Statistical information encoded in English writing

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English writing

/-əs/

FAMOUS, SOLACE, ATLAS, CYPRESS,

BONUS, TORTOISE, RHINOCEROS

Sound-to-spelling mappings are very inconsistent

Challenge for children and L2 learners

Is this inconsistency functional?

Outline of this talk

Systematicity between spelling and grammatical class

Study 1: Large-scale linguistic analysis

Q: How common is this regularity in English writing?

Study 2: Explicit judgement

Study 3: Eye-tracking

Study 4: Spelling

Q: Are people sensitive to these regularities?

Regularity between spelling and grammatical class

-/əs/

		OUS spelling	Other spelling
Number of words (and example)	adjectives	346 *Marvellous*	6 *Citrus*
	NOT adjectives	0 --	314 *Cactus*

Berg & Aronoff (2017)

-OUS, -IC, -AL, -Y

Study 1: Large-scale linguistic analysis

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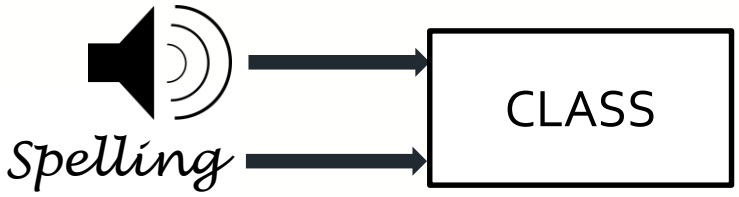
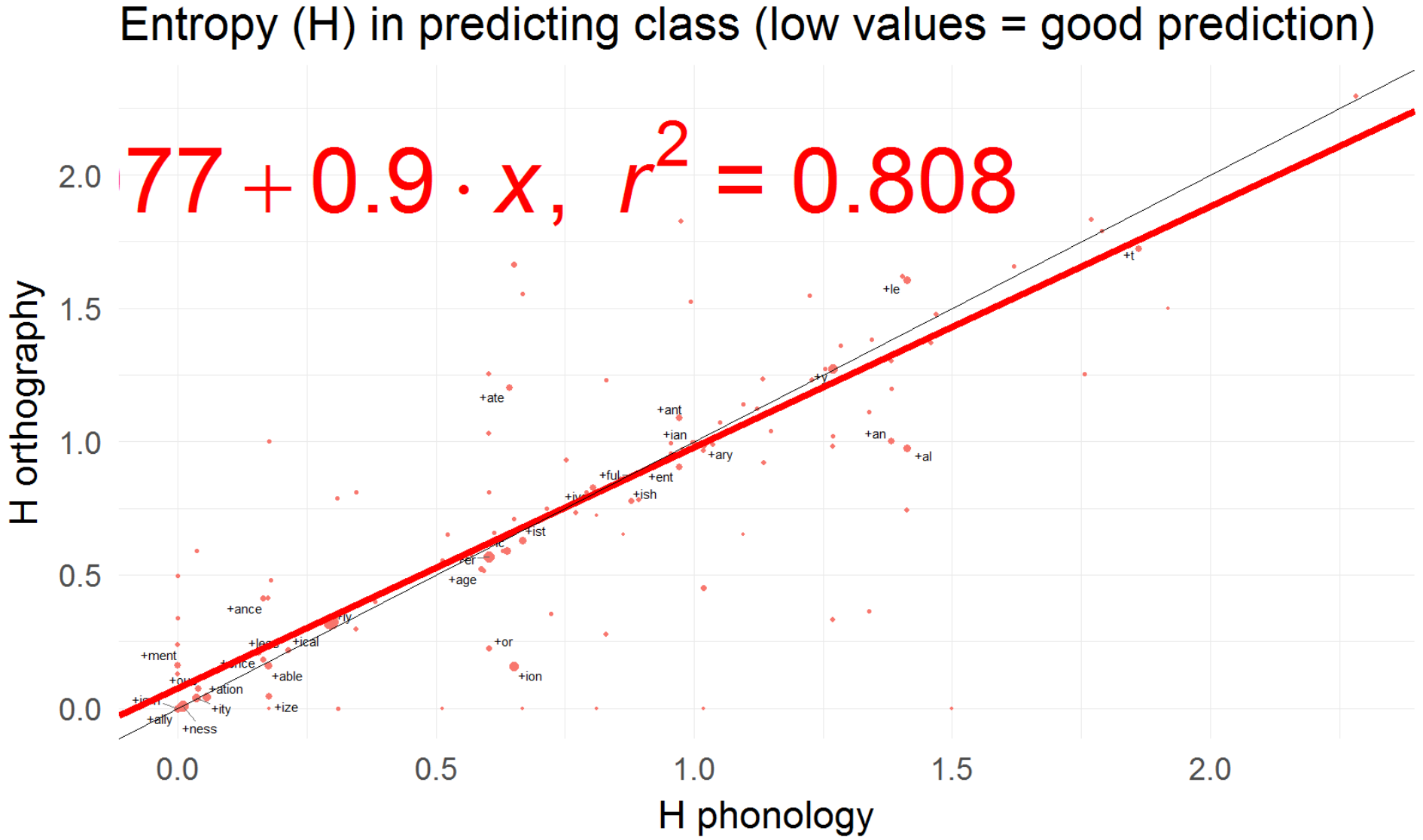
- Question: Is systematicity between spelling and class true of English derivation in general?
- Idea: Spelling disambiguates grammatical class
  - For all 159 suffixes
  - Is there a dependency between spelling and class?
  - Is this dependency stronger than that between phonology and class?
    - Entropy (H), a measure of prediction precision





