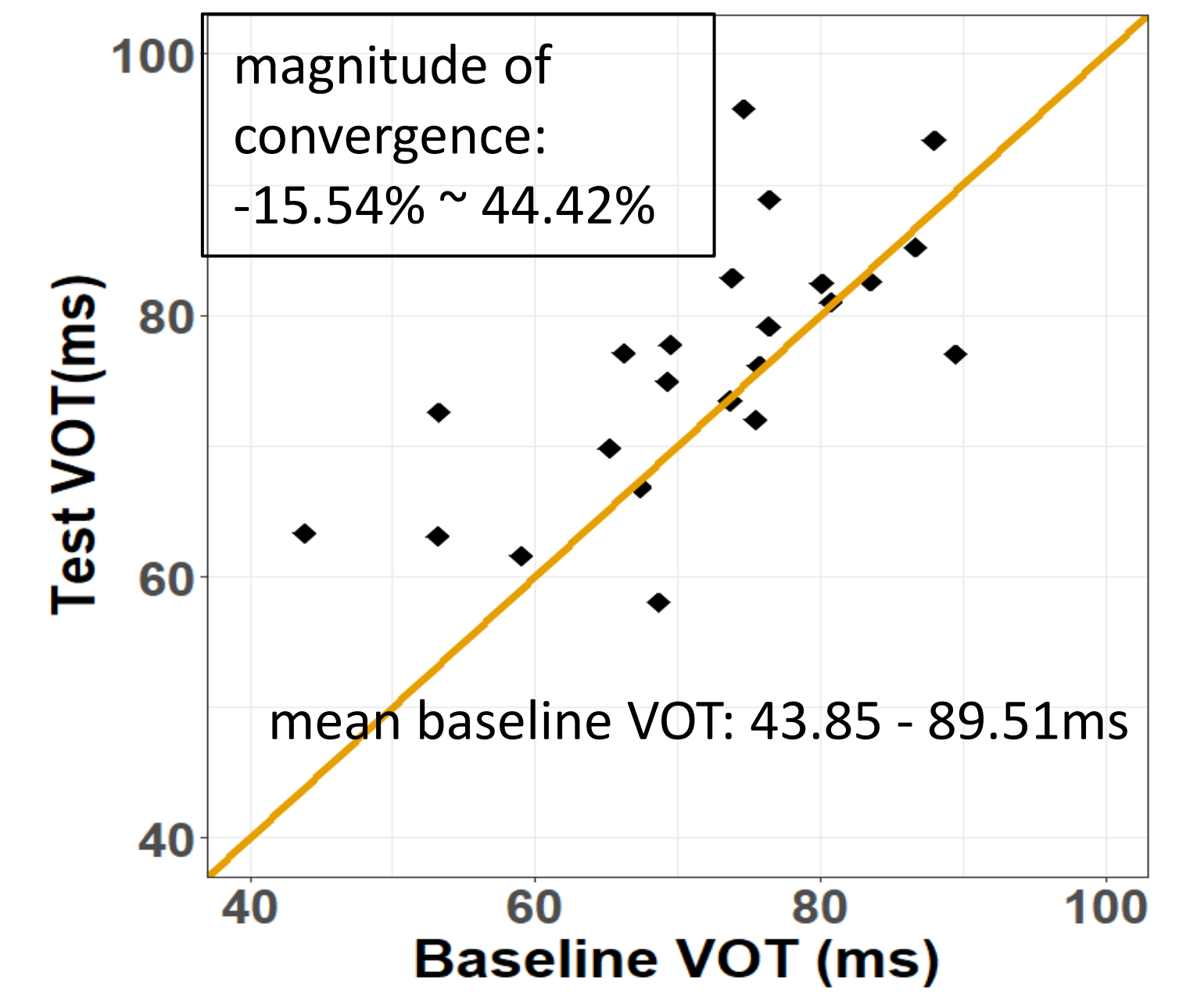
- The REST (word duration-VOT) was calculated to determine whether the increase in VOT was specific to the VOT of /p/ or due to an overall change in the speech rate.

- The speakers extended VOT after shadowing the nonword stimuli, without changing much in the REST duration.



