

# A Rational Speech Act model of cross-linguistic differences in pronoun resolution preferences

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*under the supervision of*

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# Contents

- I Introduction
- II Corpus study
- III Rational Speech Act model
- IV Experimental data
- V Conclusion

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- II Corpus study
- III Rational Speech Act model
- IV Experimental data
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# Cross-linguistic differences in pronoun resolution preferences


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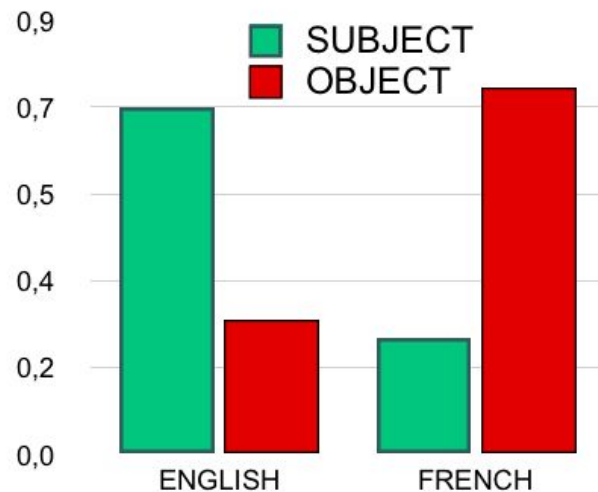
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- Superficially similar constructions can give rise to **different interpretation preferences across languages**
- **N1 (subject) preference in English** vs. **N2 (object) preference in French**

# Cross-linguistic differences in pronoun resolution preferences



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 Can explain the English data

 Fail to explain the French data 



# ... vs. alternative-based pragmatic reasoning

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Could have said

II

I

French listener

French speaker

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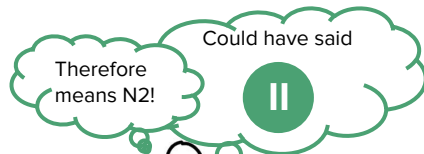
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## ... vs. alternative-based pragmatic reasoning

Can differences in the language-specific availability of an alternative construction account for the observed data?



# Hypotheses of the present work

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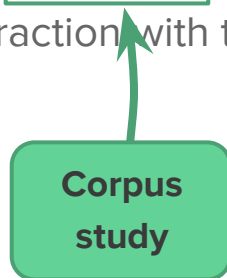
- **Pronoun resolution preferences** can be derived from **alternative-based pragmatic reasoning**

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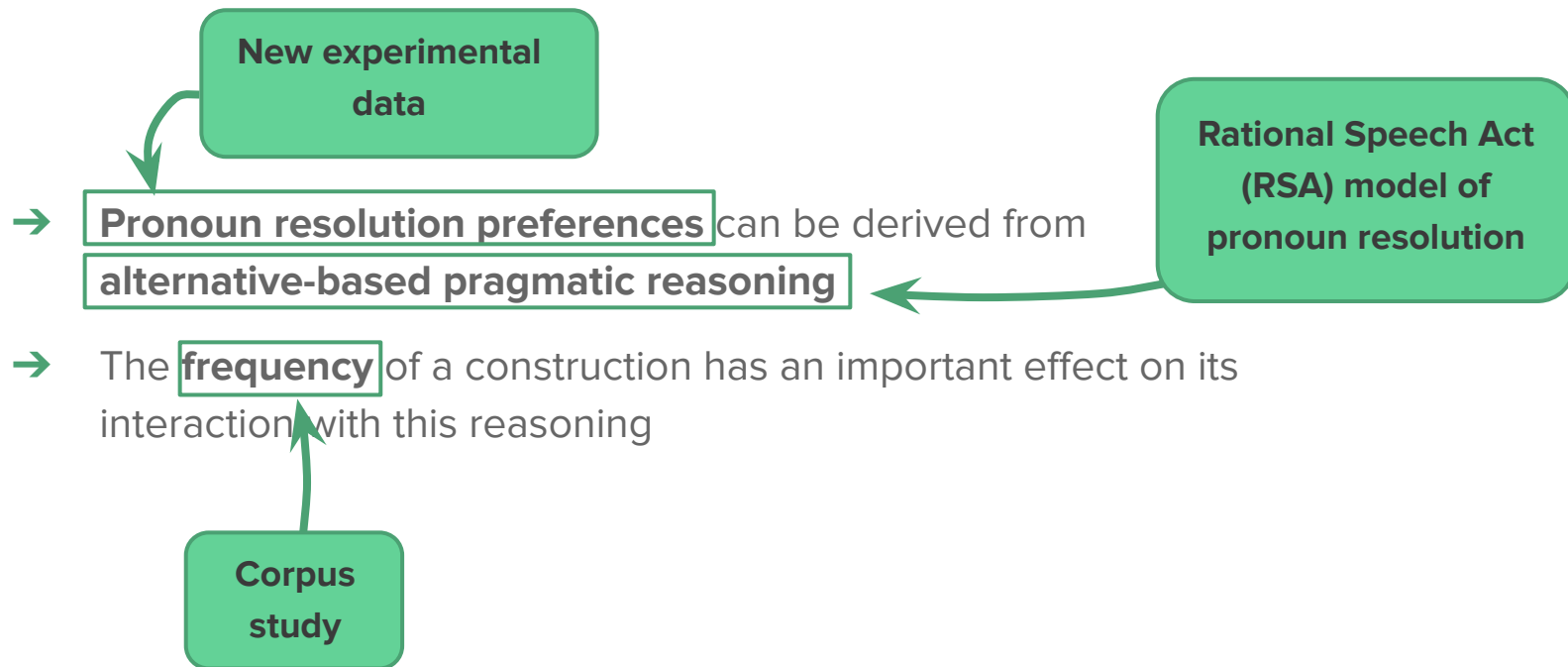
**Rational Speech Act  
(RSA) model of  
pronoun resolution**