Orthography predicts class better than phonology does

Study 1: Large-scale linguistic analysis

Example: sound /i/

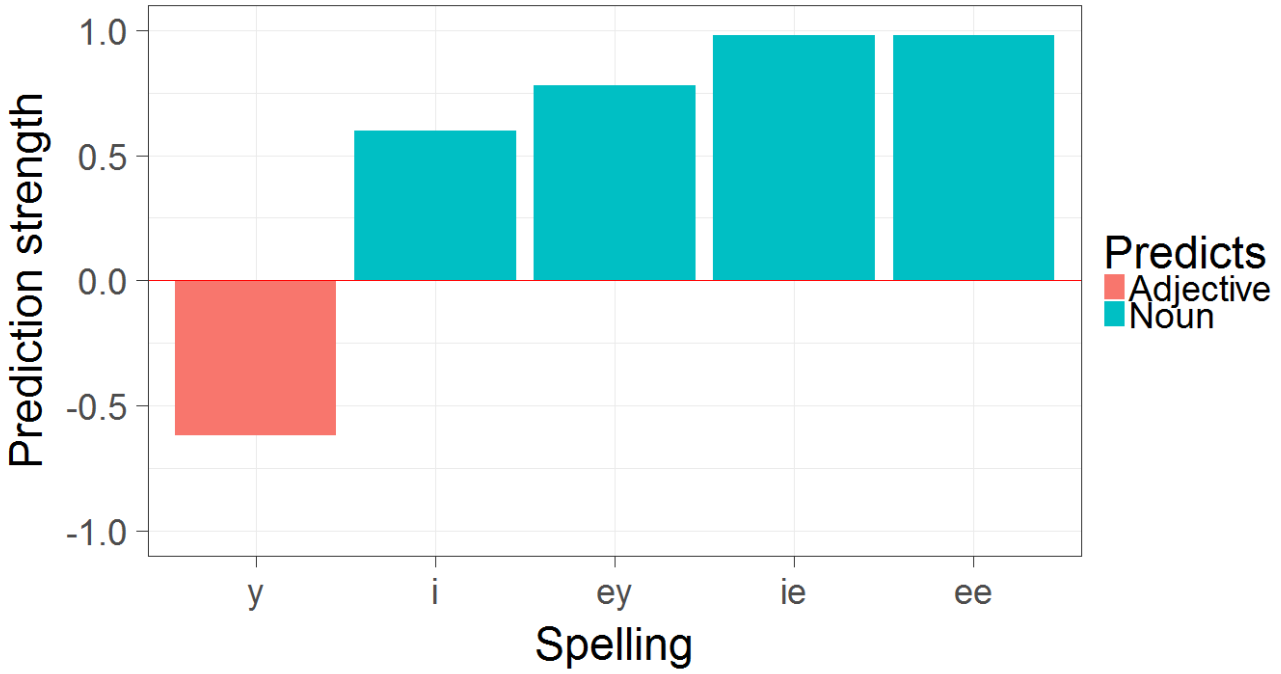
Most common spelling is "Y" e.g. BUSY

<ie>: calorie

<ee>: employee

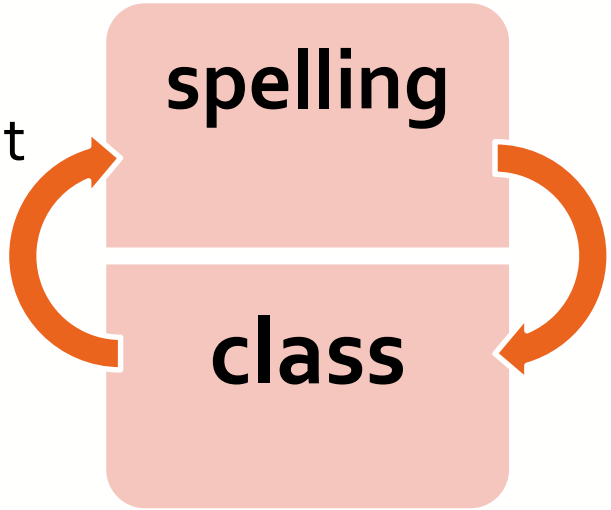
<i>: Israeli

<ey>: alley



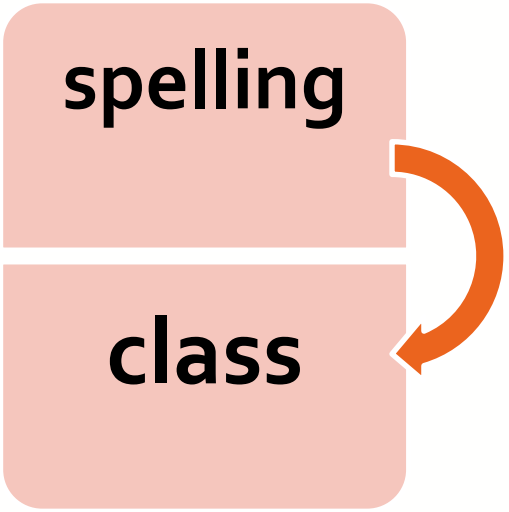
Interim summary

- Study 1: Linguistic analysis
  - Conclusions:
    - Spelling provides additional information about grammatical class
    - This is true of English derivation in general
- Q: Are people sensitive to regularities between spelling and class?
  - Experimental study 2: Explicit judgement
  - Experimental study 3: Eye-tracking
  - Experimental study 4: Spelling



Study 2: Explicit judgement

- Question: Are people sensitive to regularities between spelling and class?



- Idea:
  - We manipulate spellings of nonwords
  - Does this manipulation influence people's decisions about which grammatical class these nonwords may belong to?

