

# TEACHING MATTERS

SCIENCE OF LEARNING  
NATIONAL SUMMIT

## The science of language and reading

Professor Pamela Snow

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# Presentation Overview

- What IS reading?
- What is “literacy”?
- A conversation with Balanced Literacy
- BL versus Structured Explicit Literacy Teaching
- The SVR and some reading tests for you
- Pseudoscience and the importance of de-implementation



# Reading is key to evidence-based school improvement because...

- ✓ Reading is the means by which students **access the academic curriculum**.
- ✓ How reading is taught is a **barometer of how learning is conceptualised** in a school.
- ✓ Reading is closely **related to writing** (transcription and text generation). Written expression is central to academic success.
- ✓ When teachers understand the scientific basis of reading instruction, they typically have a stronger grasp of the **science of learning** more widely.
- ✓ Getting reading right, from the outset, **reduces the likelihood of instructional casualties** and need for expensive, often ineffective interventions.



# Why is teaching reading like launching a rocket?



# What is reading?

- A biologically secondary skill – needs to be taught.
- A skill that draws on biologically primary skills (in oral language in particular).
- A skill that enables humans to derive meaning from printed text of a range of novelty and complexity levels.



# What is literacy?

“Literacy involves students listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts”.

(ACARA)

- A number of very different, and apparently equally weighted skills.
- Biologically primary and secondary skills are not differentiated.



# There is only one *reading*, but there are multiple forms of “literacy”

- Civic Literacy
- Social Literacy
- Digital Literacy
- Financial Literacy
- Health Literacy
- Legal Literacy.
- Media Literacy
- Global Literacy
- Economic Literacy
- Aesthetic Literacy
- Spiritual Literacy
- Ethical Literacy
- Environmental Literacy
- 21<sup>st</sup> Century literacies (collaboration, cooperation, creativity).
- **Or are these simply “competencies” or knowledge domains?**



# Reading Vs Literacy

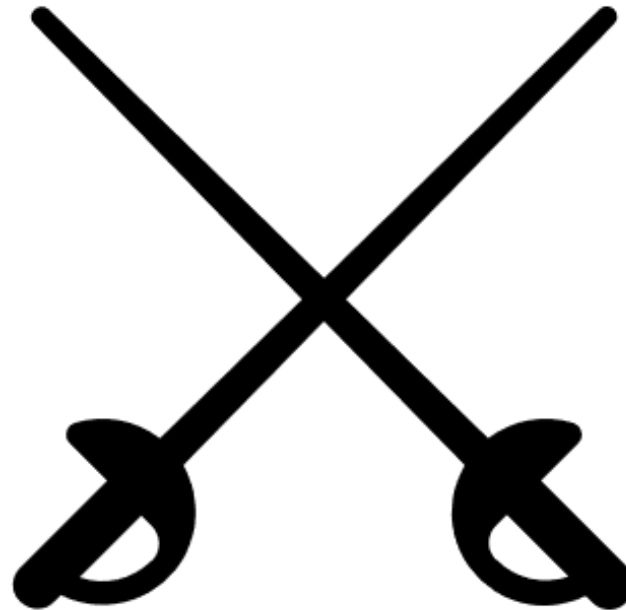
## Reading

Studied and valued by cognitive psychologists.

Neuroscience frameworks .

Analysis of (micro) subskills.

**A verb**



## Literacy

Studied and valued by education academics.

Sociological frameworks.

Focus on (macro) meaning

**A noun**





# Reading is difficult because

- We **do not have a “reading instinct”** in the same way that we have a “language instinct”
- Reading is a “**biologically secondary**” function
- As a language-based skill, it is **vulnerable** to anything that threatens the integrity of a child’s language competence in the language of instruction
  - Neurodisabilities
  - Developmental Language Disorder
  - The quality of the home language and literacy environment
  - Maltreatment/trauma exposure
  - In the case of English-speaking countries, coming from an EAL home background

.....cont



# Reading is difficult because (cont)

- Writing systems vary with respect to degree of correspondence between written and spoken text. **English has the most complex alphabetic writing system in the world.**
- Success is reliant on the **quality of instruction** students receive – this is variable within and between schools.
- The very nature of reading as a developmental task is **contested**.
- In the case of EAL students, it requires **learning a new language as well as a new writing system.**



# Balanced Literacy has not helped us resolve the distinction between reading and literacy

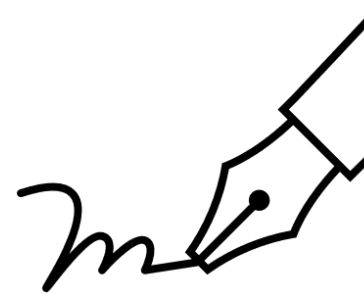


# Homunculus Loxodontus aka Balanced Literacy



# Some awkward facts that Balanced Literacy is blind

to 1. Reading is a biologically secondary (unnatural) thing for humans to do





# Oral language has a head-start on reading, writing and spelling

## Phylogenetically

(in terms of evolution)



## Ontogenetically

(in terms of individual development)



It is biologically primary

See David Didau: Education isn't natural – that's why it's hard  
(Concerning the work of David Geary)

<https://learningspy.co.uk/psychology/can-learn-evolutionary-psychology/>



# Some awkward facts that **Balanced Literacy** is blind

to

2. English has the most complex alphabetic writing system in the world





# A word about English orthography (1)

- What does the word “orthography” mean?
- English has a history of being a bower bird
  - Wars, trade, politics, and religion have all resulted in the appropriation of words from other languages
- When early scribes first started writing language down, there was little uniformity in how they chose to represent sound (phonemes) using letters (graphemes)
- Today, English has a semi-transparent orthography
- It is governed by etymological patterns and conventions; it is not “random”
- Spelling is not “the problem”; rather, shifts in pronunciation over time create challenges for readers
- Knowledge of etymology helps to de-mystify orthographic conventions





# A word about English orthography (2)

- ✓ Like all writing systems, it is a code for spoken language.
- ✓ It is an imperfect code for spoken language that makes it the most complex writing system in the world.
- ✓ It encodes both sound (phonology) and meaning (morphemes) .....more on morphology in
  - Hence, we say *English is a morpho-phonemic language* (it has some alphabetic features but is not 100% transparent)
- ✓ Academic scholars have been tinkering with the English writing system for centuries, yet we give children ~36 months to master its workings. After that, things become very hit-and-miss.
- ✓ **All students must understand how the English writing system works. Decoding is a non-negotiable skill and is one key to comprehension. Decoding remains relevant across year levels, incl. secondary.**

