

The journey from form to meaning in English and other writing systems

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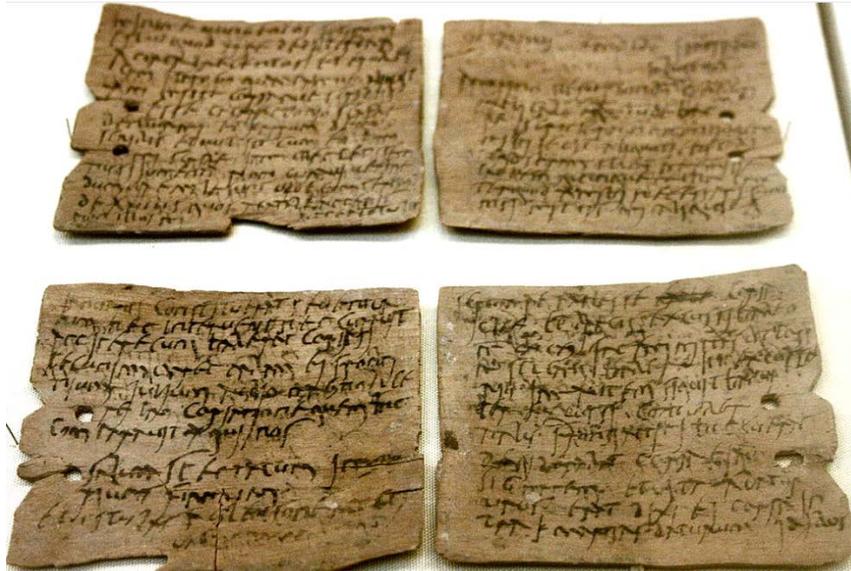
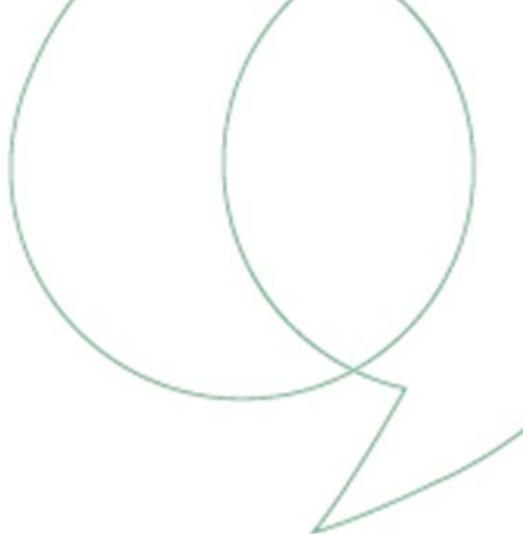
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2019
Every child a reader.
Every child a writer.



The Leverhulme Trust



Writing is a cultural invention



Vindolanda Writing Tablets (ca 100 CE,
Northumbria)



Codex Amiatinus (ca 700 CE,
Wearmouth-Jarrow, Northumbria)



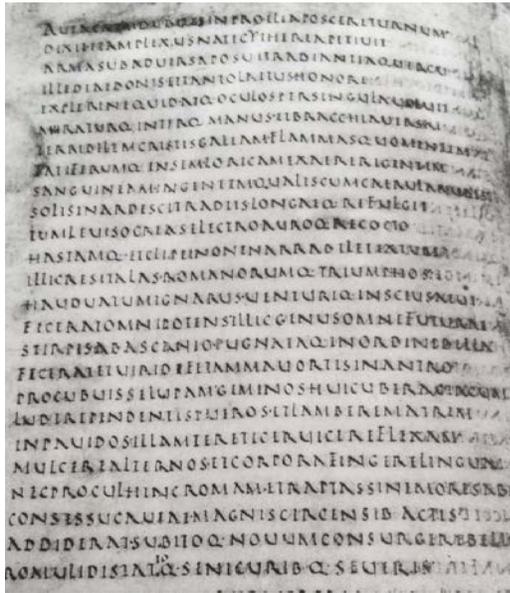
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Reading, writing and human capability

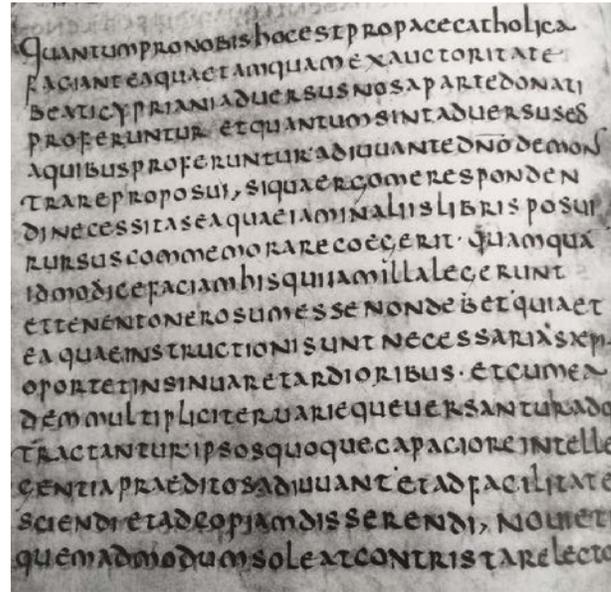


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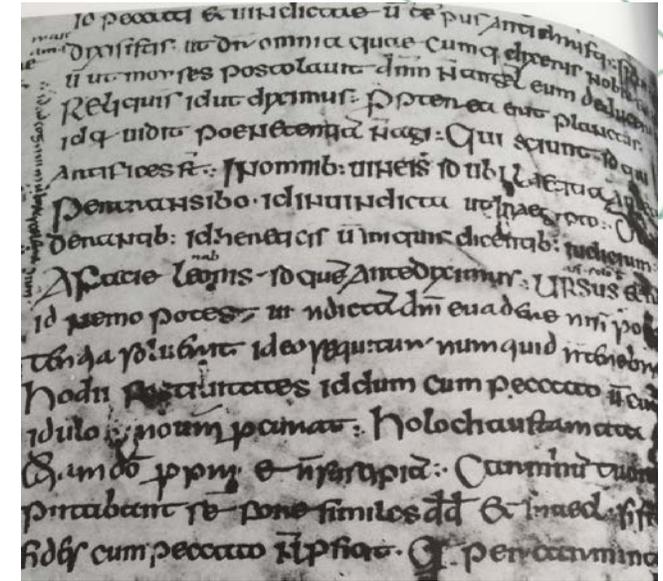
Writing in antiquity



Italy, 5th century



Spain, 7th century



Ireland, 7th century

Spacing and other graphic devices

- Developed in parallel with silent reading
- Developed largely in Ireland

What is modern reading?

Jess decided to cut and run. She couldn't face what might happen next.

- Analysis of visual features (e.g. run vs rub)
- Analysis of letters and letter positions (e.g. run vs urn)
- Analysis of morphemes (e.g. –ed reflects the past)
- Analysis of meanings of individual words
- Analysis of figurative / ambiguous language
- Analysis of causal connections
- Use of background knowledge; inferencing skills
- Demands on working memory and executive skills

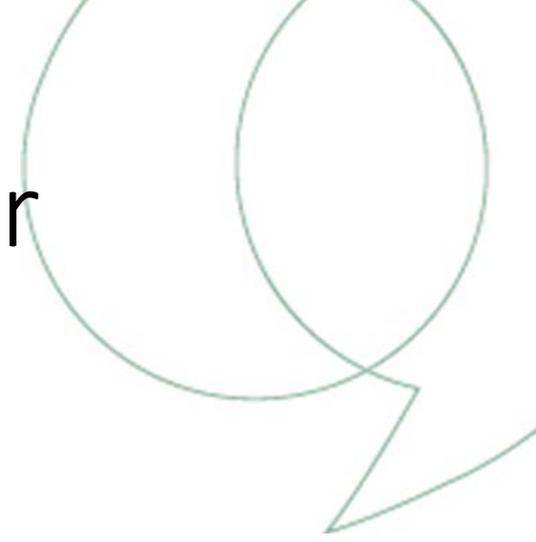
The immense complexity of reading is one reason why there has been such heated debate about how it should be taught.



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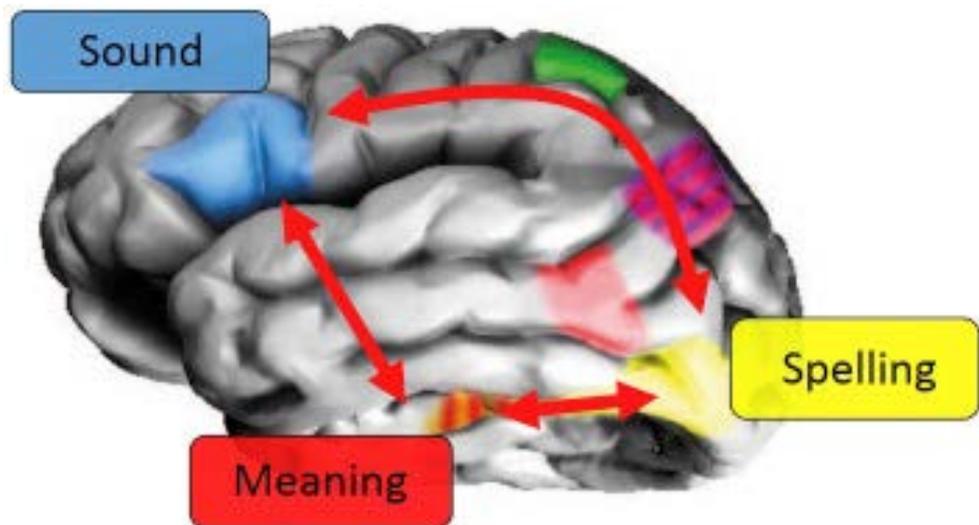


Skill acquisition versus skilled behaviour

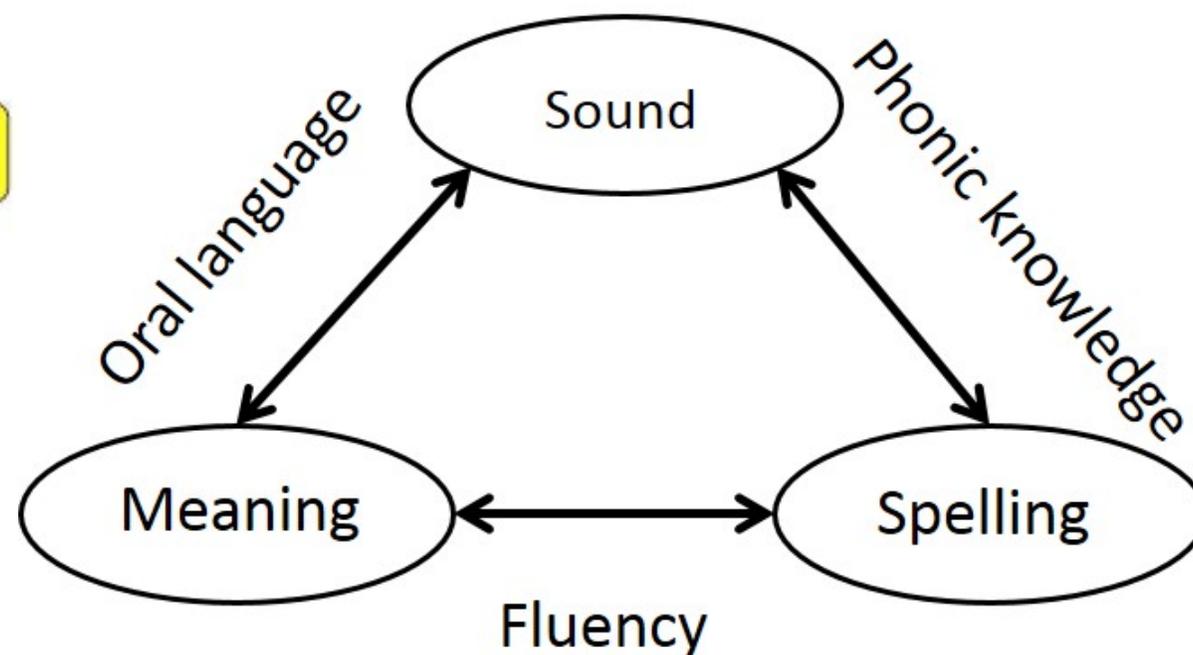


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Plan for the talk



Learning to read single words

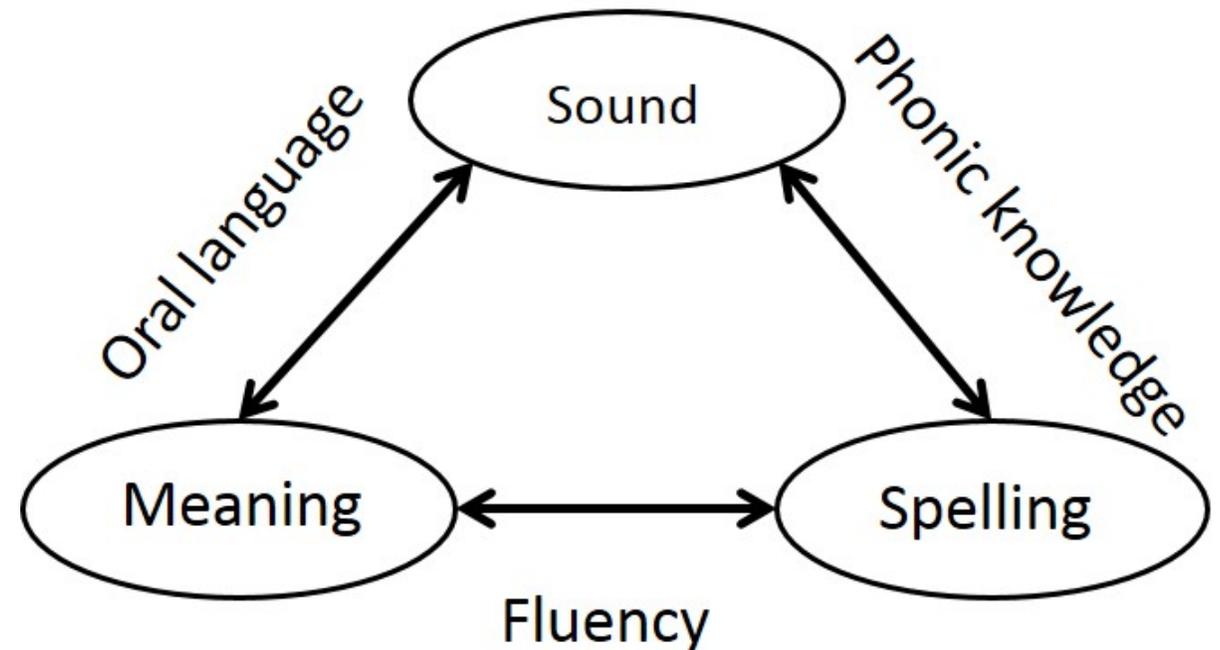


Plan for the talk

“the study of reading and reading acquisition is the study of how information transmitted through writing becomes represented in the minds and brains of individuals, through an accumulation of instruction and text experience” (Rastle, 2019)

The skilled product is always a reflection of these ingredients.

