



Holly Cooper



Marc Brysbaert



Kathy Rastle

Maria Korochkina

What and how do we learn about morphemes through reading experience?

EPS meeting @ Lancaster
3 April 2025



**Economic
and Social
Research Council**



What is morpheme knowledge for?

- Most English words are built by **recombining stems and affixes**
 - cleaner, cleanly, unclean
 - teacherer, bankerer, builderer
- Morpheme knowledge enables rapid access to the meanings of **familiar** words
- It is also crucial for computing the meanings of **unfamiliar** words
 - bright + -ify → brightify
- Limited time for explicit instruction, so morpheme knowledge must be acquired primarily through **text experience**

Many complex words in children's books

7-9 years



10-12 years



13+ years



CYP-LEX: The Children and Young People's Books Lexicon

1,200 popular books
400 books per age band
Over 70 mln words
Over 100,000 distinct words

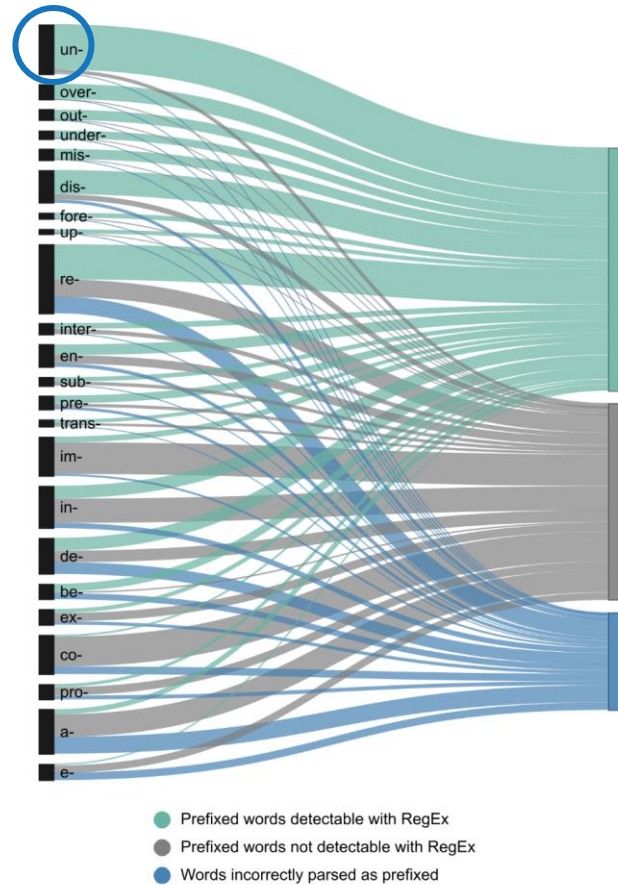
- Roughly **half of all distinct words** are complex
- **Few** complex words are **used repeatedly** or in many books
- Children are **likely to see** a complex word but **unlikely to see** this word **again**

Pre-requisites for morpheme learning

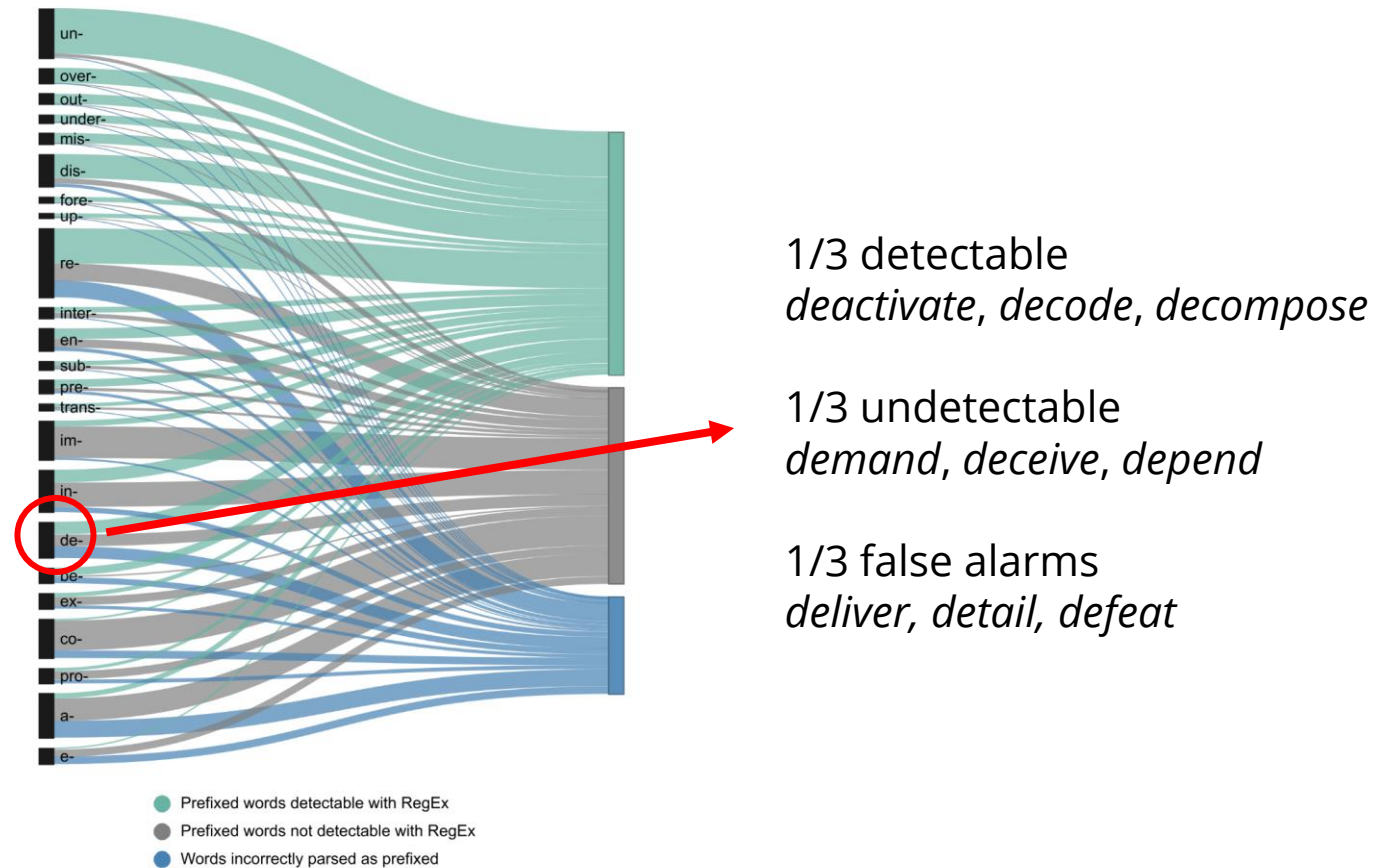
<u>u</u> nknown	<u>d</u> eactivate
<u>u</u> nfair	<u>d</u> ecode
<u>u</u> nafr ai d	<u>d</u> ecompose
<u>u</u> nlik e ly	<u>d</u> emand
<u>u</u> nconvinced	<u>d</u> eceive
<u>u</u> nsure	<u>d</u> epend
<u>u</u> nwell	<u>d</u> eliver (de + -liberare)