**Corpus  
study**



# Hypotheses of the present work



# Contents

- I Introduction
- II Corpus study
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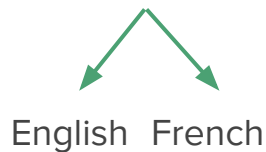
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Isolate different **language-specific**, **genre/modality-specific**, and **connector-specific** effects

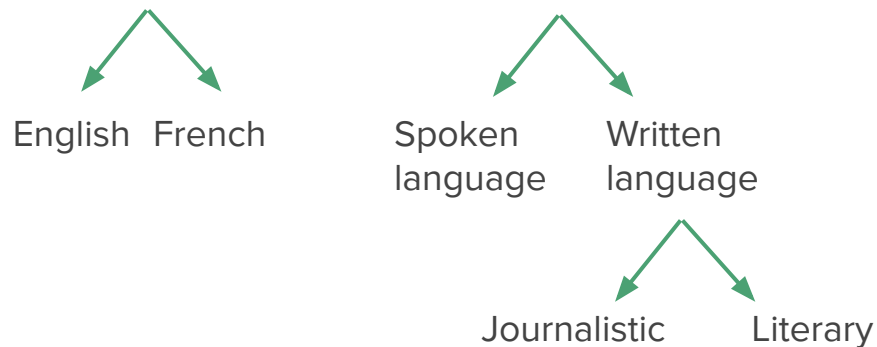
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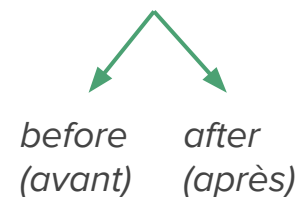
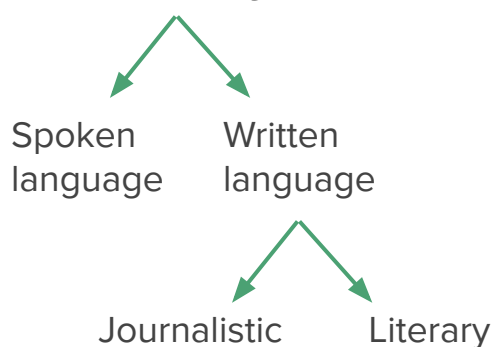
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# Corpora

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## English:

- Corpus of Contemporary American English (COCA)
  - Spoken section: 116 million words
  - Literary section: 111 million words
  - Newspaper section: 112 million words

## French:

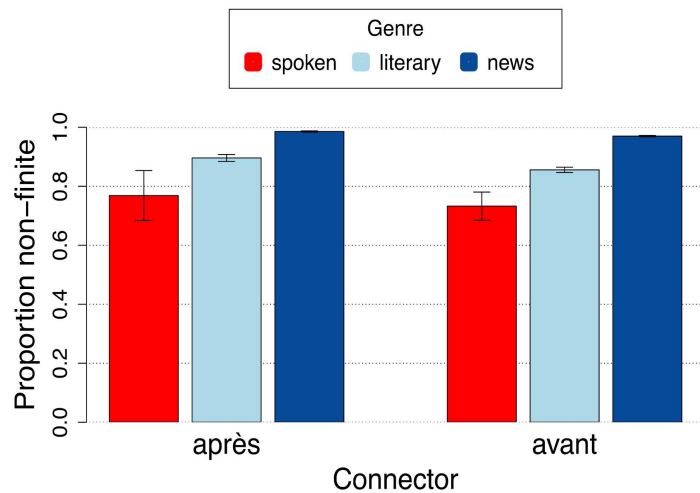
- ESLO (spoken): 2.5 million words
- Frantext (literary; limited to 1990+): 22 million words
- Est Républicain (newspaper): 149 million words