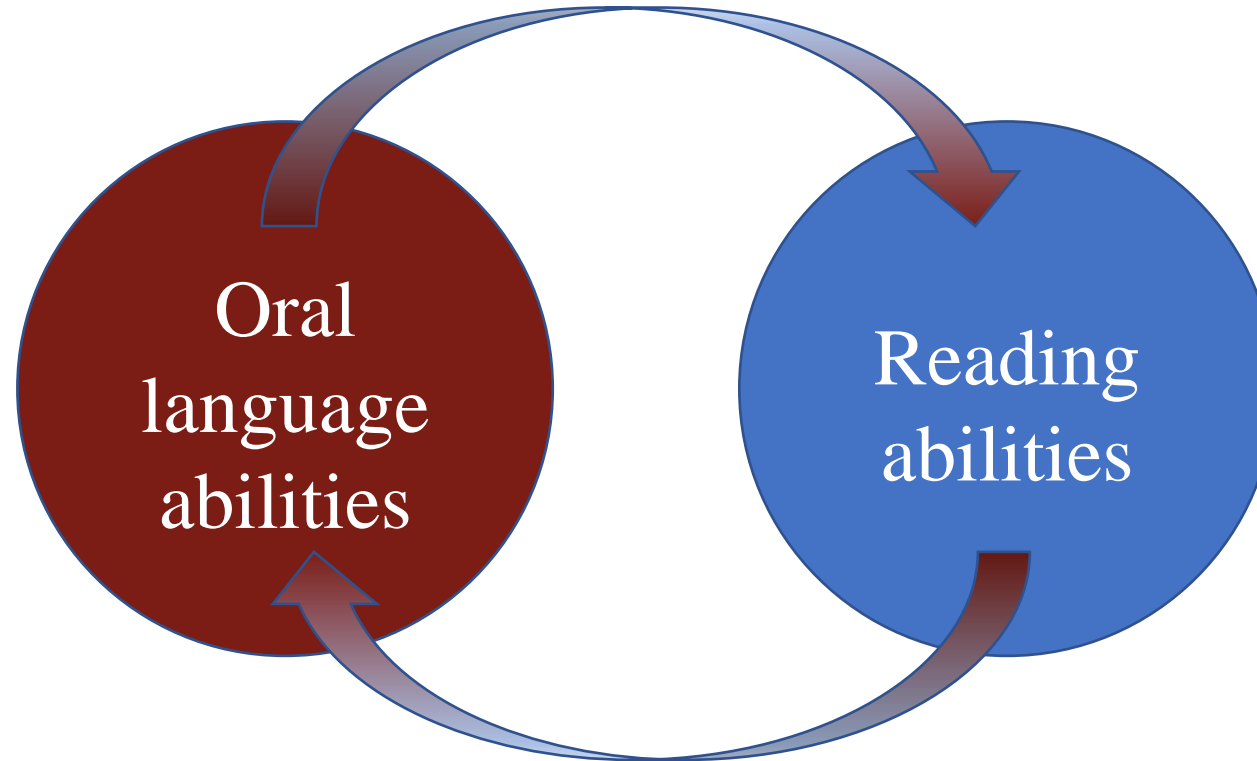


# Some awkward facts that **Balanced Literacy** is blind

**to** 3. Reading is a language-based task, but strong oral language skills are not enough



# Language and literacy: a two-way street

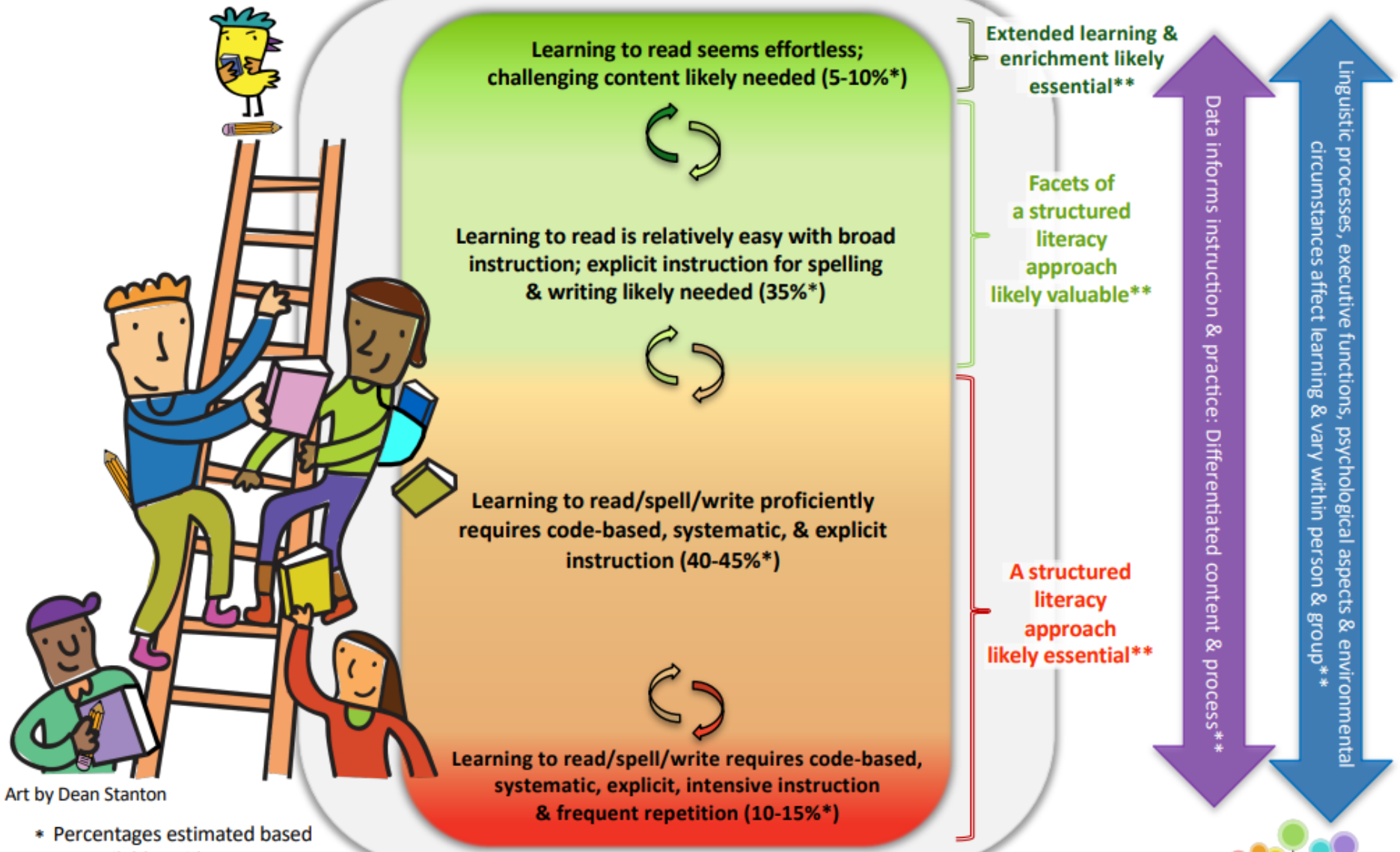


## Some awkward facts that **Balanced Literacy** is blind to

4. We should be successfully teaching 95% of children to read, not 60-70%



# The Ladder of Reading & Writing



Art by Dean Stanton

\* Percentages estimated based on available evidence  
 \*\* Terms defined and references at [www.nancyyoung.ca](http://www.nancyyoung.ca)

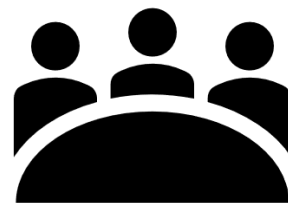
# Some awkward facts that **Balanced Literacy** is blind to

5. It takes four times as many resources to resolve a literacy problem by Year 4 than it does in Year 1



Dr Kerry Hempenstall (2015)







## Some awkward facts that **Balanced Literacy** is blind to

6. Putting adjectives in front of the word “literacy” is not an acceptable substitute for teaching children how to read.





# Some awkward facts that Balanced Literacy is blind

**70** There is no scientific evidence that supports Balanced Literacy and its key elements (see below) as a preferred reading instruction approach.