Study 2: Explicit judgement – Design

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- 10 Noun and 10 Adjective suffixes that strongly predict class
- Joined them with CVC non-existing stems

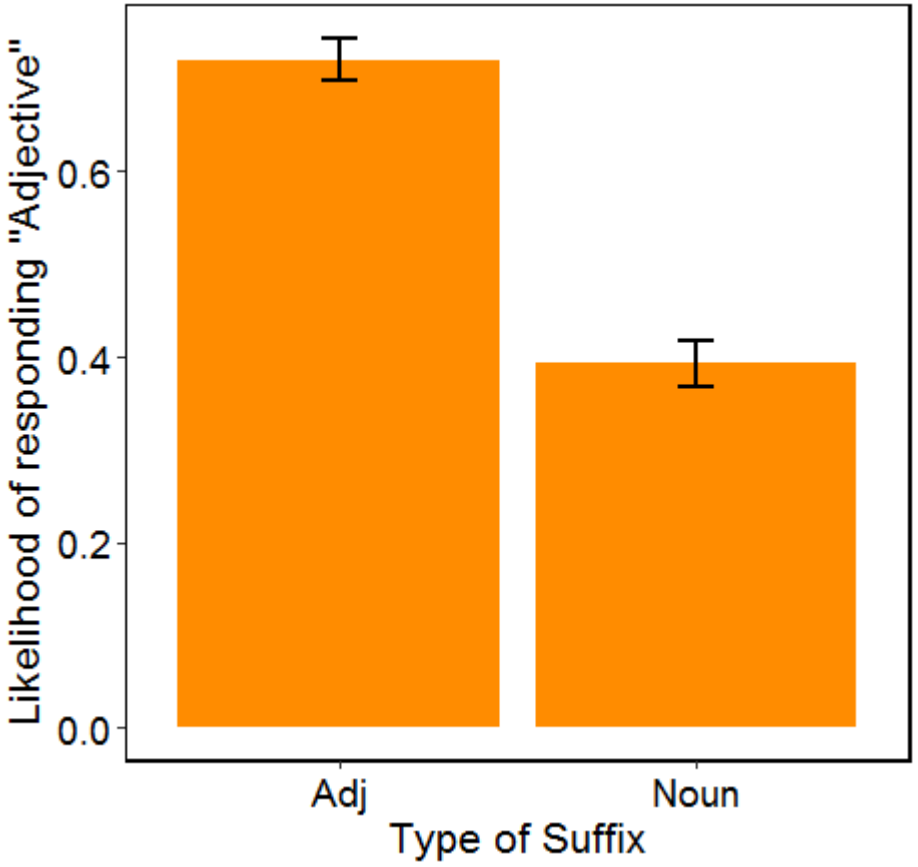
JIXLET

Does this look like a noun or an adjective?

- We explained to people what nouns are and what adjectives are
- 46 participants

Study 2: Explicit judgement – Results

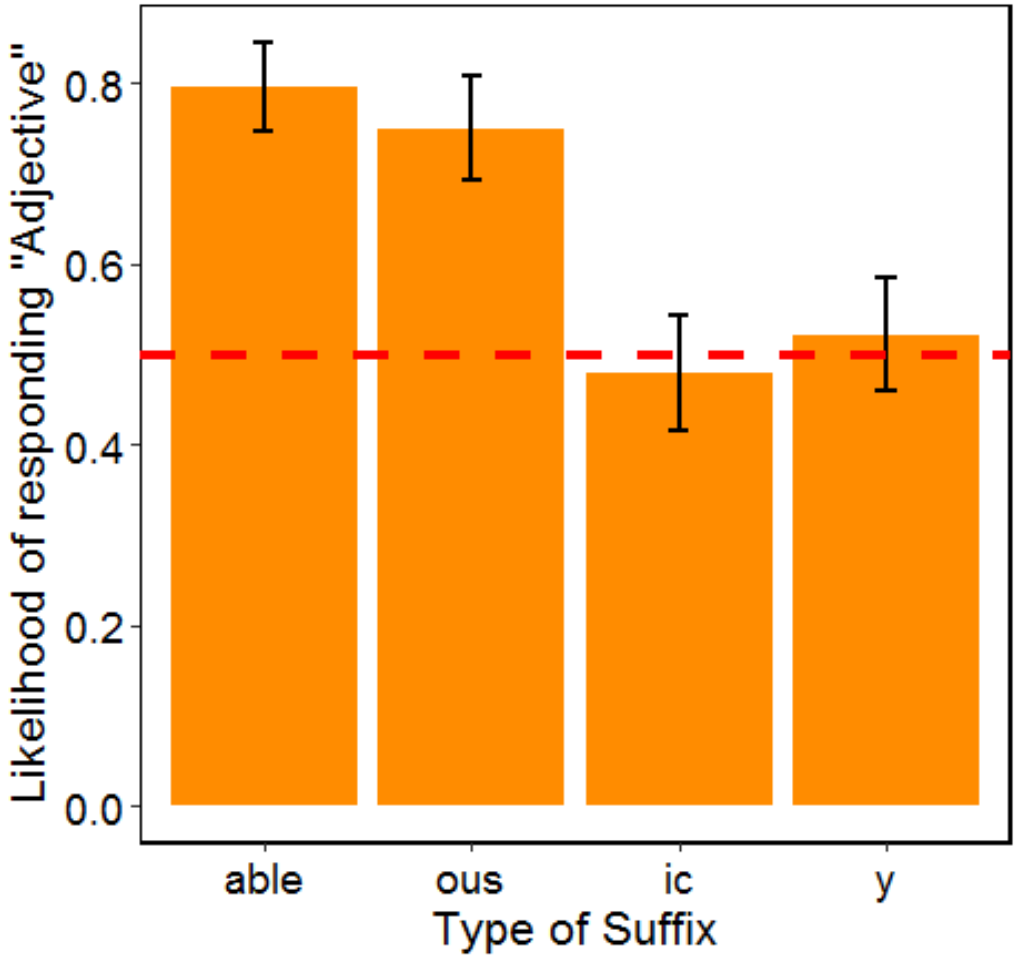
People have explicit awareness of systematicities between spelling and class



