How does knowledge about word structure support reading and spelling?

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How can we understand evidence on “what works”?

Cognitive processes during reading and writing

Development and individual differences in underpinning skills

Understanding applications to teaching and learning

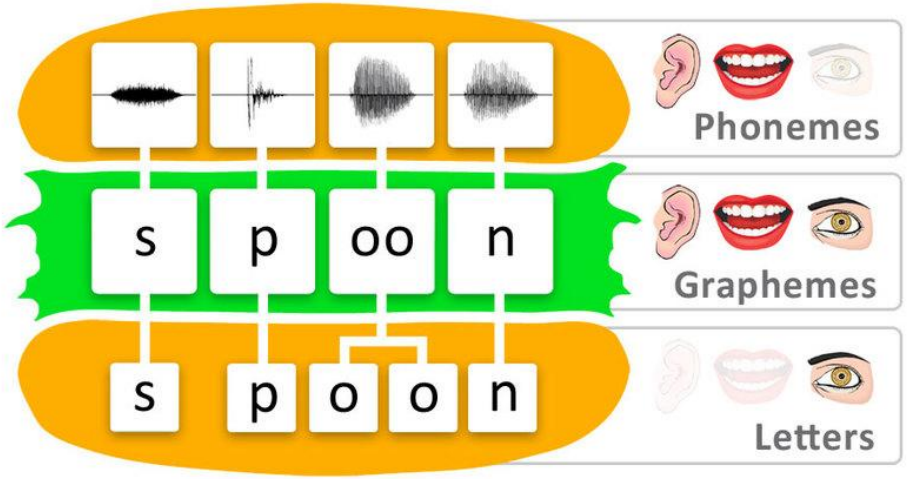
Word reading and spelling
Linking spoken and written forms of language

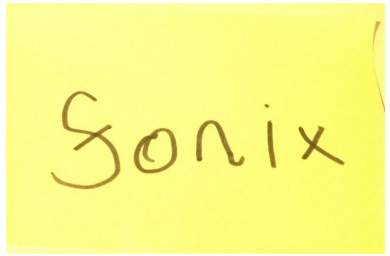
Phonological skills

Orthographic skills

Associations

Word reading and spelling

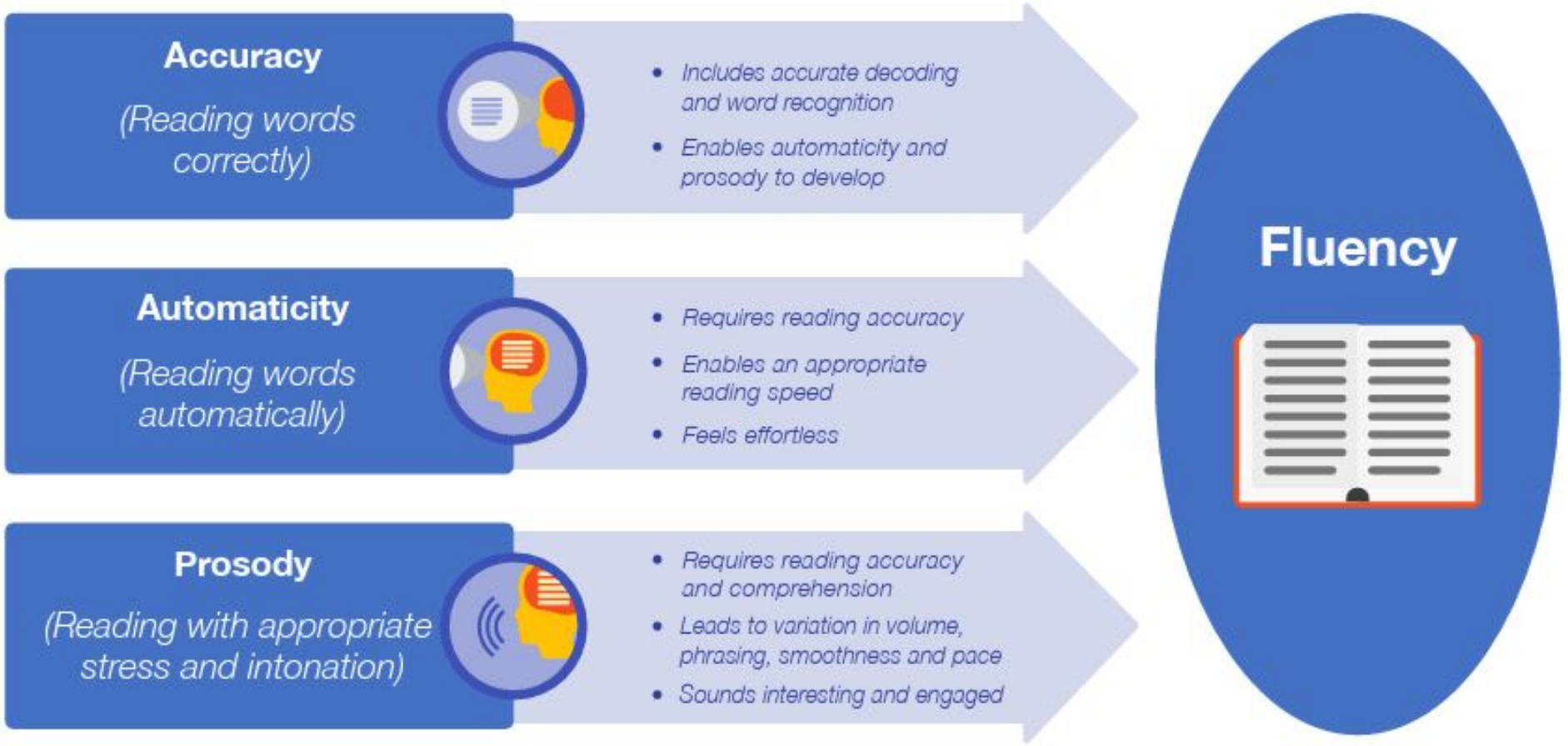




Systematic Synthetic Phonics:

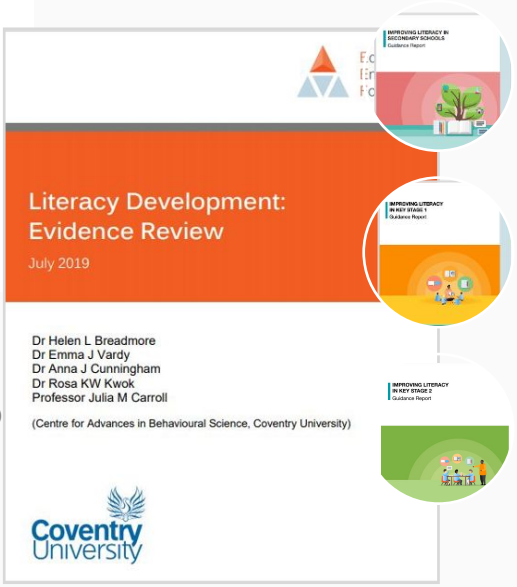
- Explicit teaching of the most common and reliable associations
- Effective in teaching pupils to decode – decoding is *necessary* but decoding not *sufficient*
- Implementation - should be engaging, include teaching to recognise phonemes, texts to apply and extend learning
- Main methods of initial instruction in England

Figure 5: Reading fluency

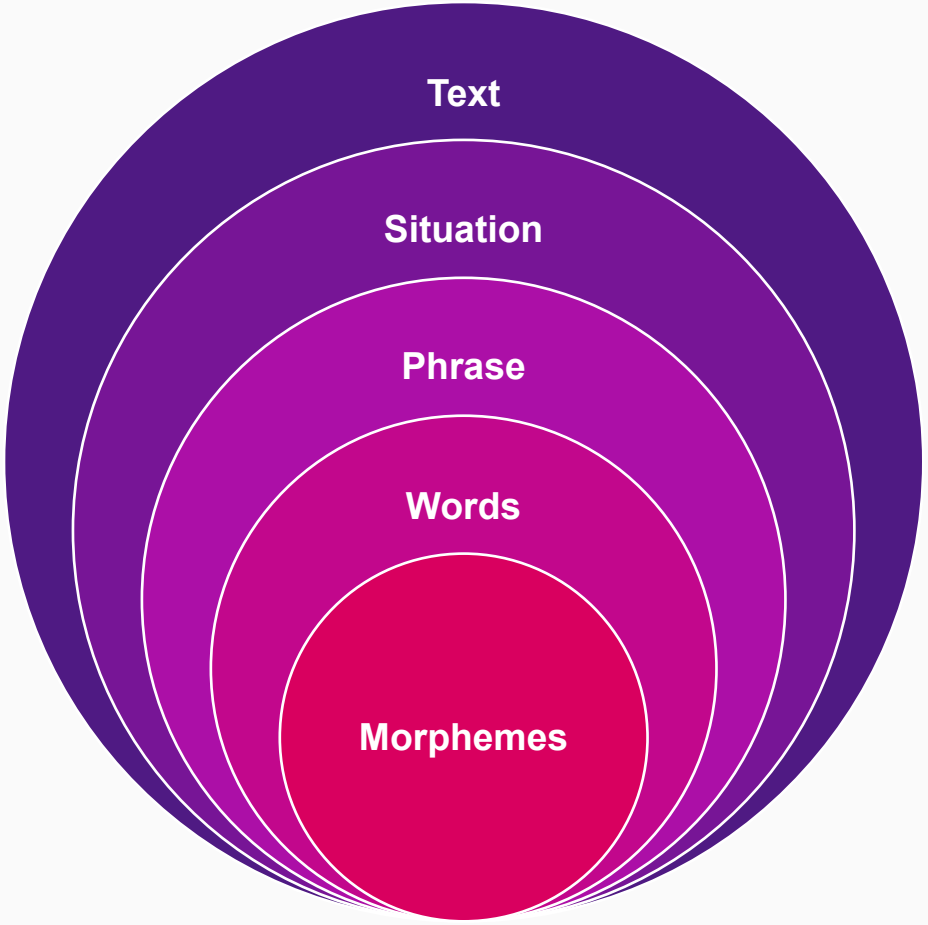


Bilton, C., & Duff, A. (2021). *Improving literacy in Key Stage 2: Guidance Report. Education Endowment Foundation, London.*

Breadmore, H.L., Vardy, E.J., Cunningham, A.J., Kwok, R.K.W., & Carroll, J.M. (2019). *Literacy Development: Evidence Review*. Londo
Education Endowment Foundation.
https://educationendowmentfoundation.org.uk/public/files/Literacy_Development_Evidence_Review.pdf



Constructing meaning beyond words
Reading fluency and comprehension



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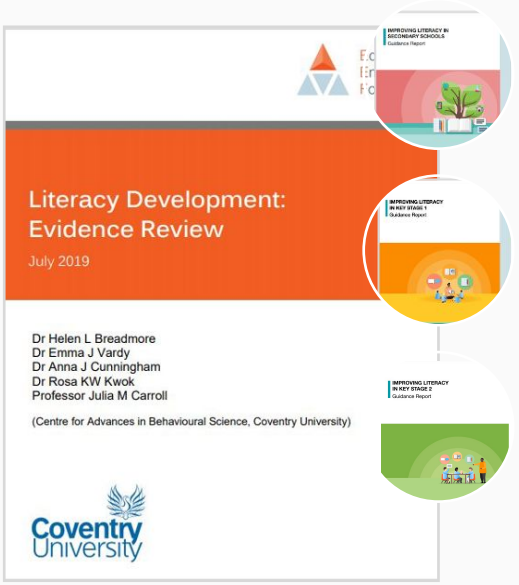
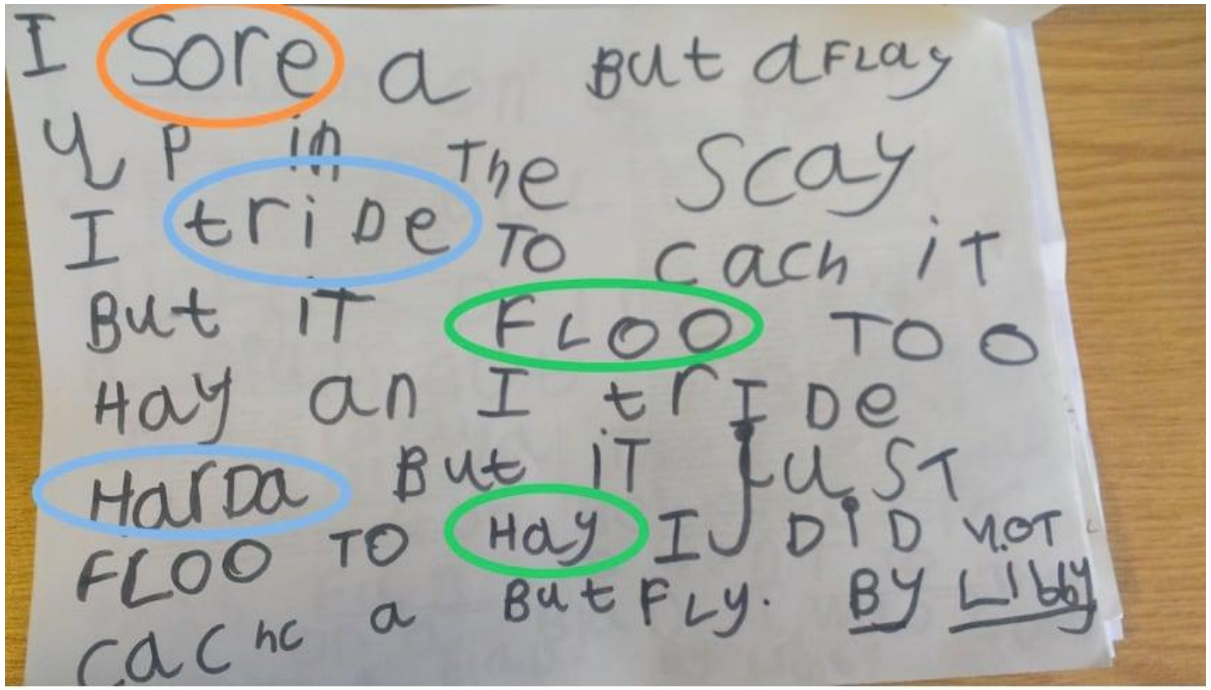


Phonological encoding is insufficient

- English is a morpho-phonemic orthography
- Spelling requires word specific precision
- Misspellings reveal gaps in knowledge
- Word reading and spelling fluency – accuracy and automaticity



These misspellings all illustrate over-reliance on letter-sound correspondence, without also using other spelling knowledge.