- Must have **consistent meaning** transformation
- Must occur with a **high number of distinct stems** (type frequency)
- Must be **detectable**

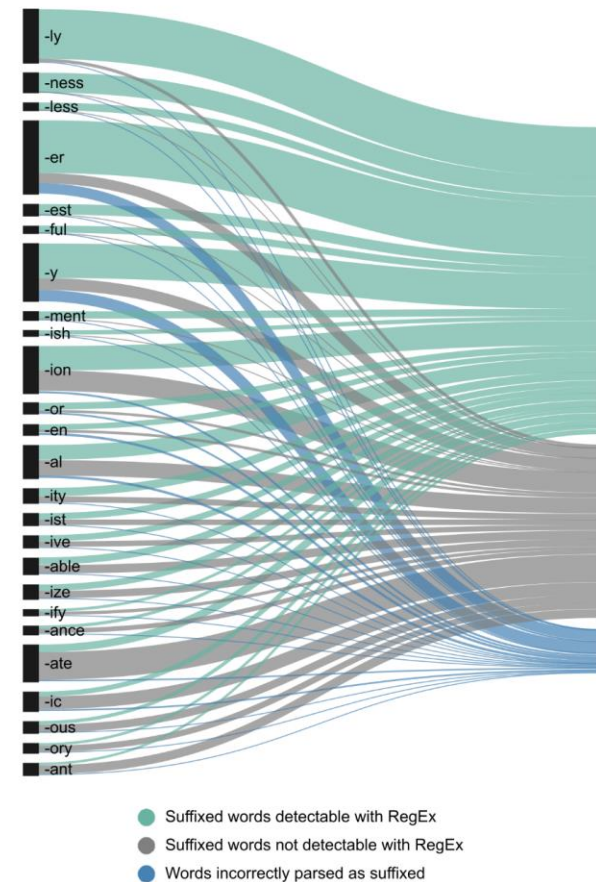
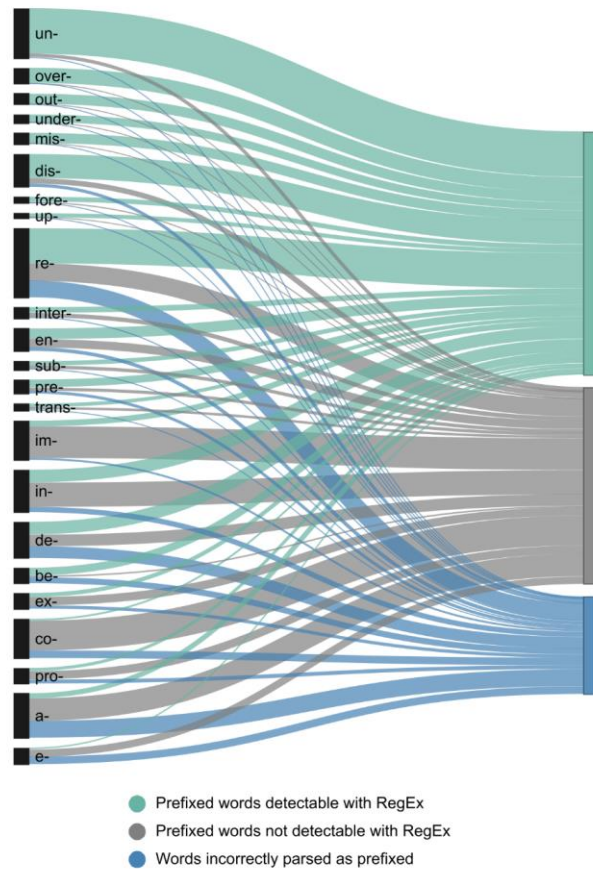
Few affixes are easy to detect



