Replacing one bias with another?

The gender star form in German

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- the feminine as specific form

**Lehrerin*

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  - used to describe individuals of all genders in singular and plural contexts
  - traditionally assumed to "abstract away" notions of gender; to be "gender-neutral" (Doleschal, 2002)
  - apparently come with a strong male bias (e.g. Demarmels, 2017; Garnham et al., 2012; Gygax et al., 2008; Irmen & Kurovskaja, 2010; Irmen & Linner, 2005; Koch, 2021; Misersky et al., 2019; Schmitz et al., 2023; Schmitz, 2024; Stahlberg & Sczesny, 2001)

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  Lehrkraft ‘teacher (of any gender)’
- some explicitly aim to include genders beyond the binary

  *Lehrer*in* ‘teacher (of any gender)’ or ‘nonbinary teacher’

gender star form

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- what we don't know: everything else, a lot!

Today’s research question

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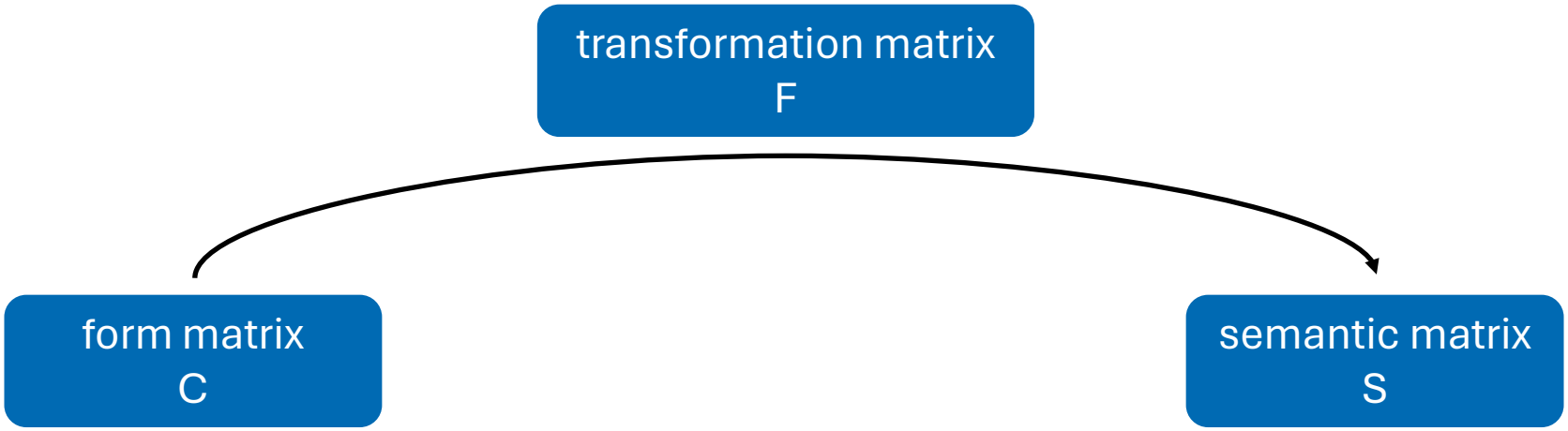
Do **semantic features** of generic masculines and gender star forms lead to the **comprehension differences** found in previous studies?

Linear discriminative learning

- simulate the comprehension process in a mental lexicon by implementing linear discriminative learning (LDL)



Step 1

Capturing the form of generic masculines and gender star forms

LDL: form matrix C

- as **form input**, we use trigraphs

	#le	leh	ehr	hre	rer	er#	eri	rin	in#	er*	r*i	*in
$Lehrer_s$	1	1	1	1	1	1	0	0	0	0	0	0
$Lehrer_g$	1	1	1	1	1	1	0	0	0	0	0	0
Lehrerin	1	1	1	1	1	0	1	1	1	0	0	0
Lehrer*in	1	1	1	1	1	0	0	0	1	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...

Step 2

Capturing the semantics of generic masculines and gender star forms

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- distributional hypothesis: differences in meaning are represented in differences in distribution (Harris, 1954; Boleda, 2020)
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Capturing semantics

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- distributional hypothesis: differences in meaning are represented in differences in distribution (Harris, 1954; Boleda, 2020)
  - if words occur in different contexts, their semantics are expected to be different
  - if words frequently occur in similar contexts, their semantics are expected to be similar
- several methods with different algorithms at work to arrive at semantic vectors are available
  - for the present study: *fastText* (Bojanowski et al., 2016)

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  - 1,400,000 pseudo-random sentences from the Leipzig Corpora Collection's *news* sub-corpus (Goldhahn et al., 2012)
  - overall: 11,829 generic masculines, 10,302 specific masculines, 4,180 specific feminines, and 9,093 gender star forms

LDL: semantic matrix S

- as **semantic input**, we use the semantic vectors generated by *fastText*

	V1	V2	V3	V4	V5
$Lehrer_s$	-0.1698544	-0.02062269	0.13144101	0.3224960	-0.356934960
$Lehrer_g$	-0.1212999	0.23588210	0.03618920	0.1520513	-0.128548180
Lehrerin	-0.1826415	0.20812154	0.18063703	0.7124651	-0.071787140
Lehrer*in	-0.4508312	0.24953875	0.26571685	0.1784766	0.001742567
...	...	...	...	...	...