*sore (saw) is a homophone error –wrong word selected.
*floo (flew) and *hay (high) hasn't used word specific letter combinations (orthography).
*tride (tried) and *harda (harder) hasn't applied knowledge of spellings for inflectional suffixes (morphology).

Orthographic awareness

Position effects

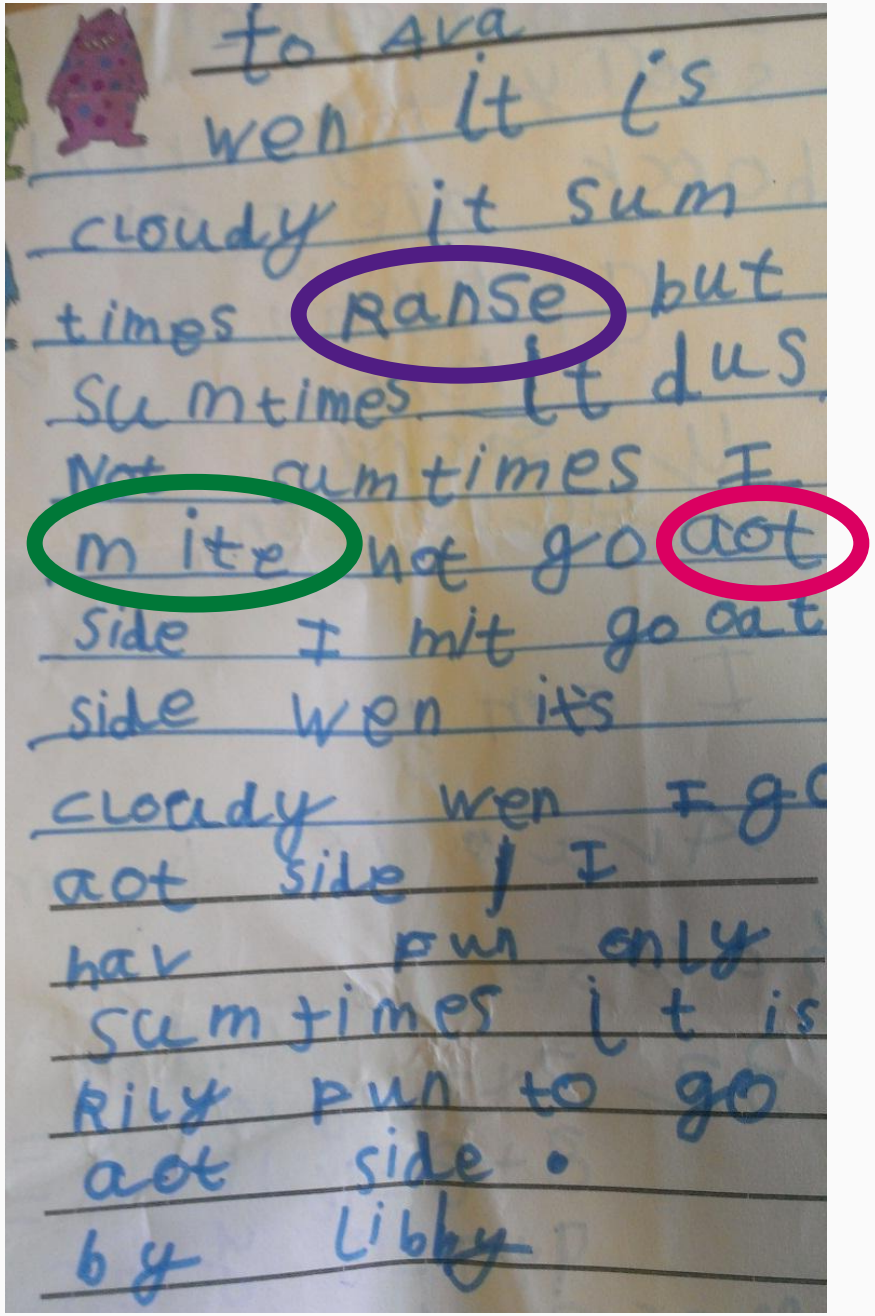
- <ck> can't be word-initial
- <bb> can't be word-initial
- Beginning spellers rarely violate (Treiman, 1997)
  - *aot contains a rare word-initial vowel combination, but letter-sound knowledge to decode approximates the target (out)

Conditional rules

- Final e *(mat-mate)*
  - *ranse uses conditional final e to lengthen the vowel (rains)
  - *mite also uses conditional final e to lengthen the vowel (might)

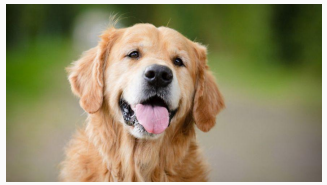
Irregular (word) parts and foreign words

- *Yacht, yak, café*



Knowledge about morphology

Dog s



/z/

/s/

/Iz/

Morphology: Meaningful structure of words.
Morpheme: Smallest meaningful unit.
Etymology: origins of meaning

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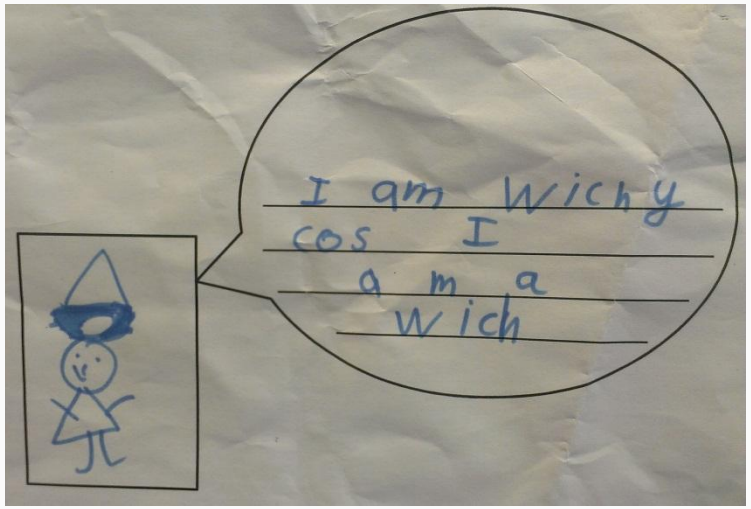
Morphology is productive



https://www.oed.com/information/updates/september-2023/new-word-entries/

Information

- Using the OED
- Understanding entries
- About the OED
- Editorial policy
- Purchasing
- Institutional account management
- Get help with access
- Updates
  - Platform updates
  - September 2024
  - June 2024
  - March 2024
  - December 2023
  - September 2023
    - **New word entries**
    - New senses
    - Additions to unrevised entries
  - June 2023
  - March 2023
  - December 2022
  - September 2022
  - June 2022
  - March 2022
  - December 2021
  - October 2021
  - Previous Updates
- Contact us
- Media enquiries

New word entries

- adultification, n.: "The action or practice of treating children or young people like adults in ways that are considered harmful or abusive, typically by subjecting them..."
- à la Tartare, adv. & adj.: "With reference to the preparation or consumption of steak or seafood: uncooked, raw."
- alt text, n.: "Text included in the code of a web page which describes the appearance or function of an image, which may be displayed in place of the image when it..."
- anti-realistic, adj.: "Tending to reject or transcend realism, esp. in literature and the arts. Also: that advocates a philosophical theory of anti-realism (see..."
- anti-republican, n. & adj.: "A person who opposes republicanism or a Republican political party."
- anti-rightism, n.: "Opposition to right-wing or reactionary people and opinions."
- anti-rightist, adj. & n.: "Opposed to right-wing or reactionary people and opinions."
- anti-romantic, adj. & n.: "Opposed to romance, romanticism, or what is romantic."
- anti-sentimental, adj.: "Opposed to or avoiding sentimentality; that is the antithesis of what is sentimental."
- anti-technology, adj. & n.: "Opposed or averse to technology."
- anti-terror, adj.: "That prevents or combats the activities of terrorists; prohibiting the use of political tactics characterized as violent or intimidating."
- anti-terrorism, n.: "The policy or position of opposing terrorism; military or political measures designed to prevent or combat terrorism."
- anti-woman, adj.: "Hostile to the rights and interests of women; antagonistic to women."
- anti-women, adj.: "Hostile to the rights and interests of women; antagonistic to women; = anti-woman, adj. Now frequently in predicative use."

Morphology is multidimensional

Morphological awareness: Ability to manipulate structure of words.

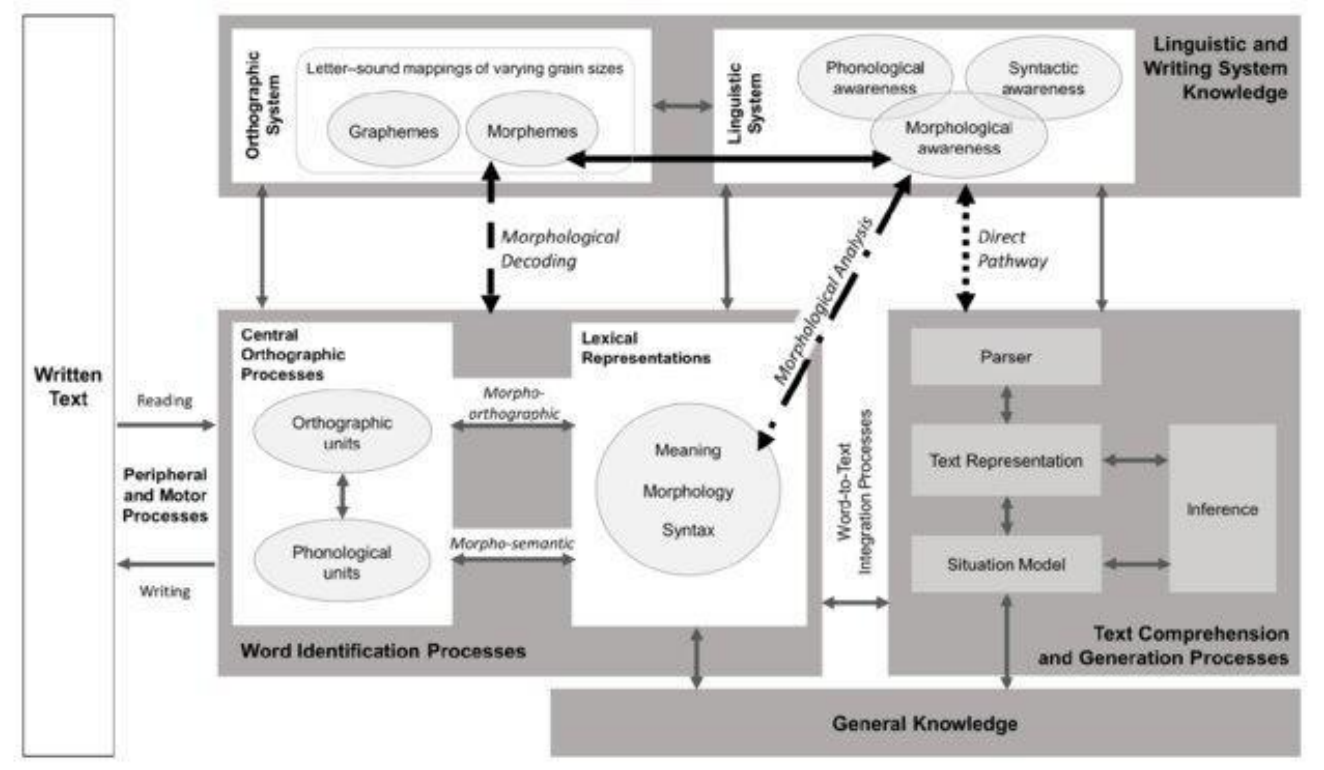
Morphological decoding disambiguates spelling

Mi**st** – miss**ed**
Si**g**n – si**g**nature
[**Ph**oto][bom**b**][ing]

Morphological analysis supports vocabulary development, meaning comprehension.

Grammar
part of speech
Agreement
*the girl(**s**) play(**s**) in the park*

"Binding agent" (Kirby & Bowers, 2017)



Levesque, K., Breadmore, H.L., & Deacon S. H. (2021). How morphology impacts reading and spelling: Advancing the role of morphology in models of literacy development. *Journal of Research in Reading. 44*(1). 10-26. https://doi.org/10.1111/1467-9817.12313

What does The Reading Framework say about morphology?