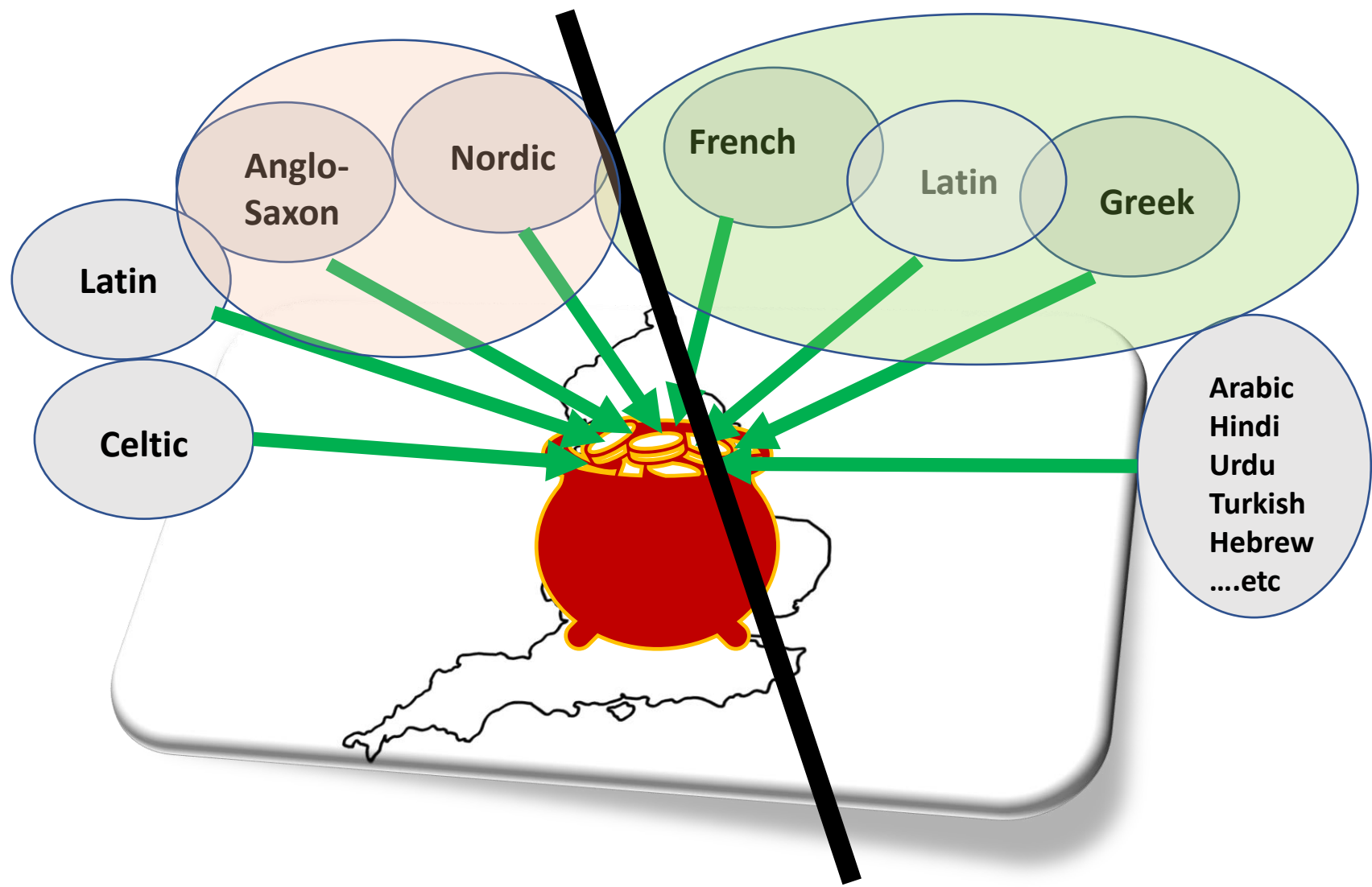
- Three-Cueing **Not endorsed in new**
- Predictable (levelled) texts **Australian Curriculum**
- Sight words as reading instructional inputs
- Invented spelling
- Letter of the Week
- Running Records
- Guided Reading
- Levelled reading systems
- Eclecticism



# Some awkward facts that Balanced Literacy is blind to

8. Teachers need to be knowledgeable about how their writing system works.





# Some awkward facts that **Balanced Literacy** is blind

9. **to** There is a strong link between reading success and psychosocial wellbeing

- ✓ academic achievement across the school years
- ✓ school attachment and retention
- ✓ positive self esteem and prosocial behaviour



**Reading success is an important mental health protective factor**



# Balanced Literacy Vs Science of Reading / Structured reading instruction

## BALANCED LITERACY

- Derived from Whole Language
- Learning to read is “natural”
- Teacher knowledge about linguistic constructs is under-valued
- Immersing children in text will create a love of reading
- Phonics just needs to be “in the mix”
- Top-down; starts with banks of sight words, predictable texts and three-cueing
- Not a recommendation of any of the three national inquires
- Parent/child-blame for failures

## STRUCTURED LITERACY INSTRUCTION

- Derived from cognitive psychology and neuroscience research
- Learning to read is not “natural”
- Teacher knowledge and skill is critical
- Text immersion is vital but does not in itself teach the skills for reading
- Phonics needs to be explicit and systematic; scope and sequence is important
- Bottom up. Starts with component parts and builds transferable skills
- Decodable texts for initial instructional support.
- Poor outcomes mean the teaching is interrogated and changed



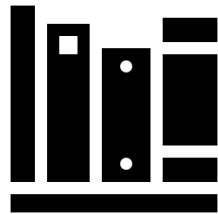
# The Science of (Language and) Reading

- Sits alongside other bodies of evolving and emerging knowledge about human cognition, e.g.,
  - Memory, perception, attention, reasoning, etc.
- Represents decades of rigorous research.
- Has suffered a massive knowledge translation-crisis.
- Belongs first and foremost to teachers (and their students).
- Will have different implications for different groups of children as the evidence changes.
- Is not based on personal preference or ideology.
- Will be debated, contested and evolving.
- Is designed to optimise performance for all children, at a population level.



# What do we mean by “evidence-based” school improvement?

- ✓ We will start with approaches based on robust, testable theories.
- ✓ We will use robust models of evidence-informed practice.
- ✓ We will monitor the student outputs from our teaching inputs and adjust accordingly.