$z = -4.18$, $p < 0.0001$

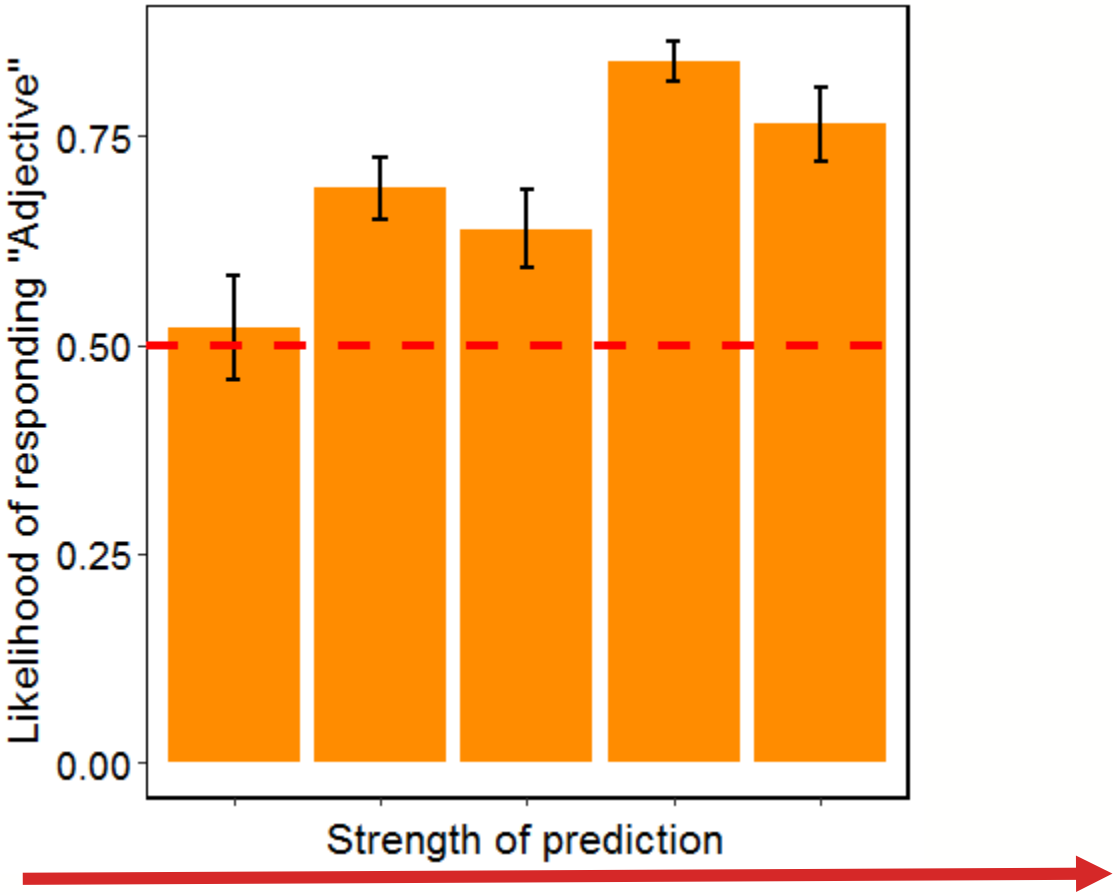
Study 2: Explicit judgement – Results

Why are there differences across suffixes?



Study 2: Explicit judgement – Results

People's awareness of class-spelling relationships is better for suffixes that effectively disambiguate class



$z = 11.963$, $p < 0.0001$

Interim Summary

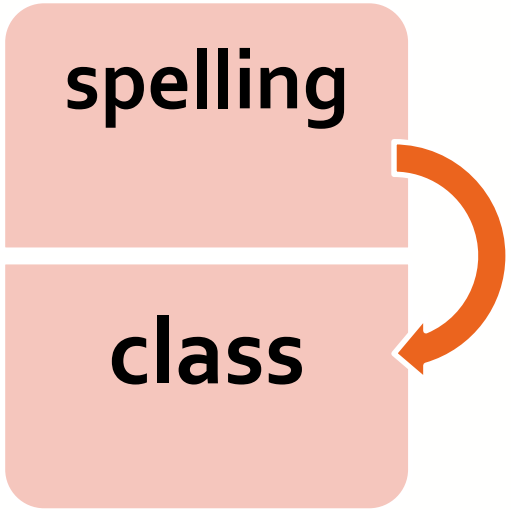
- Study 1: Computational linguistic analysis