Step 3

Capturing the comprehension process in the mental lexicon

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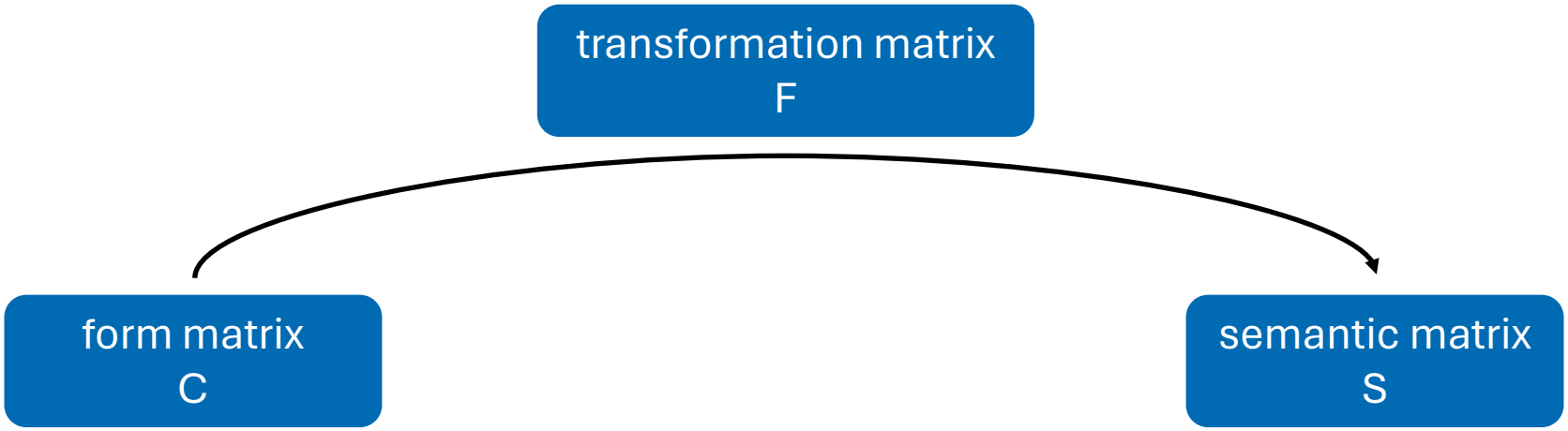

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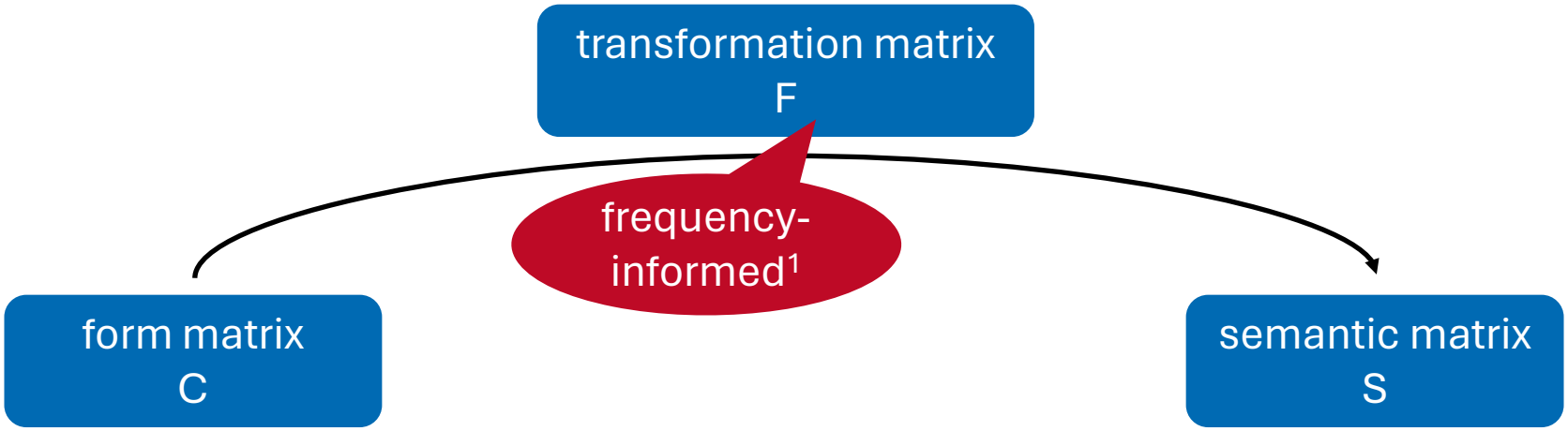