# One theoretical model:

## Simple View of Reading (Gough & Tunmer, 1986)

**Reading Comprehension =**

**Decoding x Language  
Comprehension**

An example of the SoR as an evolving way of  
thinking:





# What does “decoding” mean?

- Working out **how speech sounds and writing elements (letters, morphemes) map to each other.**
- In the early stages of reading, is often described as “**sounding out**”.
- “**Cracking the code**”.
- Not necessarily understanding the text, but an **essential step** if text is going to be understood.
- In English:
  - Understanding (implicitly) that the 26 letters of the alphabet represent ~44 sounds
  - working with the fact that sounds are represented via multiple spellings AND some spellings represent multiple sounds.
- **Decoding → recognition → orthographic mapping**



# Unlocking reading comprehension: getting to the meaning treasure

(Alison Clarke)



# SVR in action

Reading comprehension = Decoding ability  $\times$  Language comprehension

**Student A** has a decoding score of 8/10 and a language comprehension score of 4/10 (32/100). **Is this child a “good reader”?** *Why? / Why not?*

**Student B** has a decoding score of 3/10 and a language comprehension score of 10/10 (30/100). **Is this child a “good reader”?** *Why? / Why not?*

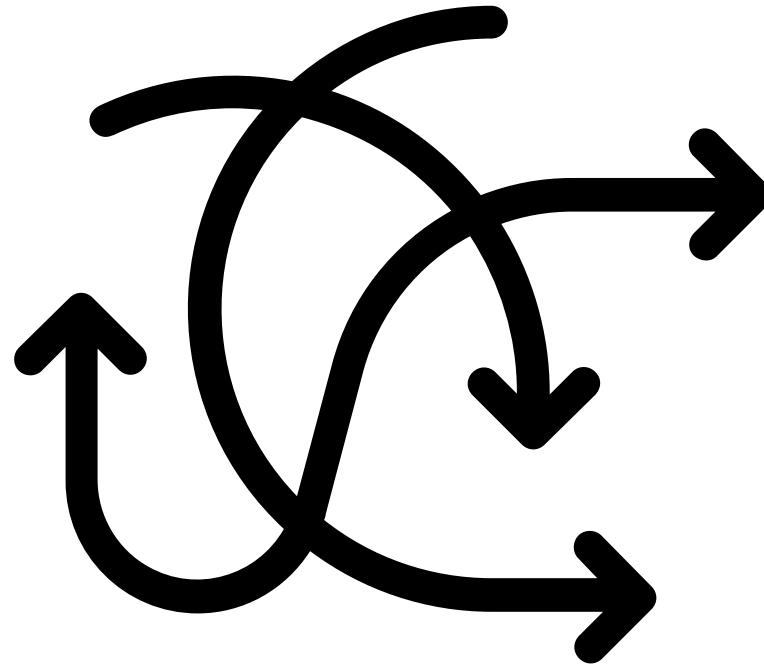
**Student C** has a decoding score of 5/10 and a language comprehension score of 5/10 (25/100). **Is this child a “good reader”?** *Why? / Why not?*

**Student D** has a decoding score of 10/10 and a language comprehension score of 9/10 (90/100). **Is this child a “good reader”?** *Why? / Why not?*



# Are you a skilled reader?

*It depends....*



# Football confirmed as the most popular organised sport in Australia

**The latest AusPlay survey released by Sport Australia has confirmed football's position as the number one organised sport in Australia, with more than 1.76 million participants.**

Recreational sports such as walking, fitness/gym, swimming, running and cycling top the list of physical activities, with football having almost twice as many participants as any other football code.

The AusPlay survey, now in its third year, highlights the fact that 5.4 per cent of the adult (15 years old +) male population regularly participates in football, with more than 396,000 girls and women participating, one of the highest numbers of any sport. More than 681,000 children aged up to 14 years took part in organised out-of-school football.

The survey, comprising 20,000 interviews, showed that the median spend for an adult participant in football is \$300 per year, with the median cost of football for a child being \$200.



# Simple View of Reading (Gough & Tunmer, 1986)

**Reading Comprehension =**  
**Decoding x Language**  
**Comprehension**



# How skilled are you now??

La dernière enquête AusPlay publiée par Sport Australia a confirmé la position du football en tant que sport organisé numéro un en Australie, avec plus de 1,76 million de participants.

Les sports récréatifs tels que la marche, le fitness / gym, la natation, la course et le cyclisme sont en tête de liste des activités physiques, le football ayant presque deux fois plus de participants que tout autre code du football.

L'enquête AusPlay, qui en est maintenant à sa troisième année, met en évidence le fait que 5,4% de la population masculine adulte (15 ans et plus) participe régulièrement au football, avec plus de 396000 filles et femmes qui y participent, l'un des nombres les plus élevés de tous les sports.

Plus de 681 000 enfants âgés de moins de 14 ans ont participé à un football organisé en dehors de l'école. L'enquête, comprenant 20 000 entretiens, a montré que la dépense médiane pour un adulte participant au football est de 300 dollars par an, le coût médian du football pour un enfant étant de 200 dollars.



# Or now?

**AusPlay** أصدرته Sport Australia أن كرة القدم هي الرياضة المنظمة الأولى في أستراليا ، مع أكثر من 1.76 مليون مشارك. الرياضات الترفيهية مثل المشي واللياقة البدنية / الصالة الرياضية والسباحة والجري وركوب الدراجات تصدر قائمة الأنشطة البدنية ، حيث تضم كرة القدم ما يقرب من ضعف عدد المشاركين في أي رمز كرة قدم آخر.

يسلط **AusPlay** ، الذي دخل عامه الثالث الآن ، الضوء على حقيقة أن 5.4 في المائة من السكان الذكور البالغين (15 عامًا فأكثر) يشاركون بانتظام في كرة القدم ، مع مشاركة أكثر من 396000 فتاة وامرأة ، وهو أحد أعلى الأرقام في أي رياضة. شارك أكثر من 681000 طفل حتى سن 14 عامًا في تنظيم كرة القدم خارج المدرسة. أظهر الاستطلاع ، الذي شمل 20000 مقابلة ، أن متوسط الإنفاق للمشارك البالغ في كرة القدم هو 300 دولار في السنة ، مع متوسط تكلفة كرة القدم للطفل 200 دولار.





# Or now?

Phosphatidylserine is an ubiquitous microparticle marker arising from the loss of phospholipid asymmetry during microparticle biogenesis. However, phosphatidylserine is not an absolute microparticle marker and its expression is variable in microparticle populations. Nevertheless, phosphatidylserine is emerging as an important mediator in extracellular vesicle biology and as a target in anticancer therapy. Its cell surface presence was shown to enable cancer cell evasion from physiological immune checkpoints. Furthermore, a recent study suggested a pro-angiogenic role for phosphatidylserine exposed on MPs surface. Phosphatidylserine is also known to be a highly immunosuppressive phospholipid. Interestingly, the exposure of phosphatidylserine on microparticles was shown to contribute to hypercoagulable states, and higher rates of thromboembolic events have been associated with the use of oral immunomodulatory drugs, thalidomide in particular.