Department for Education

The reading framework

July 2023

- 7/10 references to morphology are in the glossary
- *"In English and in other lessons, teachers should continue to provide pupils with practice in decoding unfamiliar words from a text they are about to read, both single and multi-syllabic words, and those containing rarer GPCs. They should also explain their meanings, drawing on morphology where it is helpful." p63*
- *"Pupils who need the support to develop fluency…In English and in other lessons, teachers should know who these pupils are and continue to provide them with practice in decoding unfamiliar words from a text they are about to read, both single and multi-syllabic words, and those containing rarer GPCs. They should also explain their meanings, drawing on morphology where it is helpful." p70*
- *"Preparing pupils to read the text… Identify and explain new vocabulary that is essential to pupils' understanding, first demonstrating how to decode each word, also drawing on its morphology and etymology where possible and explaining its meaning in the context of the passage, in pupil-friendly language rather than from a dictionary, without asking pupils to guess." p105*

What does the national curriculum for English say about Morphology?

Terminology avoided or used inconsistently.

- "Word families" (DfE, 2013 p76)
- "Word endings" focus on sound and orthographic features
  "Endings which sound like /ʃən/, spelt –tion, -sion, -ssion, -cian"
  (DfE, 2013, p. 62)

Some teachers may lack vocabulary/confidence to discuss morphology
(Cawley et al., submitted, Breadmore et al., in prep)

DfE. (2013). *English programmes of study: key stages 1 and 2 National curriculum in England. London, UK: Crown Copyright Retrieved from* https://www.gov.uk/government/publications/national-curriculum-in-england-english-programmes-of-study

Cawley, K. Critten, S., Breadmore, H.L., & Carroll (submitted). "It's just about printing the list, getting children to copy them": Teachers' experiences of the Key Stage 2 national curriculum for spelling and how it is implemented in primary schools.

Cognitive processes

Do we really use morphology?

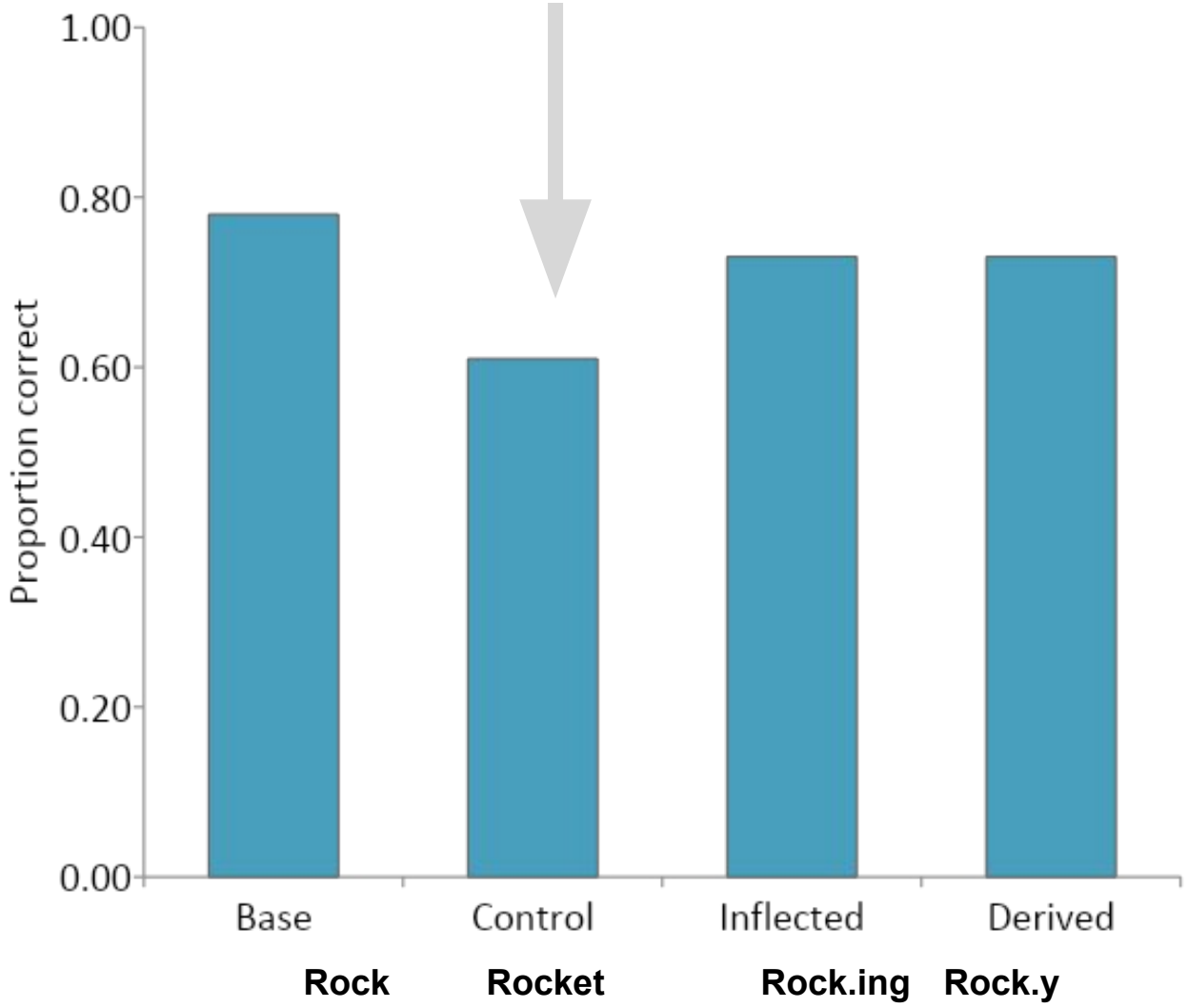
- Yes! In word reading, spelling and passage reading

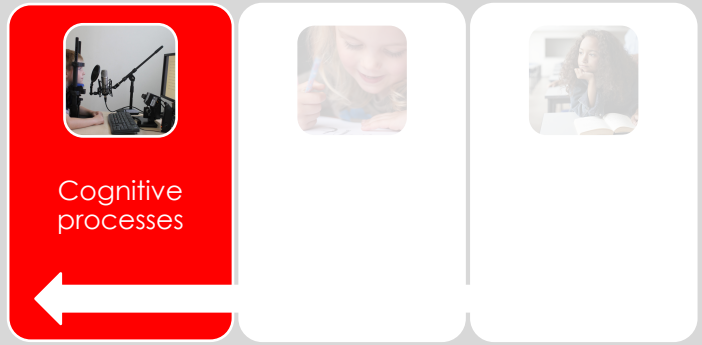
Use morphology in spelling

- Spelling tasks show children, including with low literacy, can use morphemes to support spelling
  (Breadmore, 2008; Breadmore et al., 2012; Breadmore & Carroll, 2016)

- 7-year-olds use morphemes (root consistency)
  - Inflected and derived > accurate than control words
  - Increases through childhood, approach ceiling at 9 years

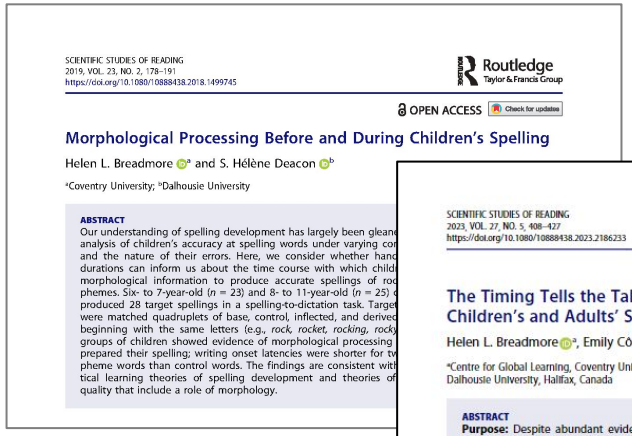
  (Deacon, 2008; Deacon & Dhooge, 2010)





When does morphological processing happen?

- Before spelling production?
- And/or during spelling production?



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https://doi.org/10.1080/10888438.2018.1499745

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Morphological Processing Before and During Children's Spelling

Helen L. Breadmore[a] and S. Hélène Deacon[b]

[a]Coventry University; [b]Dalhousie University

ABSTRACT

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durations can inform us about the time course with which child
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were matched quadruplets of base, control, inflected, and derived
beginning with the same letters (e.g., *rock, rocket, rocking, rocky*
groups of children showed evidence of morphological processing
prepared their spelling; writing onset latencies were shorter for tw
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Helen L. Breadmore[a], Emily Côté[b], and S. Hélène Deacon[b]

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Purpose: Despite abundant evidence that morphemes are important in reading and spelling, little is known about the nature of processing in spelling. This study identifies multiple morphological processes over the time course of spelling, revealing that these processes are influenced by development.

Method: Twenty adults and 46 children (8;0–12;1 years) completed an auditory lexical decision task followed by a spelling task, to explore the effects of morphological structure and cross-modal morphological priming by analyzing handwriting latencies before and during spelling production.

Results: Adults and children both demonstrated morphological processing during lexical access – they were faster to begin to write morphologically complex words (e.g., artist) compared to matched monomorphemic controls (e.g., article). Adults (but not children) also demonstrated cross-modal morphological priming. Further, adults (but not children) demonstrated the effects of morphological processing during spelling production. Inter-letter latencies were shorter between the last two letters of a root morpheme than the same letters in monomorphemic control words (e.g., ar[]tist compared to ar[]ticle).

Conclusion: Together, these findings reflect multiple facilitative effects of morphological processing during spelling production – during lexical access and spelling production. This highlights the need for greater integration of morphological processes into theories of skilled spelling and spelling development.

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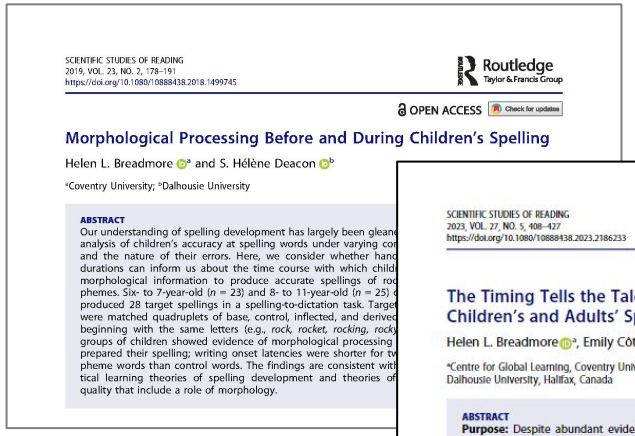

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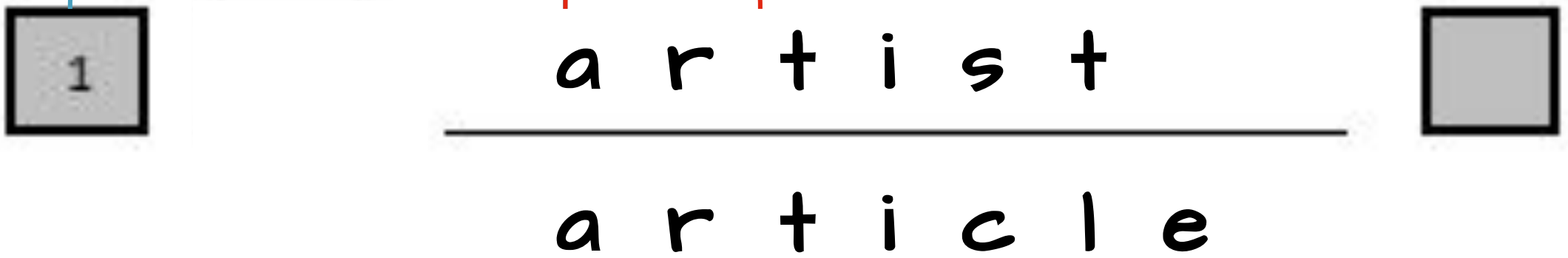
Time to begin writing