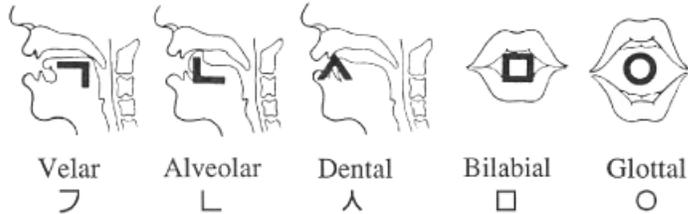
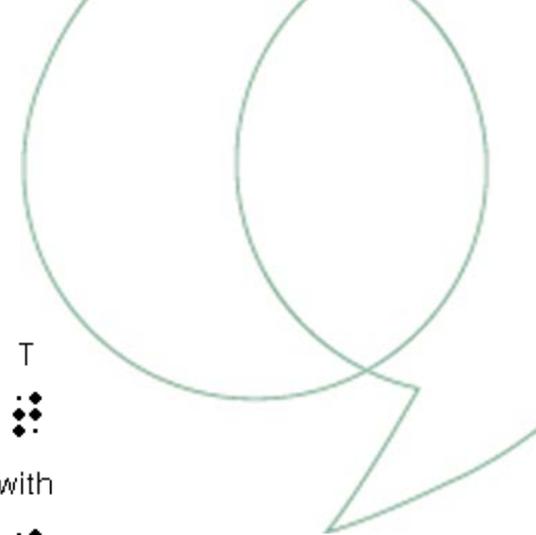
Learning to read single words



Writing systems

가 ga	나 na	다 da	라 ra	마 ma	바 ba	사 sa	아 a
가 gya	냐 nya	다 dya	랴 rya	마 mya	바 bya	샤 sya	야 ya
거 geo	너 neo	더 deo	러 reo	머 meo	버 beo	서 seo	어 eo
겨 gyeo	녀 nyeo	더 dyeo	려 ryeo	머 myeo	벼 byeo	셔 syeo	여 yeo
고 go	노 no	도 do	로 ro	모 mo	보 bo	소 so	오 o
교 gyo	뇨 nyo	도 dyo	료 ryo	묘 myo	뇨 byo	쇼 sya	요 yo

K	L	M	N	O	P	Q	R	S	T
⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠
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⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠
ch	gh	sh	th	wh	ed	er	ou	ow	W
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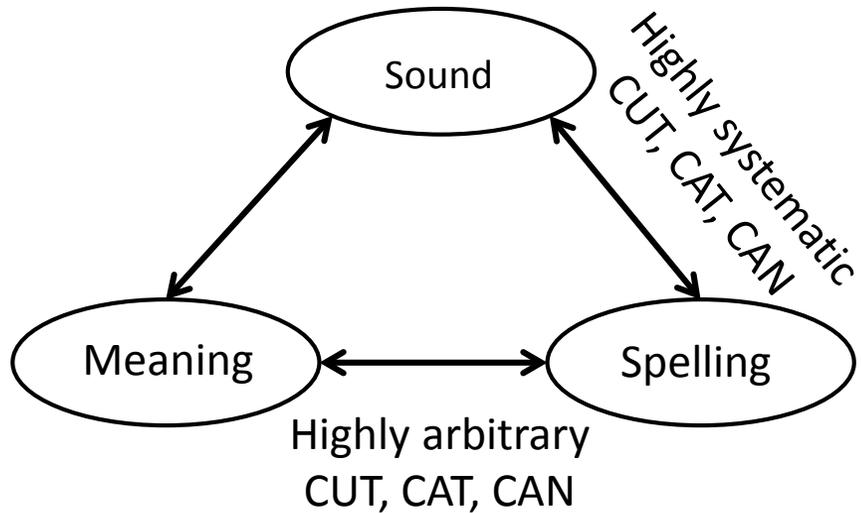
Upper case
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Lower case
a b c d e f g h i j k l m n o p q r s t u v w x y z

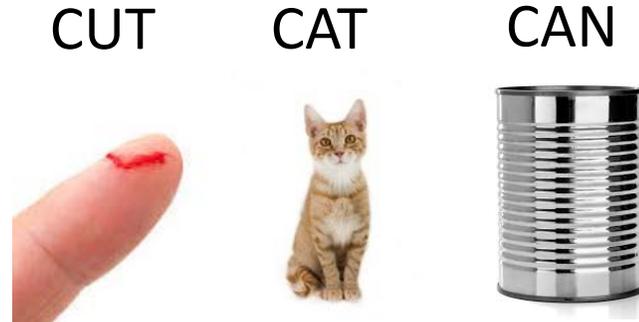


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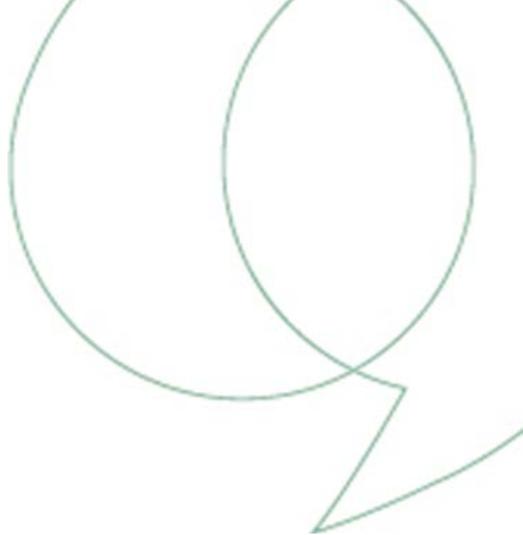
Learning to recognise English words



Skilled English readers can recognize ~70,000 printed words;
Children in reception exposed to ~5,000 printed words



- Spelling-sound knowledge provides hook into oral language
- Systematic phonics teaches this knowledge explicitly
- Allows generalisation (e.g. NUT)
- What about Chinese?



Learning the spelling-sound mapping



Jo Taylor

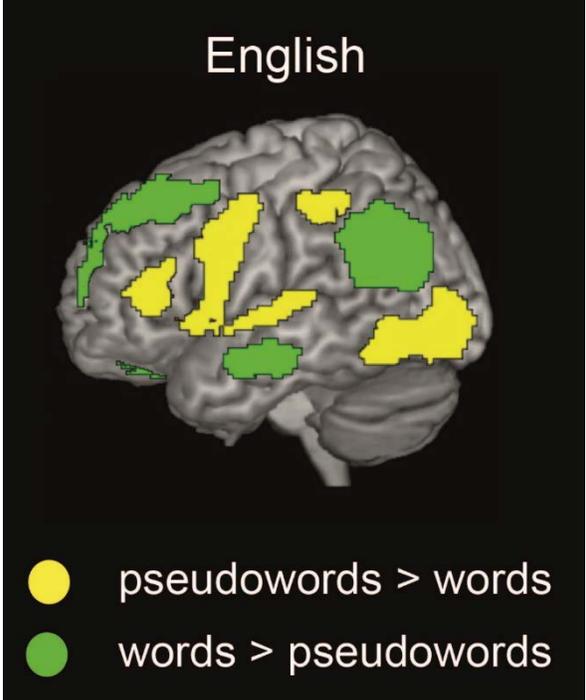
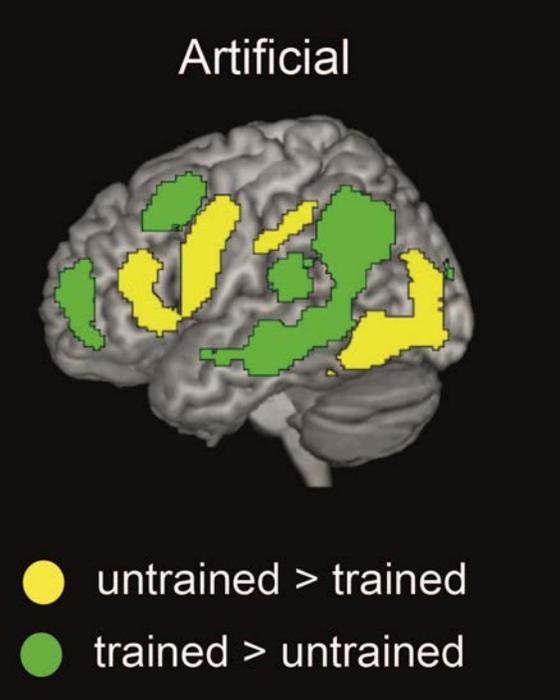
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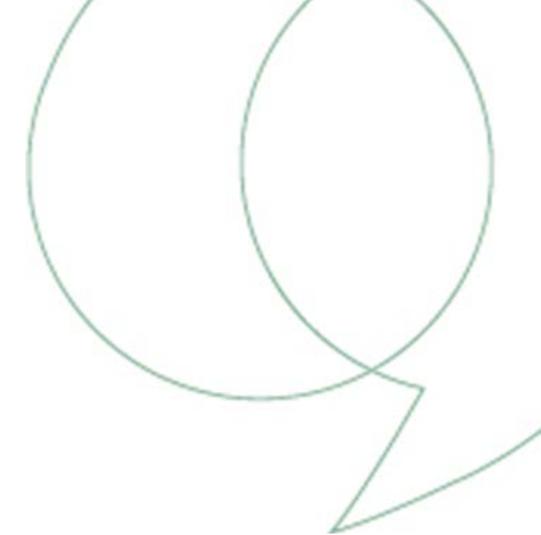
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Fully trained participants show benchmark effects of reading and generalisation.