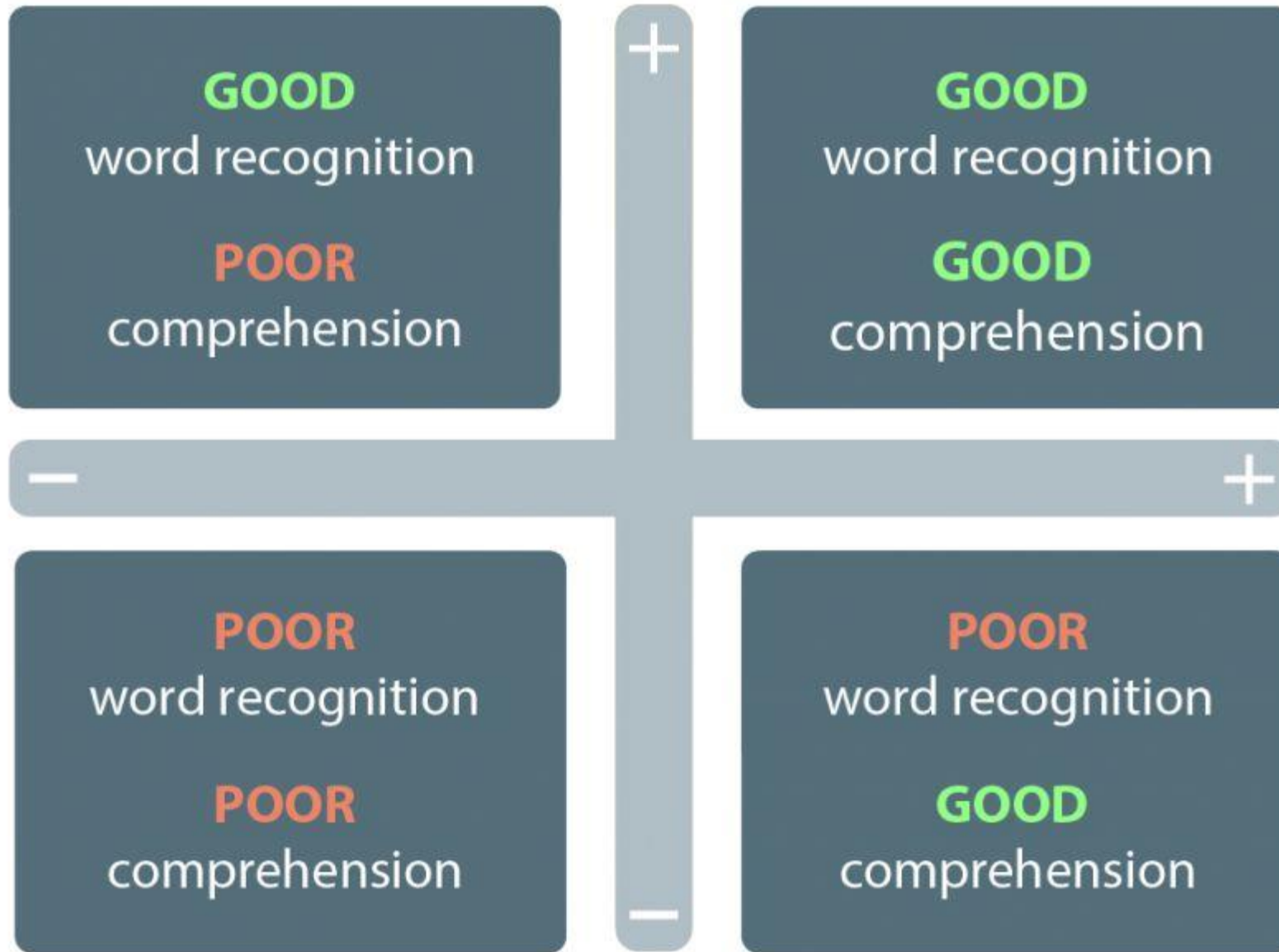
# Example from The Age, 2021

(names and minor details changed).

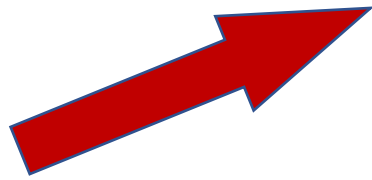
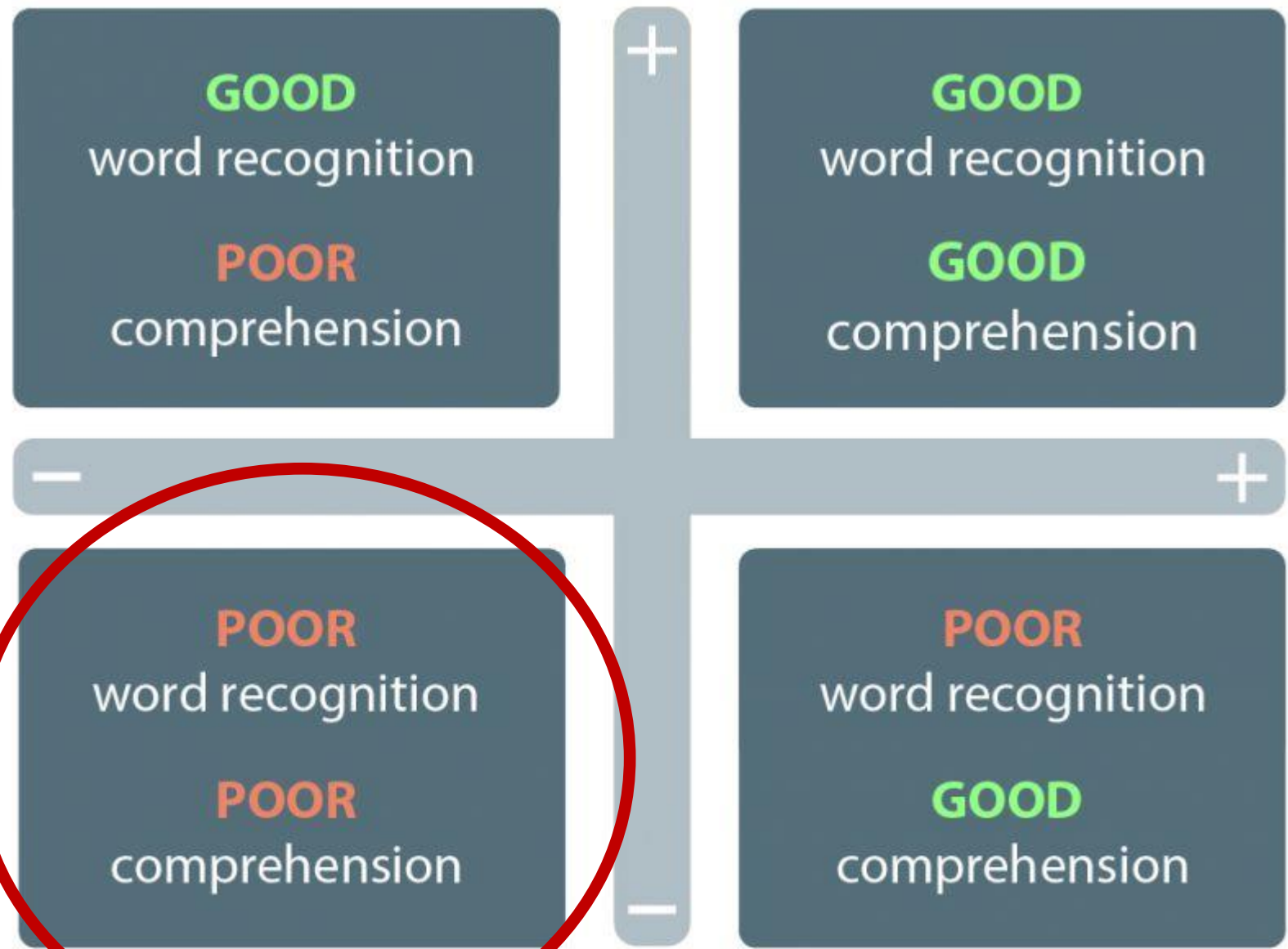
**Note: this is just two sentences.**

Anderson's appointment, confirmed in the space of five days last year after long-serving secretary Jones resigned for inadvertently misleading the Robertson inquiry into hospital wait-times is cited by critics – both academic and from within the public service – as emblematic of a bigger issue: the erosion of one of the key notions of the Westminster system, that the public service is independent of the government and gives frank and fearless policy advice. Instead, there has been a concentration of power in the hands of the Premier, the staffers in his private office and a select group of political operatives-turned-bureaucrats.