Root writing time



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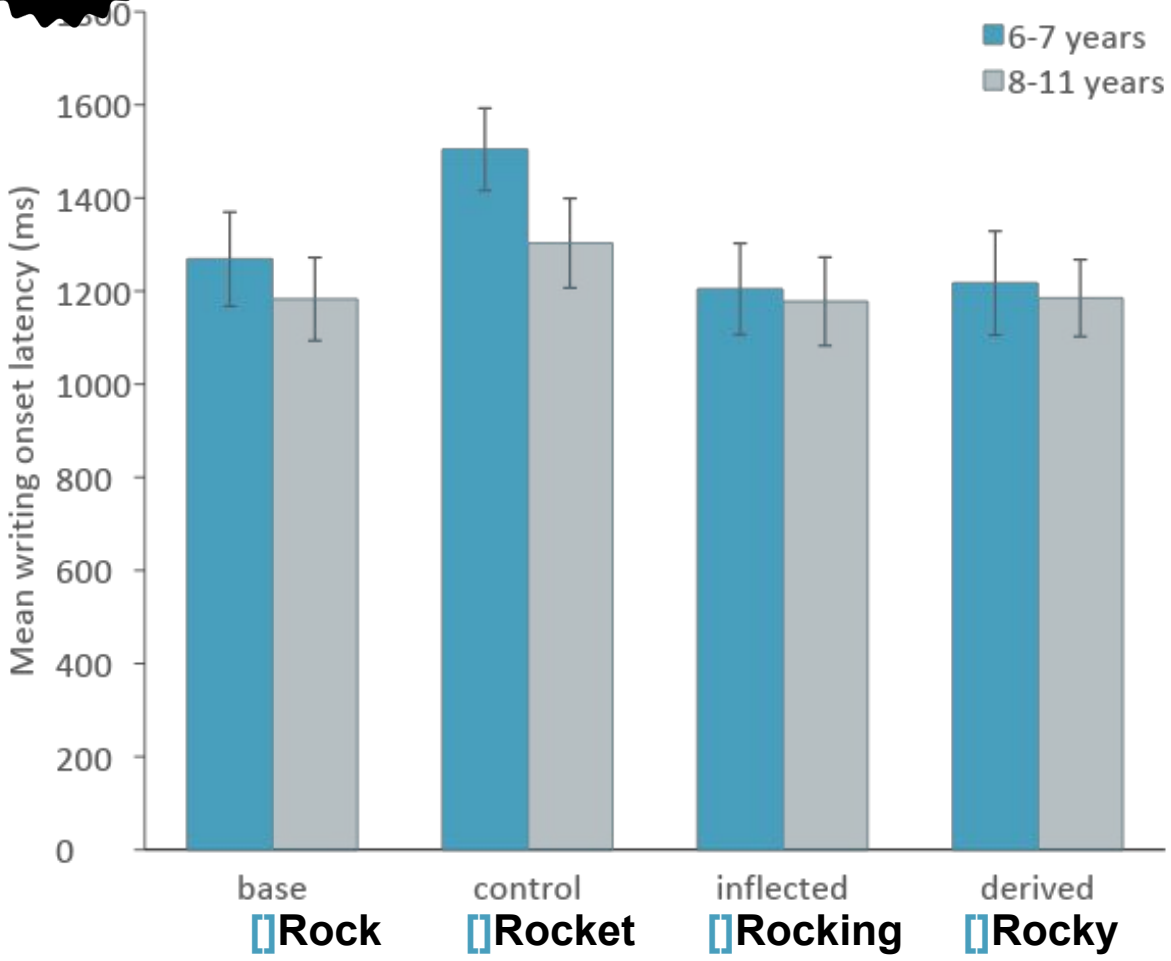
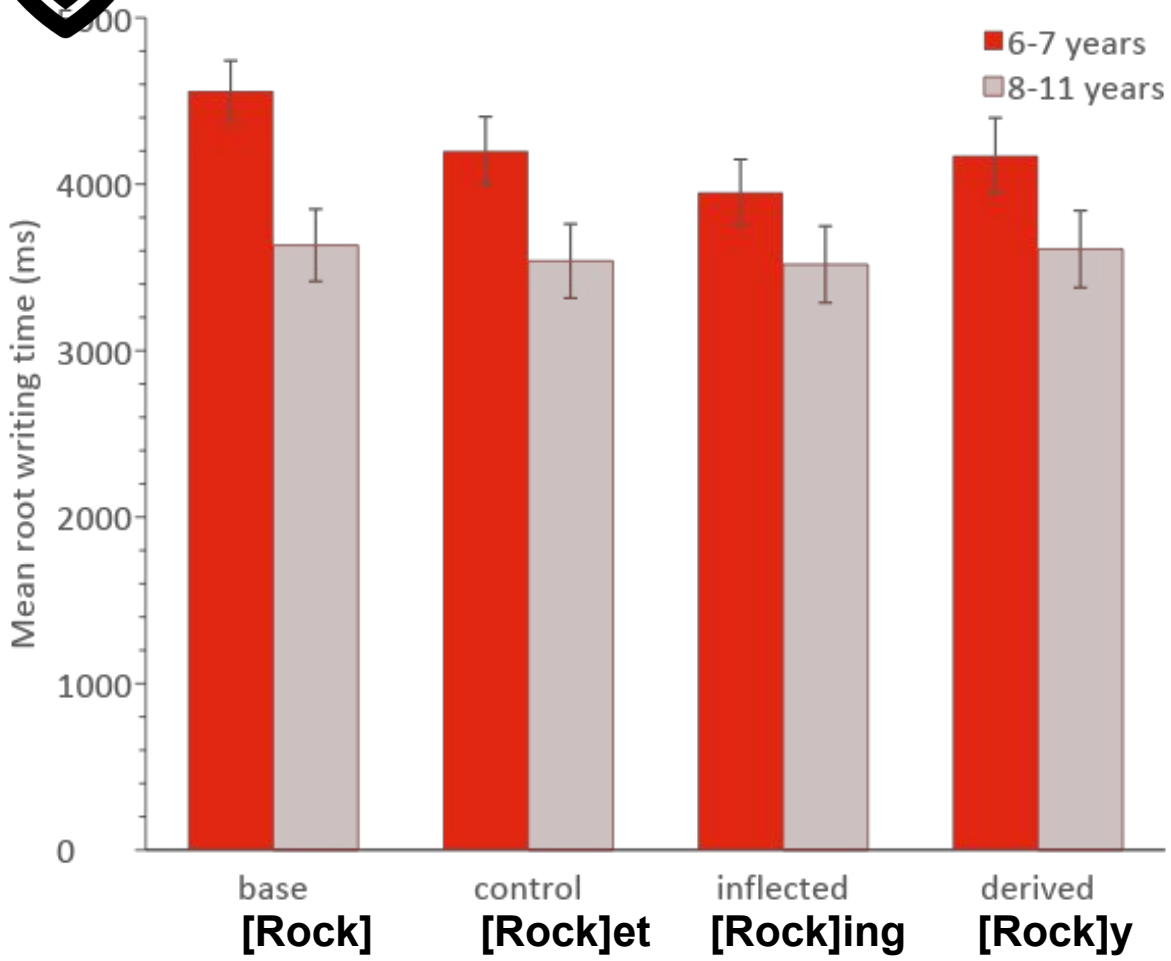
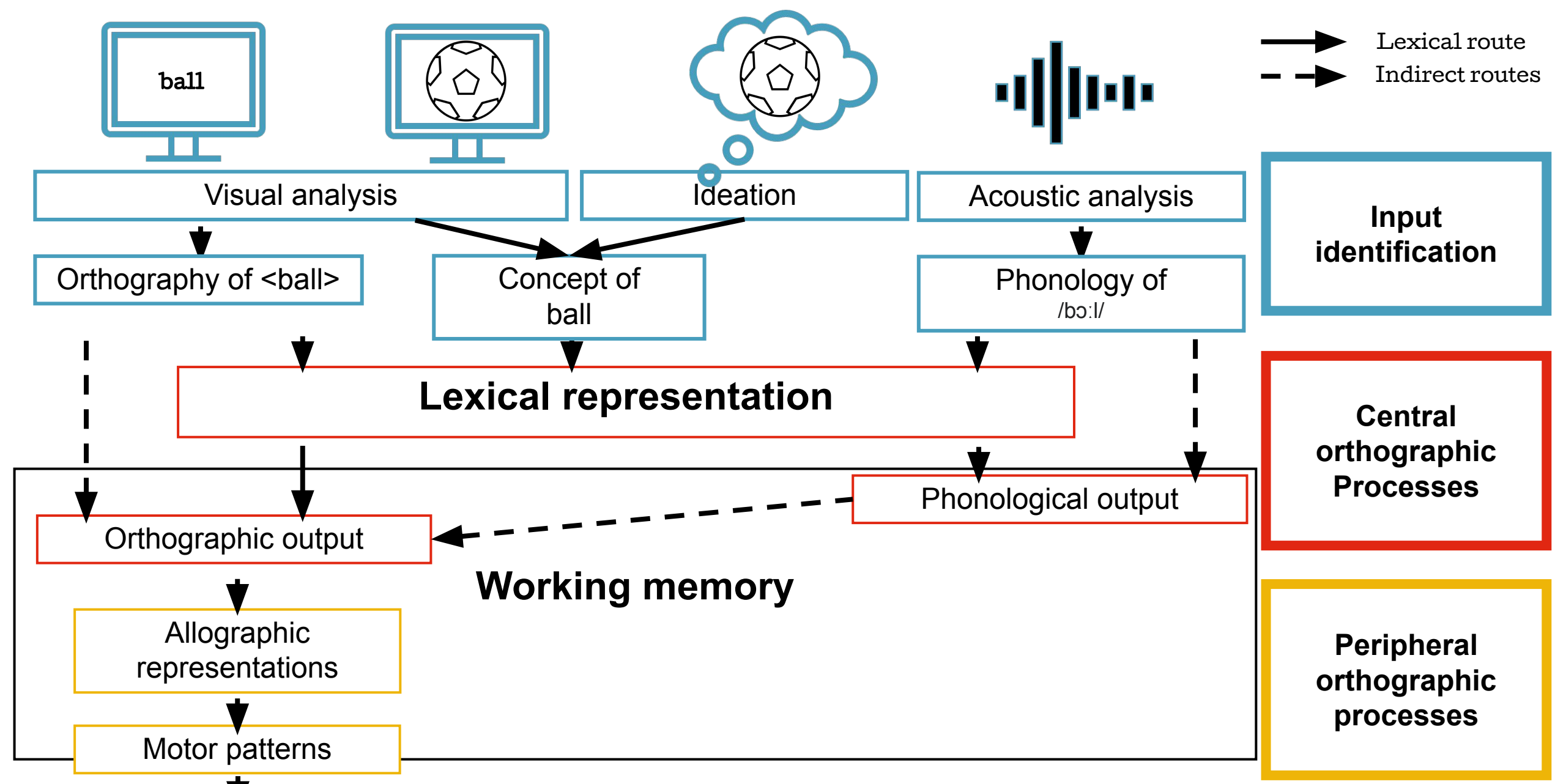
BEFORE



DURING





Côté, E., Breadmore, H. L., & Deacon, S. H. (2023). It's About the Process, Not Perfection: What Spelling Fluency Tells Us about Spelling. In *Routledge International Handbook of Visual-motor skills, Handwriting, and Spelling* (pp. 49-62). Routledge.

Priming task:
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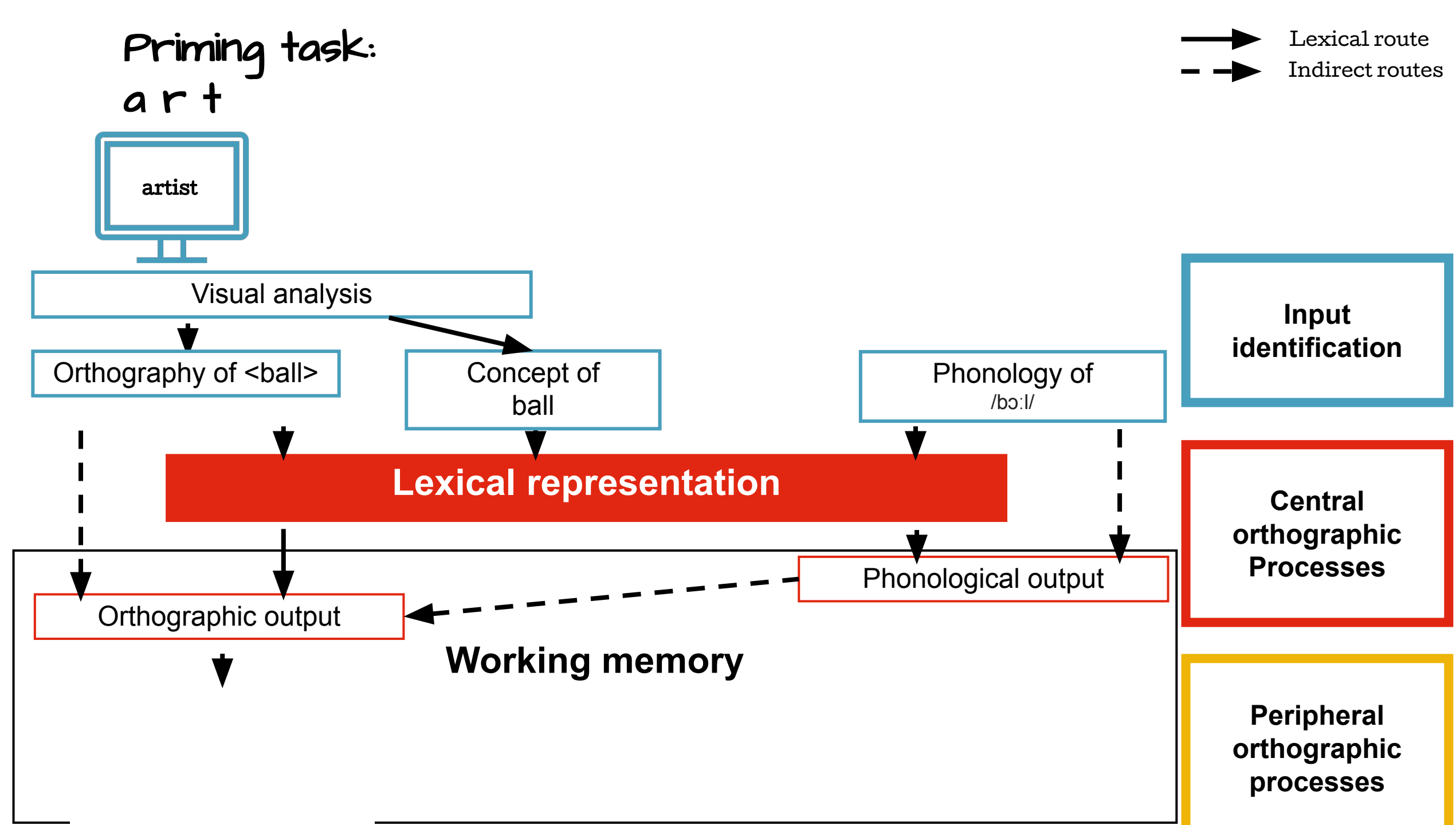