# Results



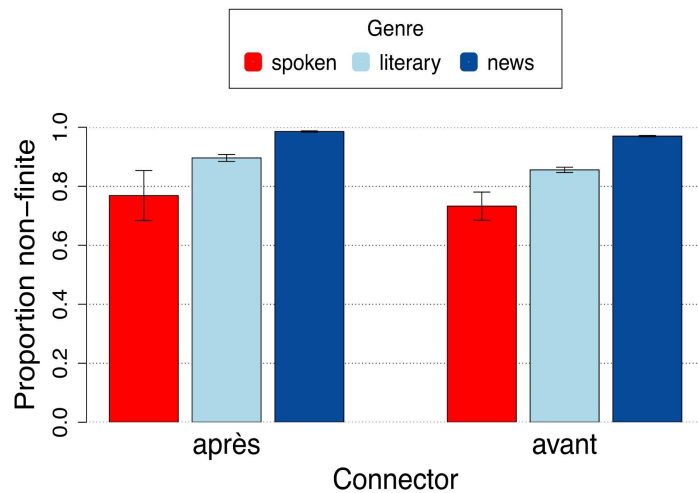
# Results

## French

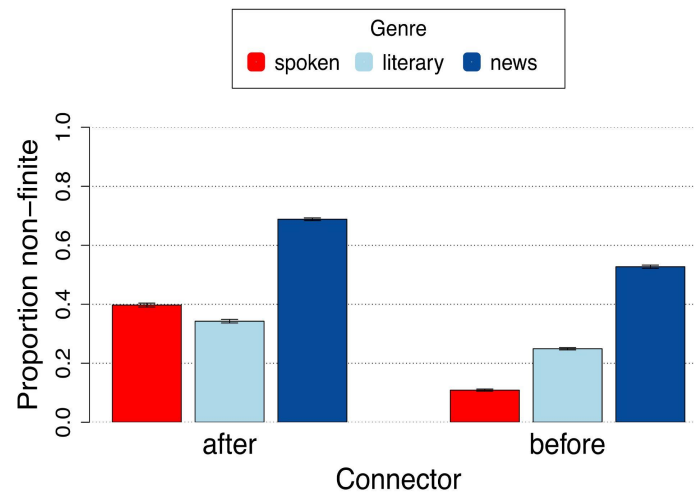


# Results

## French



## English

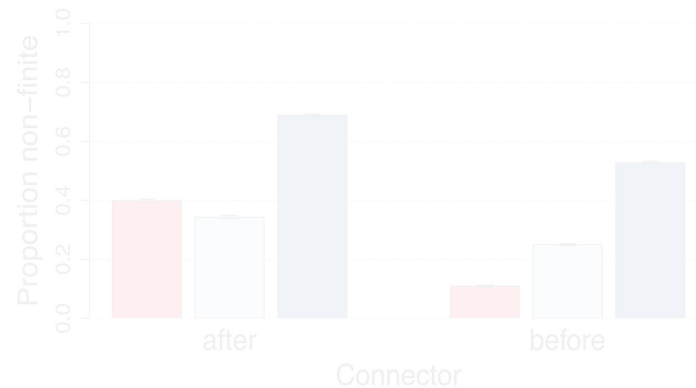
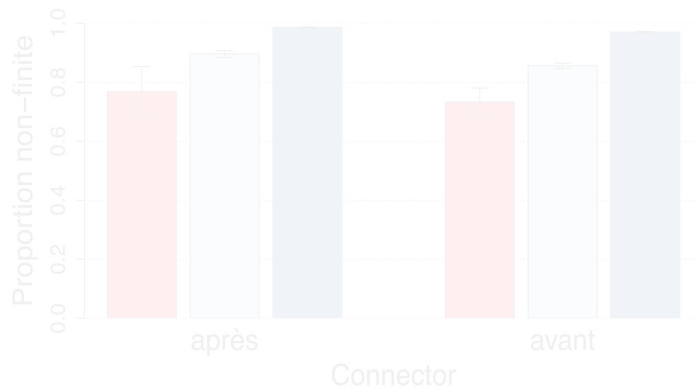


# Results

## French

## English

- Alternative construction much more frequent in French!