**DECODING****LANGUAGE COMPREHENSION**

**DECODING**



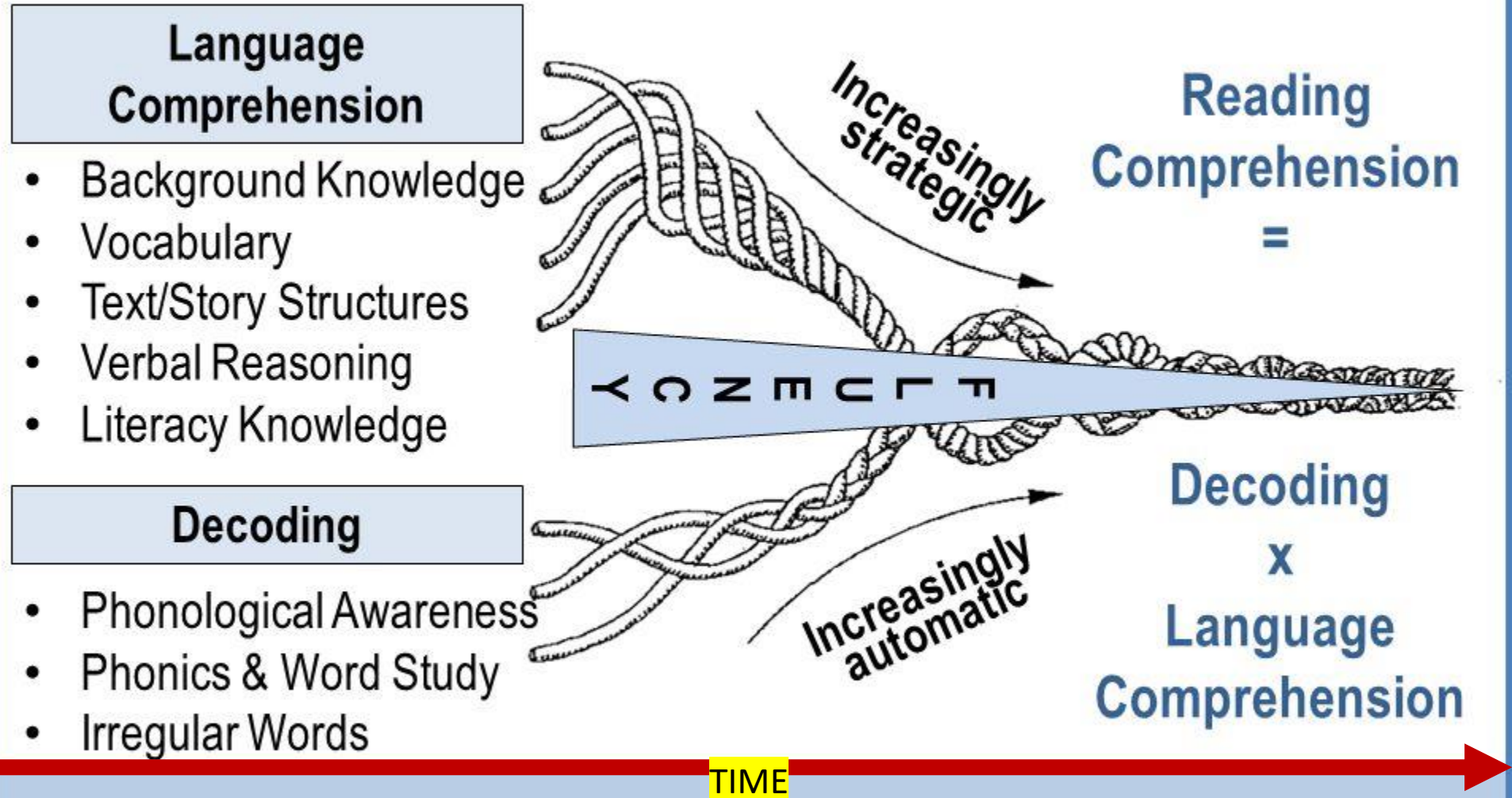
This cell accounts for most struggling students – to varying degrees

**LANGUAGE COMPREHENSION**



# Reading Comprehension (RC = D x LC)

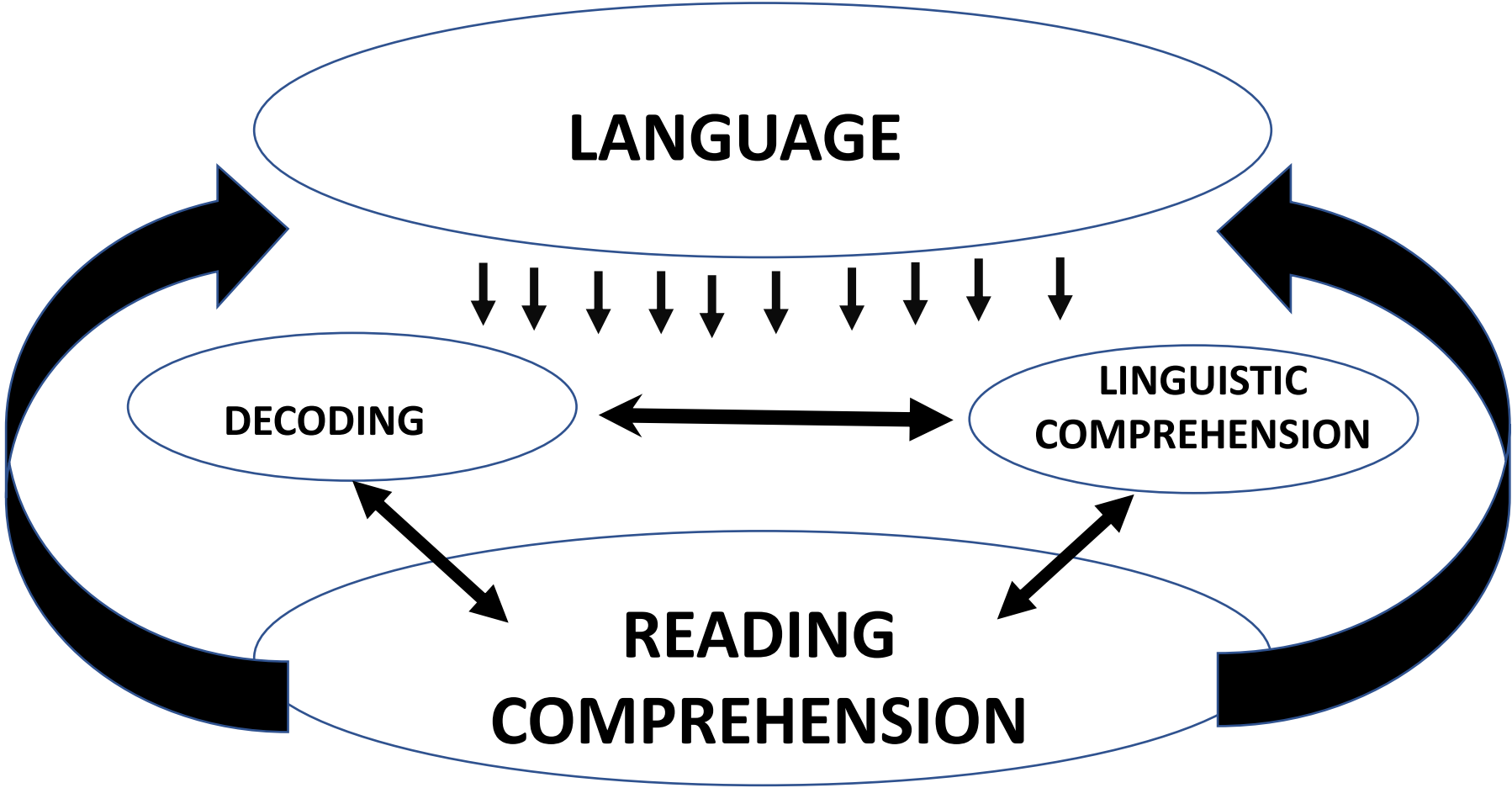
(based on Gough & Tunmer's Simple View of Reading & Scarborough's Reading Rope)