[1]Heitmeier et al. (2024)

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  - model 1: frequency of gender star forms = 0
  - model 20: frequency of gender star forms = frequency of generic masculines
- each model was created 100 times
  - difference: randomised increases of gender star form frequencies across targets
- overall: 2000 models
  - reflect the comprehension of gender star forms with increasing frequency, while taking into account that frequencies increase non-uniformly

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  - **word-level CERTAINTY**

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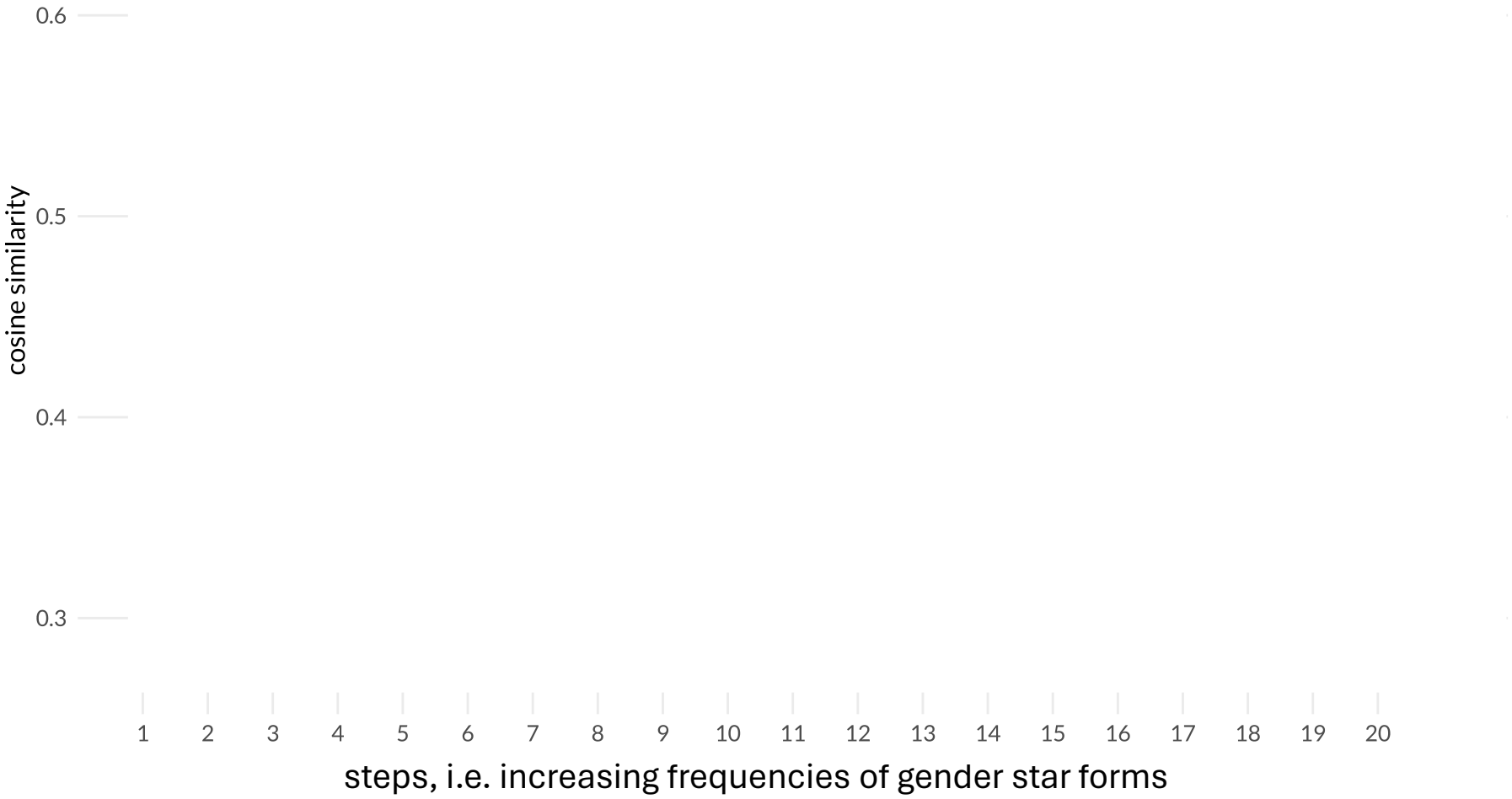
  - **lexicon-level UNCERTAINTY**

    how uncertain is the model in comprehending a word taking into account the whole lexicon