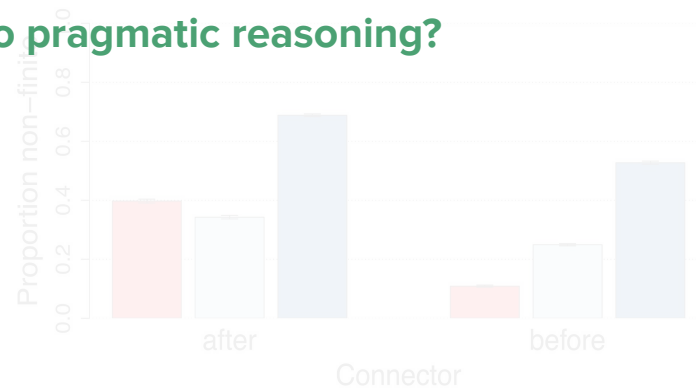
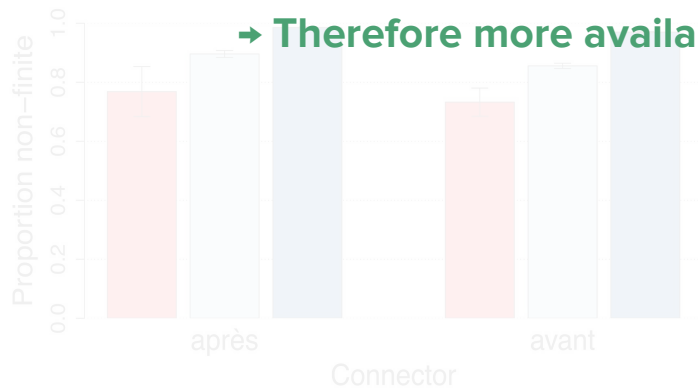
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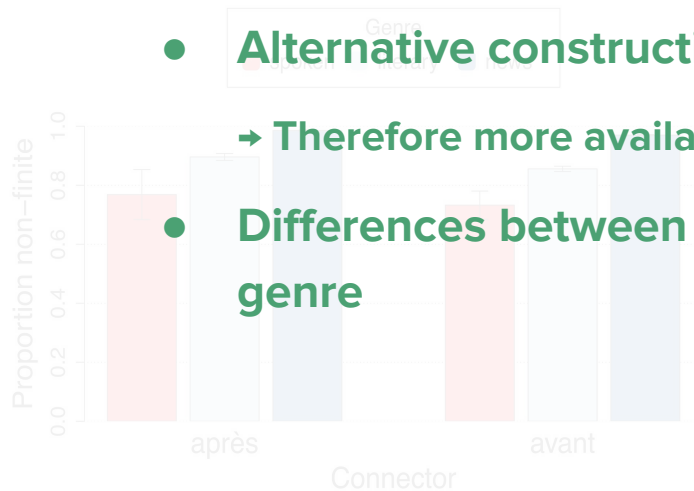
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→ Therefore more available to pragmatic reasoning?

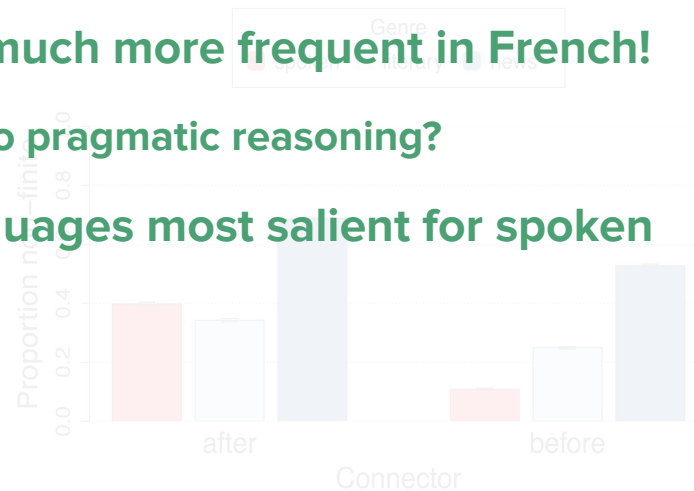


# Results

## French



## English



- **Alternative construction much more frequent in French!**
  - Therefore more available to pragmatic reasoning?
- **Differences between languages most salient for spoken genre**

# Results

## French

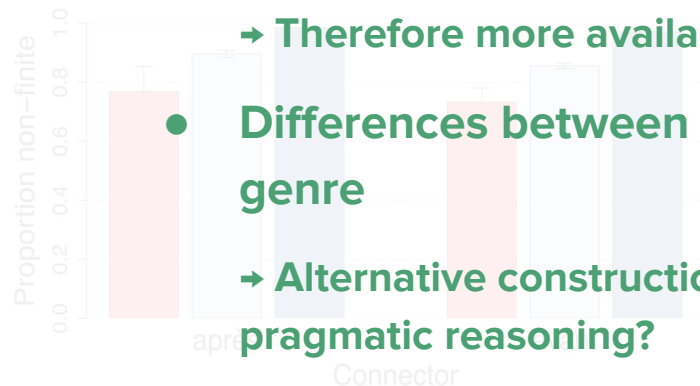
## English

- **Alternative construction much more frequent in French!**

→ Therefore more available to pragmatic reasoning?