Reading comprehension is complex and increasingly develops over years of explicit and systematic instruction, practice, and application

# Kate Nation's updated Simple View of Reading (2019)

Nation, K. (2019) Children's reading difficulties, language, and reflections on the simple view of reading, *Australian Journal of Learning Difficulties*, 24:1, 47-73, DOI: [10.1080/19404158.2019.1609272](https://doi.org/10.1080/19404158.2019.1609272)



# ALL children need to learn to decode.

## Most need to be taught to do so explicitly



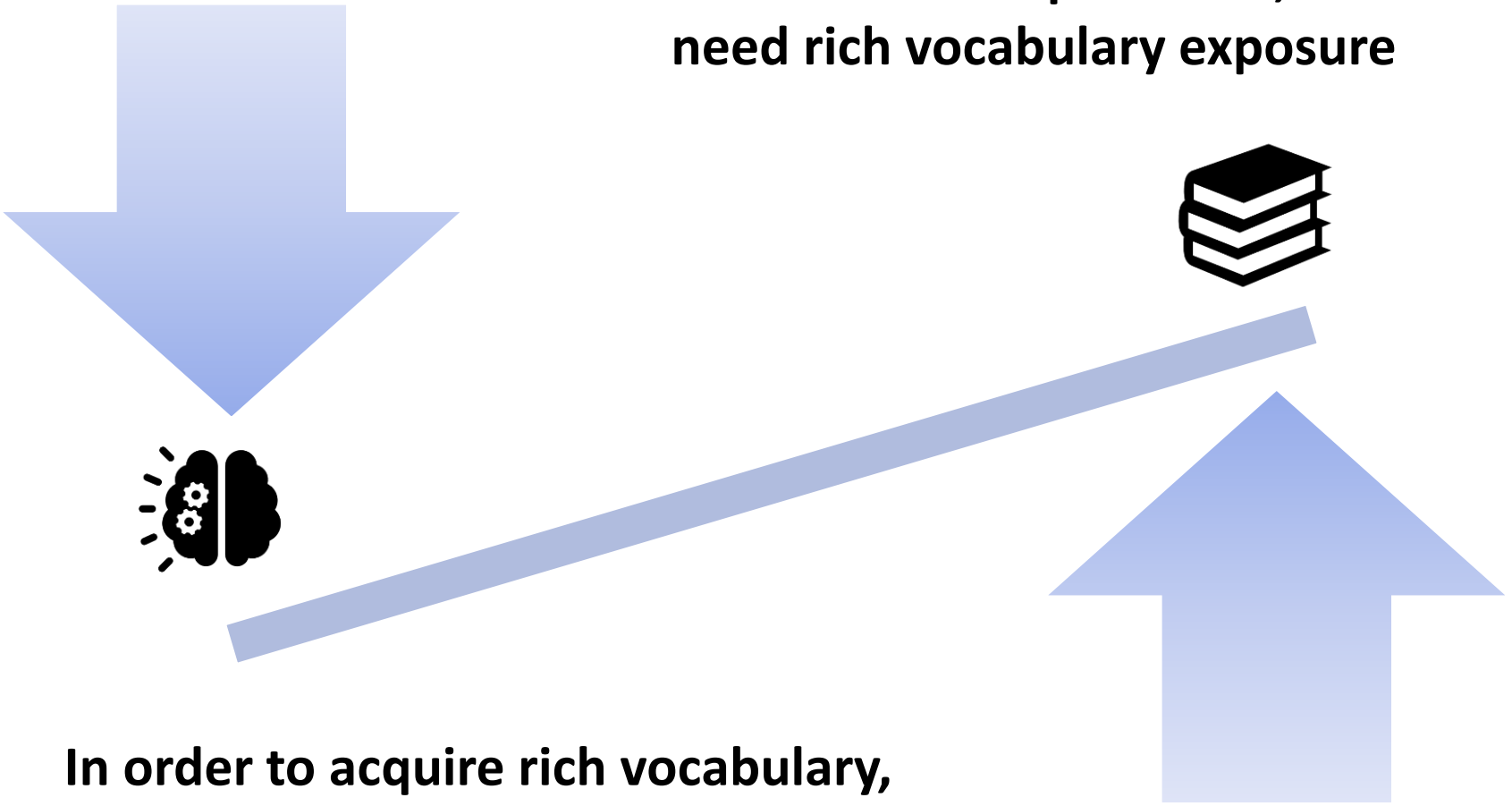
1. English is a morpho-phonemic language
2. Efficient decoding/word identification is a necessary but not sufficient skill-set for all children





# The challenge for schools

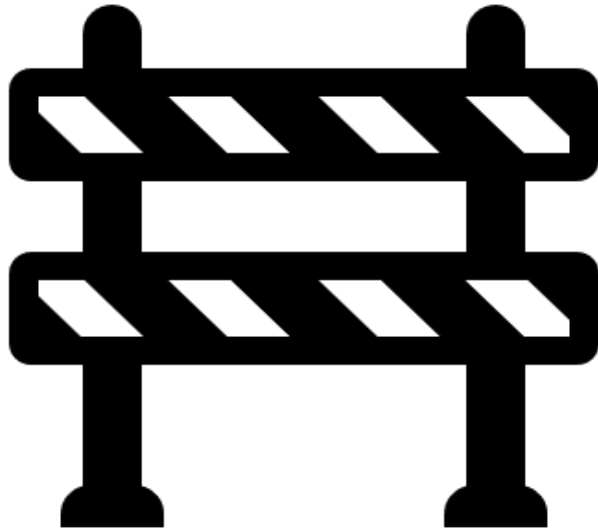
In order to read complex texts, students need rich vocabulary exposure



In order to acquire rich vocabulary, students need to read complex texts



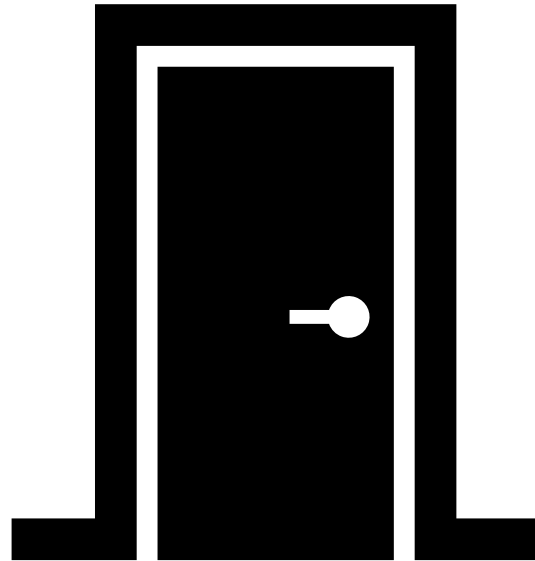
# Removing barriers to success (across year levels)