  Systematicity between suffix spelling and class is ubiquitous

- Study 2: Explicit judgement

  People access grammatical class information from spelling

- Study 3: Eye-tracking study
- Study 4: Spelling



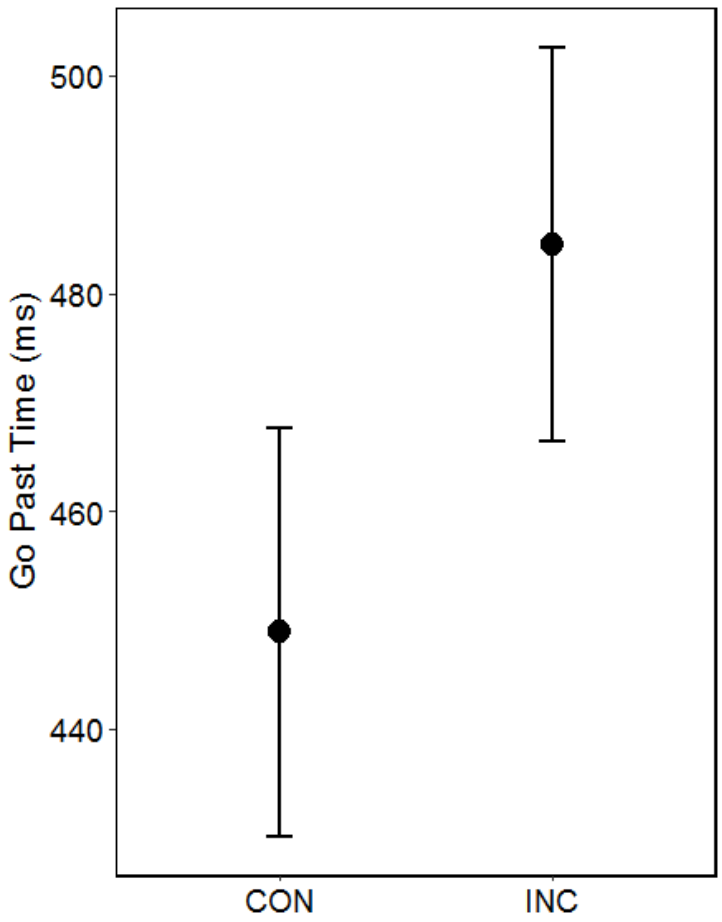
Study 3: Eye-tracking – Design

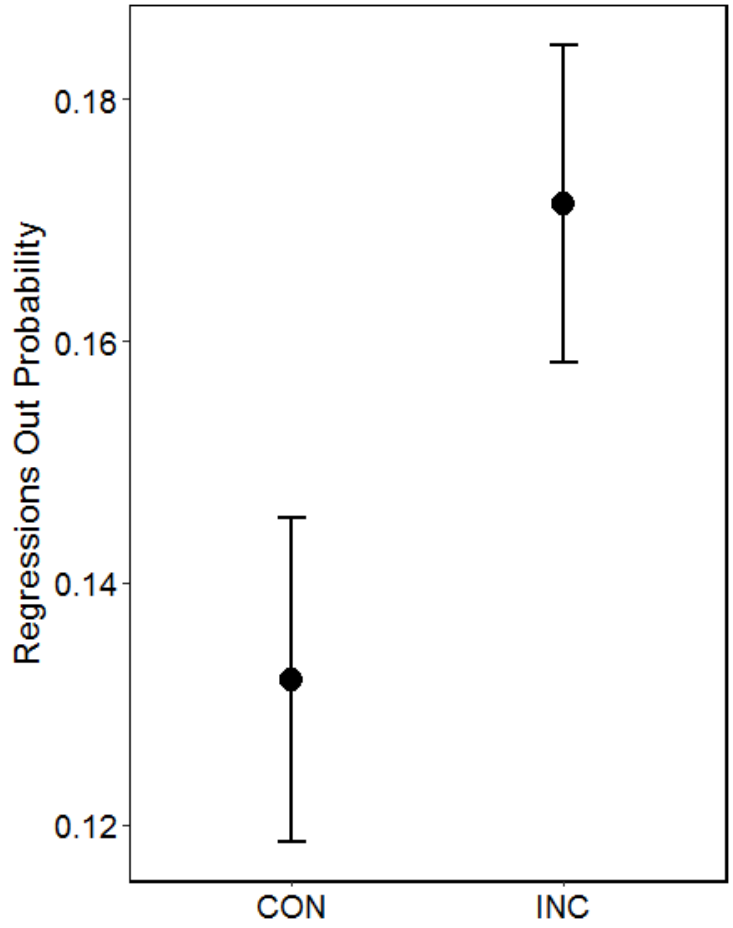
- Nonwords as in Class Judgement experiment
- 40 noun, 40 adjective, 40 verb contexts
- 47 participants

Context	Sentence (beg.)	Target	Sentence (end.)
CON	The presentation recognised the impressive	**tobness**	of the protestors.
INC	The mourners began to sadly	**tobness**	as the coffin disappeared.