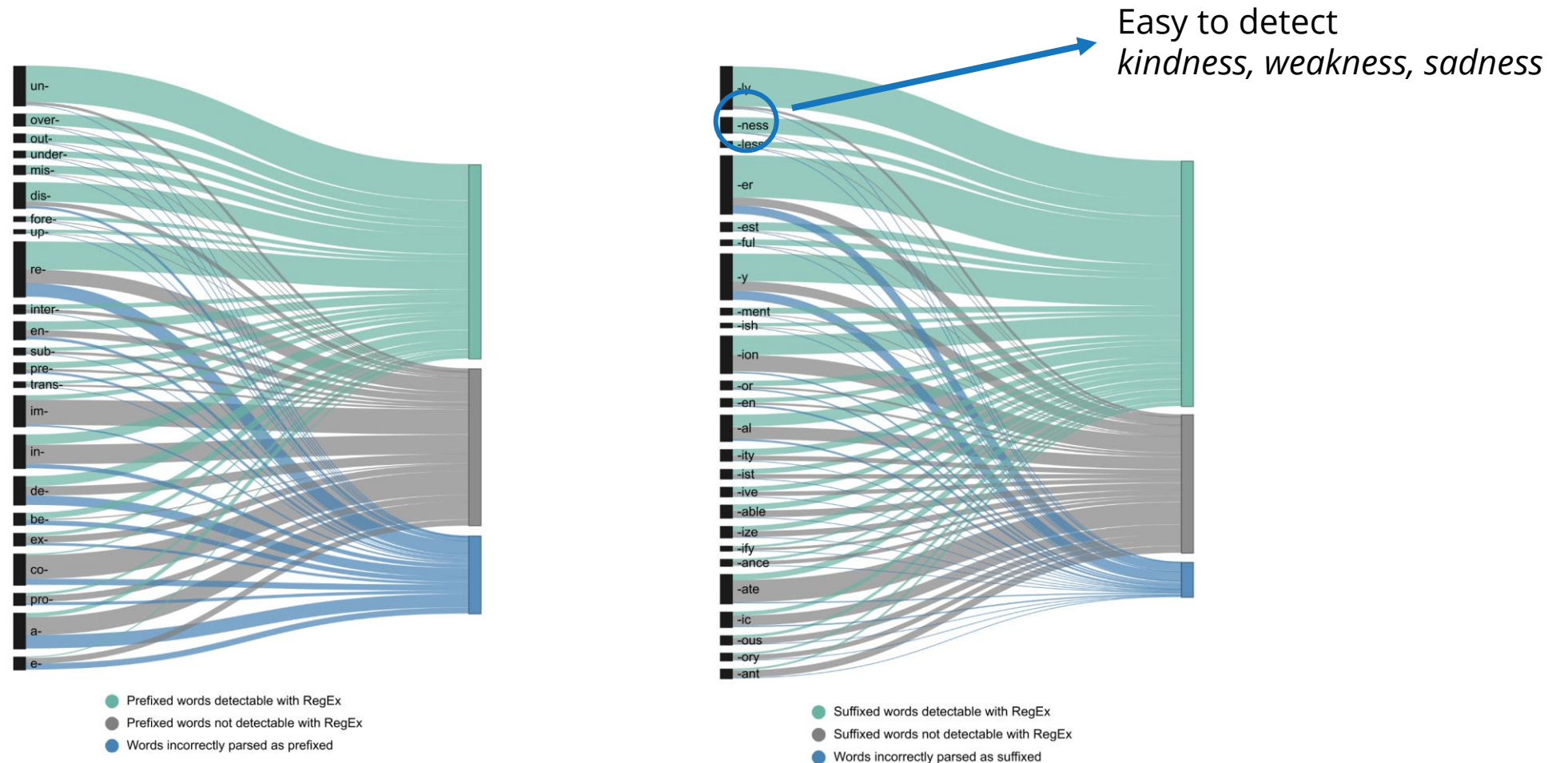
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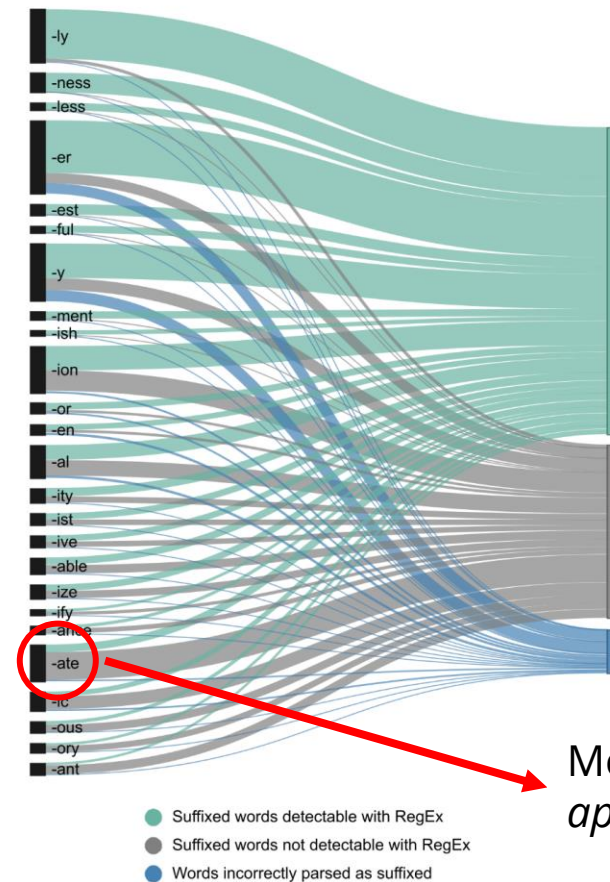
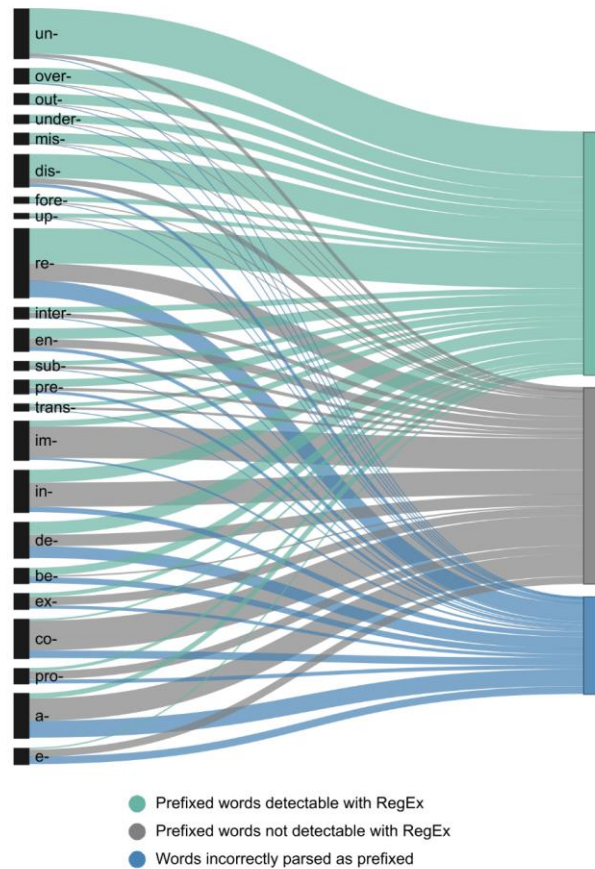
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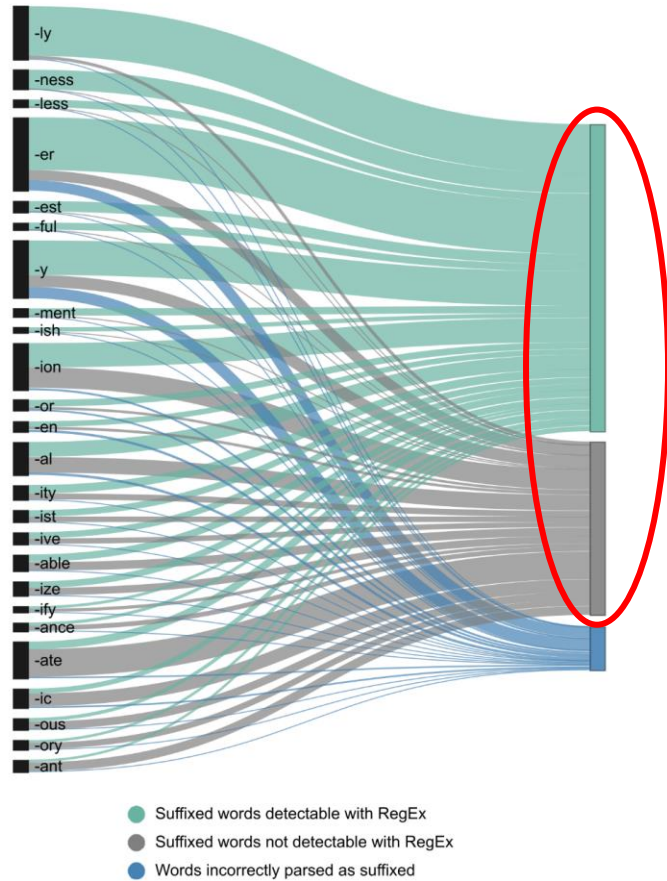


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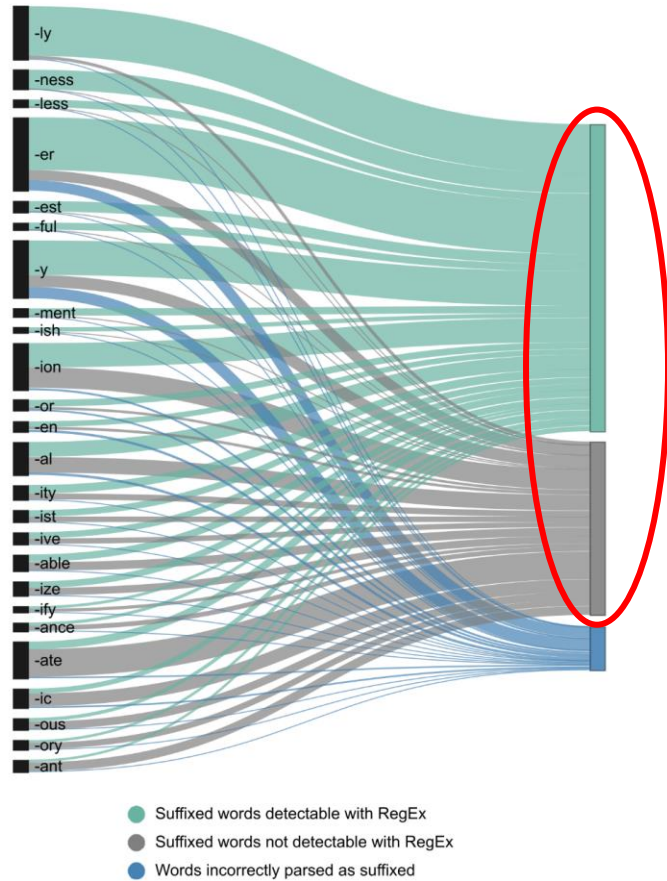
Mostly undetectable
appreciate, generate, integrate

What constitutes morpheme experience?



