

1. Introduction

Cue-based theories (e.g., Lewis & Vasishth, 2005, McElree, 2000, Van Dyke & Lewis, 2003) assume:

- real-time linguistic dependency formation relies on cue-dependent memory retrieval
- sentence-external material interferes with establishment of within-sentence dependencies
- complete syntactic dependencies are built; interference conditional on complete dependency processing

Van Dyke & McElree (2006) reported similarity-based interference effect in English:

Self-paced reading; N = 56; Memory load × Interference interaction ($F_1(1, 55) = 4.07, p < 0.04$; $F_2(1, 35) = 5.58, p < 0.02$; $\min F'(1, 90) = 2.35, p = 0.13$).

3. Design & Materials

Design: 2 × 2 fully-crossed factorial design; two within-subjects, within-items manipulations:

- Factor 1: Memory load (load vs. no load)
- Factor 2: Interference (no interference vs. interference)

English example item (adapted from Van Dyke & McElree, 2006):

Memory load conditions:

table ^{+fixable/-sailable}_{-open filler} sink ^{+fixable/-sailable}_{-open filler} truck ^{+fixable/-sailable}_{-open filler}

a. No interference

The boat ^{+sailable}_{+open filler} that the guy who lived by the sea **sailed**_{sailable} in the morning was very old.

b. Interference

The boat ^{+fixable}_{+open filler} that the guy who lived by the sea **fixed**_{fixable} in the morning was very old.

No memory load conditions:

c. No interference

The boat ^{+sailable}_{+open filler} that the guy who lived by the sea **sailed**_{sailable} in the morning was very old.

d. Interference

The boat ^{+fixable}_{+open filler} that the guy who lived by the sea **fixed**_{fixable} in the morning was very old.

Depth of processing manipulated through question complexity (complex vs. simple-question version)
 Within-subjects, between-items factor: versions tested 7–21 days apart with same participant group

2. Research questions

- Can interference effect be shown in eye-tracking in **English**?
- Can effect be observed cross-linguistically, e.g., in **German** (language with richer morphological marking)?
- Is similarity-based interference a function of **depth of processing**? (Logačev & Vasishth, 2016, Swets et al., 2008)

4. Experiments

Two eye-tracking while reading studies:

Study	Expt version	Subjects	Items
English	Complex	65	40
	Simple		40
German	Complex	120	40
	Simple		40

5. Predictions pre-registered: <https://osf.io/9qgrk>

For each language in each version separately:

Load × Interference interaction in reading times at critical relative clause verb (**sailed/fixe**d):

In **Load conditions**:

sailed (no interference) < **fixed** (interference)
 - memory items *table*, *sink*, *truck*, and *The boat* are plausible objects of **fixed** ⇒ interference

In **No load conditions**:

sailed (no interference) ≈ **fixed** (interference)
 - no memory items ⇒ no interference