Regressions

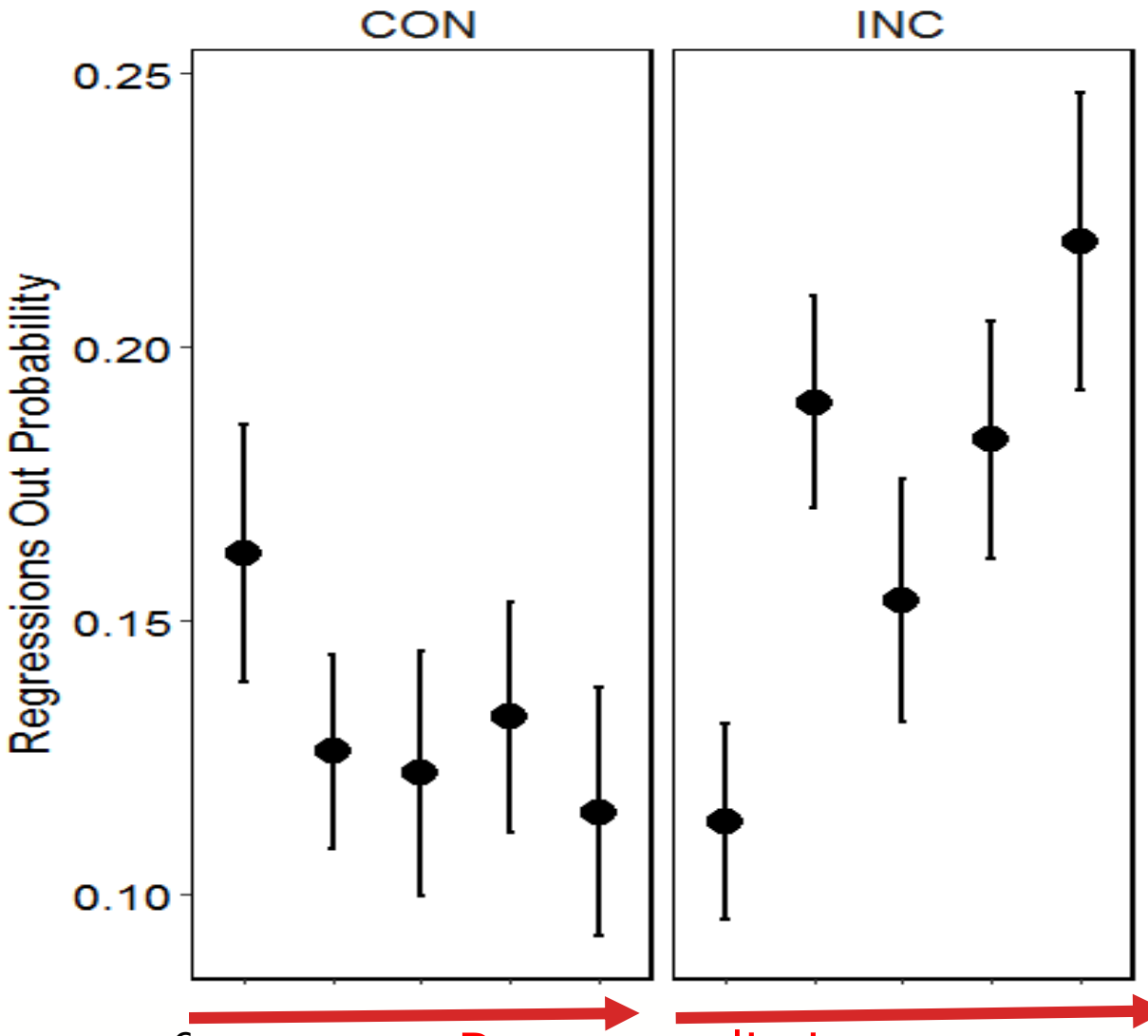
Study 3: Eye-tracking – Results





Incongruency with context causes integration difficulties

Greater integration difficulty for suffixes that strongly predict class



B = -0.19, z = -2.56, p < 0.05

B = 0.35, z = 2.3, p < 0.05

Interim Summary

- Study 1: Computational linguistic analysis

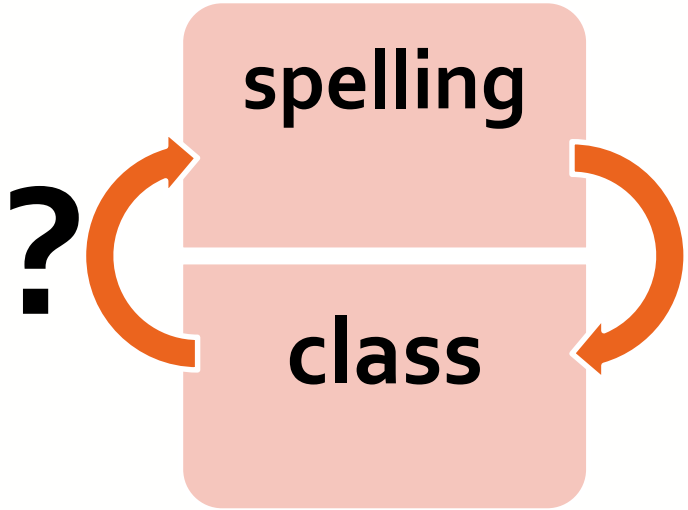
  Systematicity between suffix spelling and class is ubiquitous

- Study 2: Explicit judgement

  People access grammatical class information from spelling

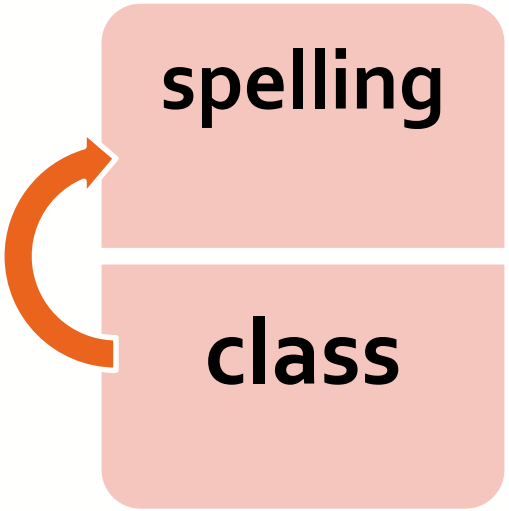
- Study 3: Eye-tracking study

- Study 4: Spelling study



Study 3: Spelling study

- Q: Are people sensitive to regularities between spelling and class?



- Idea:
  - Nonwords are placed into different sentence frames
  - Does context influence people's spellings?

Study 3: Spelling study – Design

- 11 phonological endings that can be spelled differently
- Joined them with CVC non-existing stems
- 66 nonword recordings
- Biasing sentence contexts

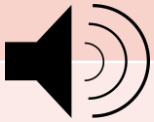
[sedʒnɪs]

Can you spell this?