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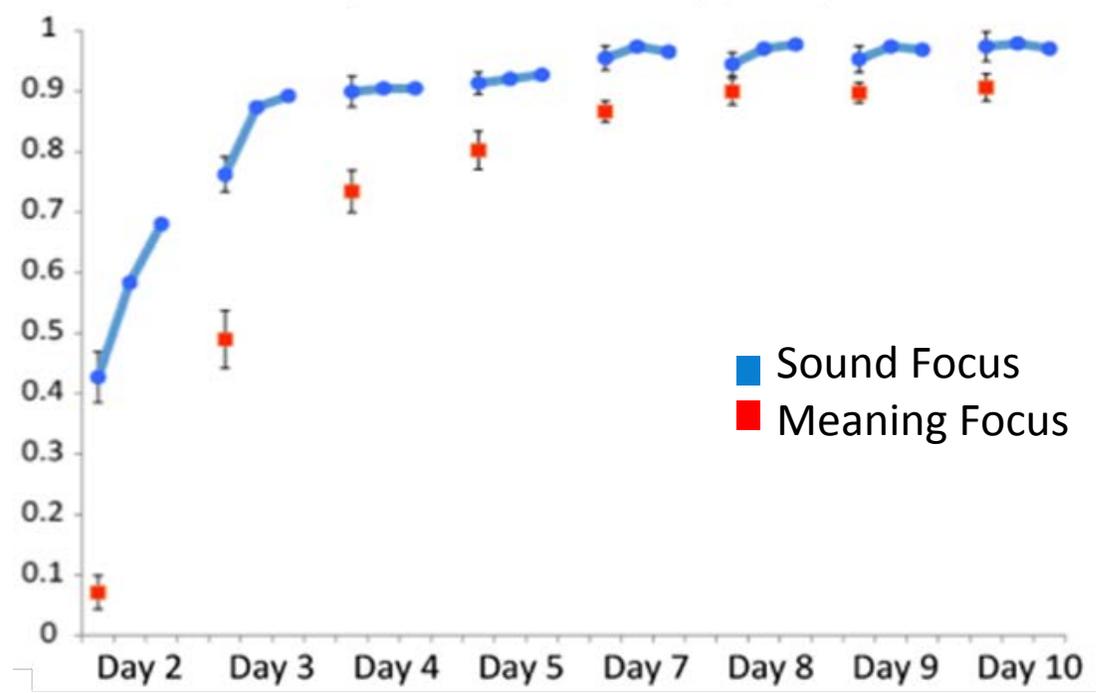


Learning the spelling-sound mapping



Jo Taylor

Reading Aloud Accuracy




 kEs


 falm


 gVk

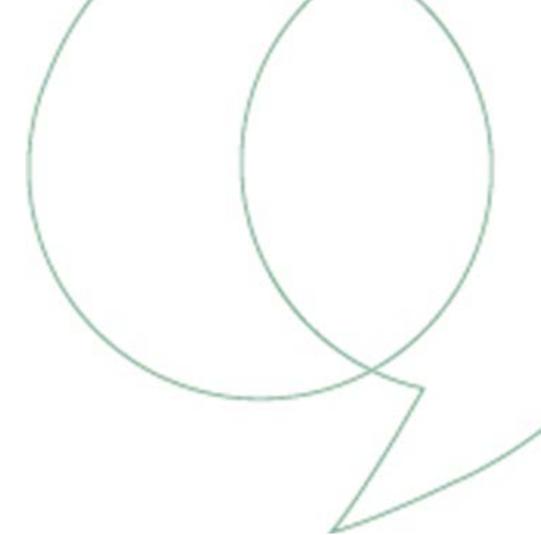

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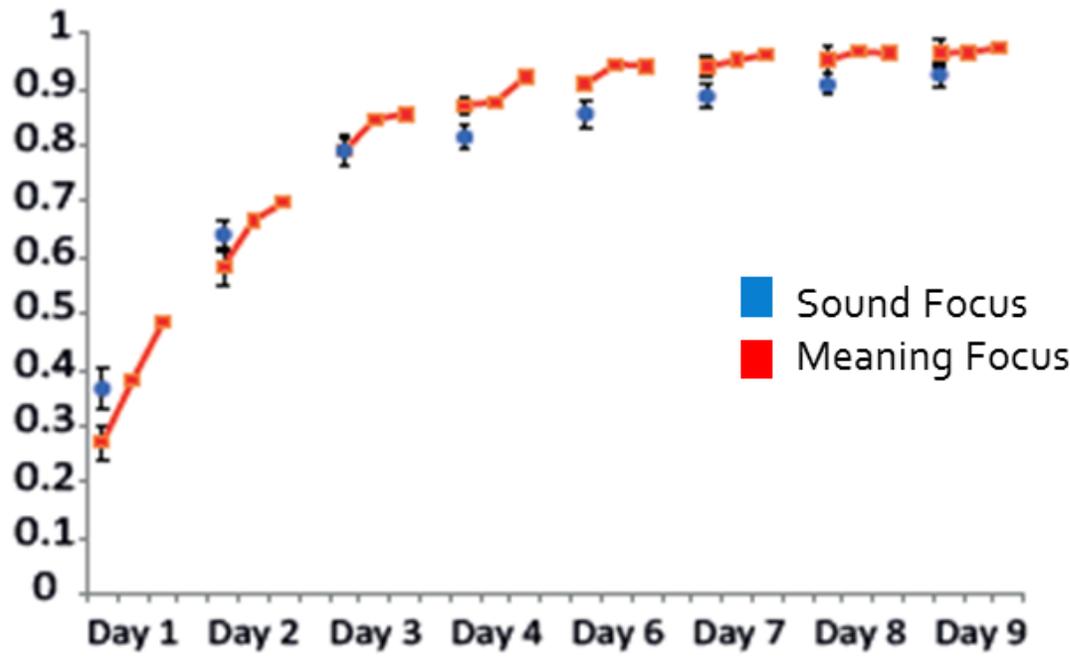


Learning the spelling-sound mapping



Jo Taylor

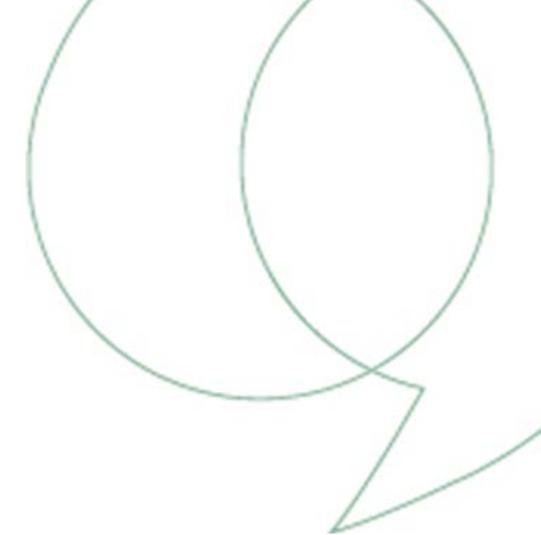
Saying the Meaning Accuracy



Meaning-based training hurts performance on reading aloud; gives no additional benefit to comprehension

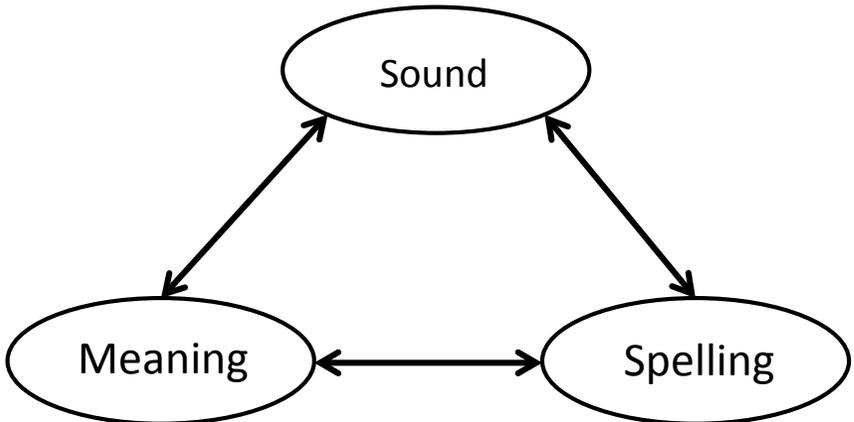


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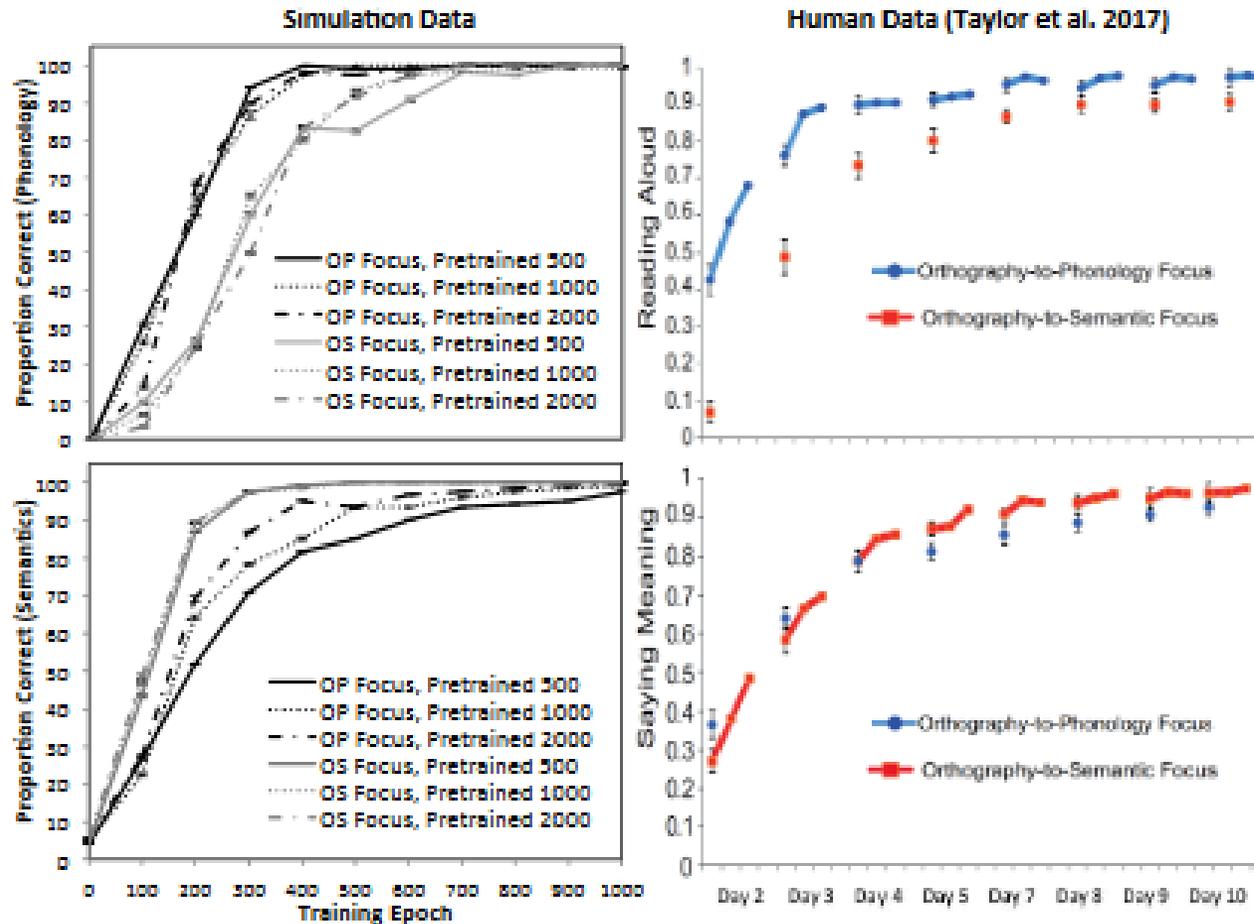
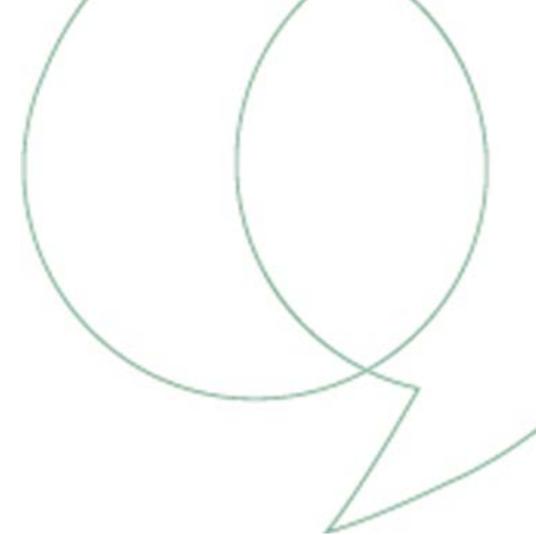
Learning the spelling-sound mapping

Simulations varying (a) nature of training and (b) strength of oral language ability



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Learning the spelling-sound mapping



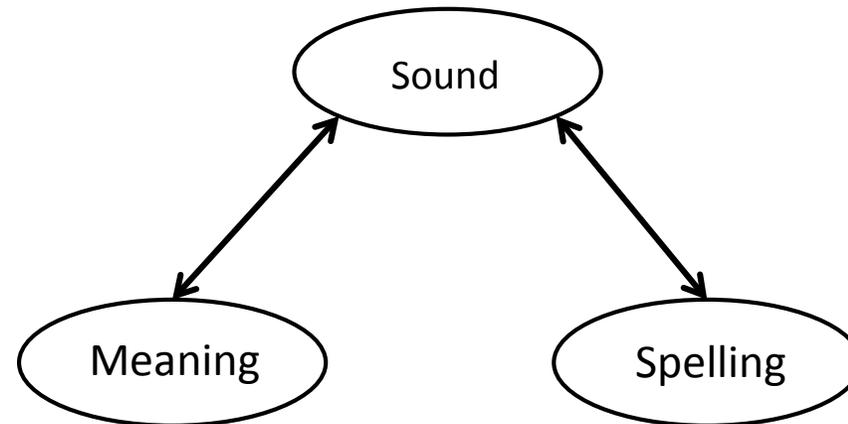
- Sound-based training helps reading aloud irrespective of oral language.
- Sound-based training helps accessing meaning only if oral language in place.

Phonics + oral language in initial stages of learning to read.

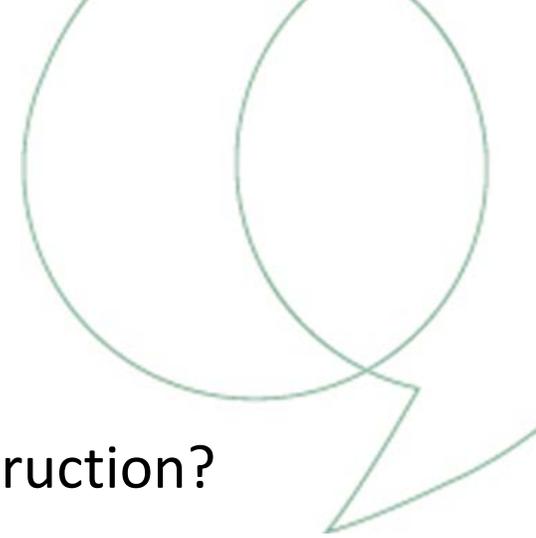
Fact about the writing system, but instruction matters too.