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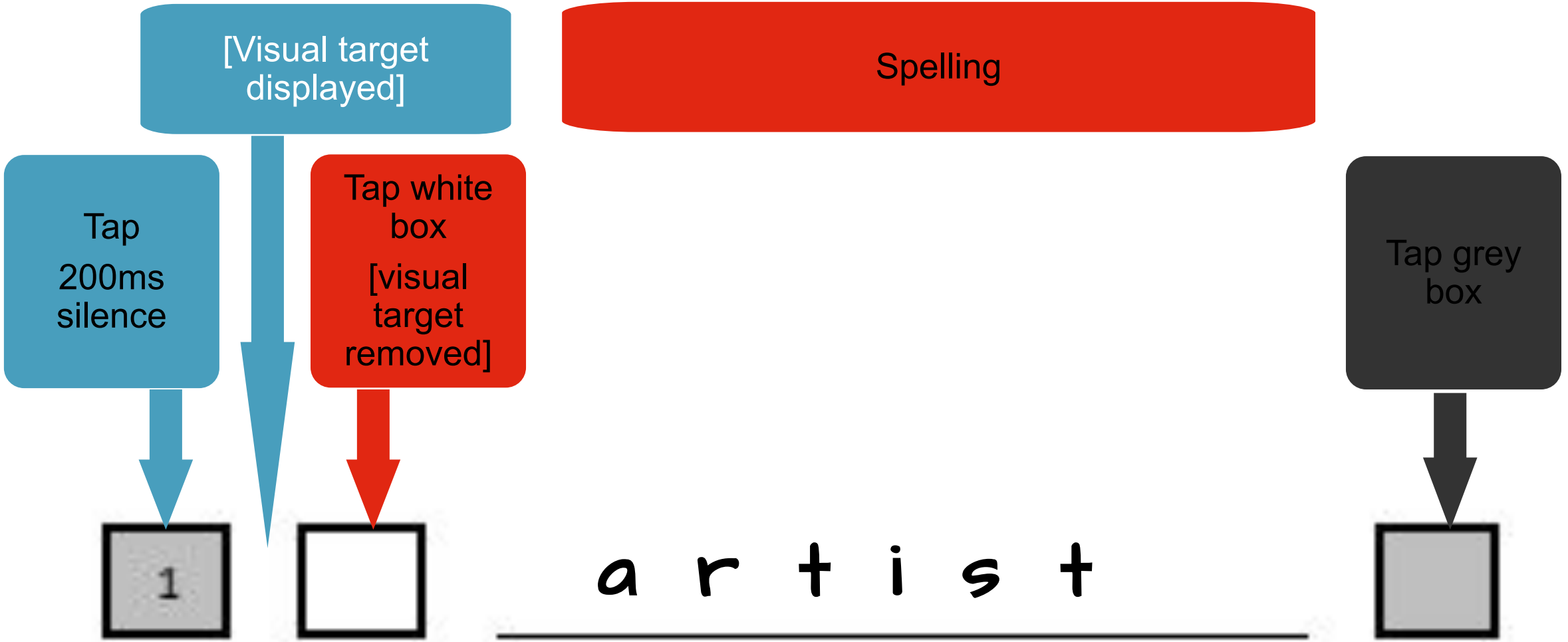
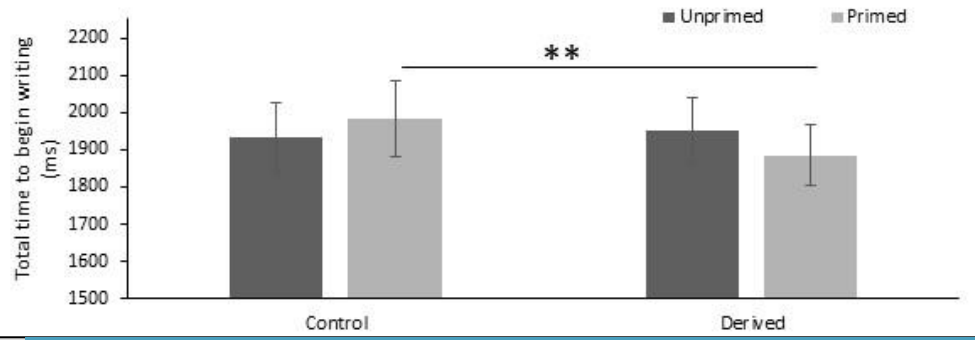


Adults

art
artist
article

Before

A.



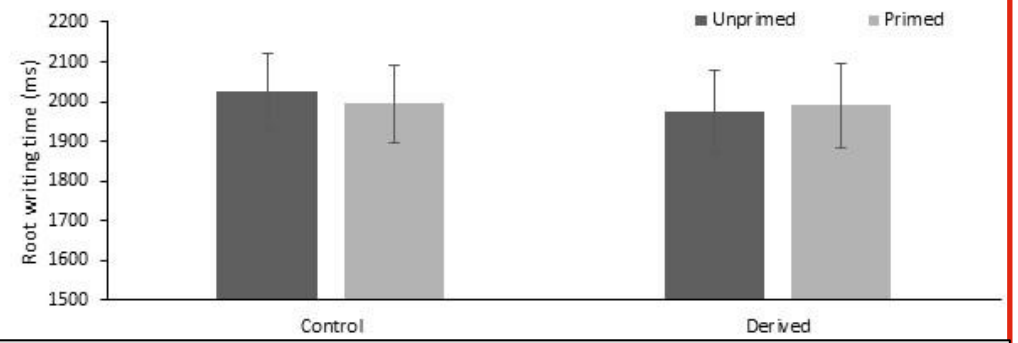
Time to begin writing:

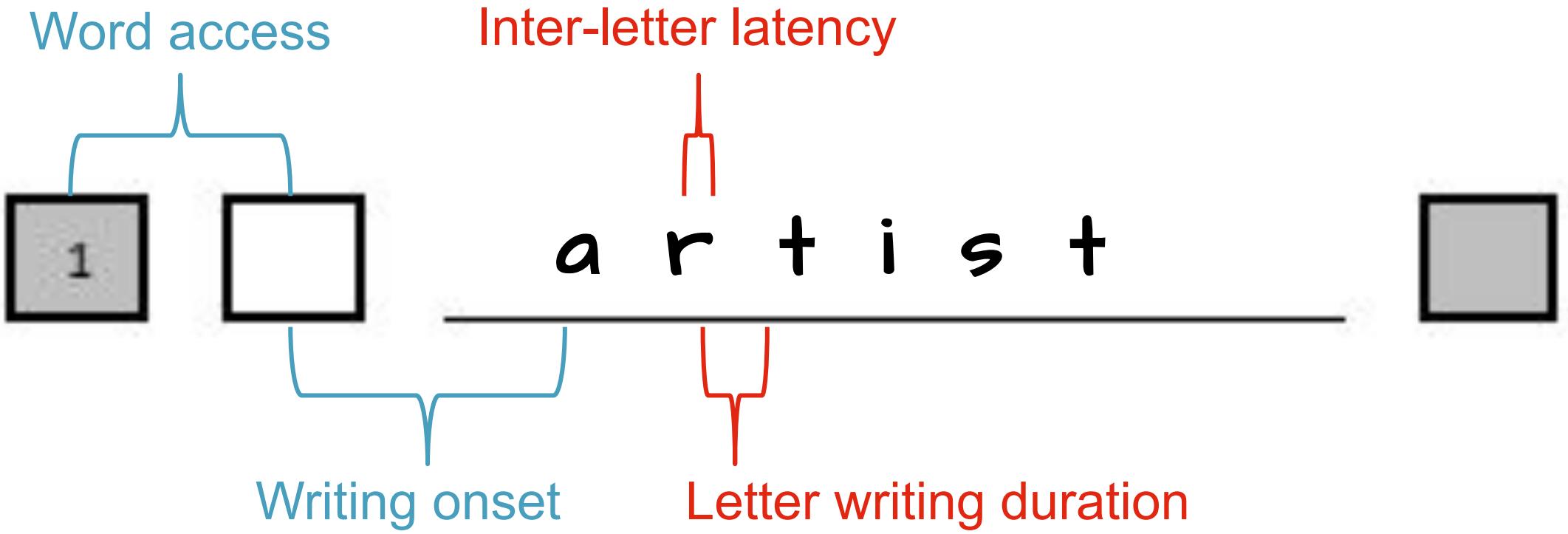
Priming*Condition interaction $\chi^2(1) = 5.84$, $p = .0157$

Main effect of structure for **primed** words $\chi^2(1) = 9.47$, $p = .0021$ (faster to respond to **derived** words, particularly when primed)
NS for unprimed words

During

D.



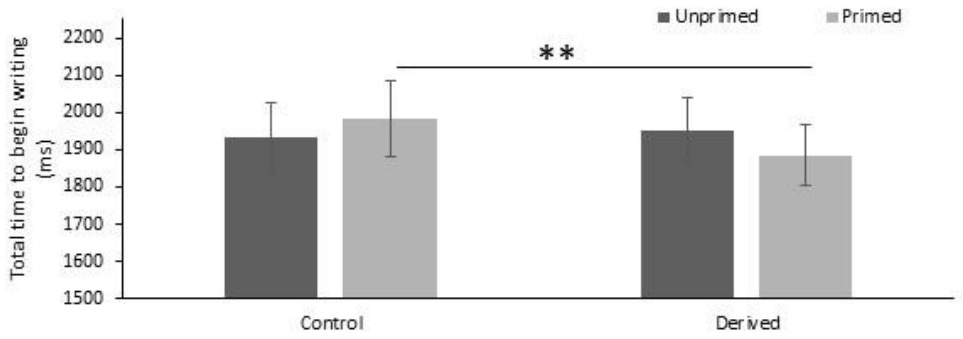

Word access
Inter-letter latency
1
a r t i s t
Writing onset
Letter writing duration

Adults

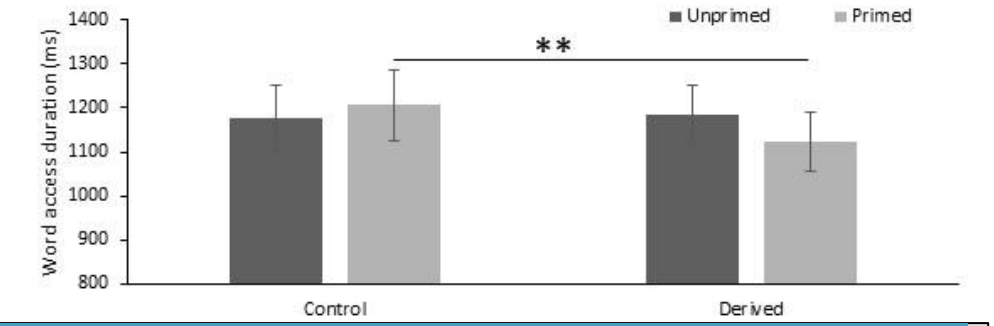
art
artist
article

Before

A.



B.

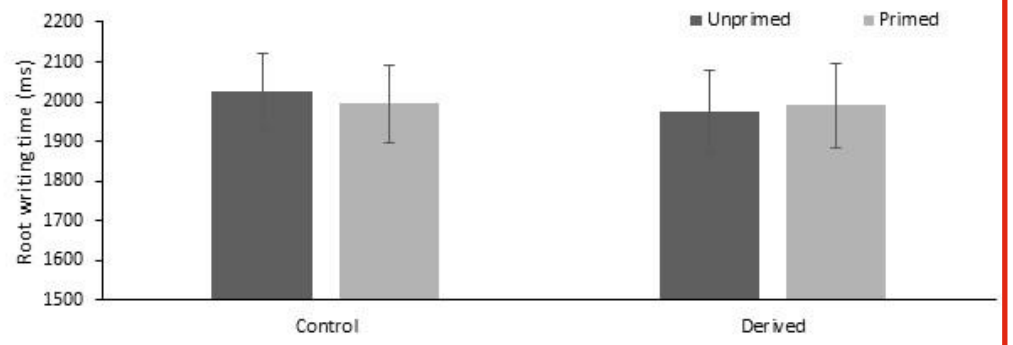


Priming*Condition interaction $\chi^2(1) = 5.84$, $p = .0157$

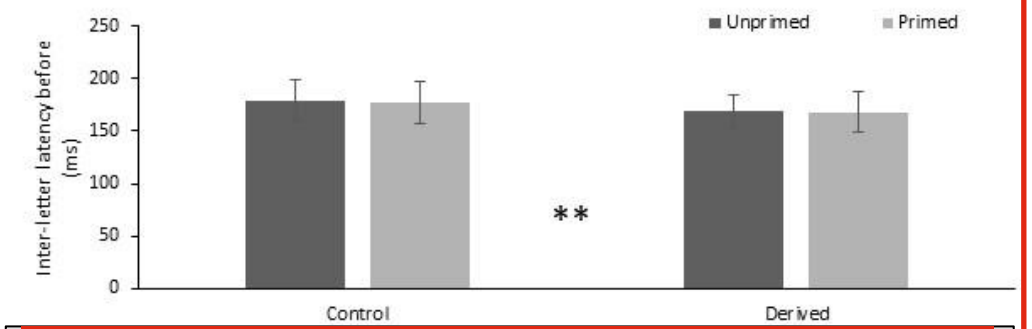
Main effect of structure $\chi^2(1) = 4.14$, $p = .0420$
(overall faster to respond to derived words when primed)

During

D.



E.