Study 3: Spelling study – Design

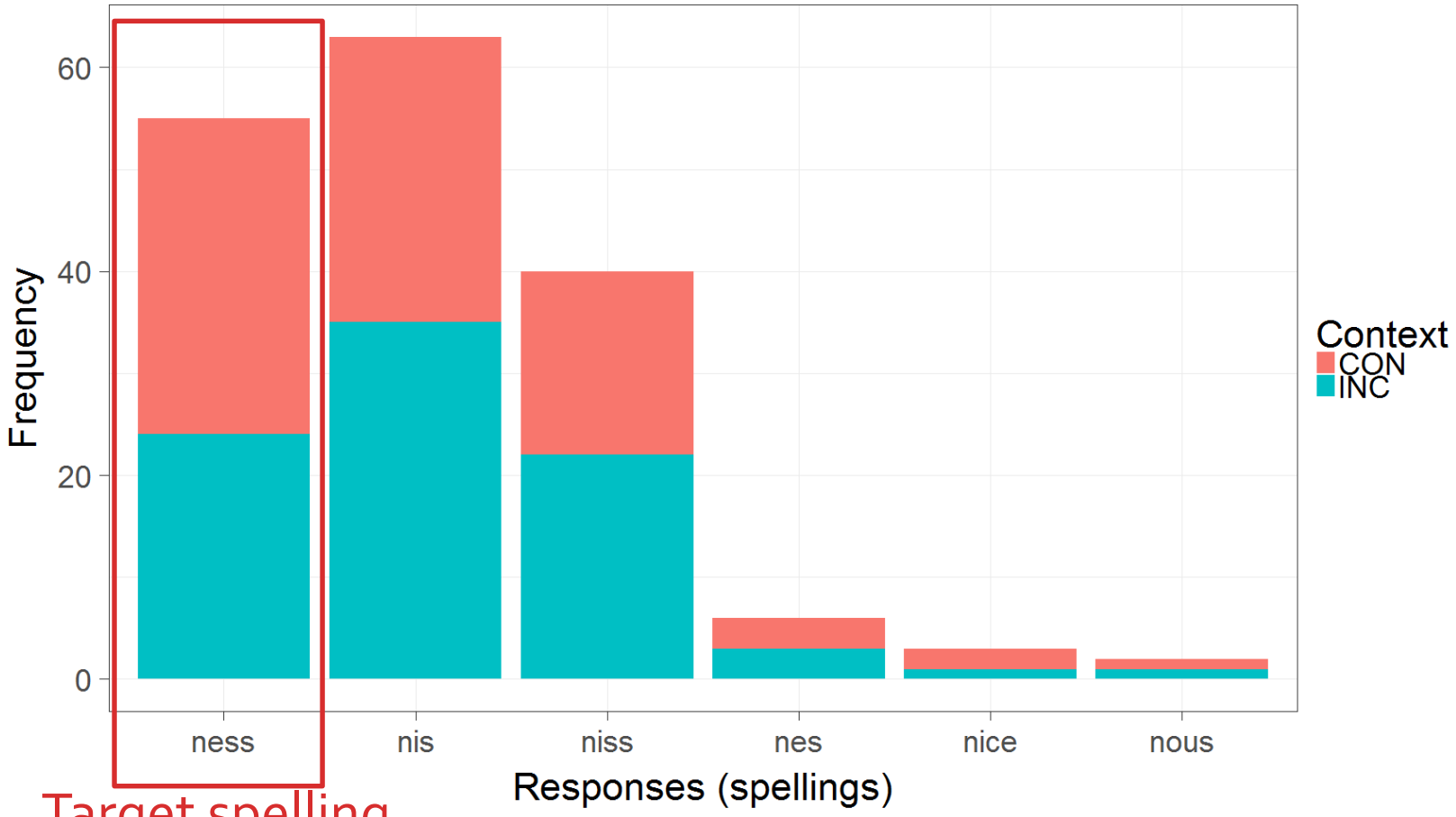
- 29 participants

[sedʒnɪs]

Context	Sentence (beg.)	Target	Sentence (end.)	Spelling
CON	The presentation recognised the impressive		of the protestors.	**-NESS**
INC	The mourners began to sadly		as the coffin disappeared.	**???**