- **Differences between languages most salient for spoken genre**

→ **Alternative construction not available to English speakers in pragmatic reasoning?**



# Contents

- I Introduction
- II Corpus study
- III Rational Speech Act model
- IV Experimental data
- V Conclusion

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- II Corpus study
- III **Rational Speech Act model**
- IV Experimental data
- V Conclusion



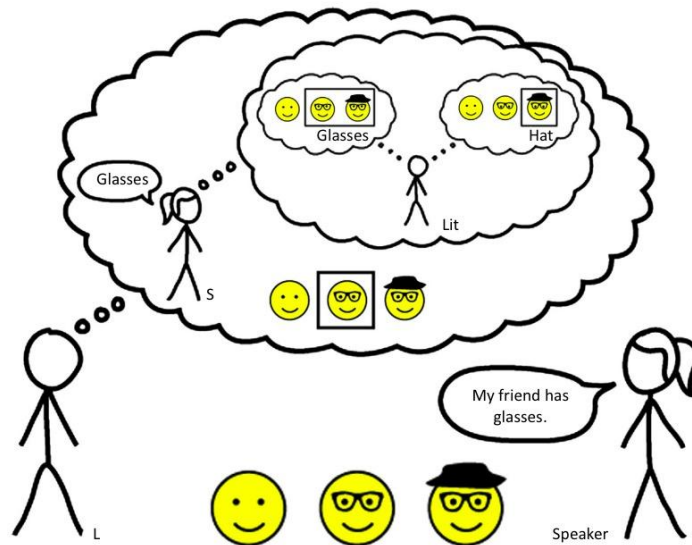
# The Rational Speech Act (RSA) framework

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A precise mathematical framework **formalizing key aspects of Gricean reasoning**

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→ High prior probability of next mention of subjects (see e.g. Arnold, 2001; Kehler & Rohde, 2019):

◆  $Pr(w1) = 0.8$

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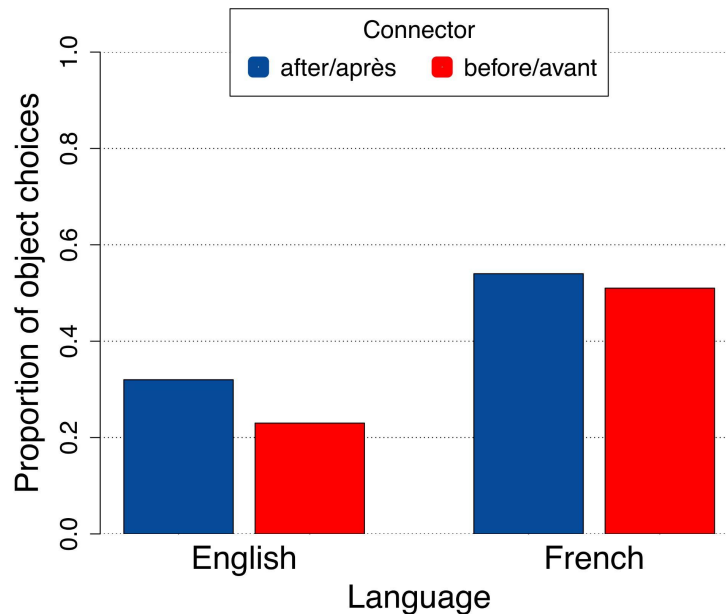
**Lower construction corpus frequencies**

**→ higher speaker utterance costs**



# Model predictions for pronoun resolution

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# Contents

- I Introduction
- II Corpus study
- III Rational Speech Act model
- IV Experimental data
- V Conclusion

# Contents

- I Introduction
- II Corpus study
- III Rational Speech Act model
- IV Experimental data**
- V Conclusion

# New experimental data

# New experimental data

## → Cloze task:

- ◆ The policeman called the postman [ before/after ] he tied his shoelaces.
- ◆ \_\_\_\_\_ tied his shoelaces.