Priming*Condition interaction NS

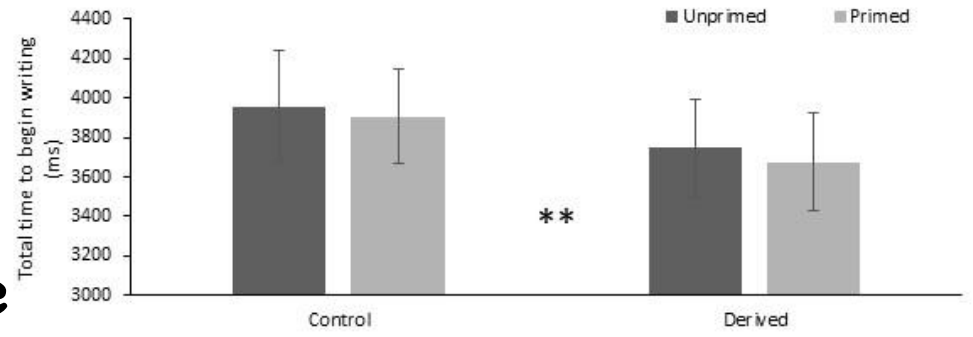
Main effect of structure $\chi^2(1) = 4.14$, $p = .0420$
(faster to respond to derived words)

Children

art
artist
article

Before

A.

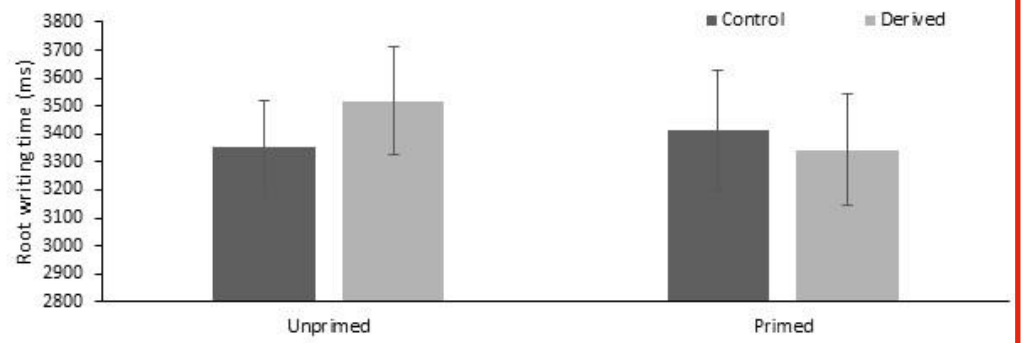


Priming*Condition interaction NS

Main effect of structure $\chi^2(3) = 12.55$, $p = .0057$
(faster to respond to **derived** words)

During

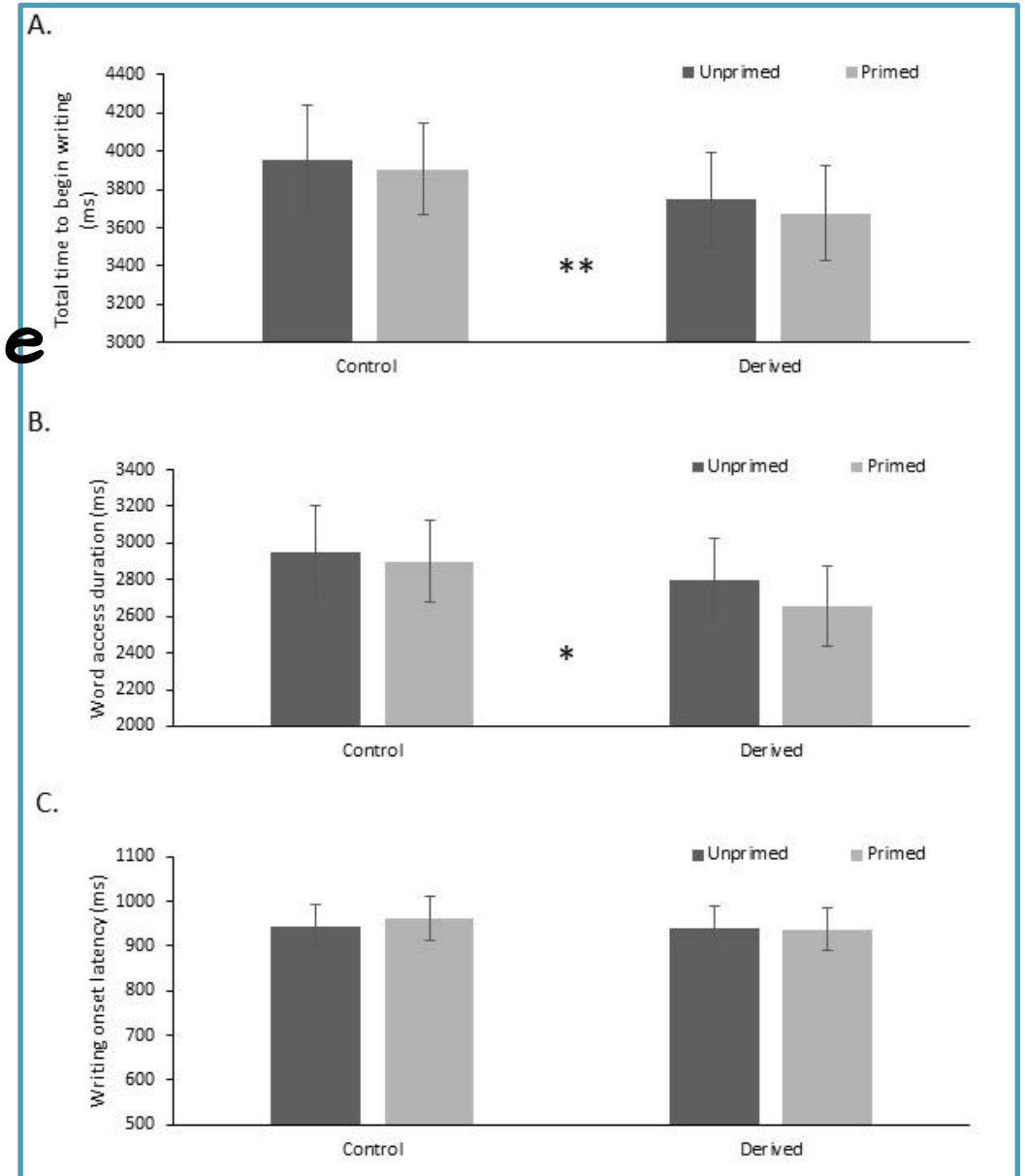
D.



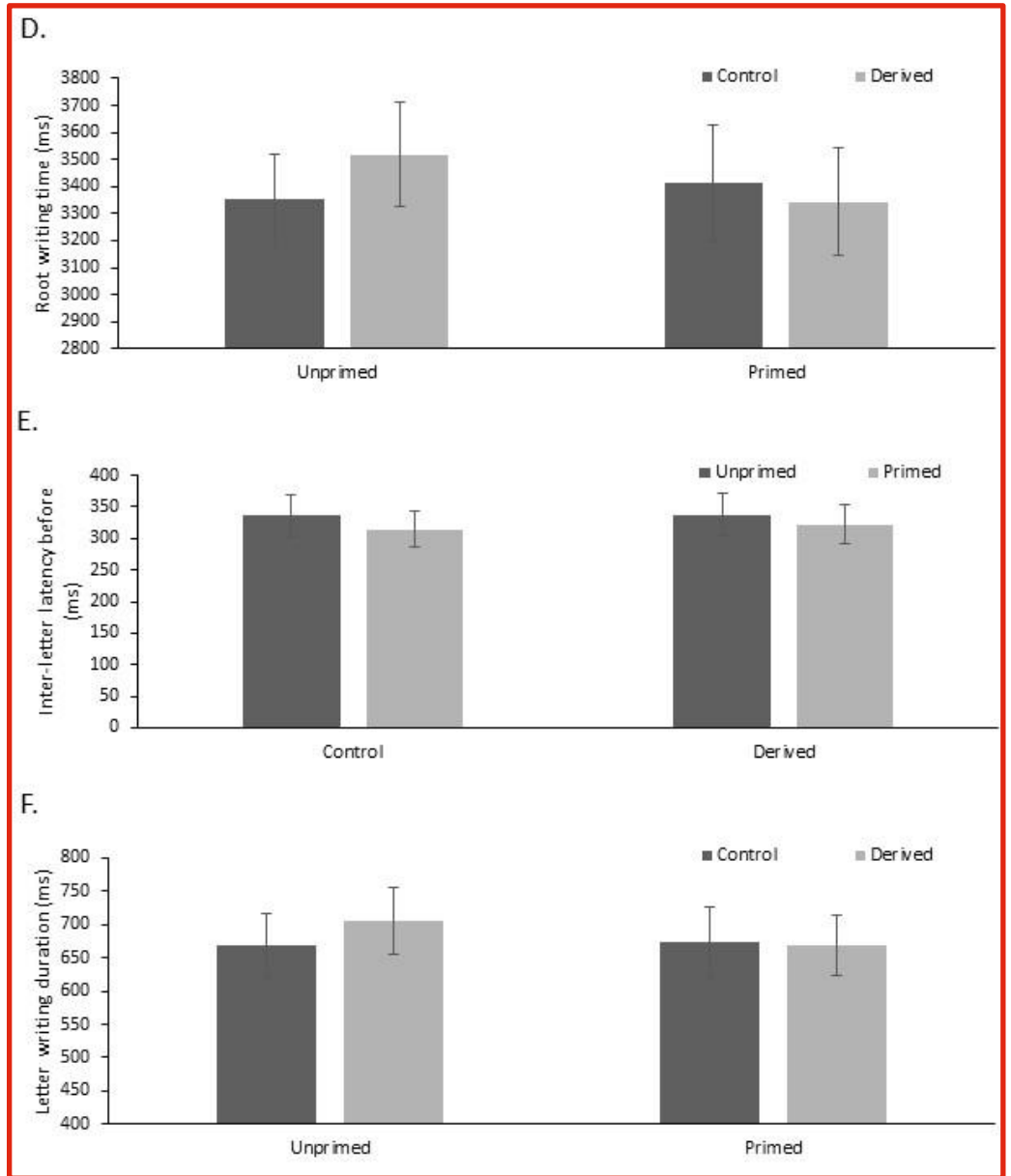
Children

art
artist
article

Before



During

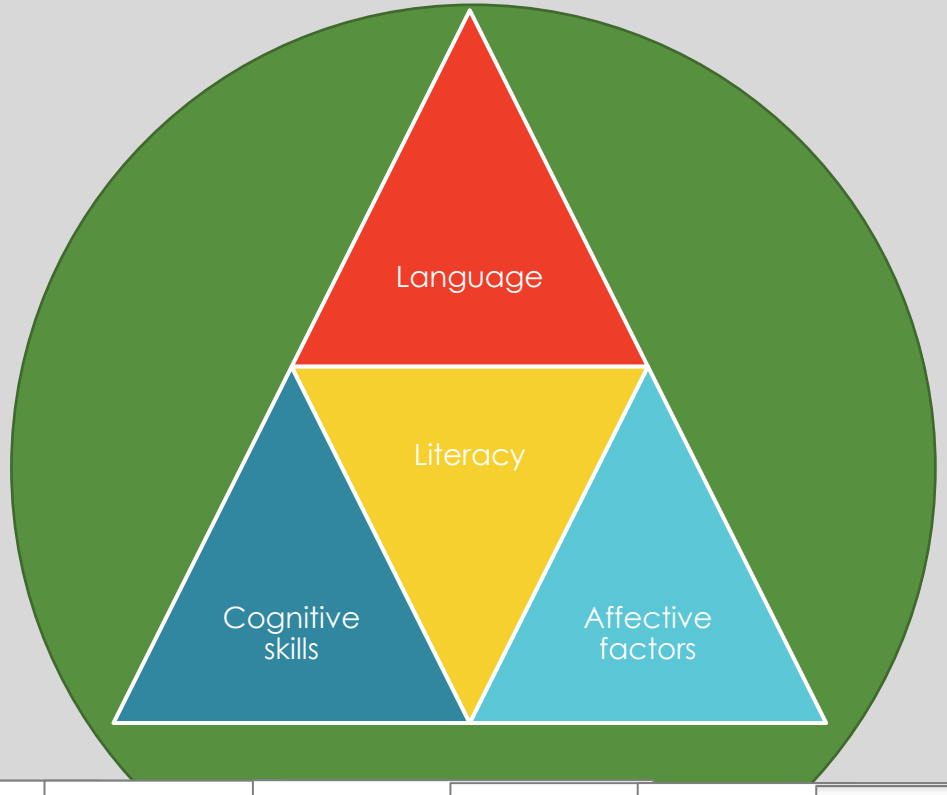


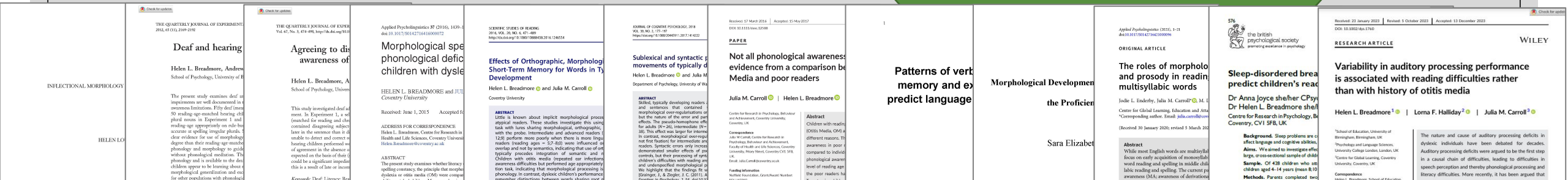
When does morphological processing happen?

- Before spelling production? YES
- And/or during spelling production?
  - Adults but not children (?)

What skills are needed? Who might need help?

- Individual differences, SEND
  - Risk and protective factors
  - D/deaf
  - OME (glue ear - fluctuating hearing)
  - Dyslexia
  - Developmental Language Disorder
- Methods: Longitudinal, cross-sectional, ability-matched





When does morphological processing happen?