Results: comprehended vectors



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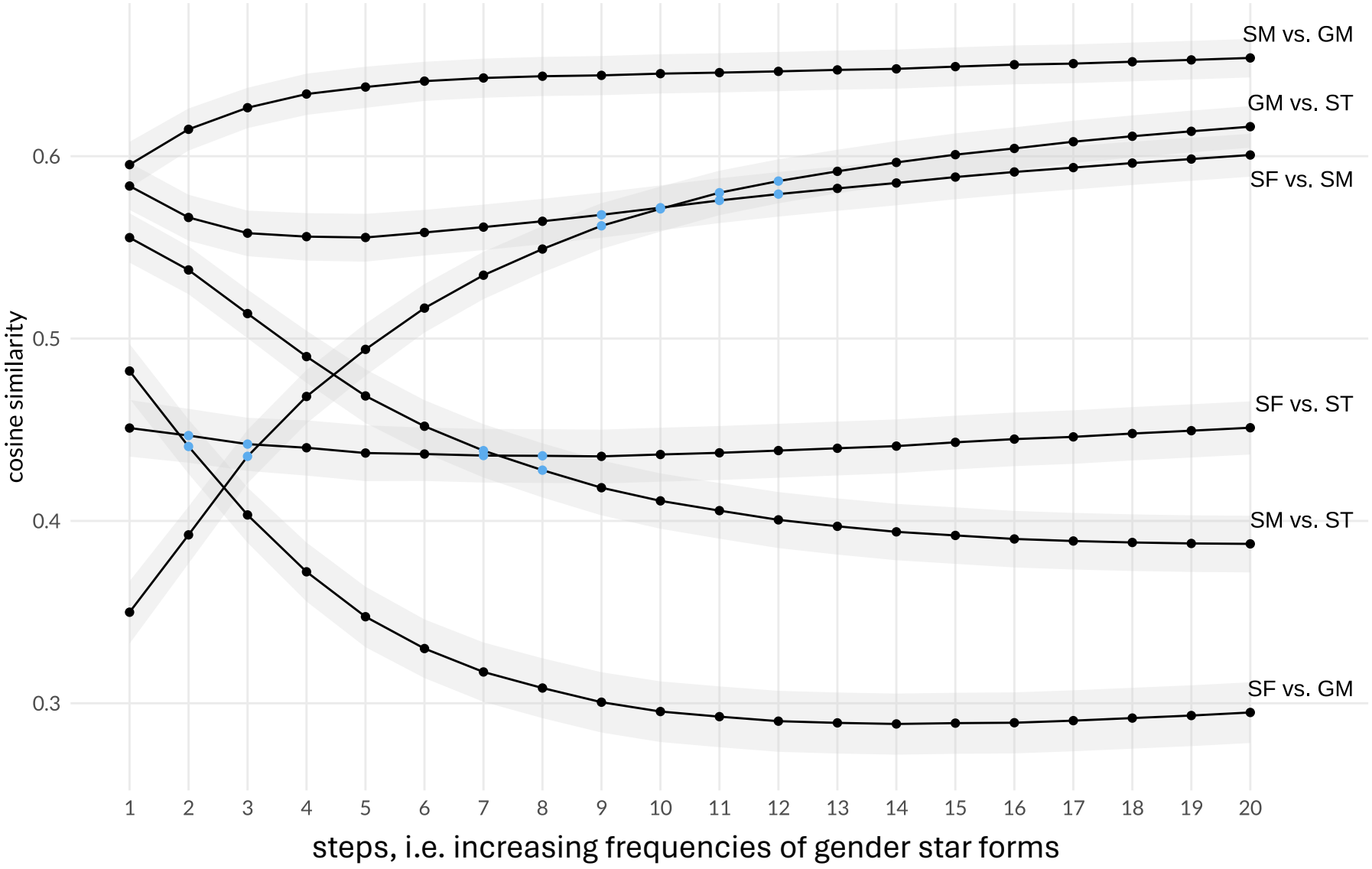