## → **Stimuli:** 16 experimental items, counterbalanced for order effects; 40 fillers

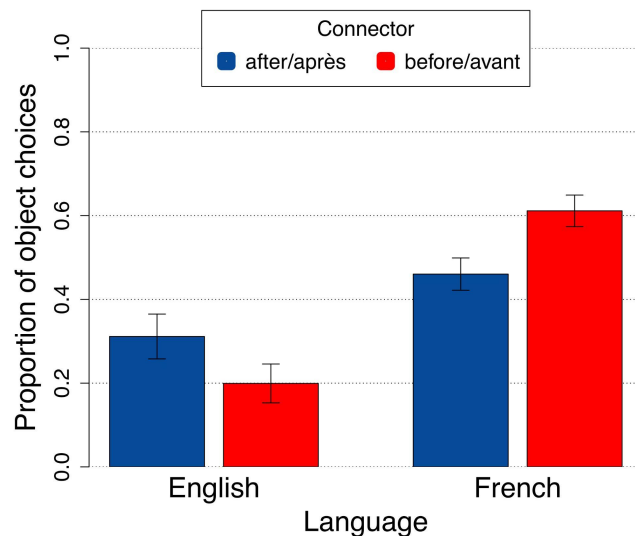
## → **Participants:**

- ◆ **English experiment:** 37 participants, mean age 36, recruited through Amazon Mechanical Turk
- ◆ **French experiment:** 83 participants, mean age 37, recruited through the RISC website

# Results

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## Experimental data



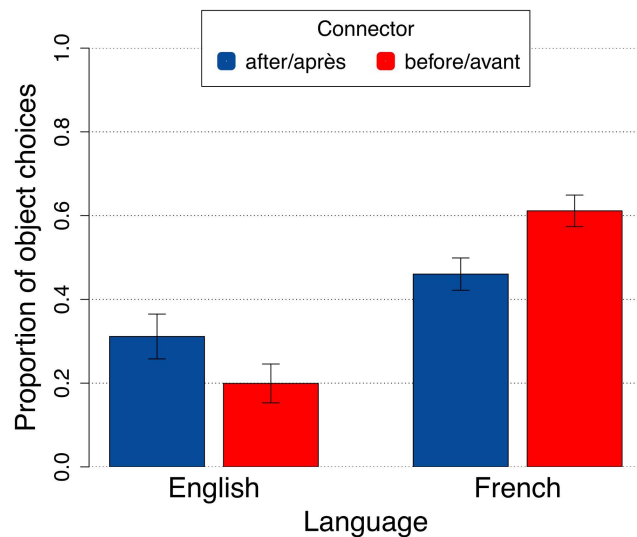
A logistic mixed-effects model shows significant effects of

- **Language**
- **Interaction between language and connector** on antecedent choice (subject vs. object) ( $p < 0.001$ )

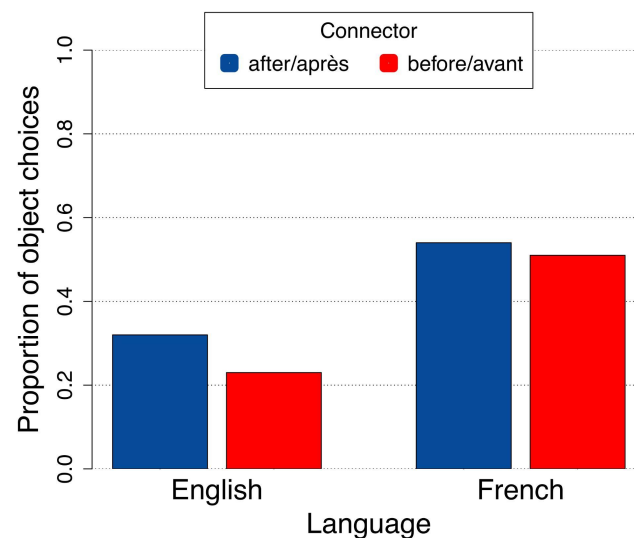


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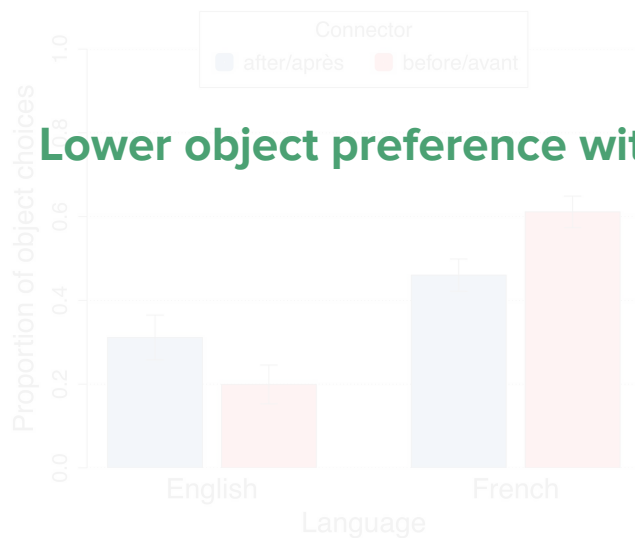