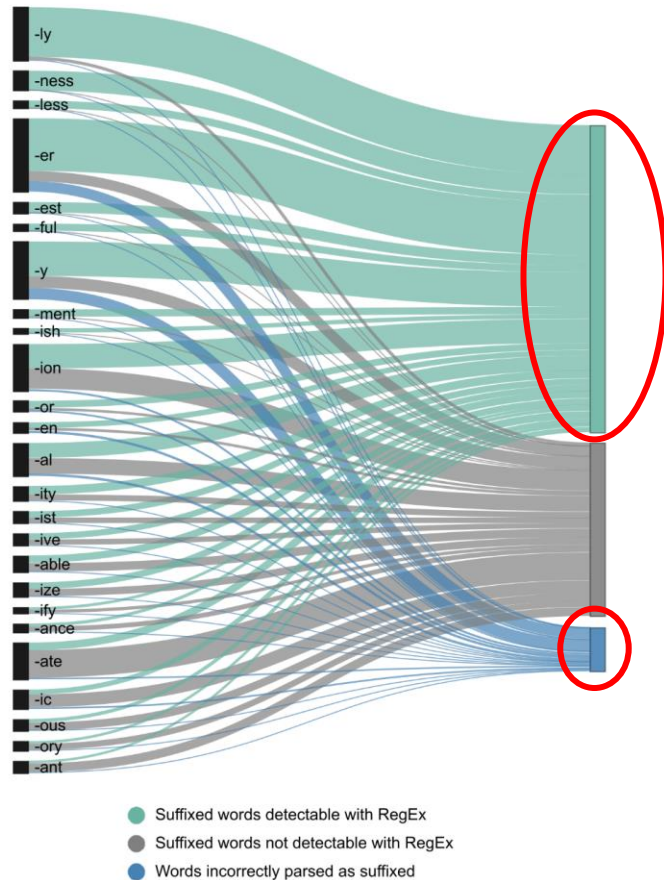
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What constitutes morpheme experience?