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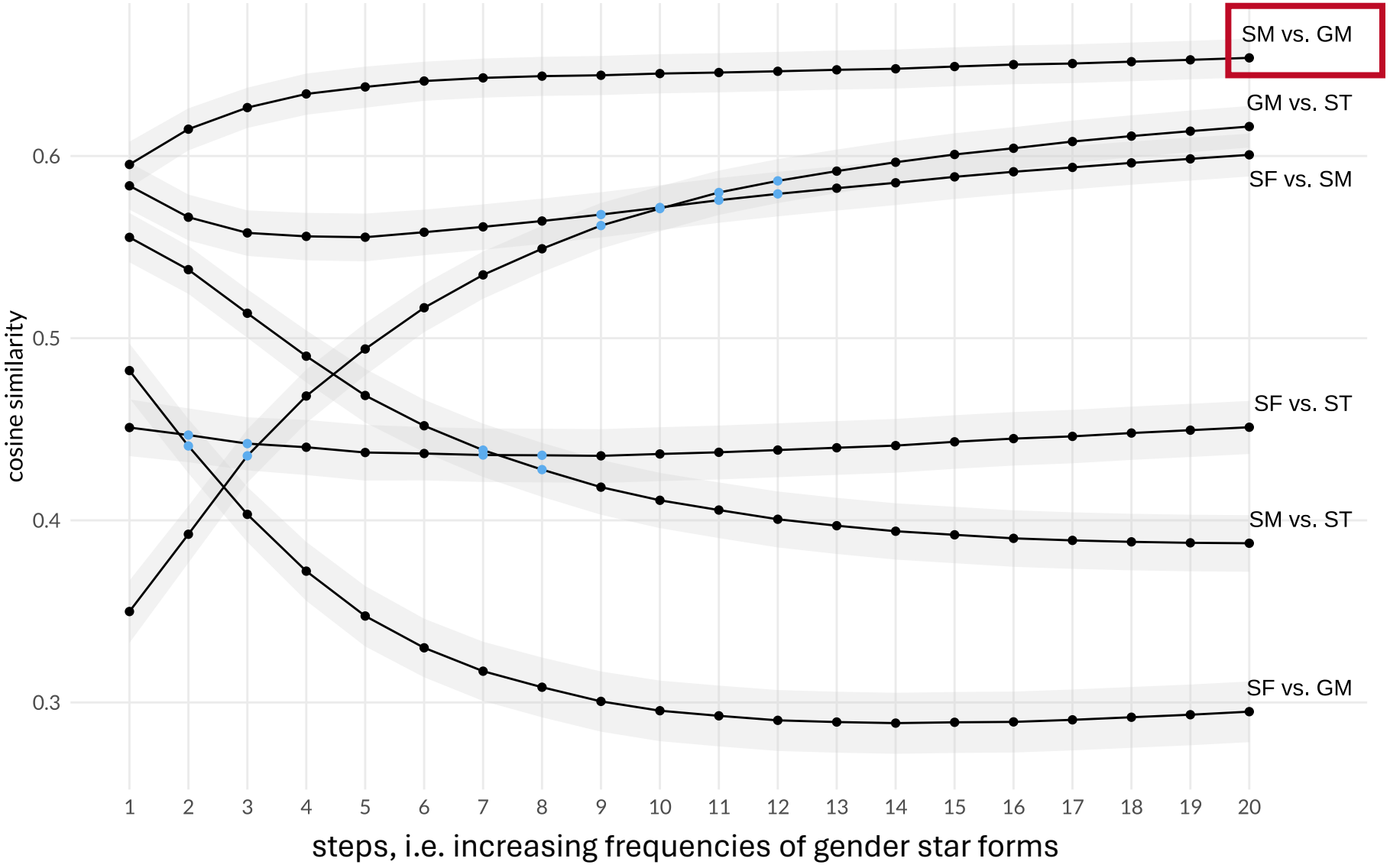