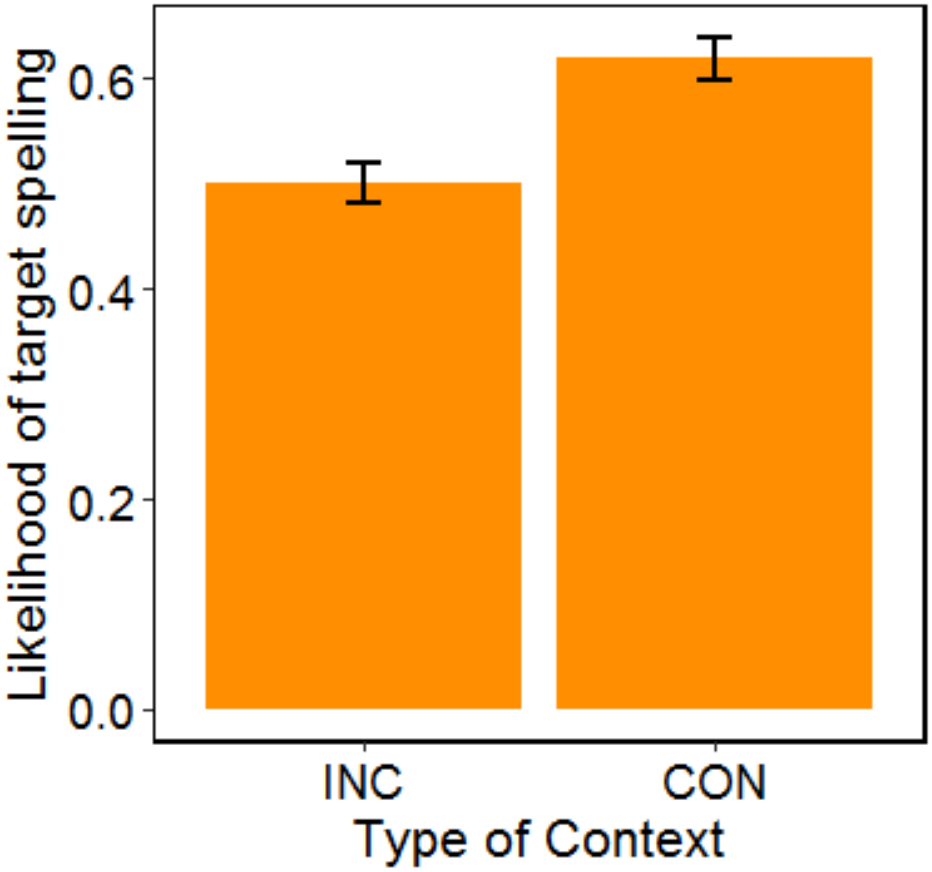
Study 3: Spelling study – Results

- Variety of spellings



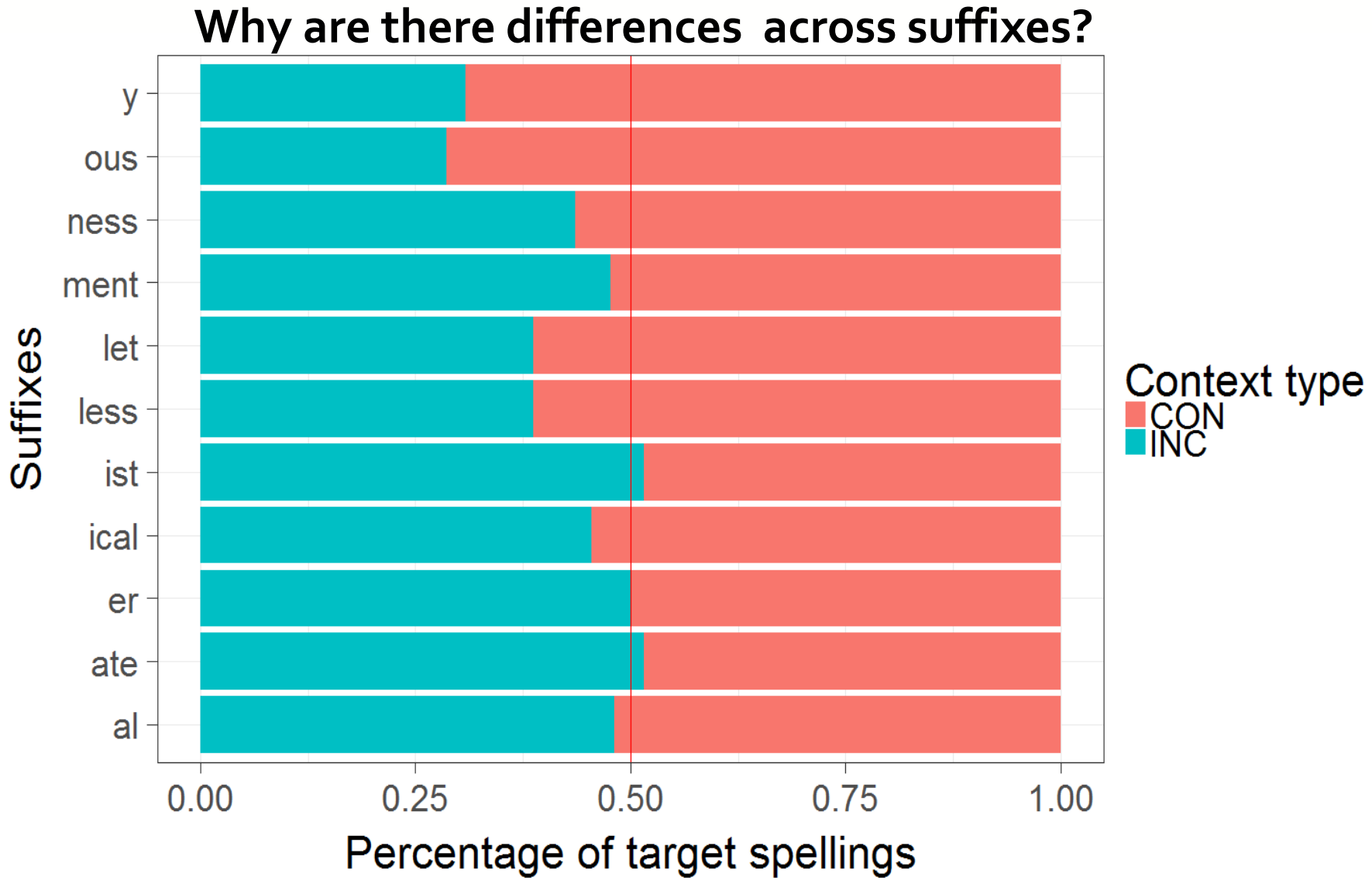
Study 3: Spelling study – Results

People exploit their knowledge of class-spelling regularities to indicate grammatical class



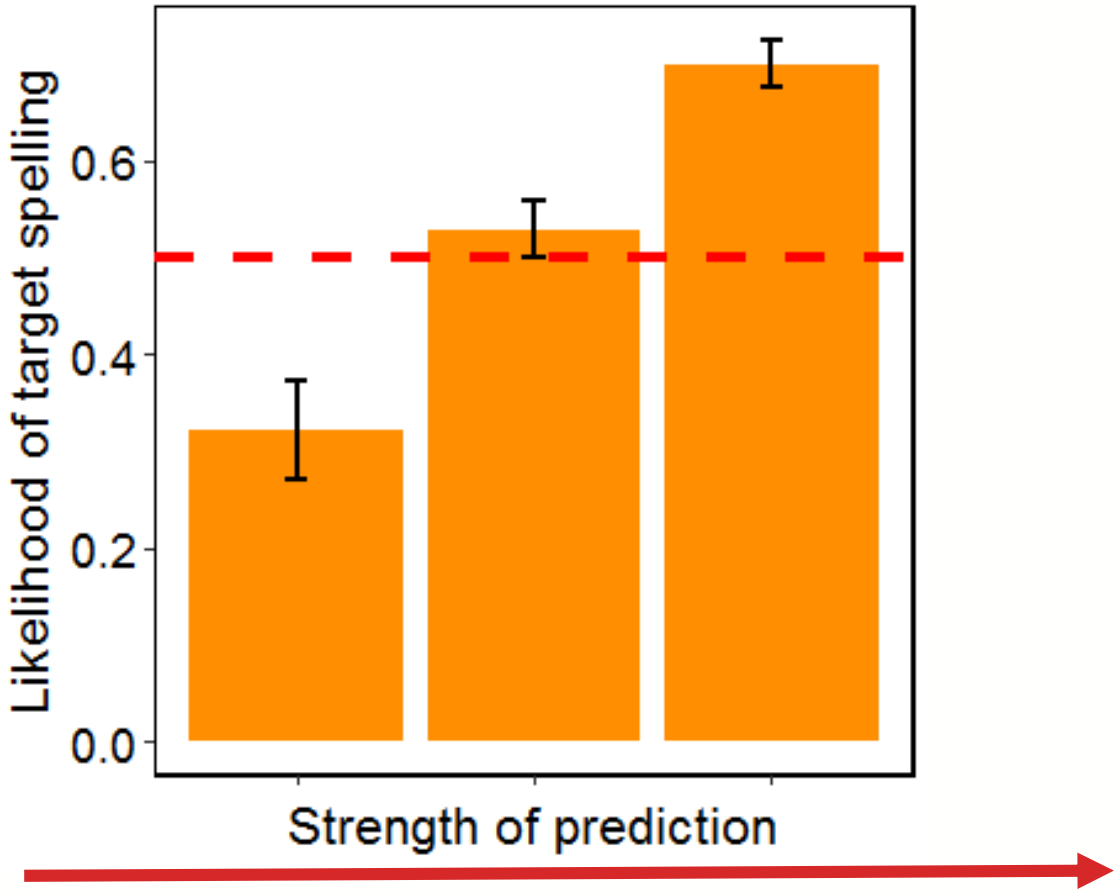
$z = 4.84$, $p < 0.0001$

Study 3: Spelling study – Results



Study 3: Spelling study – Results

Strongest effects on spelling are found for suffixes that disambiguate class



$z = 2.809$, $p < 0.01$

Conclusions

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- Regularities between spelling and grammatical class are ubiquitous
- People are sensitive to these regularities
- Degree of sensitivity mirrors the statistics of the writing system

Thank you for your attention!

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Any questions?

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