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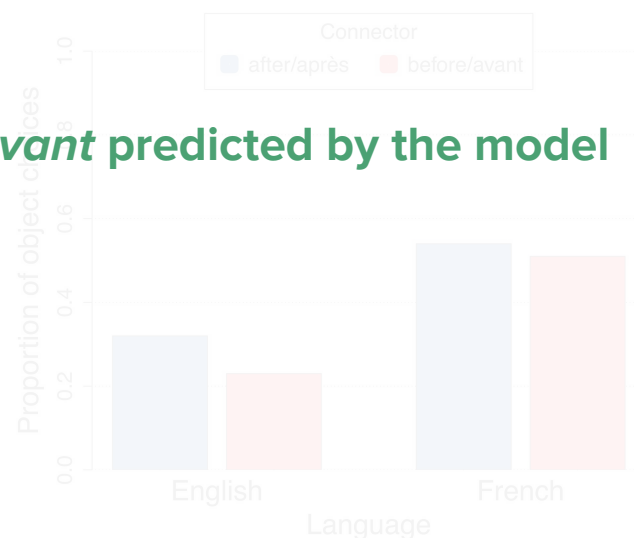


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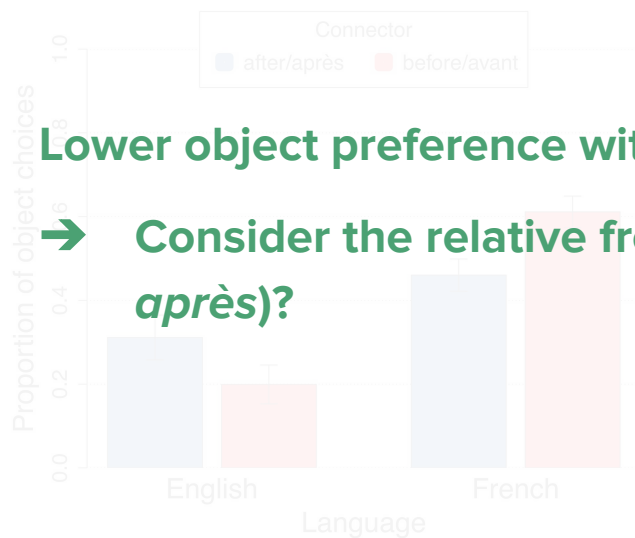
## Model predictions



Lower object preference with French *avant* predicted by the model

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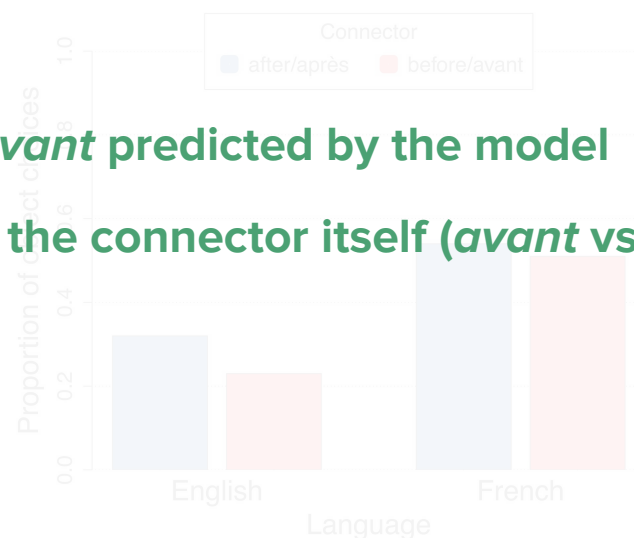
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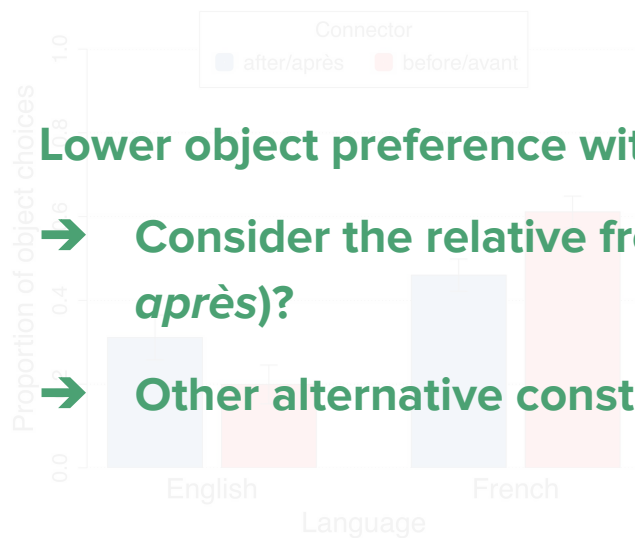
→ **Consider the relative frequency of the connector itself (*avant* vs. *après*)?**