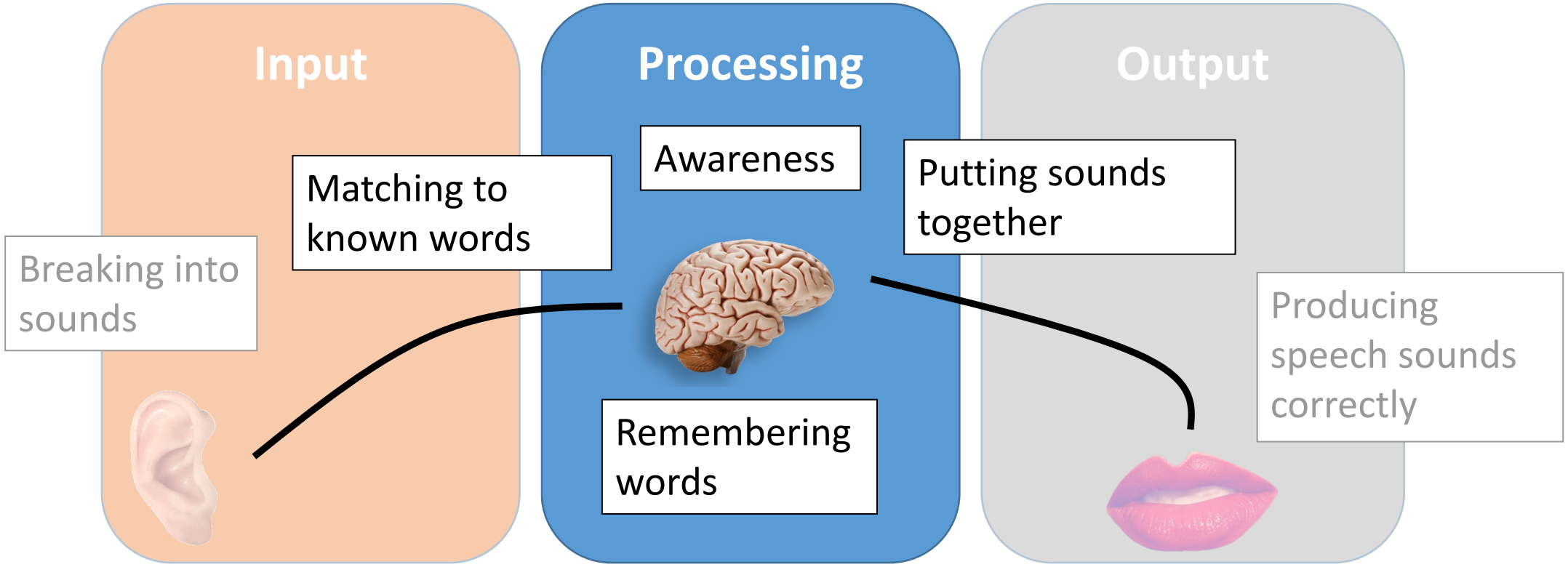
- What skills need to be in place to use morphology?
- Do phonological skills need to be secure?

Dyslexia

Phonological awareness: Ability to manipulate the sounds of spoken language

Difficulty in reading and spelling (particularly fluency) (Carroll et al., 2025)

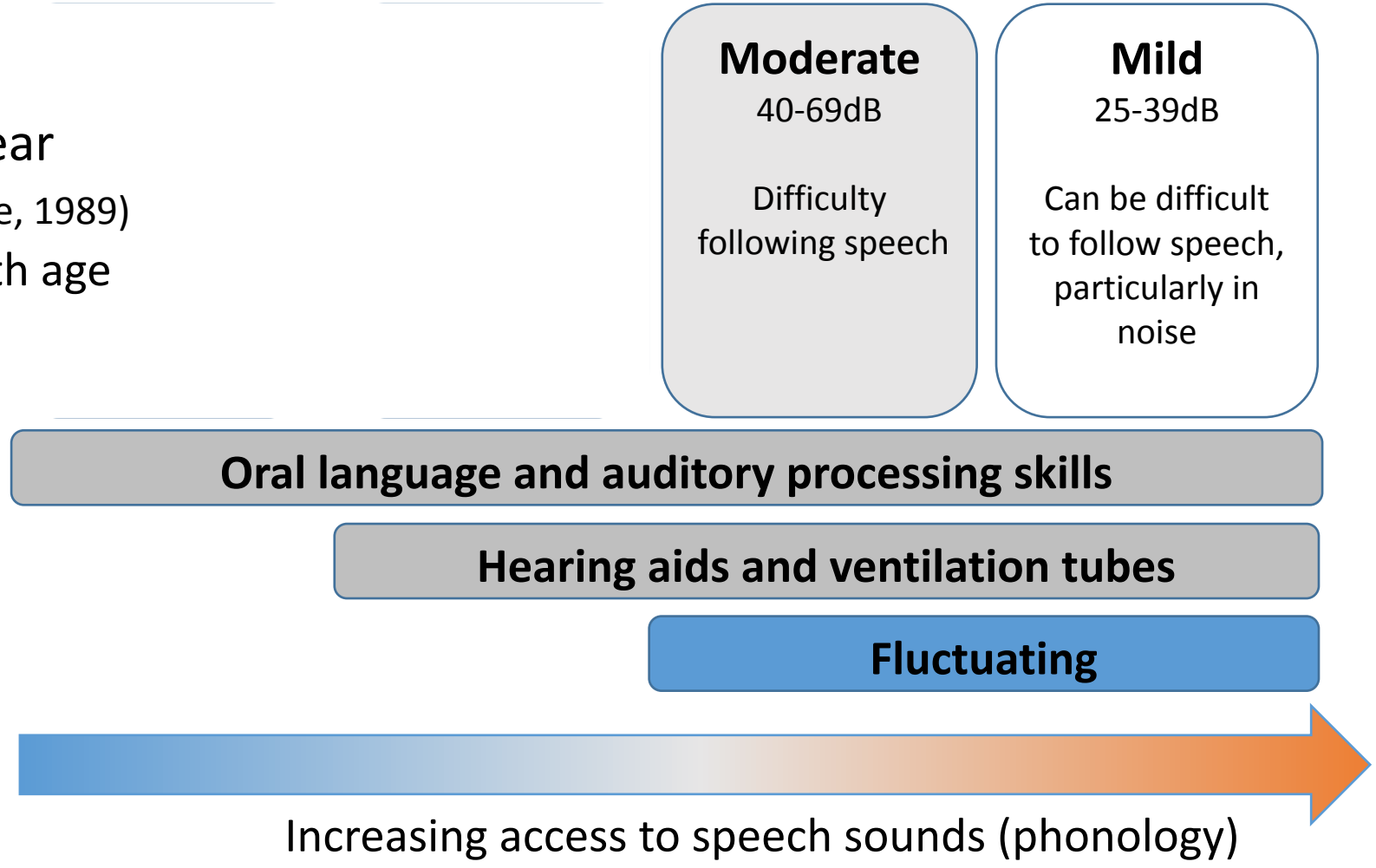
Associates with phonological awareness difficulties - unknown aetiology (Snowling & Carroll, 2011)



Otitis media with effusion (OME)

Middle ear infections, glue ear

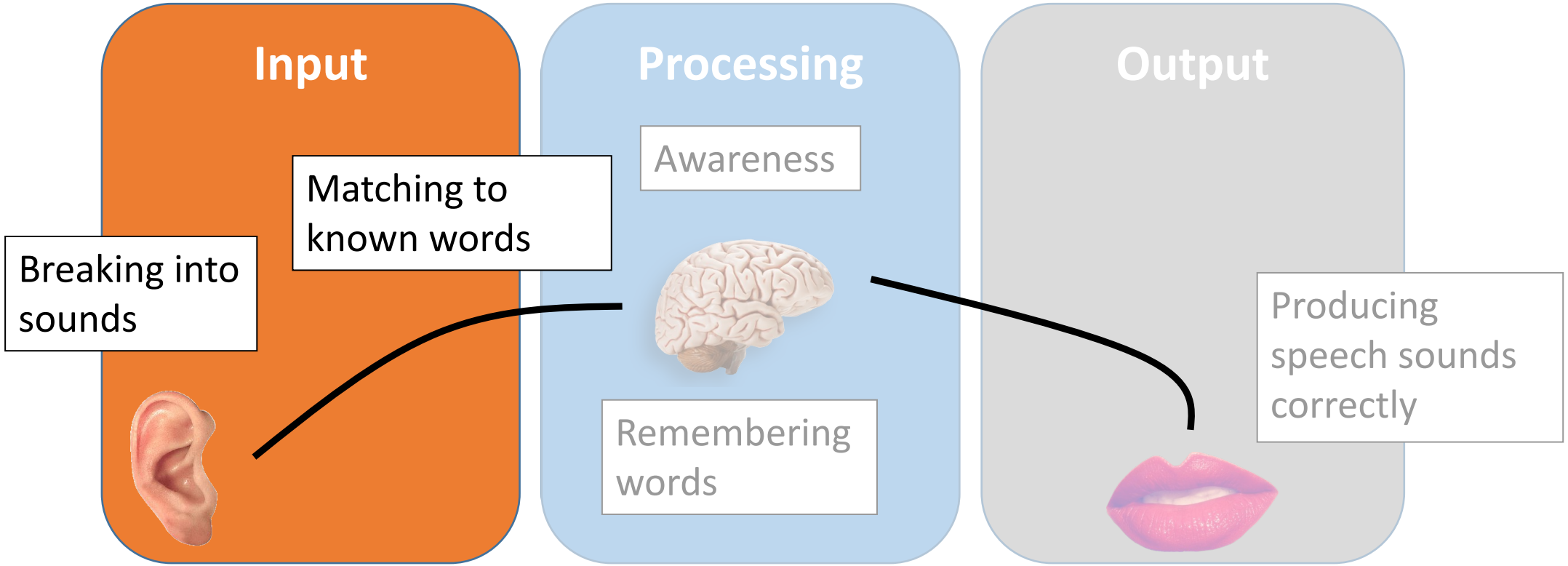
- 46% of 3 year olds (Teele, 1989)
- Prevalence declines with age



OME

Severe and persistent cases

Phonological difficulties of known aetiology



Participants

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PAPER

WILEY Developmental Science

Not all phonological awareness deficits are created equal: evidence from a comparison between children with Otitis Media and poor readers

Julia M. Carroll | Helen L. Breadmore

Centre for Research in Psychology, Behaviour and Achievement, Coventry University

Abstract

		Dyslexia		OME	
	N	36		29	
	CA	9;1	(7;5-10;9)	9;2	(8;0-10;9)
	RA	7;3	(5;7-8;9)	9;2	(5;10-12;3)
Chronological age match	CA	9;1	(7;8-10;10)	9;2	(7;9-10;7)
	RA	10;6	(8;9-12;9)	10;5	(8;9-12;9)
Reading age match	CA	7;4	(5;4-9;3)	8;8	(6;0-11;6)
	RA	7;5	(5;10-8;9)	9;3	(5;7-12;3)

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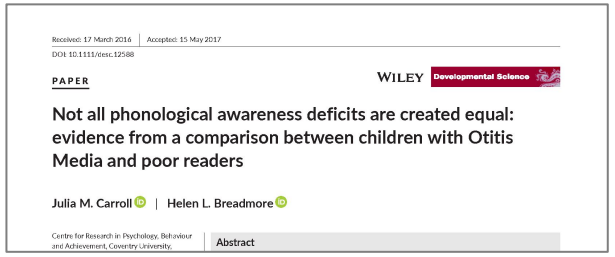
Literacy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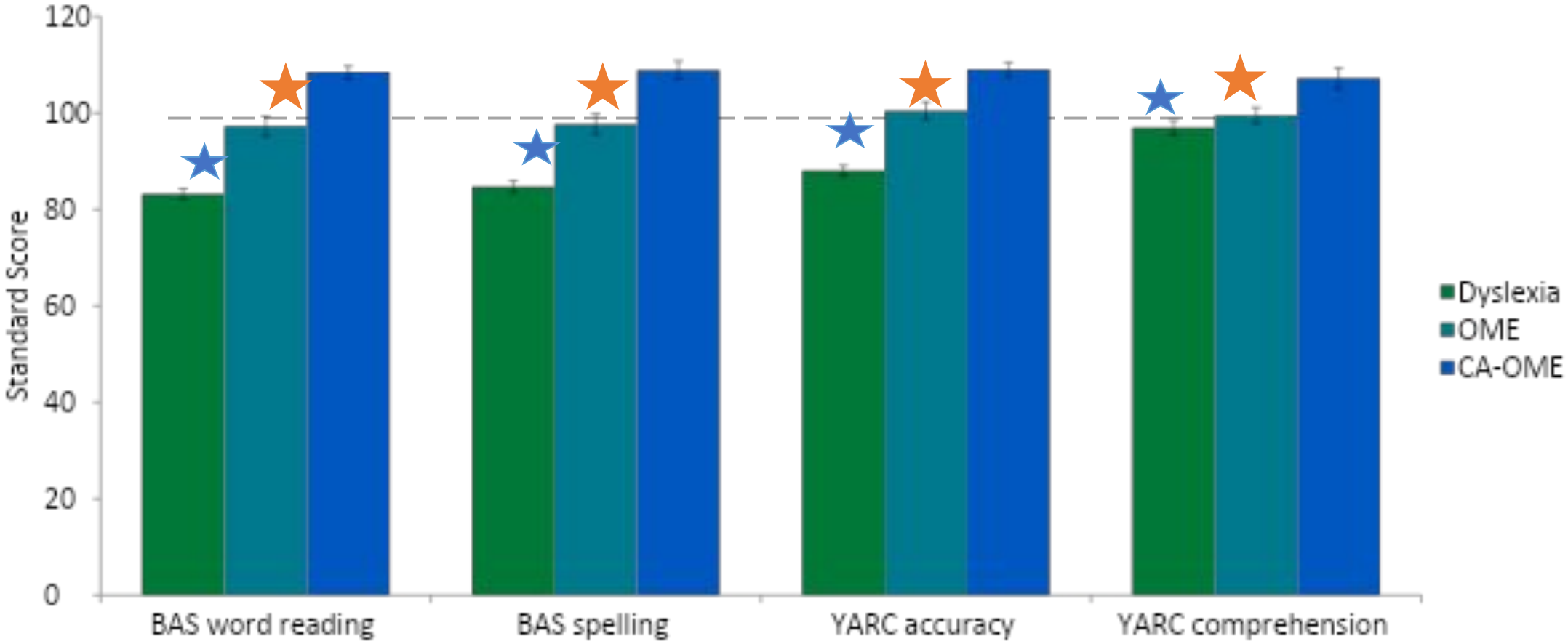