Learning the spelling-sound mapping

- Unlocking spelling-sound relationship critical in (alphabetic) reading acquisition; *a fact that follows from the writing system.*
- What's wrong with phonics in 'balanced literacy' or 'multi-cueing' programmes?

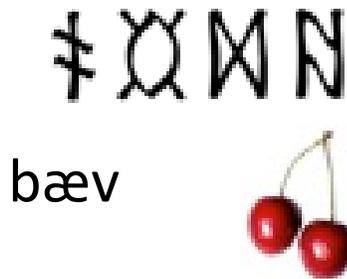


Learning the spelling-sound mapping



Is it possible to discover spelling-sound relationship without explicit instruction?

- Studies with preliterate children (Byrne)
- Artificial language studies with adults (symposium Saturday 11am)

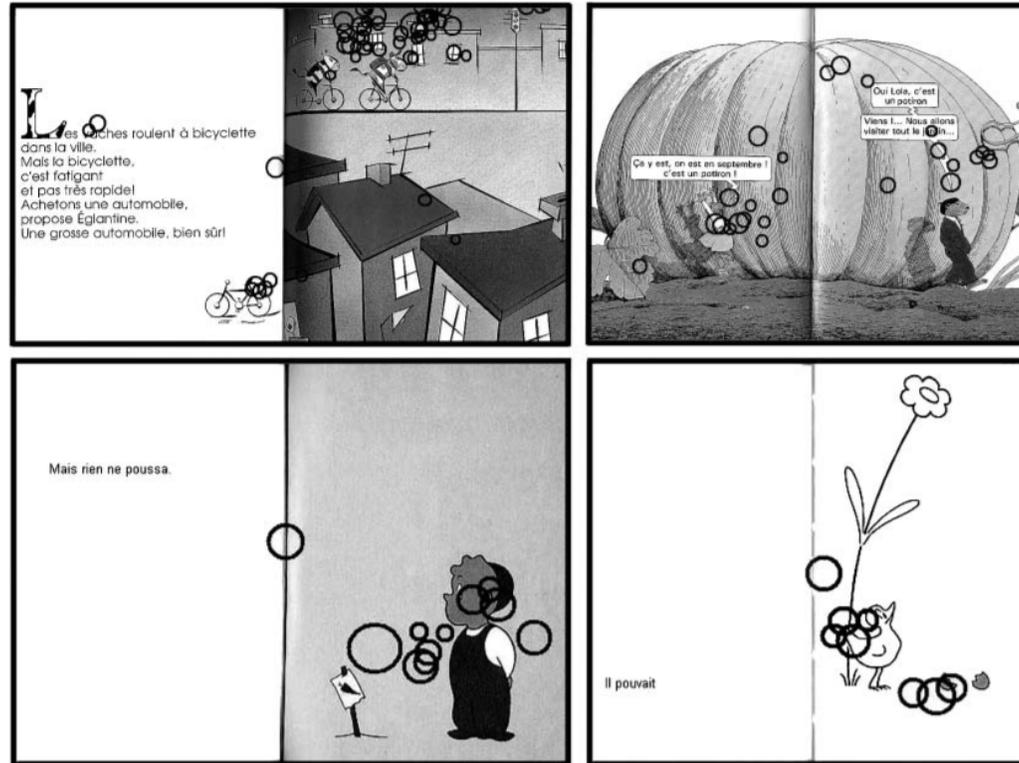


Less than 25% of skilled adult readers able to discover underlying regularities without explicit instruction after ~20 hours of training.



Learning without explicit instruction?

What are 4-5 year old children looking at during shared storybook reading?



Unlikely this could be a major vehicle for development of print skills without other forms of systematic instruction.

Evans & Saint-Aubin (2005)

Phonic knowledge in skilled reading



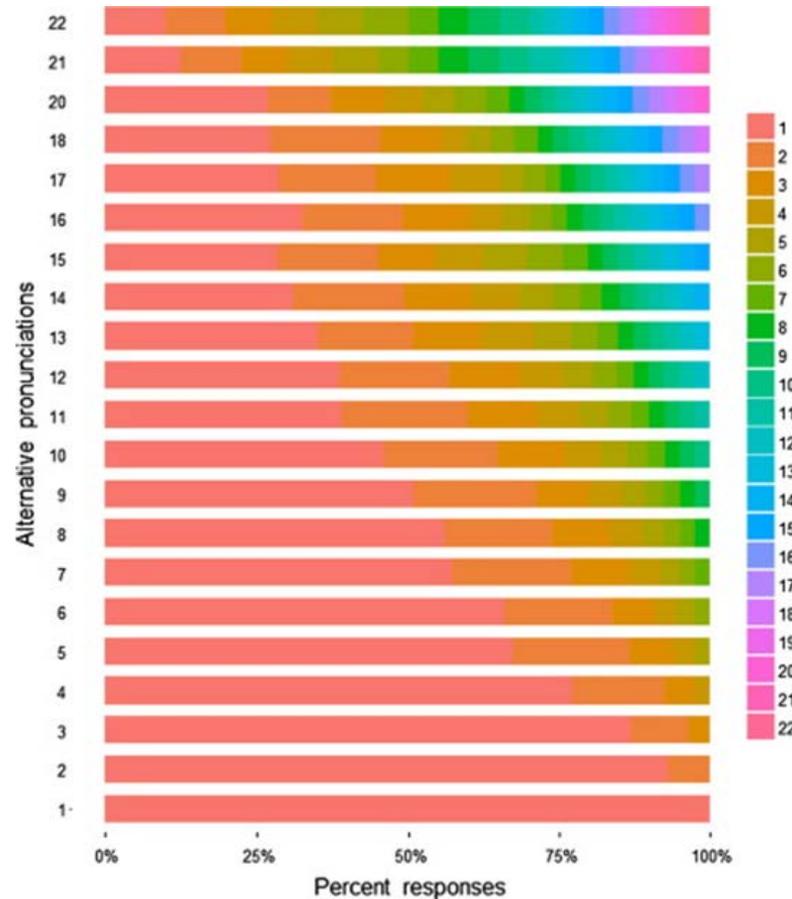
- Skilled readers also compute meaning via sound-based codes
- But decoding to abstract sound-based codes is not the same as spoken language!
- Plus, as for many other writing systems, English spelling-sound relationship is imperfect (e.g. rough, though, cough)

Phonic knowledge in skilled reading



Betty Mousikou

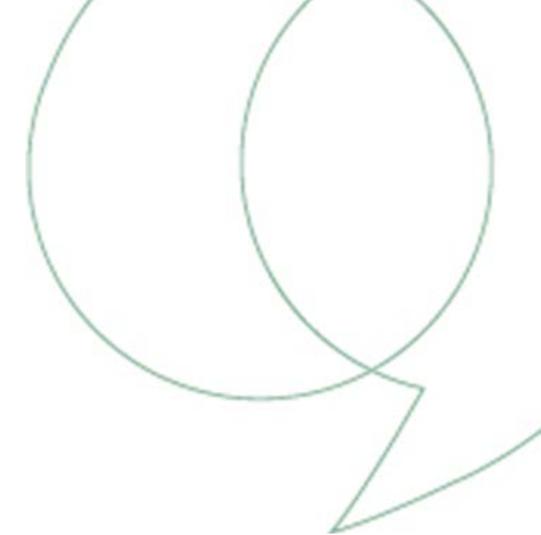
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ucide



- What is the nature of spelling-sound knowledge in adult, skilled readers?
- Variation strongly attributable to regularities in the writing system



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Phonic knowledge in skilled reading



Betty Mousikou

BAMPER

b	am	p	er	
100%	92%	100%	98%	pronunciation
96%	87%	56%	98%	1 st syll stress

ELUCH

e	l	uch	
65%	100%	50%	pronunciation
13%	74%	100%	1 st syll stress



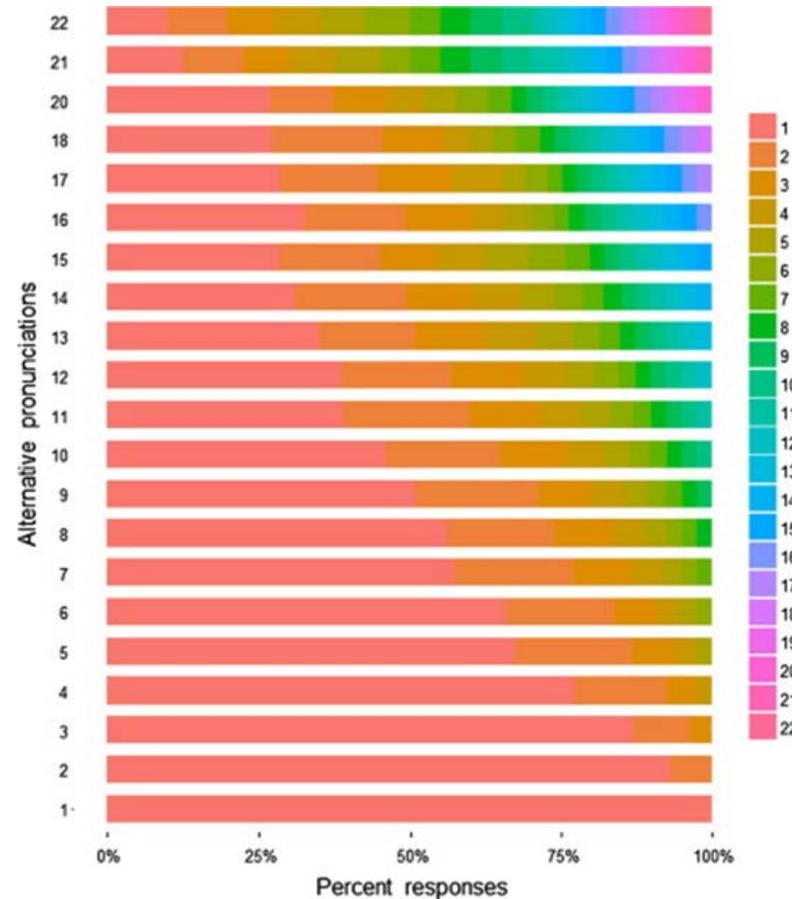
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Phonic knowledge in skilled reading



Betty Mousikou

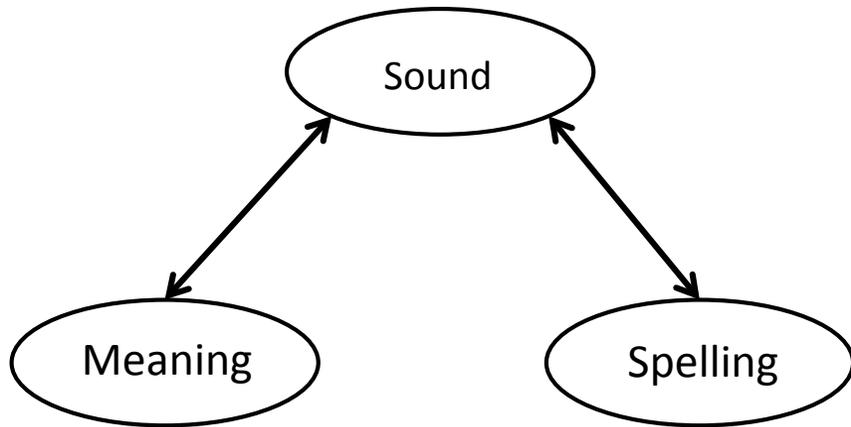
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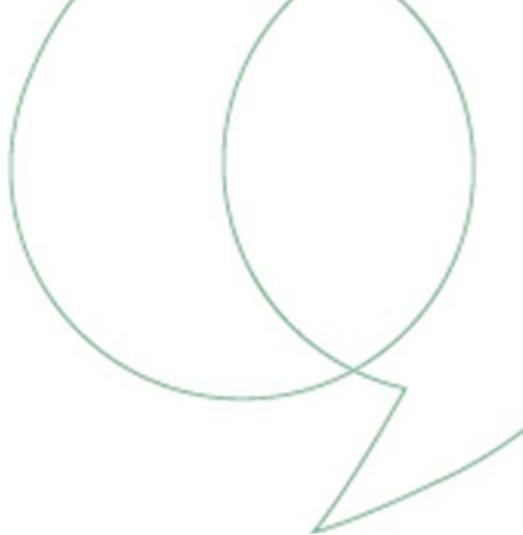
- What is the nature of spelling-sound knowledge in adult, skilled readers
- Variation strongly attributable to regularities in the writing system
- Spelling-sound and spelling-stress knowledge mirrors writing system