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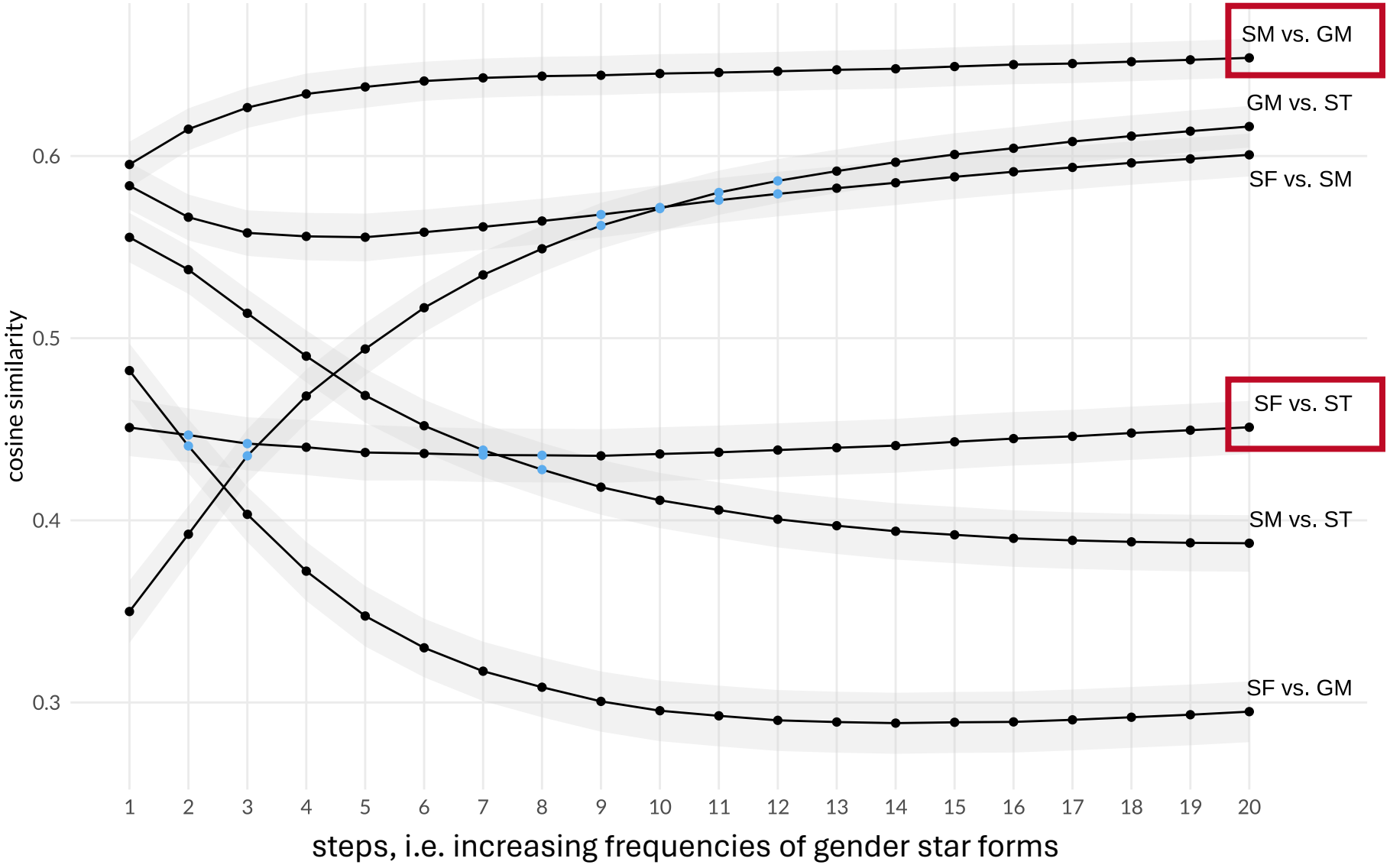

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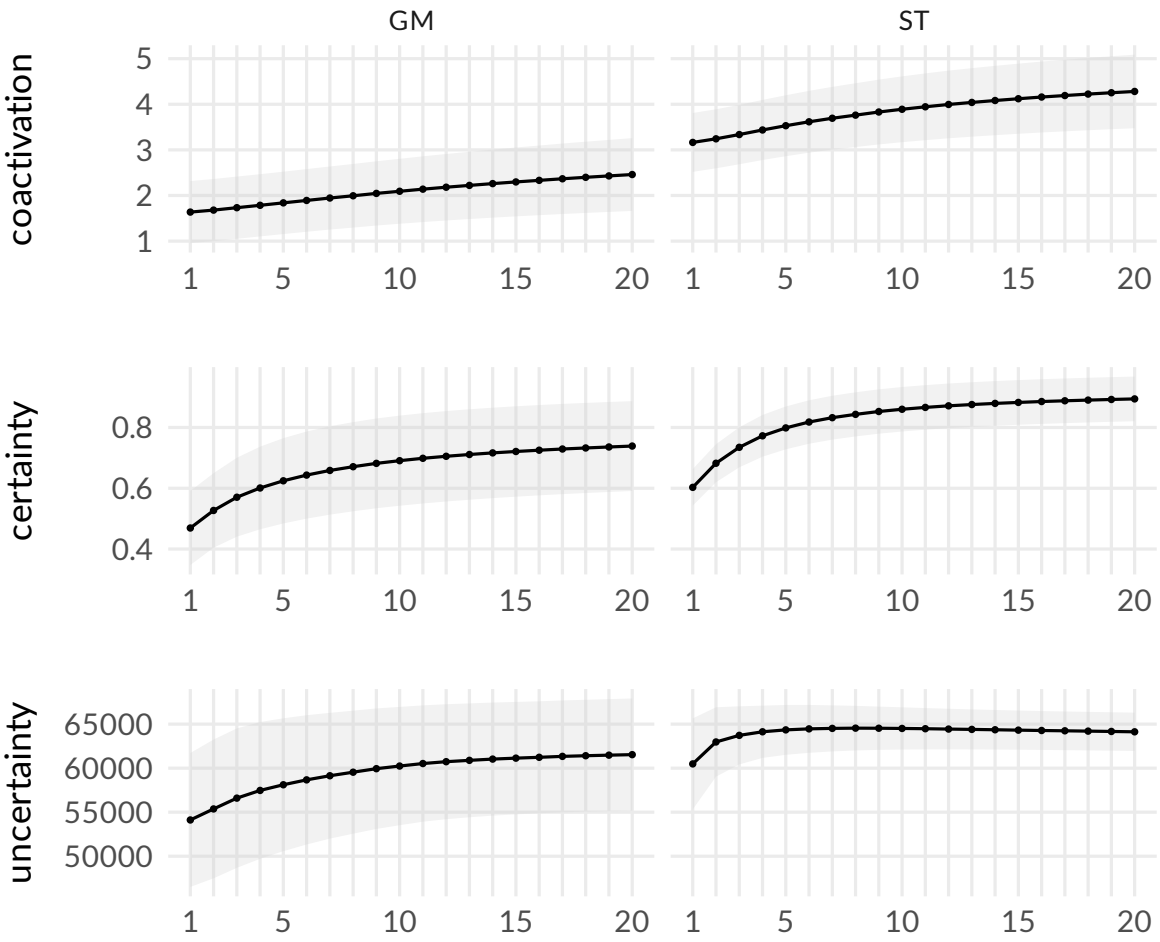