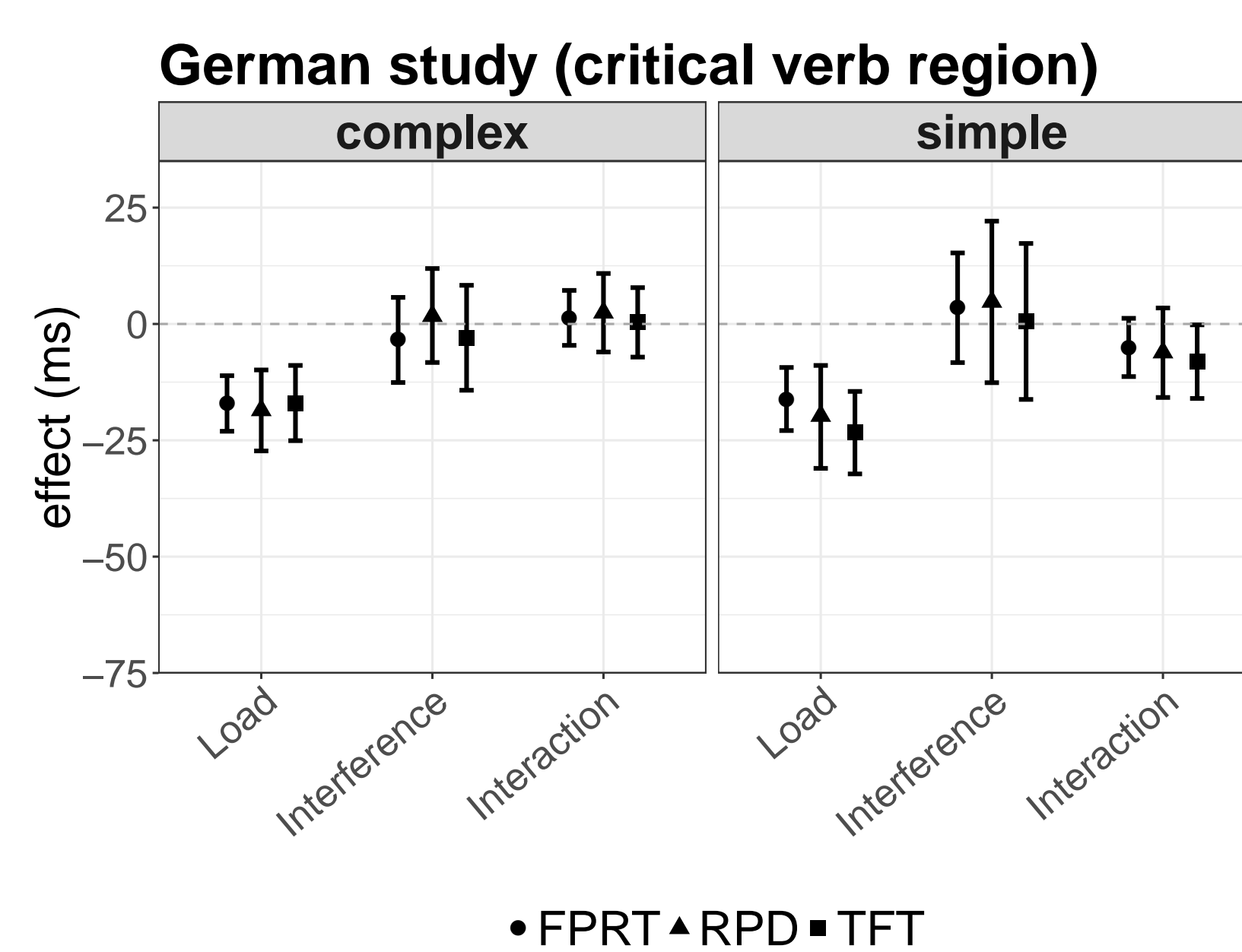
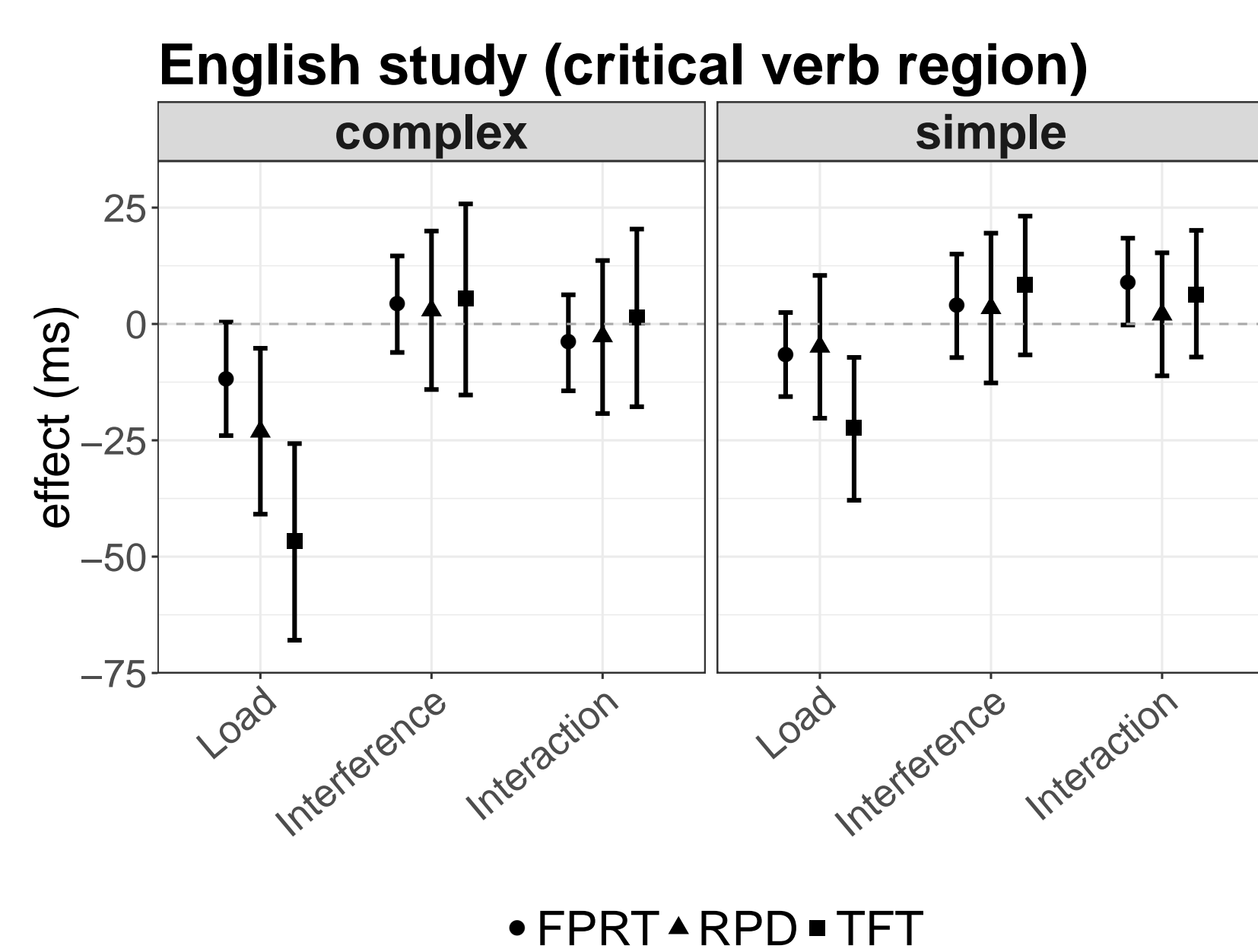
Version × Load × Interference interaction:

If superficial processing is induced (in simple-question version), interference effect might be reduced or disappear altogether.

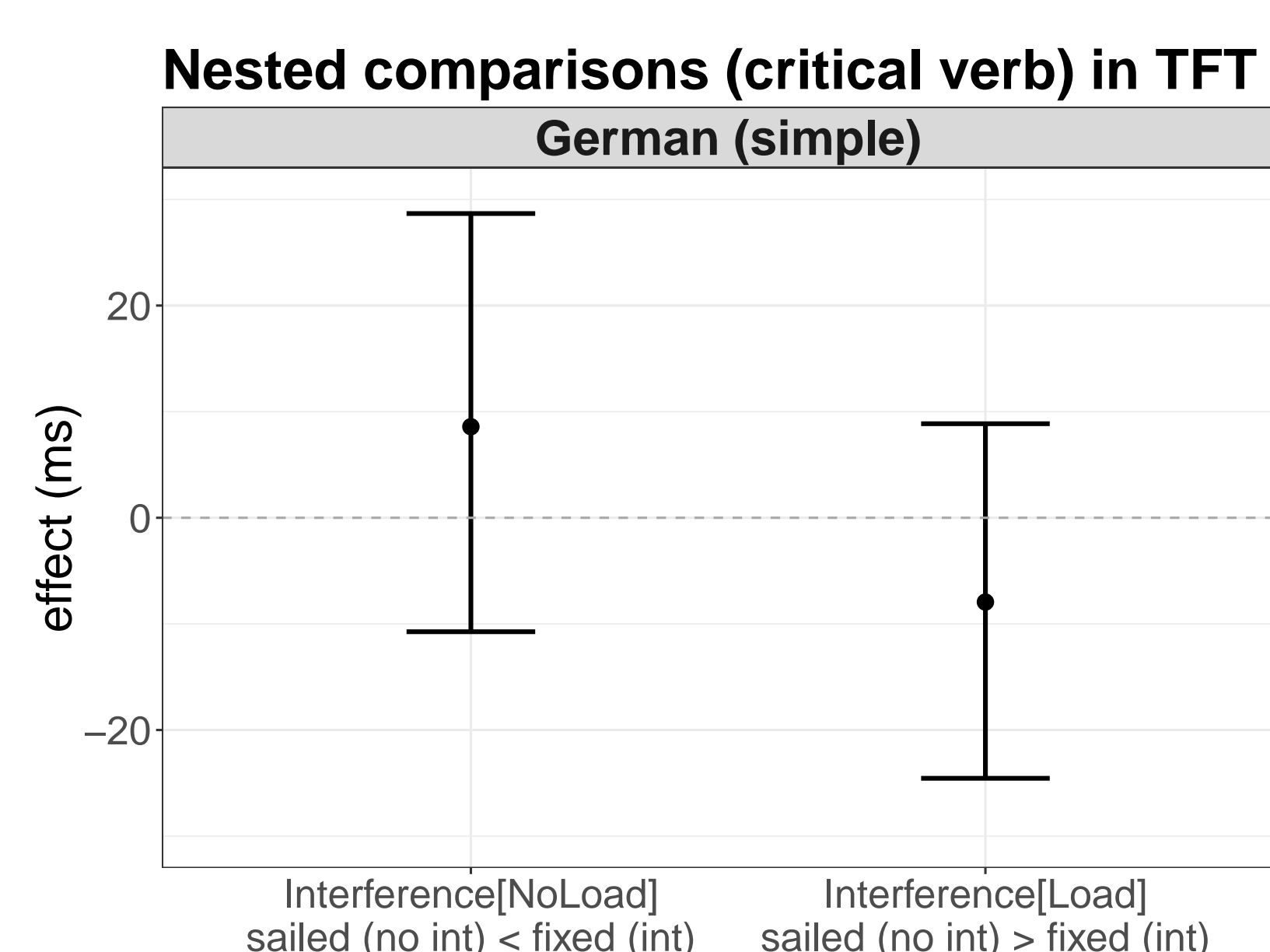
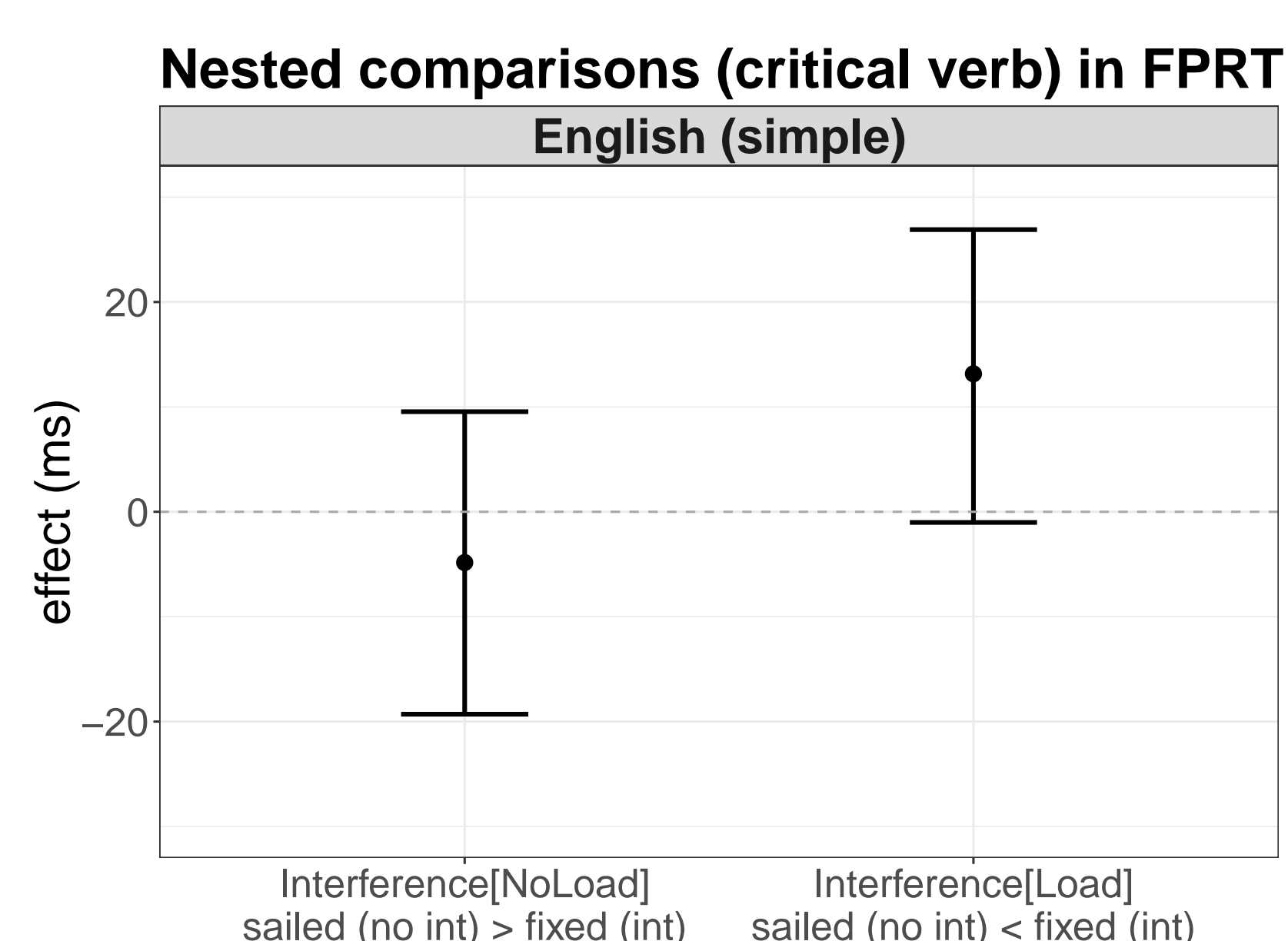
6. Results

English: Version × Load × Interference
 FPRT: CrI [-14, 1] ms

German: Version × Load × Interference
 TFT: CrI [-1, 11] ms



Posterior means with 95% credible intervals (CrI) computed from Bayesian maximal linear mixed model using Stan. Shown are FPRT = first-pass reading time, RPD = regression-path duration, TFT = total fixation time at the critical relative clause verb (**sailed/fixe**d).



Posterior means with 95% credible intervals (CrI) for nested comparisons. Shown are first-pass reading times (FPRT) for English and total fixation times (TFT) for German.

7. Summary

English

- Similarity-based interference effect (simple version) as predicted by cue-based theories

German

- no indication of expected interaction, but Load × Interference interaction (simple version) not predicted by theory → further investigation needed

Depth of processing

- Effects only in simple version (≠ predictions): effect might disappear with more demanding task

OPEN ISSUES

- Effect not observable in German due to richer morphological marking?
 * Larger-sample study in Russian, another language with rich morphological marking, underway
- Proactive weaker than retroactive interference manipulation (Van Dyke & McElree, 2011)?
 * Retroactive interference design currently being tested in German

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