Considerable uncertainty even after years of reading experience

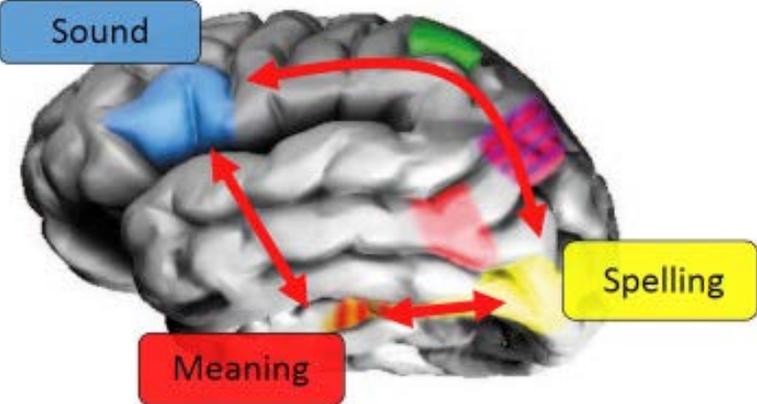
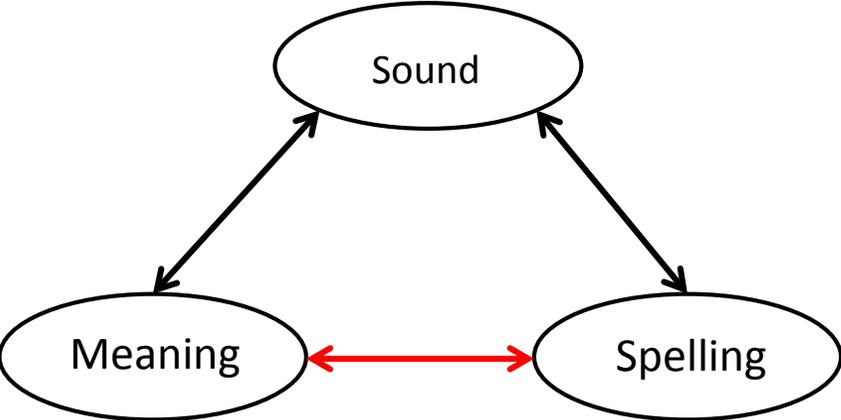
Interim summary



- Spelling-sound relationship is the primary regularity in alphabetic writing systems.
- Learning this relationship is necessary, but not sufficient to drive skilled reading.
- Must ultimately acquire a direct mapping between spelling and meaning.

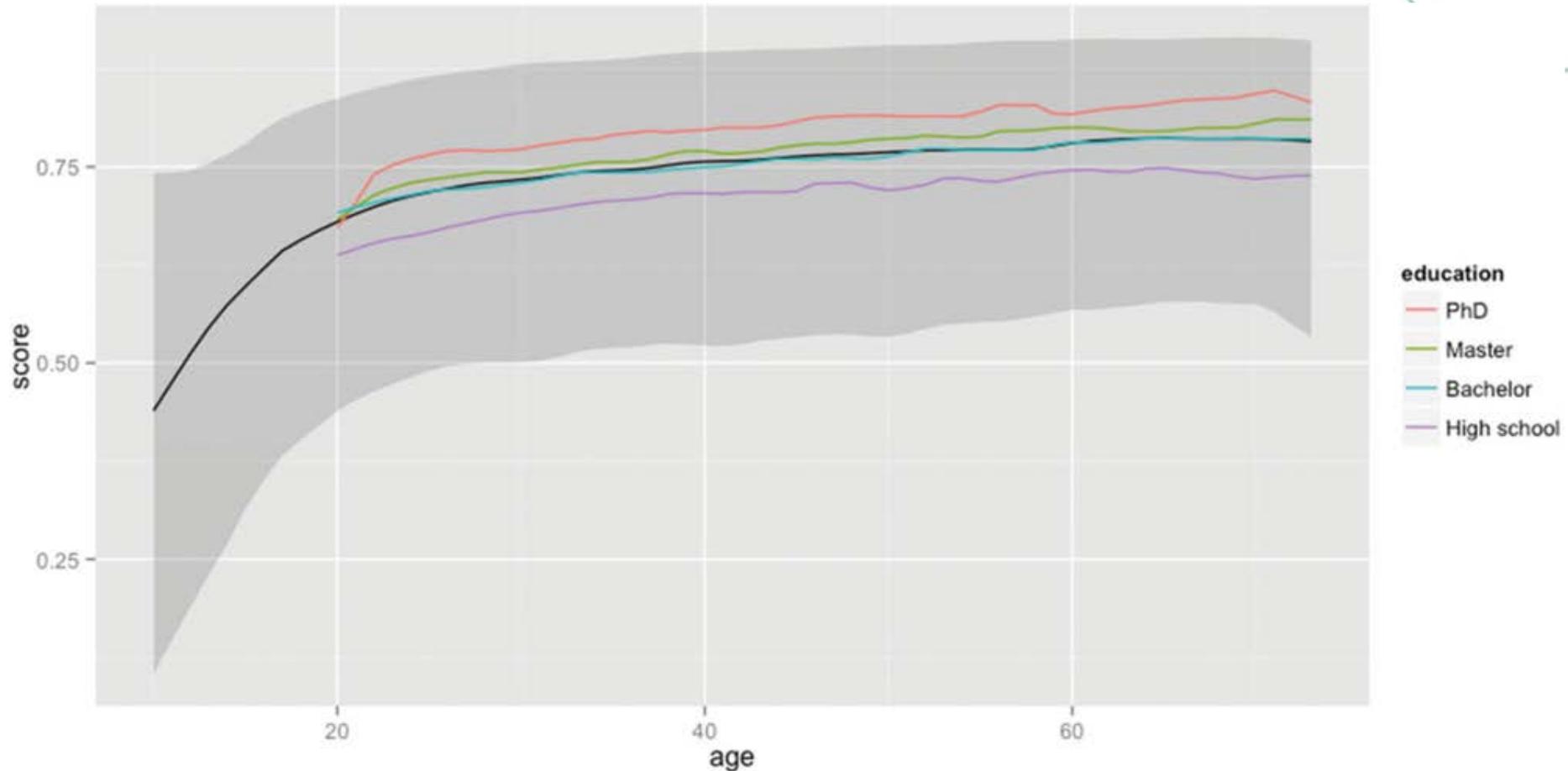


From novice to expert



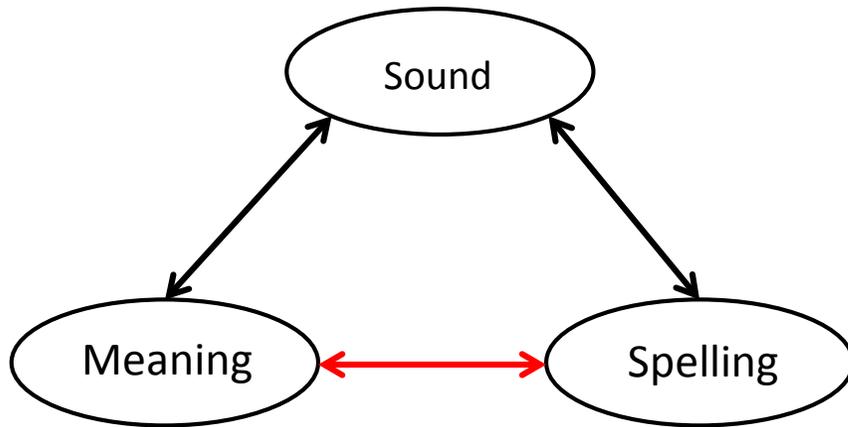
- Development of expertise, laying down of long-term experience *through self-teaching*.
- Based on *massive* text experience over years of reading acquisition; but huge variation ... grade 5 children, 10th percentile 60,000 words / year; 90th percentile 6,000,000 words / year (Anderson, Wilson & Fielding, 1988).
- ***Reading for pleasure is important. Phonics instruction doesn't prevent that; it enables it.***

From novice to expert



Substantial growth in number of printed words recognized between ages of 20 and 60, especially in periods of education.

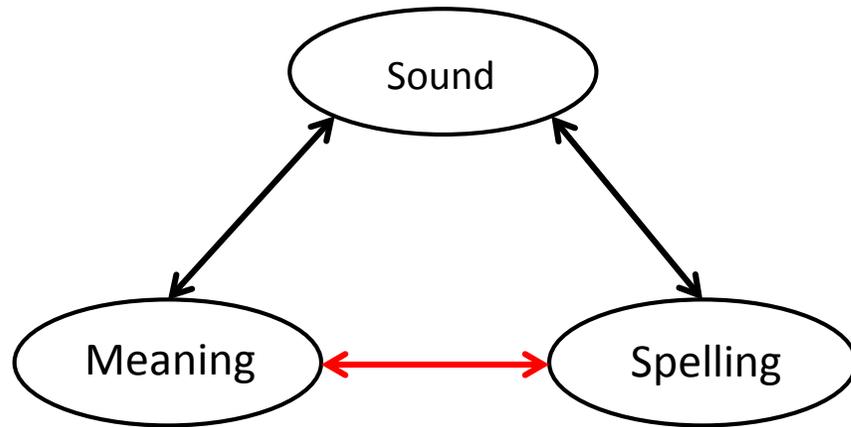
From novice to expert



develop, develops, developing, developed, developer(s), undeveloped, undevelopable, developable, development(s), developmental, developmentally, antidevelopment, redevelop, predevelop, predevelopment

- Item-level “orthographic learning” (e.g. Castles & Nation, 2006)
- Morphology dramatically reduces the learning challenge; average 20 year old – 71,000 word forms -> 11,100 base words (Brysbaert et al., 2016)
- Over 80% of English words have more than one morpheme; but only 20% of words in first year of reading instruction do (mostly –s and –ed; Rastle & Taylor, 2018)

Morphology in English writing



- Arbitrariness
- Morphemes are “islands of regularity”
 - Stems (e.g. unclean, cleaner, cleanly)
 - Affixes (e.g. teacherer, builderer, cleanerer)
- Sacrifice spelling-sound regularity for spelling-meaning regularity (e.g. busted, snored, kicked vs bustid, snord, kict)
- **Particular letter clusters in English are “reserved” for communicating meaning**

Morphology in English writing

-ed

Word-final -ed is only used 38 times in all English monomorphemic words

- 8 in monosyllables (e.g. bed, shed)
- 20 in words with complex vowel (e.g. breed, heed)
- 10 in polysyllables (e.g. moped, naked, kindred, hatred, wicked)

Words that could be spelled –ed but which aren't past tense are spelled another way (e.g. instead, salad, horrid).

Only these run the risk of a past-tense interpretation.

Proliferation of spellings protects –ed.



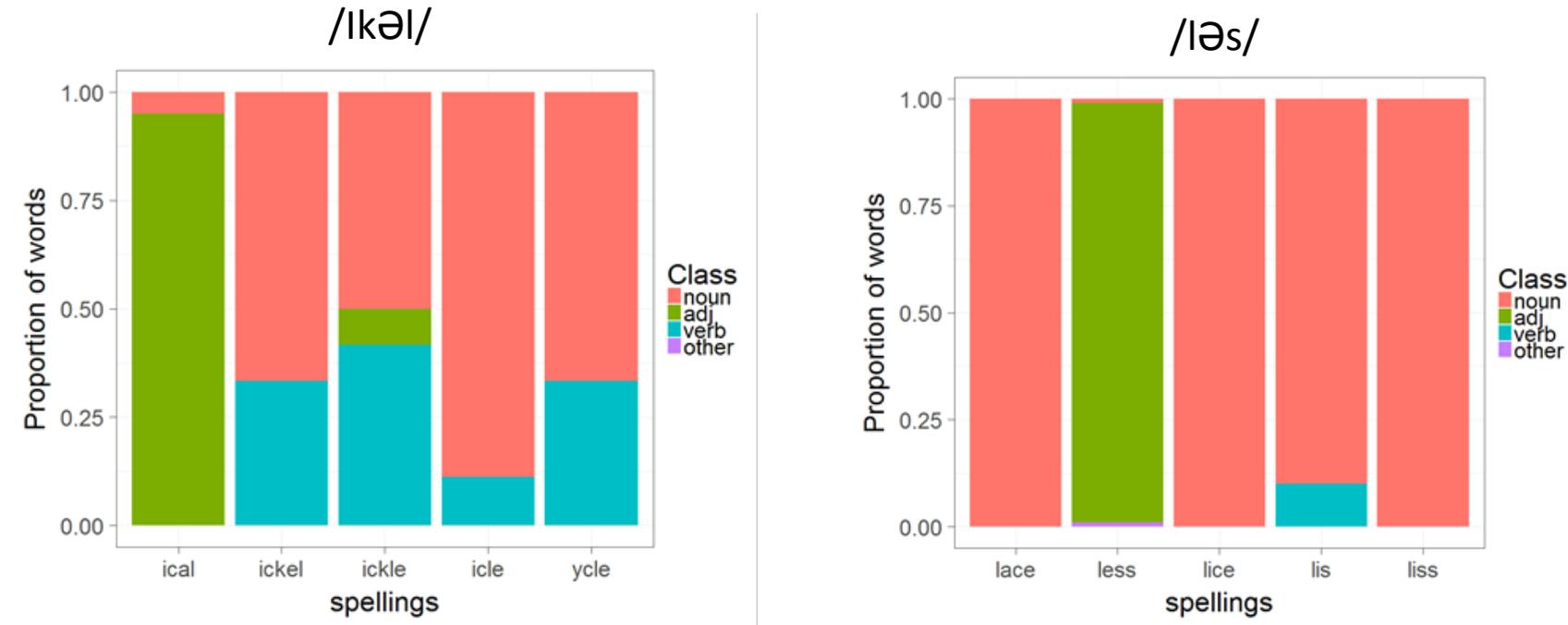
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Morphology in English writing



Ana Ulicheva

This is a general principle of English writing



Information in the *spelling*, not the sound!