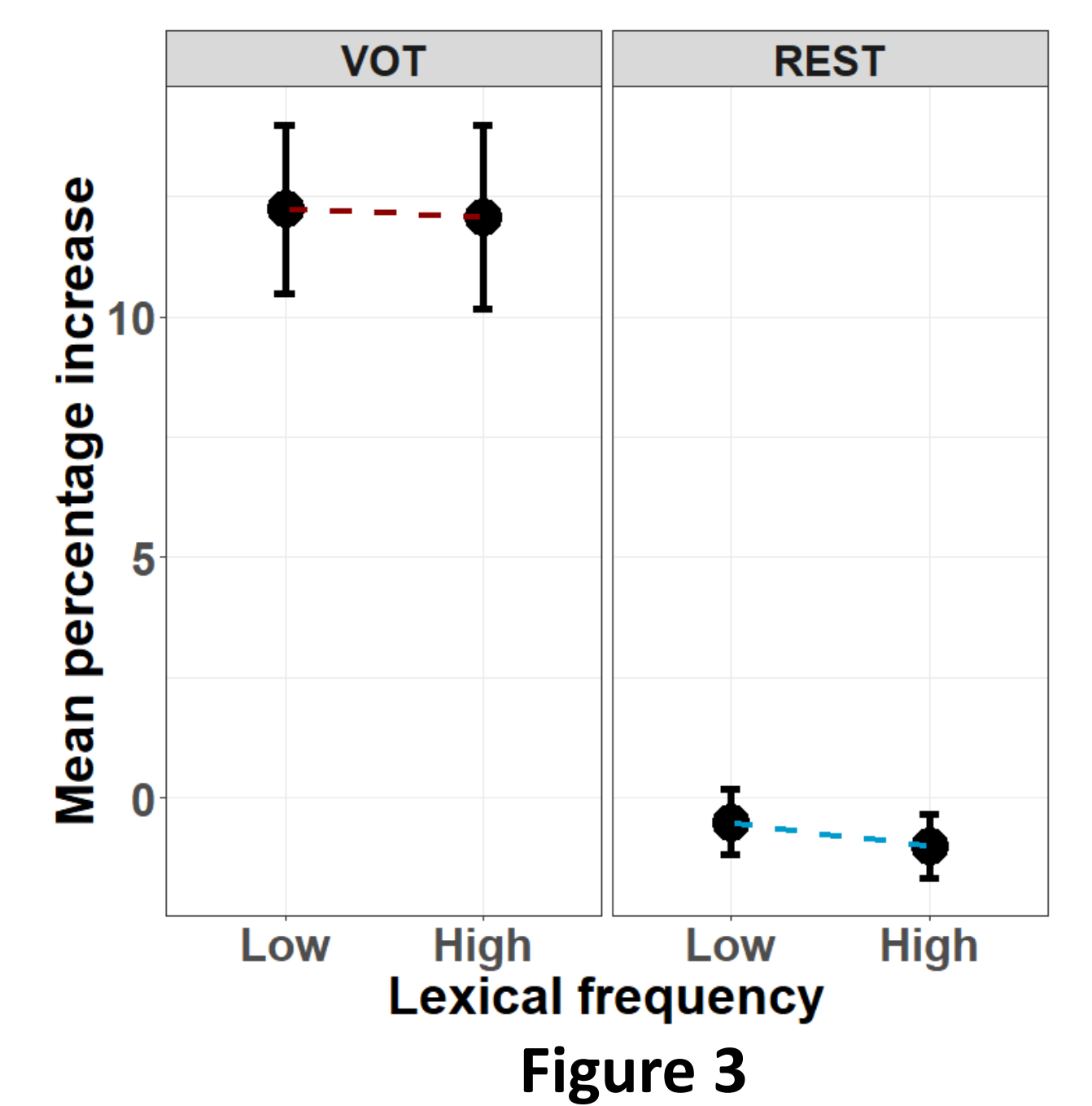
The magnitude of convergence varied considerably among speakers.

- Each diamond represents the mean VOT of individual speakers.
- The diamonds above the diagonal line represent speakers who converged.



The effect of Lexical Frequency was **insignificant**:

words of high or low frequency did not differ significantly in how much they changed.



Statistical analyses: mixed effects model

- DV:** percentage increase (= 100 * (test - baseline) / baseline)
- Fixed effects:** Word part (VOT vs. REST) Lexical Frequency (high vs. low) their interaction (the interaction was not significant.)
- Random effects:** by-participant, by-item Intercepts; by-participant random slopes for Word Part and Lexical Frequency

Concluding remarks

The convergence effect can be achieved from nonwords to real English words.

- This is in line with the version of exemplar models allowing for abstract linguistic levels in the exemplar space (e.g., Pierrehumbert 2001) and the Automatic Alignment Account (e.g., Garrod and Pickering 2004): nonwords can fulfill a communicative function in later communicative events.
- Lexical frequency** of the real words being produced did not influence the degree of convergence: arguably, lexical frequency influences the degree of convergence only when it is tied to the words being heard or shadowed.



Selected References

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