gender star forms co-activate semantics more strongly

more frequent gender star forms increase values for both forms; one more “point of comparison”

more frequent gender star forms increase values for both forms; GM becomes even less neutral, ST is strongly connected to many semantic dimensions

Step 4

Re-analysing previous findings with LDL comprehension measures

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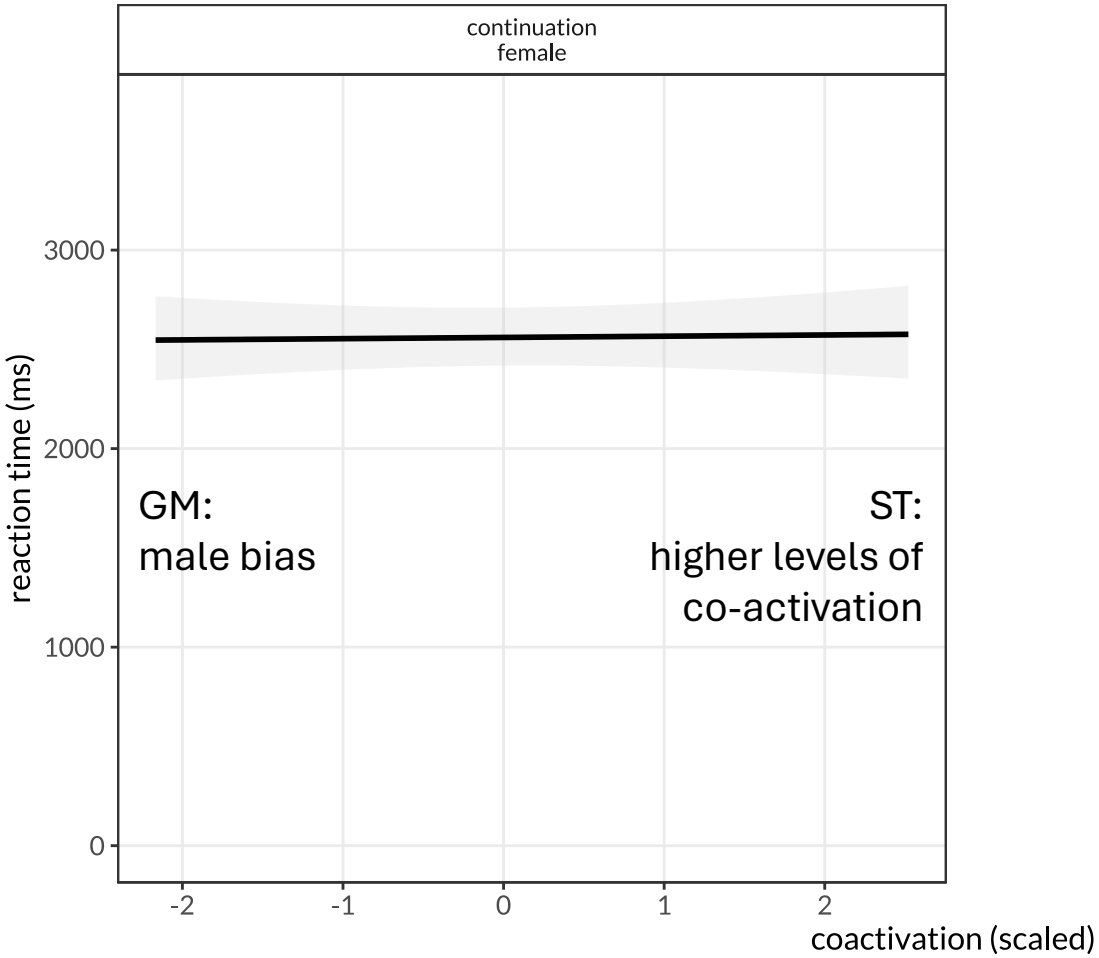
- **Result**
  - generic masculines: lower RTs for male continuations
  - gender star forms: lower RTs for female continuations