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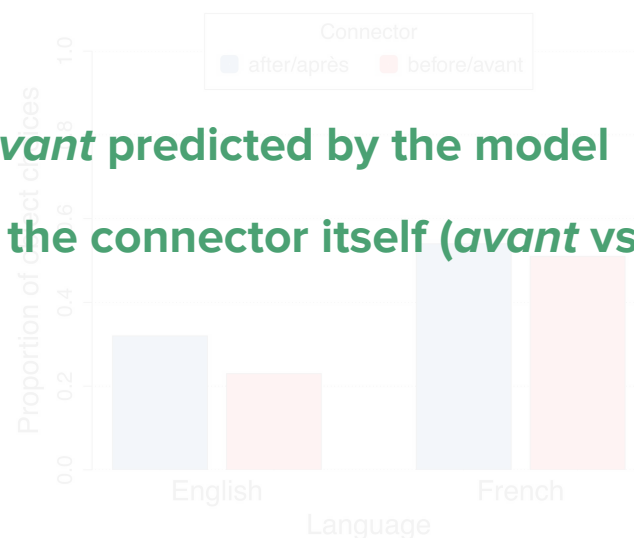


**Lower object preference with French *avant* predicted by the model**

→ **Consider the relative frequency of the connector itself (*avant* vs. *après*)?**

→ **Other alternative constructions?**

## Model predictions



# Contents

- I Introduction
- II Corpus study
- III Rational Speech Act model
- IV Experimental data
- V Conclusion

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- II Corpus study
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→ **Cross-linguistic differences** in pronoun resolution preferences: English vs. French



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- Comparison of **model predictions** vs **experimental data**: close match for English, deviations for French

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- Integrate **proportional construction frequencies** derived from corpus data into an **RSA model of pronoun resolution** as speaker **utterance costs**
- Comparison of **model predictions** vs **experimental data**: close match for English, deviations for French
- Frameworks like RSA allow to **test high-level theoretical predictions** and pinpoint key data for further investigation

**Thank you**

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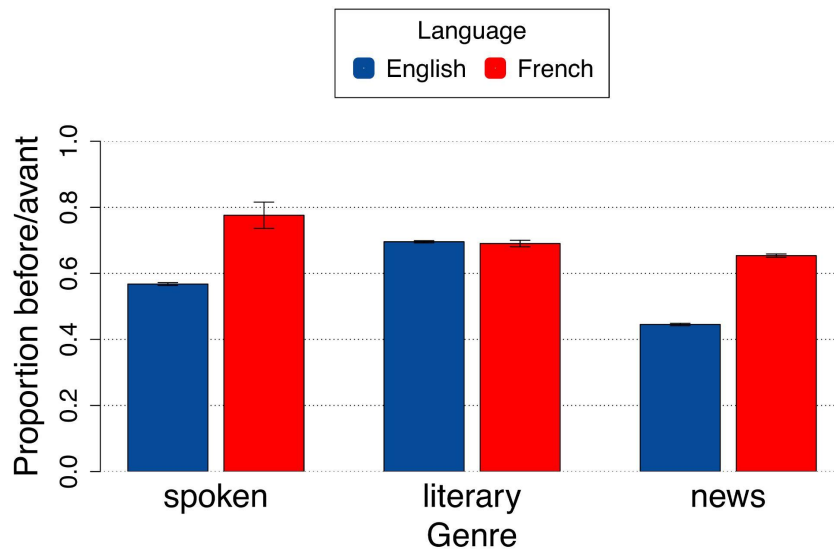
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# Acknowledgements

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# Results: frequency of *before* vs. *after*



# RSA model of cross-linguistic pronoun resolution

- Implementation using **WebPPL** (Goodman & Stuhlmüller, 2015):  
[https://github.com/miriamschulz/RSA\\_pronoun\\_resolution](https://github.com/miriamschulz/RSA_pronoun_resolution)
- **Bayesian parameter estimation** with Markov-chain Monte Carlo sampling for the rationality parameter *alpha* (based on Appendix IV in Scontras, Tessler & Franke, 2017)