Disorder in spelling-sound relationship permits order in spelling-meaning relationship.
Evolution of English spelling has prioritised spelling-meaning information Why?

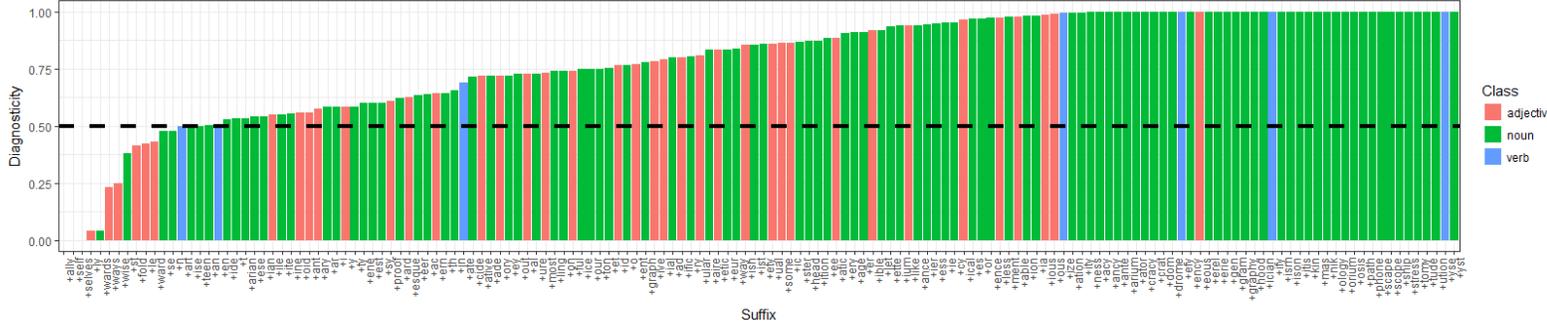
Morphology in English writing



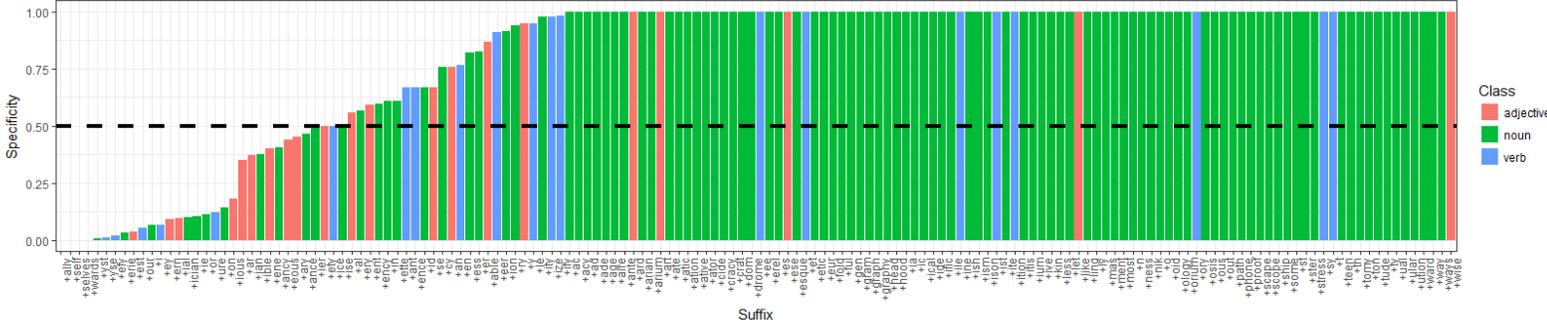
Ana Ulicheva

Meaningful information is *highly visible* in English spelling:
object, property, act

Most English suffix spellings are highly diagnostic of grammatical category



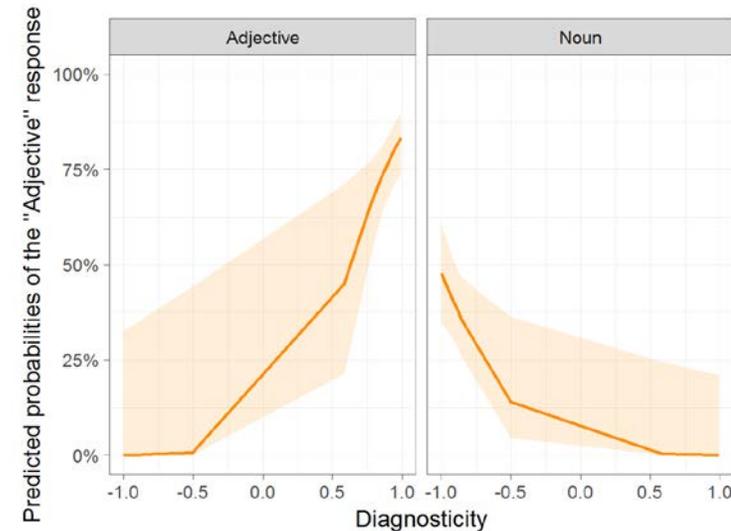
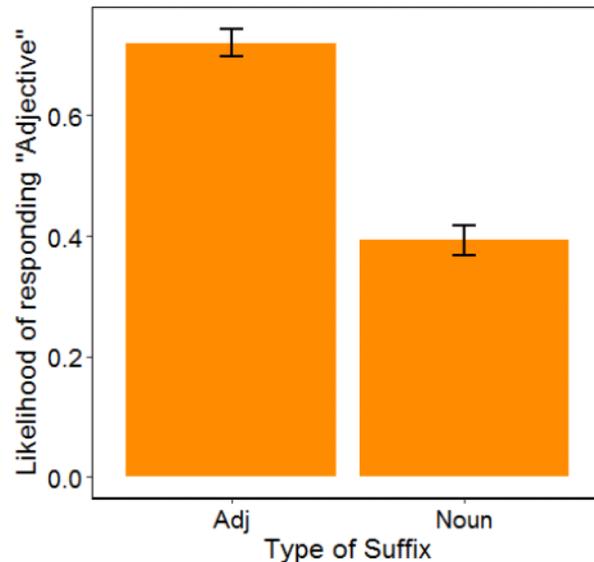
Most English suffix spellings provide the *only* means of expressing a sound sequence for a particular grammatical category



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Morphology in English writing

Is it an adjective or noun?
DOMOUS, JIXLET, TERISH, RABNESS ...



- Explicit knowledge of object / property status, linked to strength of cue
- Similar, graded effects in eye-tracking and spelling

Spelling-meaning knowledge mirrors the writing system

JABBERWOCKY

Lewis Carroll

(from *Through the Looking-Glass and What Alice Found There*,
1872)

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that catch!
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

He took his vorpal word in hand:
Long time the manxome foe he sought --
So rested he by the Tumtum tree,
And stood awhile in thought.

And, as in uffish thought he stood,
The Jabberwock, with eyes of flame,
Came whiffling through the tulgey wood,
And burbled as it came!

One, two! One, two! And through and through
The vorpal blade went snicker-snack!
He left it dead, and with its head
He went galumphing back.

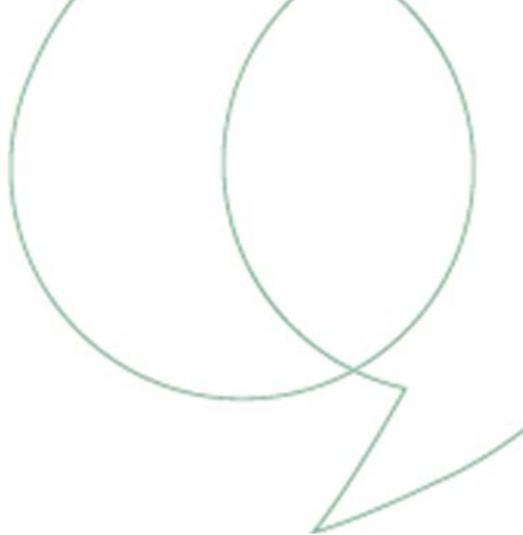
"And, has thou slain the Jabberwock?
Come to my arms, my beamish boy!
O frabjous day! Callooh! Callay!"
He chortled in his joy.

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogoves,
And the mome raths outgrabe.



"Beware the Jabberwock, my Son."

— Jabberwocky Illustration by John Tenniel



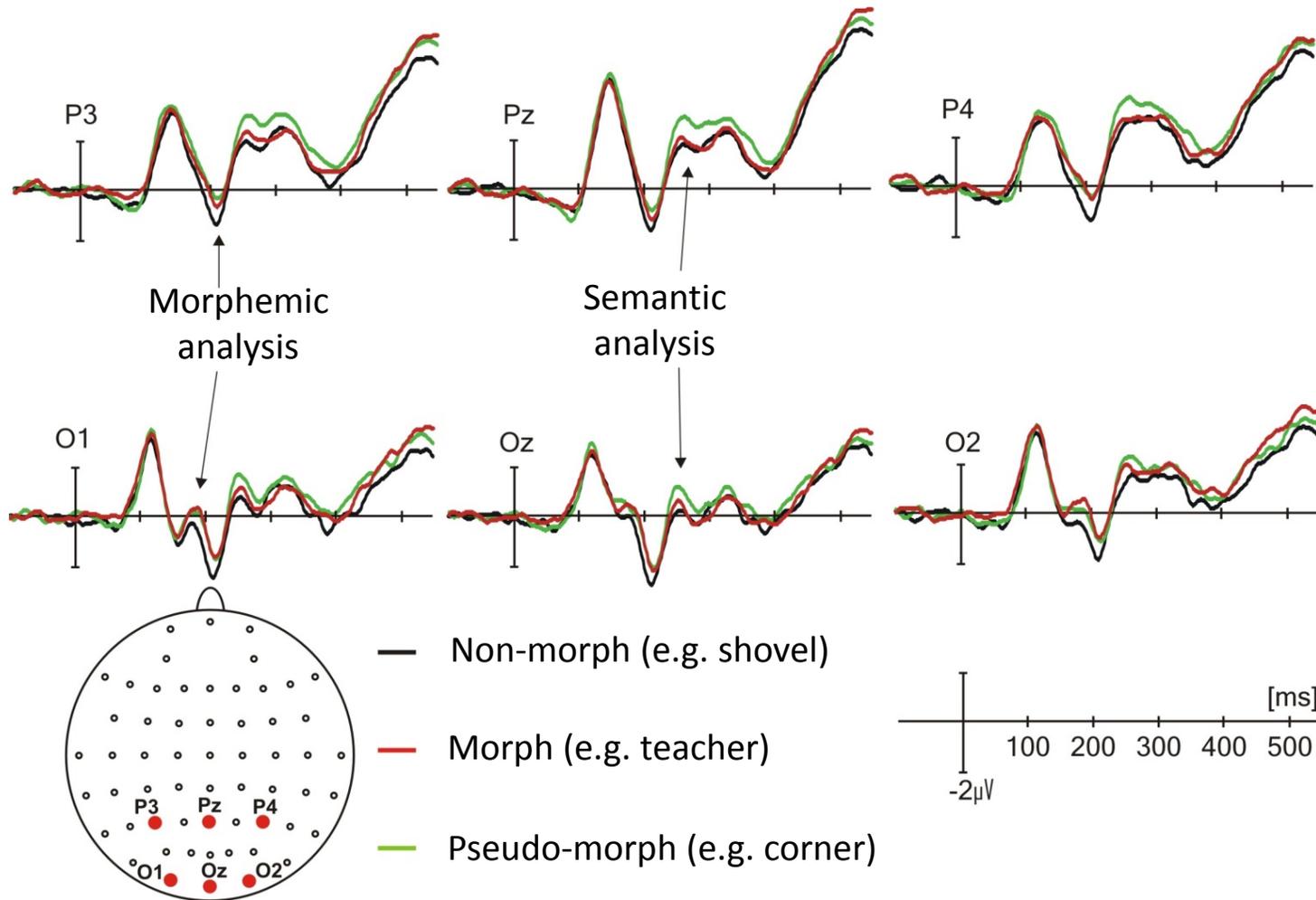
Morphology in English writing

	develop		
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	develop	ment	al ly
anti	develop	ment	
re	develop		
pre	develop		
pre	develop	ment	

- High visibility of morphology in English writing permits meaningful structuring of print knowledge.
- Assists learning, and permits rapid access to meaning on the basis of *likely* morphemes.

teacher, corner, shovel

Morphology in English writing

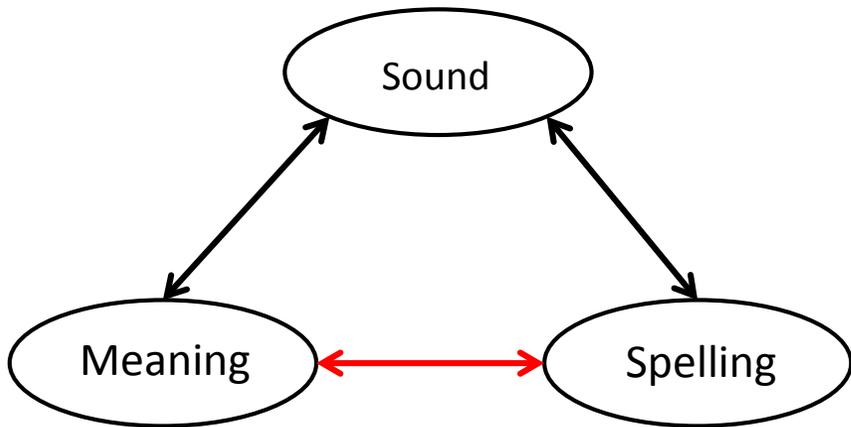


- Morphological analysis ~190 ms
- Semantic analysis ~250 ms
- Substantial converging evidence in brain and behaviour
- Dependent on reader skill and experience
- **Rapid, superficial analysis, only possible because of writing system**

How long to develop expertise?