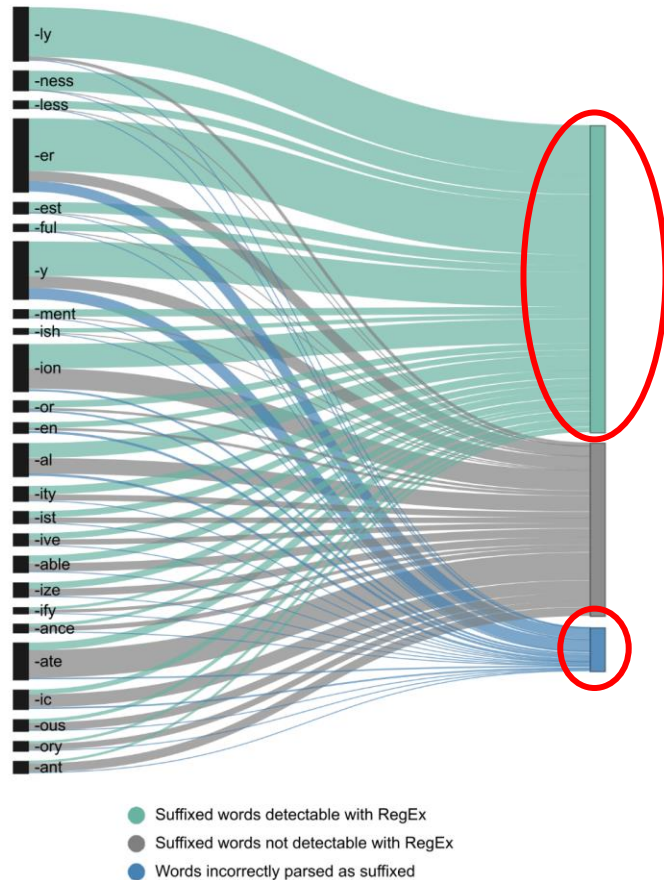
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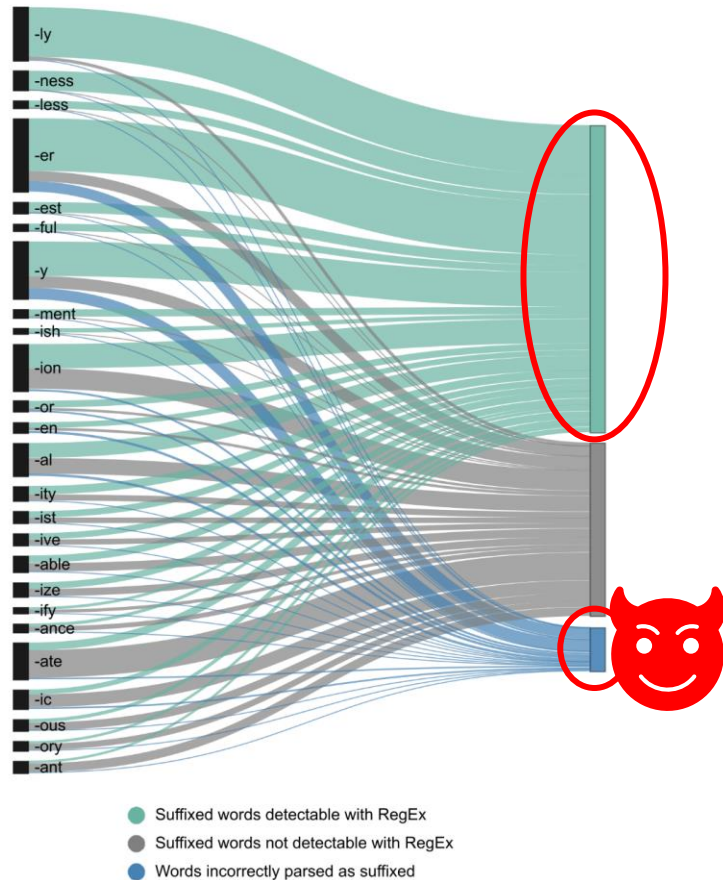
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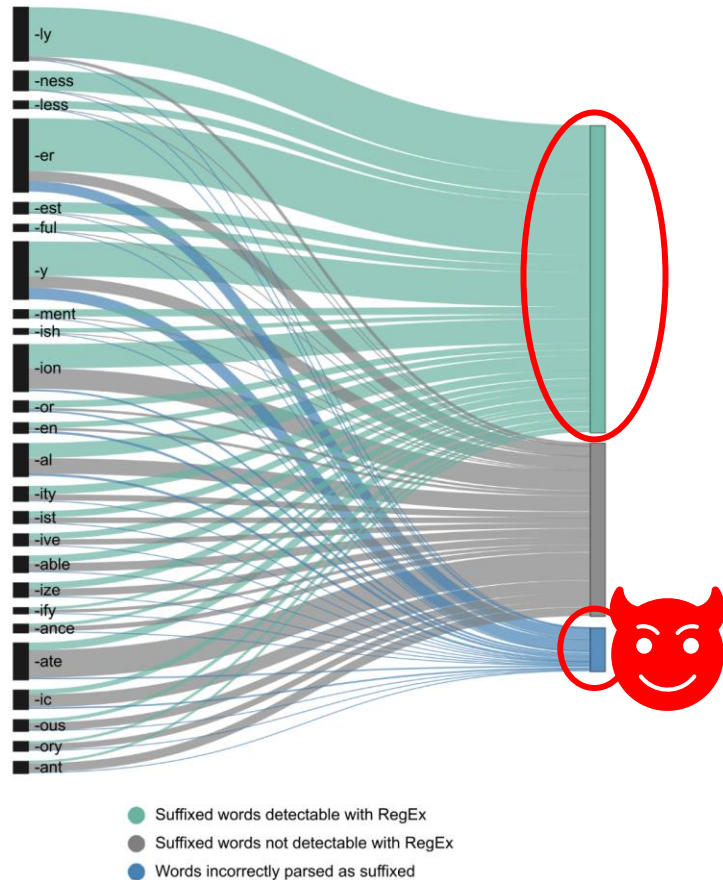
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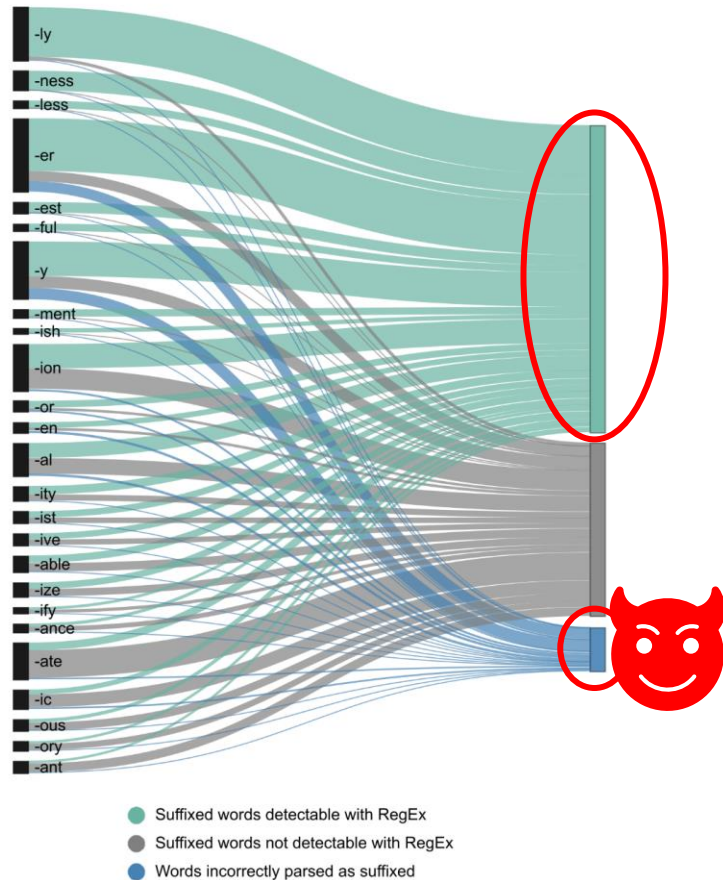
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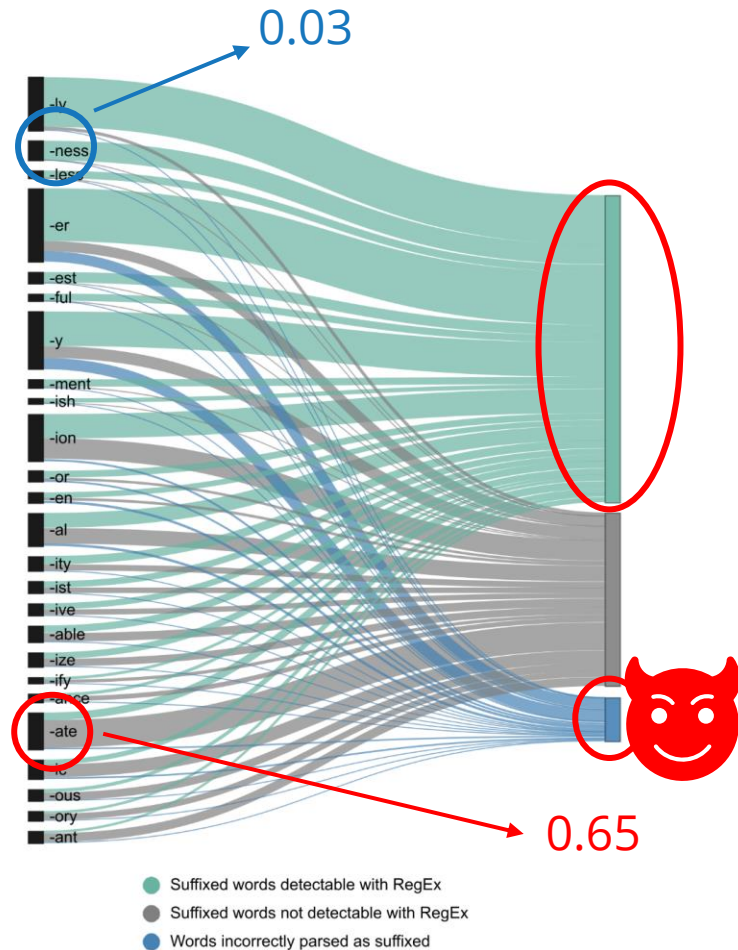
The false alarm penalty



Shannon entropy

Quantifies the **uncertainty about the function** of the orthographic pattern associated with an affix

The false alarm penalty



Shannon entropy

Quantifies the **uncertainty about the function** of the orthographic pattern associated with an affix

Low entropy → little uncertainty → low penalty

High entropy → more uncertainty → high penalty

Theories in action

Which definition best explains human behaviour?

The morpheme interference effect

woodness

word not a word

woodnels

word not a word

- Morphologically-structured nonwords are more difficult, and take longer, to reject
- Skilled readers segment complex-looking words into morphemes

Stimuli

- 6 prefixes
 - *un-, mis-, dis-, pre-, de-, re-*
- 6 suffixes
 - *-ness, -ly, -able, -er, -ic, -ate*
- Morphologically structured nonwords
 - *unwood, woodness*
- Nonwords without morphological structure
 - *ubwood, woodnels*
- Each participant saw...
 - Each affix with 10 stems (120 morphologically structured nonwords)
 - Orthographic controls (120 nonwords with no morphological structure)
 - 120 morphologically complex + 120 morphologically simple words

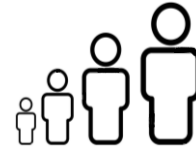
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- Morphologically structured nonwords
 - *unwood, woodness*
- Nonwords without morphological structure
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- Each participant saw **480 letter strings**
 - Each affix with 10 stems (120 morphologically structured nonwords)
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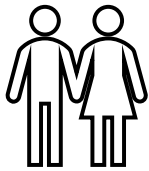
Participants