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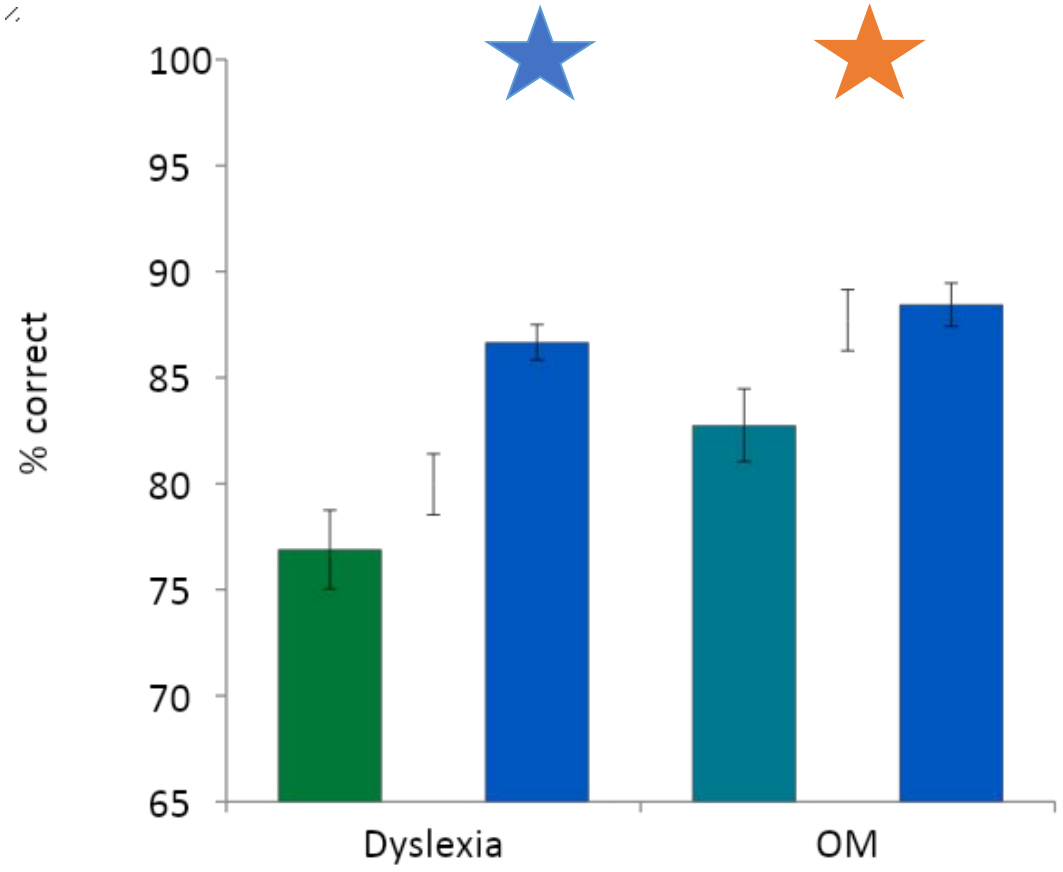
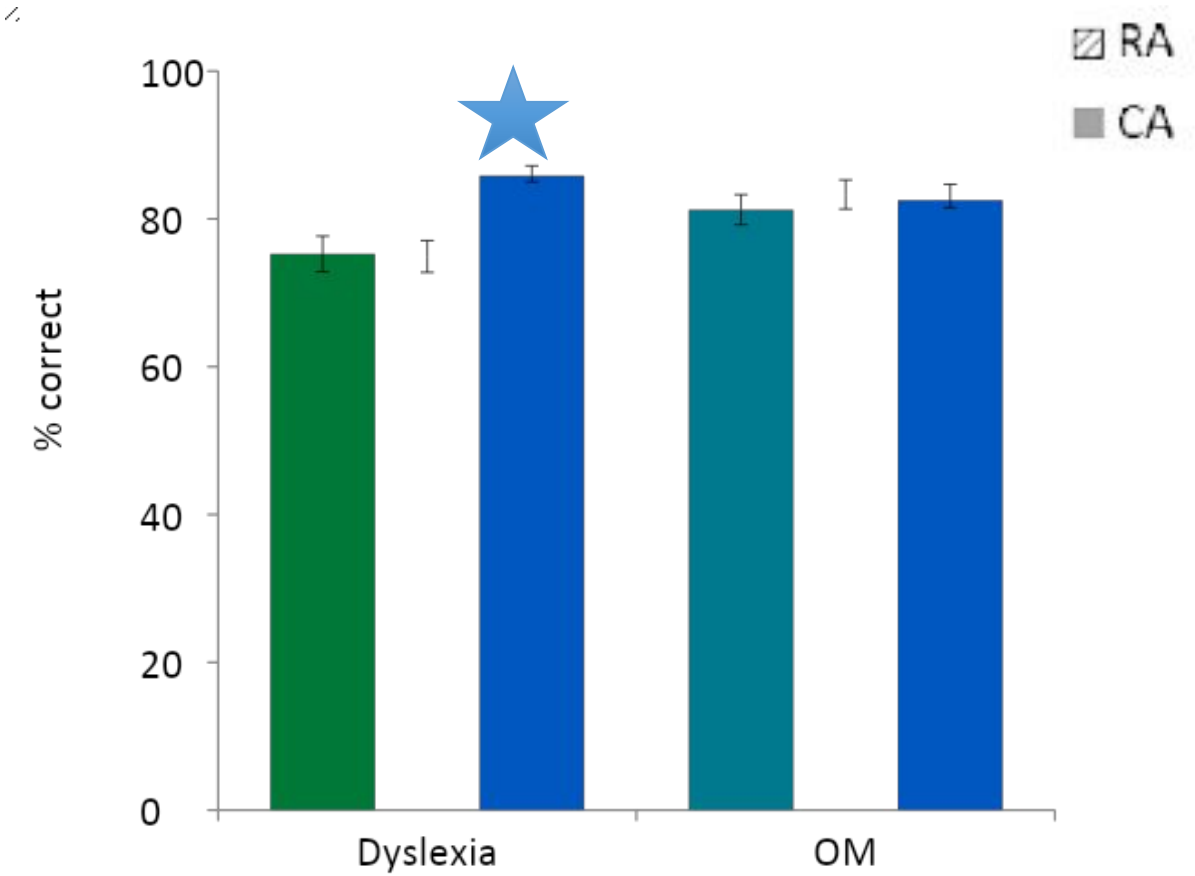
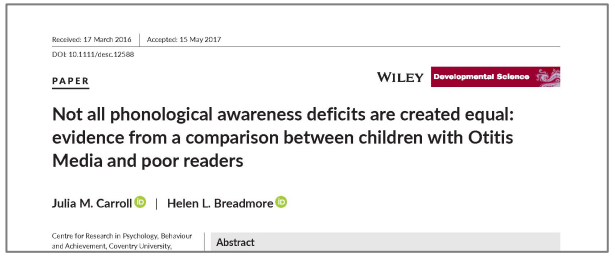
Awareness

Phonological: (CELF PA)



Morphological (CELF MA)

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When does morphological processing happen?

- What skills need to be in place?
- Do phonological skills need to be secure?

Dyslexia: Weaknesses in PA and MA
OME: Weaknesses in PA but not MA

Is there evidence that morphological training can work?

- What skills need to be trained?
- What training is effective?

Morphological training improves word knowledge – reading, spelling, vocabulary

Systematic reviews and meta-analyses
(Bowers et al., 2010; Goodwin & Ahn, 2010; Goodwin & Ahn, 2013; Bratlie et al., 2022; Colenbrander et al., 2024).

Colenbrander et al. (2024)

- Small to medium effect sizes
- Transfer to untrained words for spelling (but possibly not reading?)
- Less evidence of effects on comprehension

Studies tend to be small scale, effects, dosage and outcome measures are variable.

Intervention contents varies – often unclear what components of morphological knowledge are trained (rarely all!).

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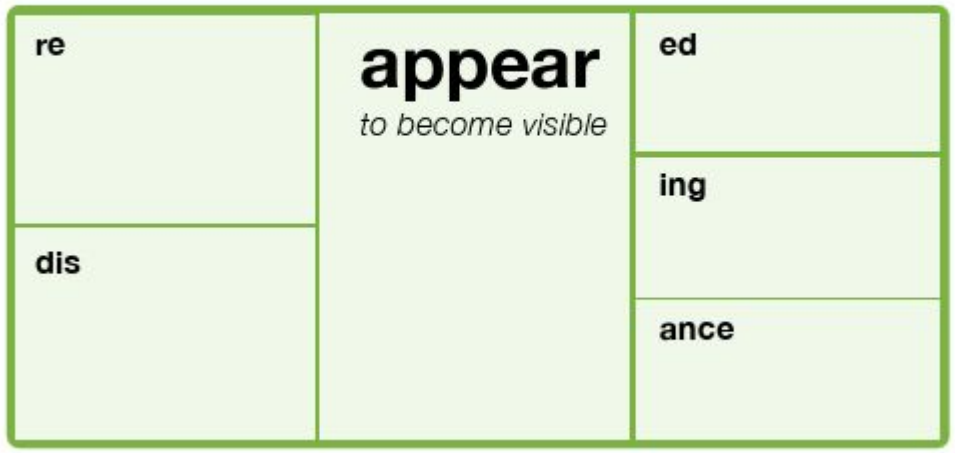
Colenbrander, D., von Hagen, A., Kohnen, S., Wegener, S., Ko, K., Beyersmann, E., Behzadnia, A., Parrila, R., & Castles, A. (2024). The Effects of Morphological Instruction on Literacy Outcomes for Children in English-Speaking Countries: A Systematic Review and Meta-Analysis. *Educational Psychology Review, 36(4), 119. https://doi.org/10.1007/s10648-024-09953-3*

Different types of morphological interventions

Figure 13: An example of a graphic organiser for morphology



Bilton, C., & Duff, A. (2021). *Improving literacy in Key Stage 2: Guidance Report. Education Endowment Foundation, London.*

Direct morphological decoding instruction (e.g., Savage et al., 2024)

- primarily text based, focus on decoding and synthesis of morphemes.

Morphological inquiry (e.g., Bowers et al., 2010; Kriby & Bowers, 2017; Colenbrander et al., 2022; Savage et al., 2024)

- primarily oral and inquiry led, focus on meaning, high demands on teacher.

Implicit (e.g., Torkildsen et al., 2021)

- learn from increased exposure to statistical regularities in the language, low demands on teacher.

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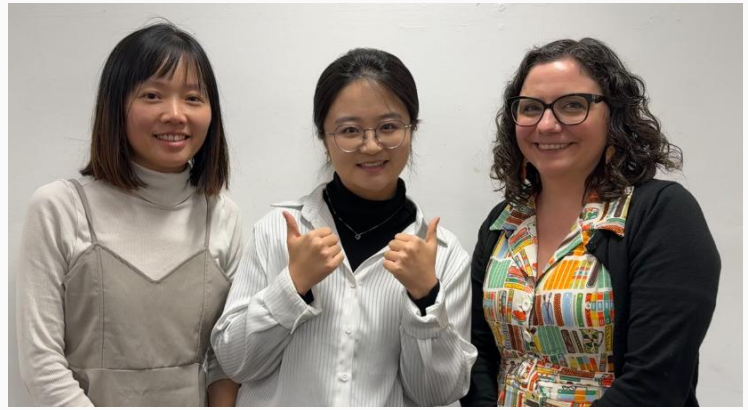
Ongoing research

Morphological spelling intervention for Year 3 (Cawley et al., forthcoming)

- 10 weeks, detailed lesson plans
- Cumulative and sequentially structured (includes revision and consolidation)
- Mapped to national curriculum for English

Morphological training programme for Chinese-English bilinguals (Yin et al., forthcoming)

- 8 weeks, digital programme
- Sequentially structured
- Impact on English spelling, reading and comprehension
- Cross-language transfer?



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Conclusions

- Good evidence that we use morphology during literacy tasks
- Good evidence that morphological skills associate with literacy abilities
  - Even when other skills (e.g., phonological awareness) are weak/impaired
  - Although children with dyslexia often have difficulties in both
- A range of different morphological interventions have been shown to increase morphological skills and literacy skills

Take home message:

Assess morphological skills (awareness, decoding, analysis)

Integrate morphological training into literacy instruction

Thank you!

Participants: pupils, parents and teachers
Key collaborators: Julia Carroll, Hélène Deacon
PGR students: Katherine Hall, Parminder Khela, Sara Whylie, Jodie Enderby, Kathryn Cawley, Zhenyan Yin

Any questions?

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