Re-analysis


continuation
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3000
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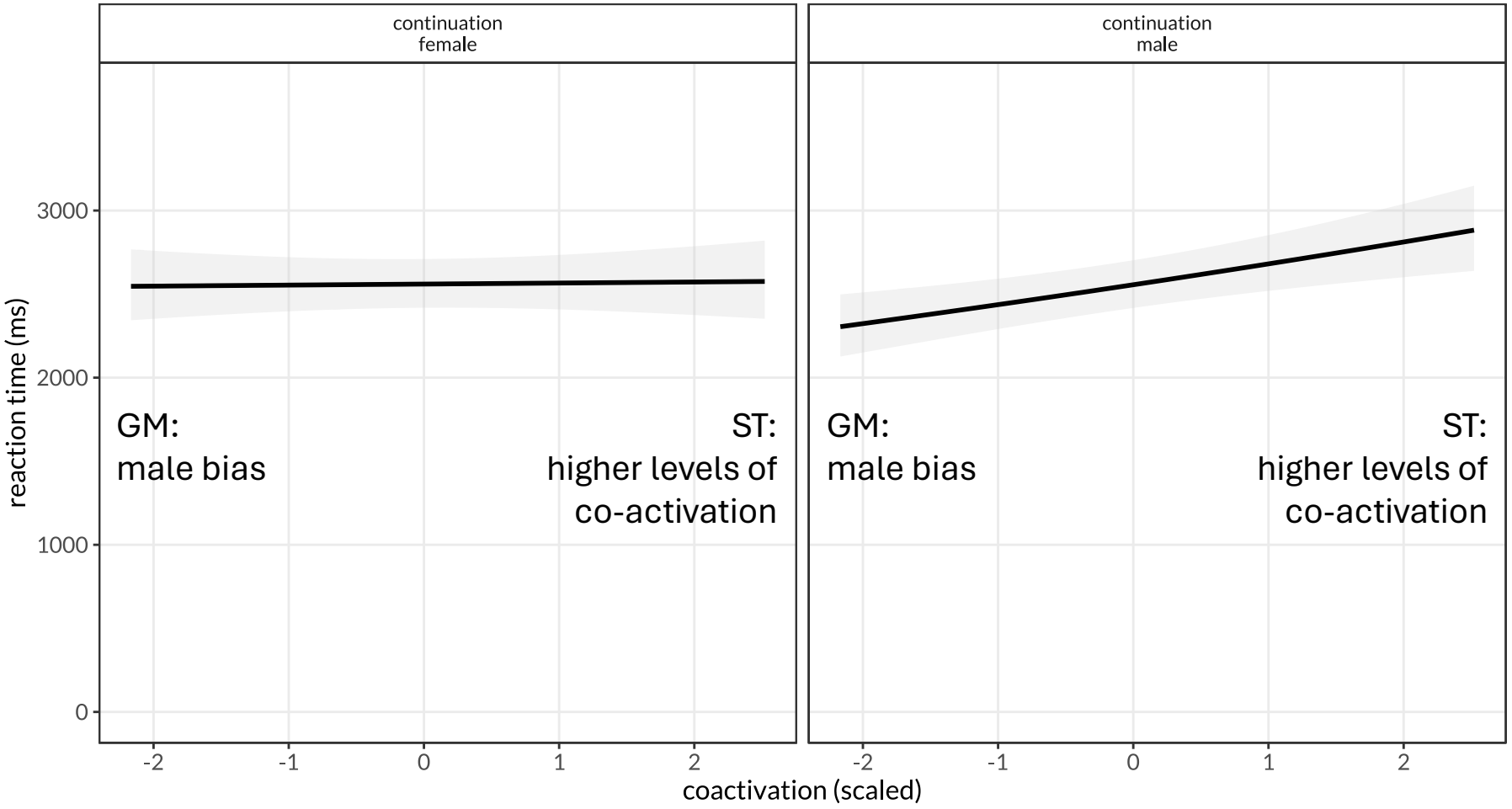
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- similar re-analyses of Kurz & Mulder (2023) and Schunack & Binanzer (2022) also showed that LDL measures account for differences between generic masculines and gender star forms

What should we take away from today’s results?

Summary and discussion

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- generic masculines and gender star forms are different in terms of their semantic features
- these features account for differences in language behaviour found in previous studies on the gender star form
- computational methods are a valuable addition to the study of gender and language

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- without data to work with, computational approaches like today's cannot provide any relevant insight
- overall, more research on gender star forms and nonbinary linguistic representation is called for

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- first, the generic masculine is (still) biased towards male readings
- second, the gender star form appears to be more gender-inclusive
- third, the gender star form appears to be more complicated to comprehend, at least in some sense
- fourth, whether we include genders beyond the binary on a linguistic level by using gender star forms is still unclear

manuscript incl. further analyses

Thank you!

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