120 participants



18 – 40 years old

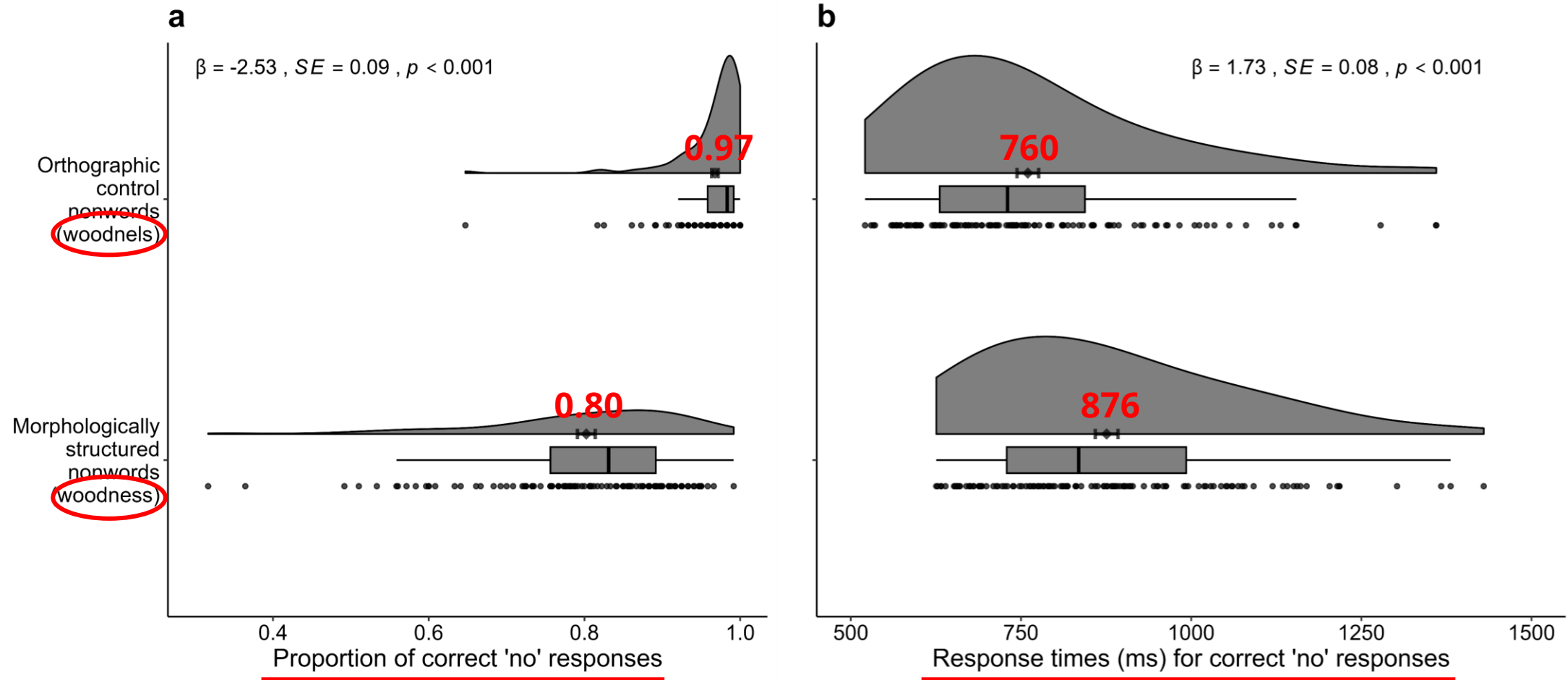


63 female
56 male
1 non-binary

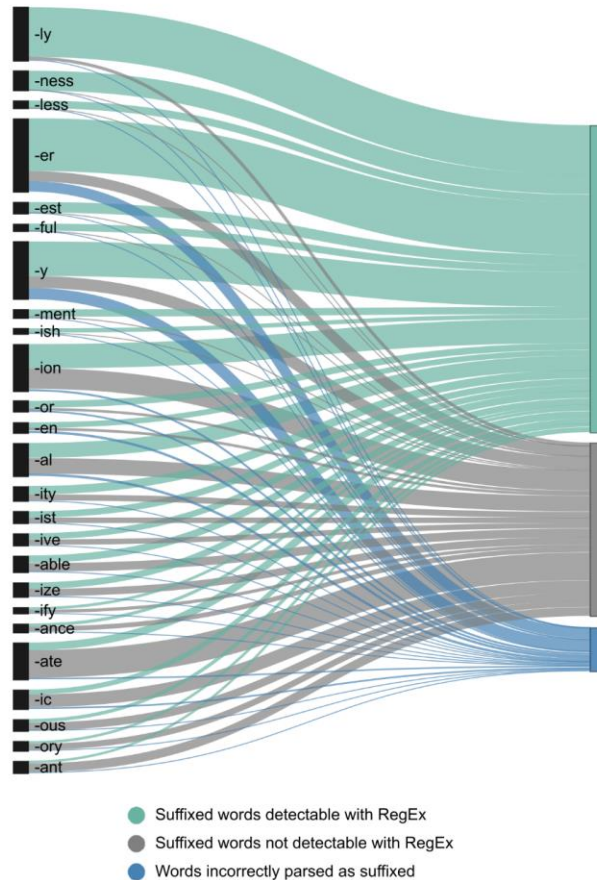


UK based
English as a first language
No language disorders

Readers are sensitive to morphological structure

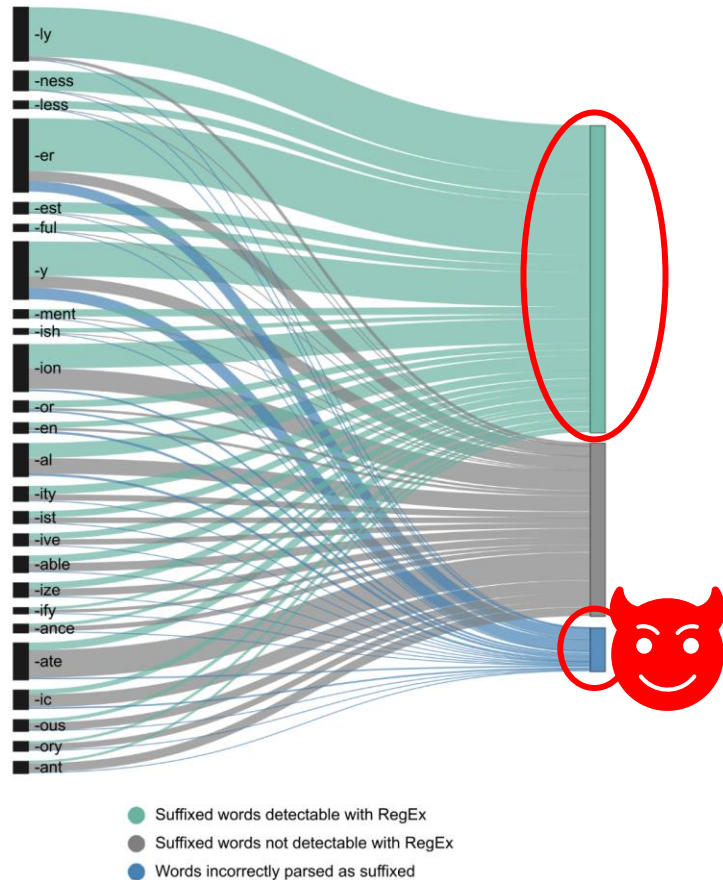


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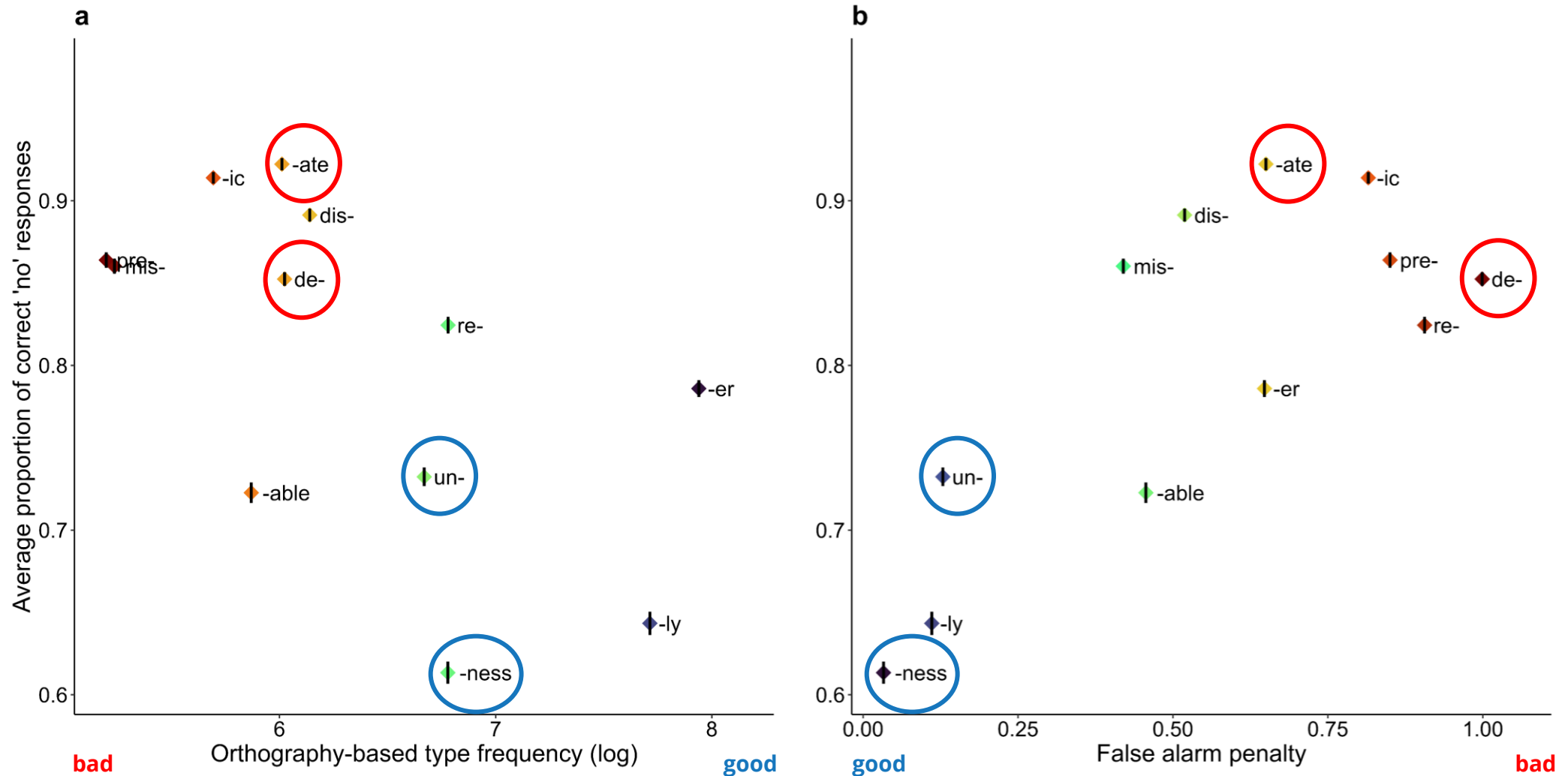
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Theory 3 explains data best!