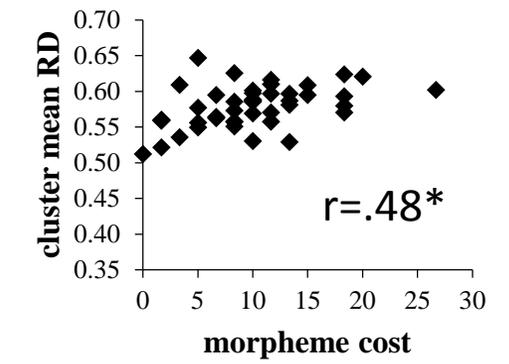
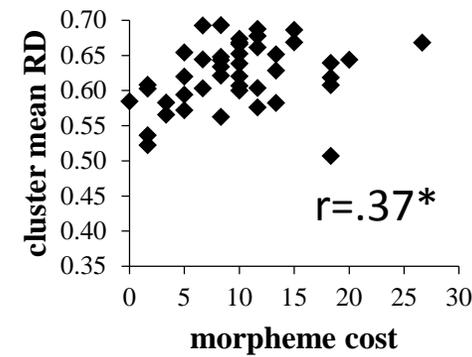
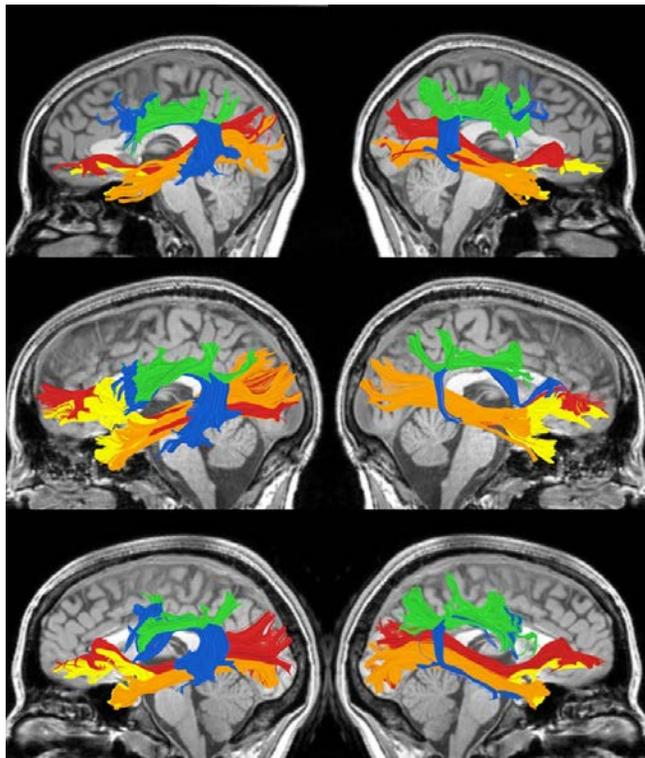
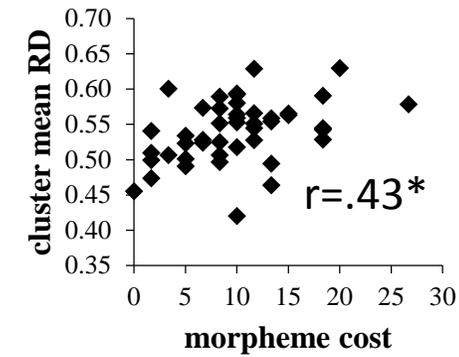
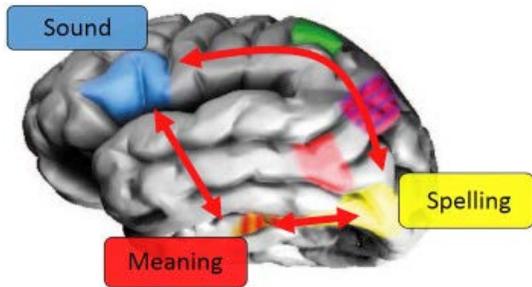


N. Dawson



- Children starting school have oral morphological knowledge (e.g. “teach – he was a very good _____”; e.g. *Carlisle, 2000*)
- Children in first years of reading instruction use morphological knowledge in some reading tasks, but rapid segmentation apparent only in late adolescence (*Dawson et al., 2017, 2019*). Why?
- Possible impact of morphological instruction

Morphology and spelling-meaning pathway



Variation in morphological knowledge in adults associated with diffusion properties of ventral white matter pathway; degree of specificity

The information in text

There were rooms in the old farmhouse which I never saw used and which smelt of the past that held extraordinary fascination for me: little windows where unknown ancestors had sat on autumn evenings; old leather-lined bookcases with books that no one had handled for fifty years; dust that no one had bothered to remove; piles of candle wax in unlikely corners; huge chamber pots and cracked basins, and everywhere a great generosity of space. Outside there was a big lawn hardly walked on, flowerbeds hardly looked at, a vegetable garden which always produced too much, a vast horse chestnut with enough conkers to satisfy the needs of a whole village of boys, a second lawn that nobody ever sat on, and the poignant smells of animals and harvests of a bygone age.

- Fluent word reading necessary but not sufficient
- Impact on oral language from text (and shared reading)
- More fundamental: this is what language is for literate individuals

The Reading Wars



<https://www.tes.com/news/tes-magazine/tes-magazine/ceasefire-reading-wars>

- Decades of raging debate about best way to teach children to read
- Phonics versus “whole language”; more recently “multi-cueing” or “balanced literacy”
- Perspectives embedded in more general and hotly-debated pedagogical philosophies

The Reading Wars



"We sit with our children reading whole books, talking about them, sometimes pointing at whole words, sometimes at letters. We sit with them writing shopping lists, labelling things in their rooms, doing texting on phones, planning holidays looking at pictures Parents and carers have been doing this for centuries" (Michael Rosen, 2013)



Lucy Powell MP
@LucyMPowell



Follow

Another eg of how mad primary assessment is now: my Y1 daughter who can read well beyond her age FAILED phonics screening cos of "non words"

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Every child a reader.
Every child a writer.

*"Reading is creating meaning with text.
This is different from sounding out words...
Simply barking sounds into the air on cue like a trained seal is not reading...
We want to develop readers who create meaning not trained seals."
(Andrew Johnson, Professor of Education, 2015)*

Literacy policy in English-speaking world

England: Mandatory phonics instruction; phonics screen

Scotland: Multiple methods

Australia: Multiple methods; phonics screen pilot

USA: Phonics in the Common Core; but states do not have to adopt

New Zealand: Meaning-based methods

Typically no literacy policy at all following the initial years of reading instruction.

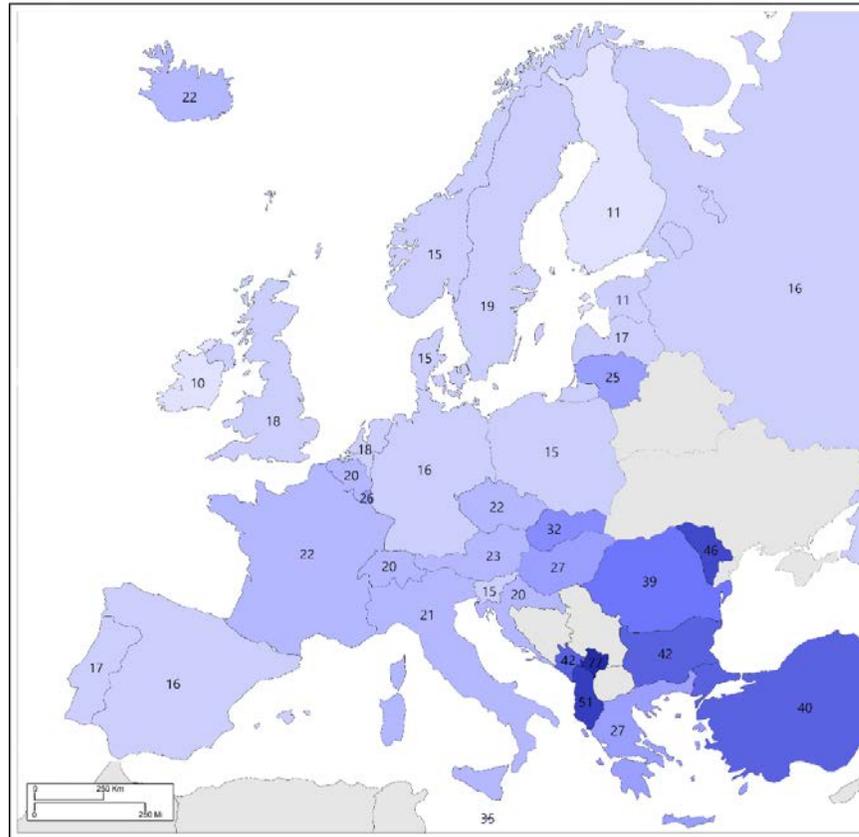
These decisions have consequences for hundreds of thousands of children each year

Evidence-based education



Low literacy and its costs

Percent 15-year-olds who lack 'baseline' reading skills



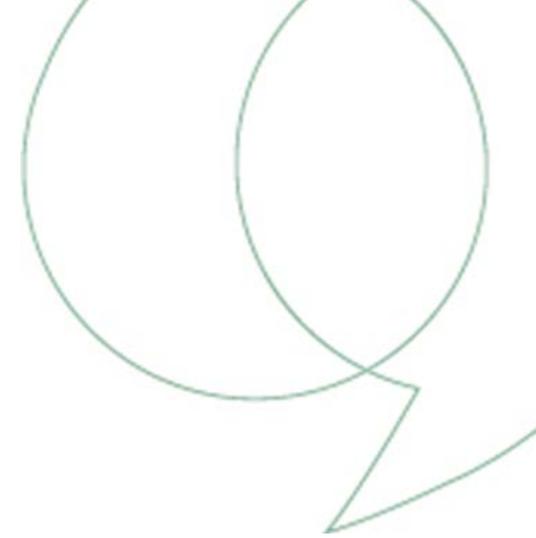
Massive costs to individuals, society and the economy;
major contributor to inequality.

OECD, 2016



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What does low literacy look like?



Peanut Allergy Alert Lemon Cream Biscuits

Date of alert: 04 February

Manufacturer's Name: Fine Foods Ltd

Product Information: 125g Lemon Cream Biscuits (Best before 18 June and Best before 01 July)

Details: Some biscuits in these batches may contain pieces of peanut, which are not included in the ingredient list. People with an allergy to peanuts should not eat these biscuits.

Consumer action: If you have bought these biscuits you may return the product to the place of purchase for a full refund.