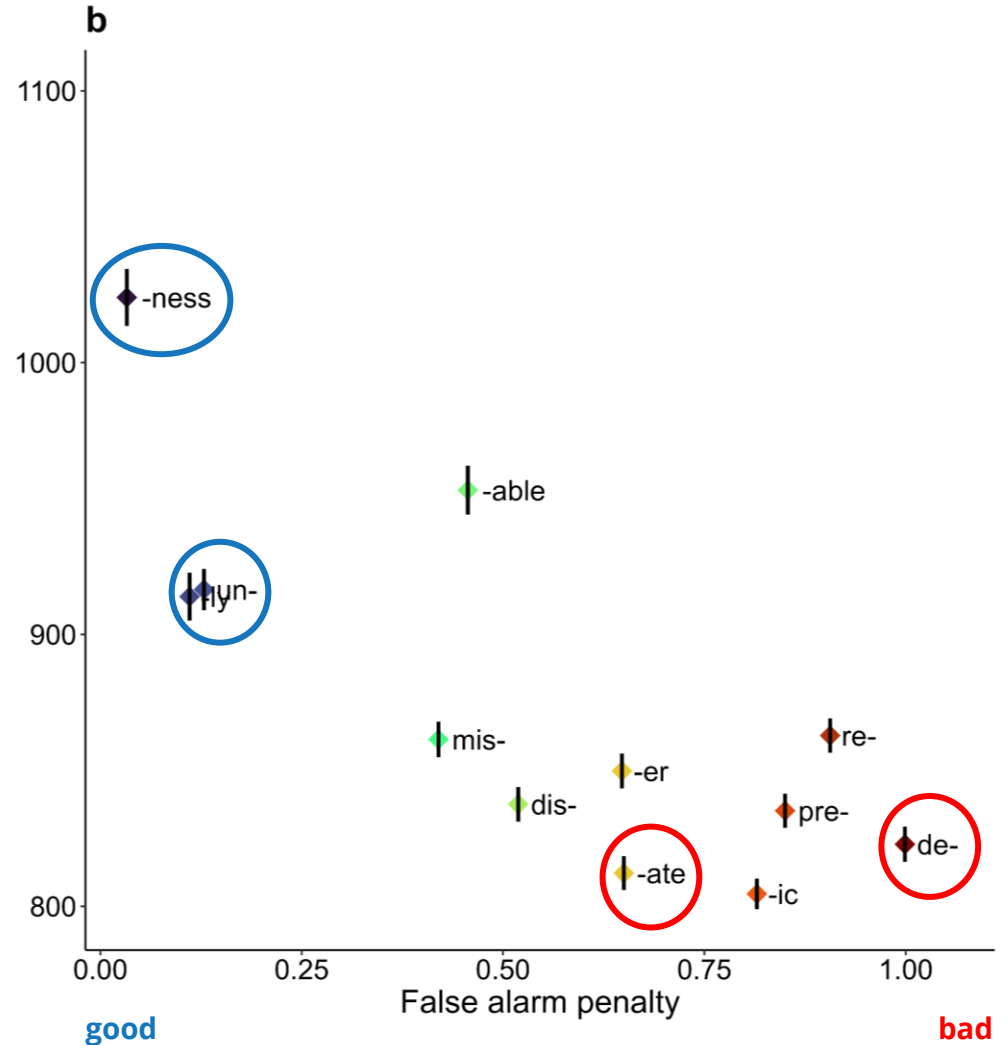
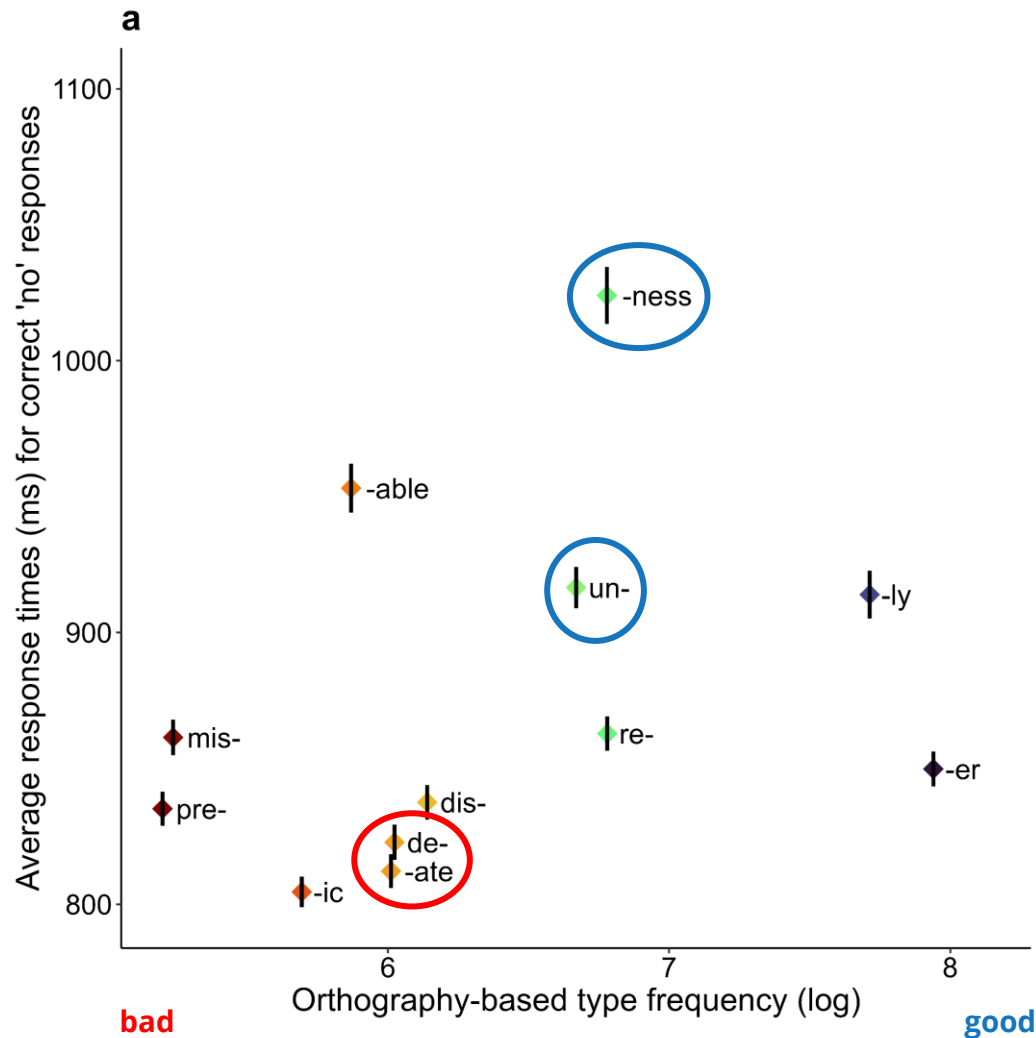


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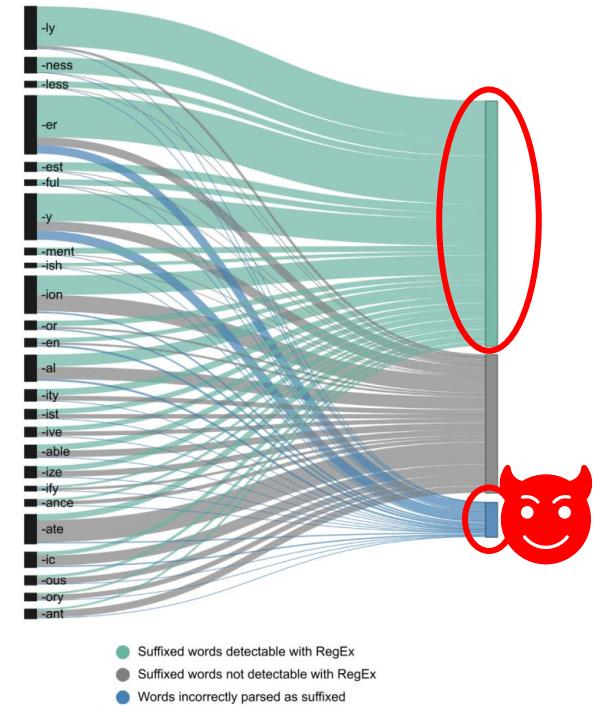
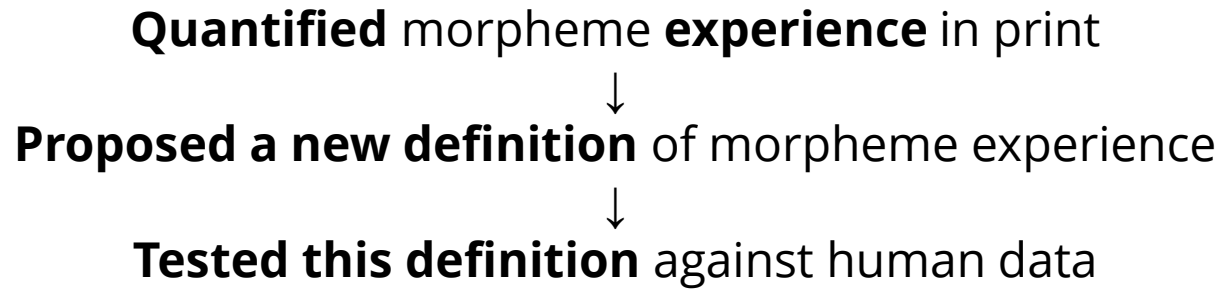
Nonwords with “good” affixes are hard to reject...



... and these rejections take time



Conclusions



- Critical step toward a **psychologically valid theory** of morpheme learning
- The field needs to **go beyond** approaches based on experience proxies detached from the *individual's actual experience*

maria.korochkina@rhul.ac.uk
<https://mariakna.github.io/>

Morphology in children's books: What's there and
what's useful for learning?

Maria Korochkina^{1*} and Kathleen Rastle¹

^{1*}Department of Psychology, Royal Holloway, University of London,
Egham, Surrey, TW20 0EX, United Kingdom.

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Morpheme knowledge is shaped by information available
through orthography

Maria Korochkina¹, Holly Cooper¹, Marc Brysbaert², and Kathleen
Rastle¹

¹Department of Psychology, Royal Holloway, University of London, United Kingdom

²Department of Experimental Psychology, Ghent University, Belgium

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Thank you!