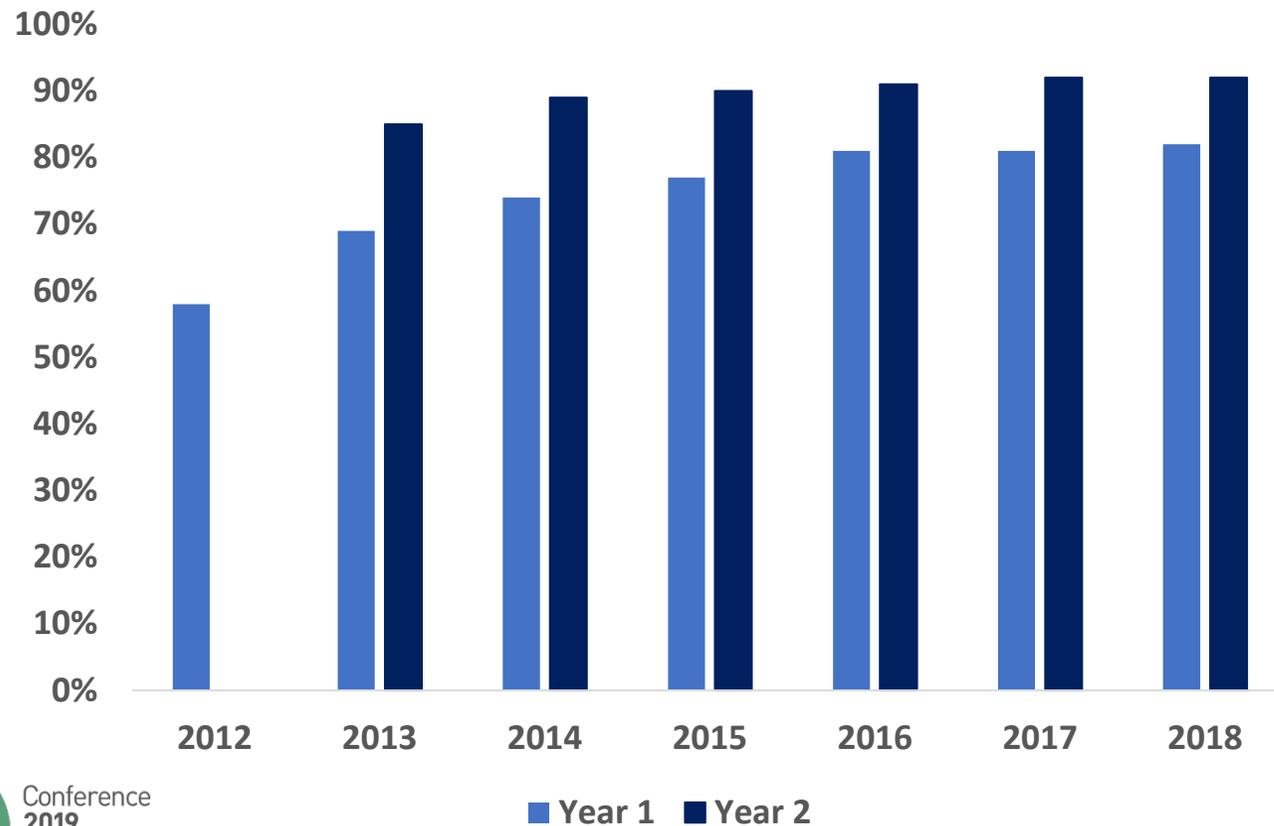
Or call 1800 034 241 for further information.

Question 2: SUPERMARKET NOTICE

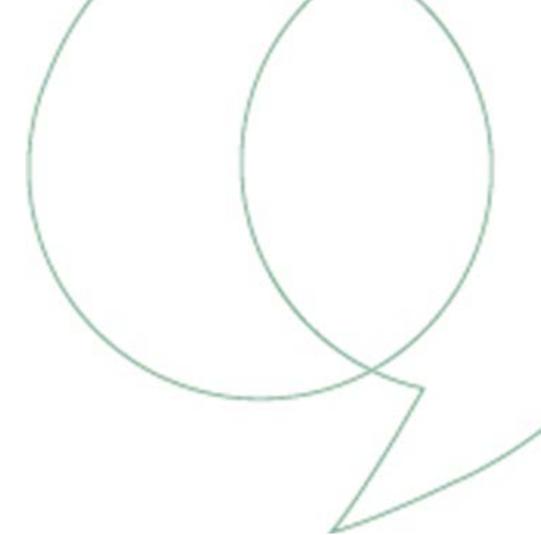
What is the purpose of this notice?

- A. To advertise Lemon Cream Biscuits.
- B. To tell people when the biscuits were made.
- C. To warn people about the biscuits.
- D. To explain where to buy Lemon Cream Biscuits.

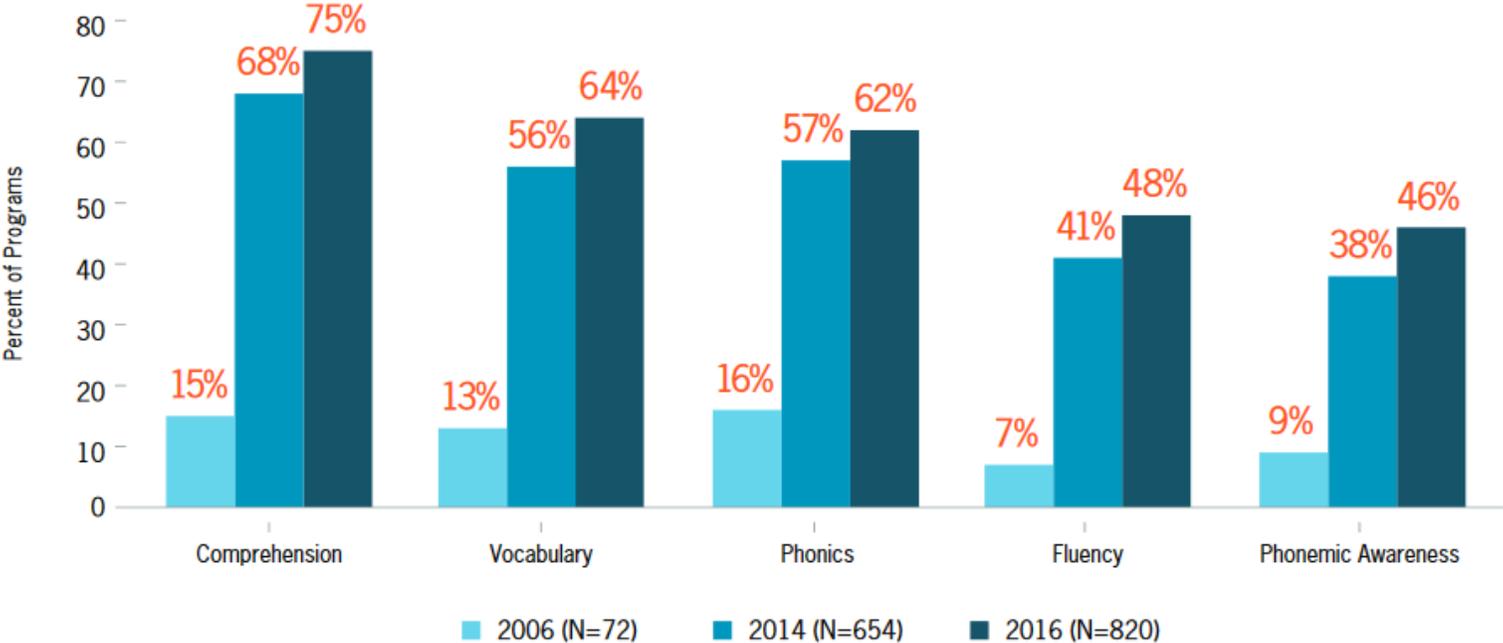
Phonics screen in England



- Impact of the phonics screen on getting policy working (through e.g. enhanced teacher knowledge).
- Evidence of broader benefits, particularly for those who enter school at risk of reading failure (*Machin et al., 2018*).



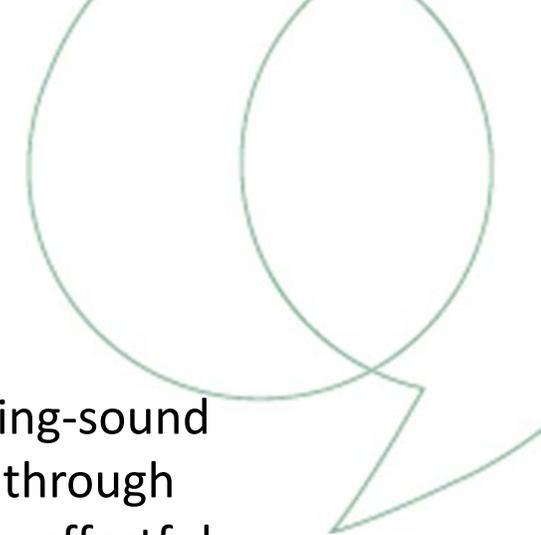
Reading in teacher training



- Only 39% of primary education programmes address all of these aspects of reading.
- 49% of textbooks do not discuss reading instruction as an object of science.



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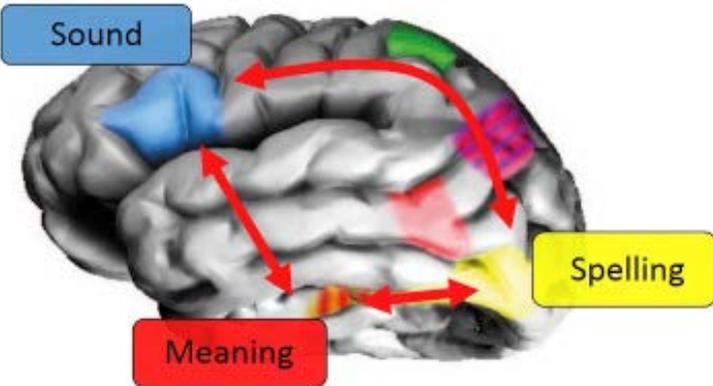
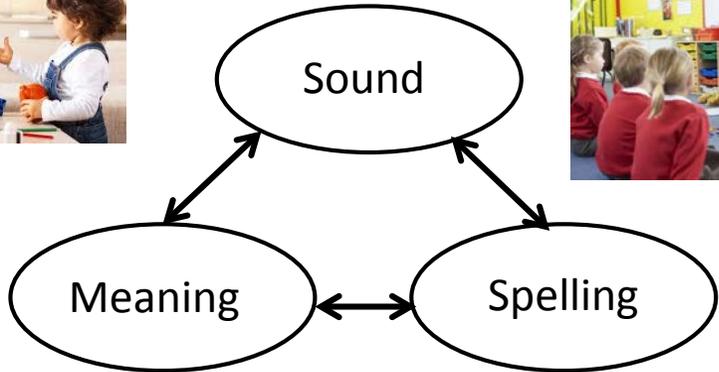


How we learn to read

Reading begins with oral language



Learning spelling-sound relationship through phonics. Highly effortful.



Fluency, learning high-level regularities; releasing resources for comprehension; building vocabulary

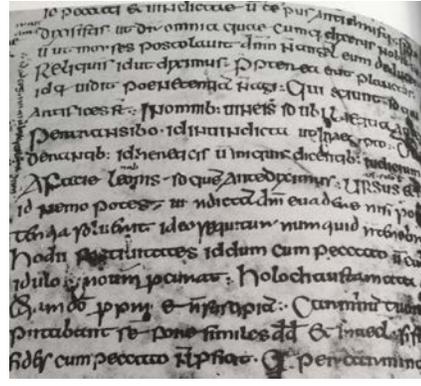
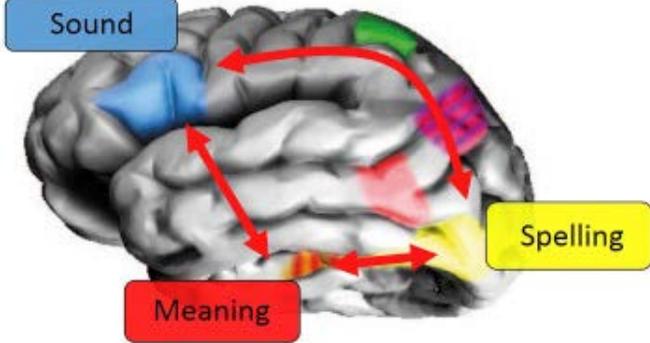
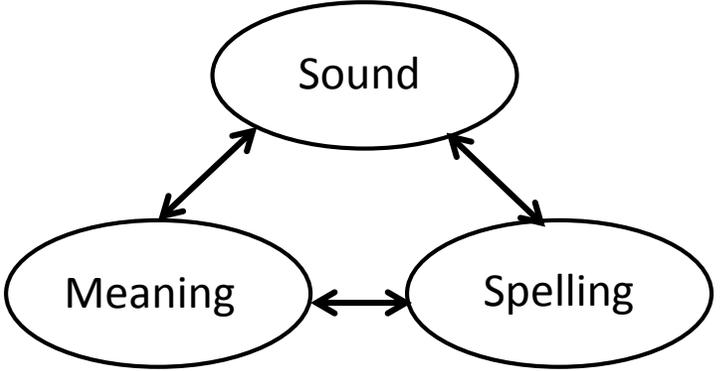


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The reading system is the writing system

Reading systems and writing systems both have foundations in spoken language; but they also diverge, and the way that they do so is linked.



We can end the reading wars

“...and adopt an instructional agenda that is developmentally informed and based on a deep understanding of how language and writing systems work.”



Anne Castles



Kate Nation



Ending the Reading Wars: Reading Acquisition From Novice to Expert

Anne Castles^{1,2}, Kathleen Rastle³, and Kate Nation^{2,4}

¹Department of Cognitive Science, Macquarie University; ²Australian Research Council Centre of Excellence in Cognition and its Disorders; ³Department of Psychology, Royal Holloway, University of London; and ⁴Department of Experimental Psychology, University of Oxford

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OPEN ACCESS

www.tinyurl.com/readingwars

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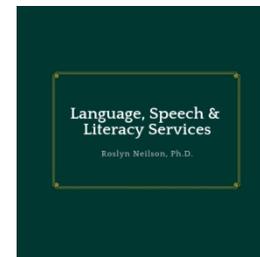
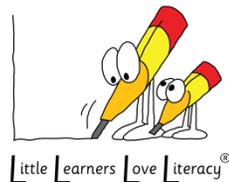
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Key readings (open access)

* Rastle, K. (2019). EPS mid-career prize lecture: Writing systems, reading and language. *Quarterly Journal of Experimental Psychology*, 72, 677-692.

<https://journals.sagepub.com/doi/pdf/10.1177/1747021819829696>

* Castles, A., Rastle, K. & Nation, K. (2018). Ending the “Reading Wars”: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 19, 5-51.

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