Need to consider both sides of the SVR



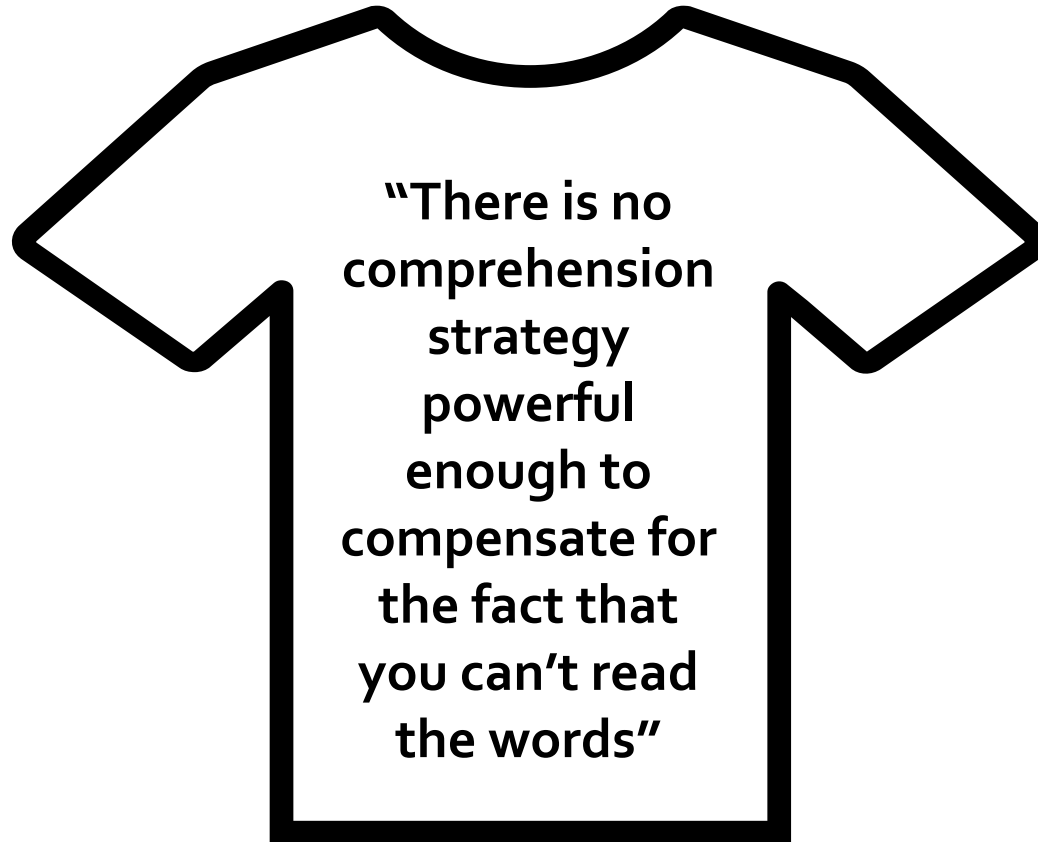
# Students who can't decode efficiently Vs those who can



[Filip Kominik](#) via Unsplash



# Why are strong decoding / word identification skills essential for primary and secondary students?



## Dr Anita Archer



## Context is for deriving meaning, not for identifying words

“Skilled readers rarely try to recognize words by guessing their identities on the basis of context because decoding is a far more accurate and efficient approach. Research has shown that there is only a slim chance of guessing a word correctly from context clues alone”.

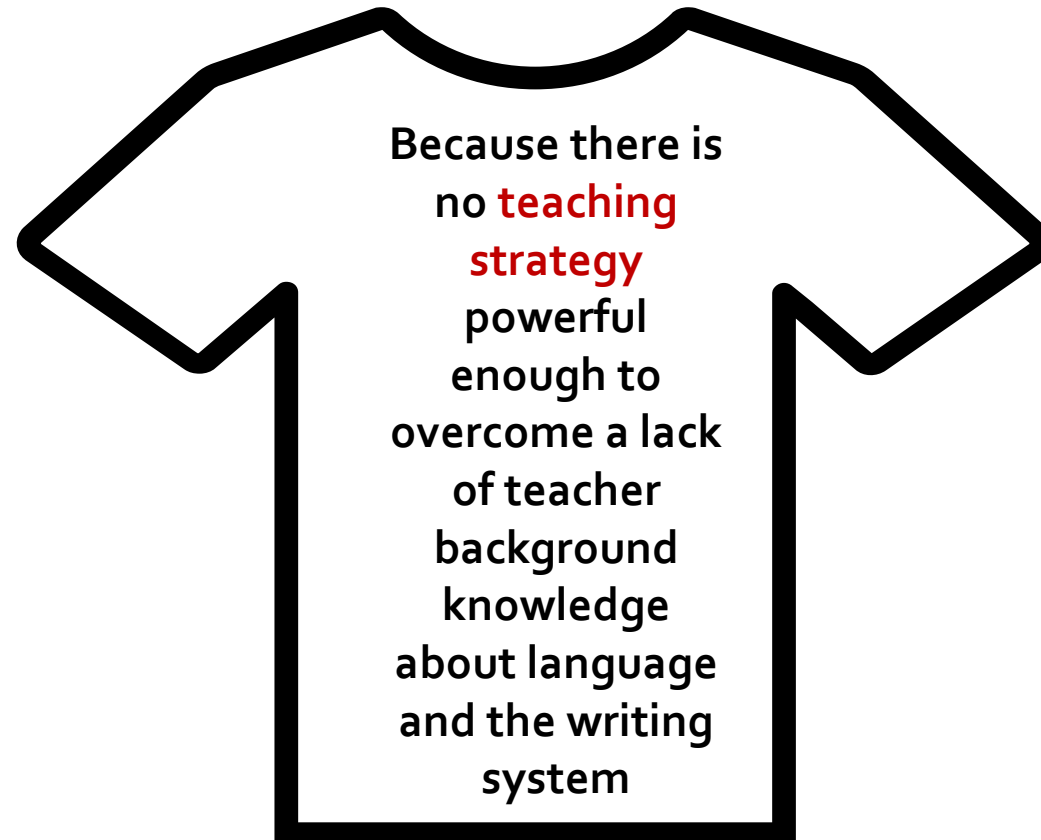
Snow, C. E., Scarborough, H. S., & Burns, M. S. (1999). What speech-language pathologists need to know about early reading. *Topics in Language Disorders*, 20(1), 48–58. (p.51)



# Why do primary and secondary teachers need to know about how language works “under the bonnet”?



# To paraphrase Dr Anita Archer





# How much does application of science matter to you in other fields?



# How does robust research evidence find its way into schools?



# But pseudoscience, fads and fashions?





# Things that don't work / have no / weak evidence-base

- ❖ CogMed
- ❖ Neuro-feedback
- ❖ Brain Gym
- ❖ Special diets
- ❖ Arrowsmith Program
- ❖ Learning Styles
- ❖ Whole-Brain / Brain-Based Learning
- ❖ Balanced Literacy
- ❖ Reading Recovery
- ❖ Story Dogs
- ❖ Remember – there is an **opportunity-cost** associated with time/money wasting too



# Education's relationship with evidence

“Unfortunately, lack of rigor and respect for evidence in reading education are reinforced by the passivity of education leaders who feel that **any idea that can muster a vigorous advocate** is legitimate and deserves to be aired”.

Dr Louisa Moats (2000, p.12)



**De-implementation science is just as important as implementation science**

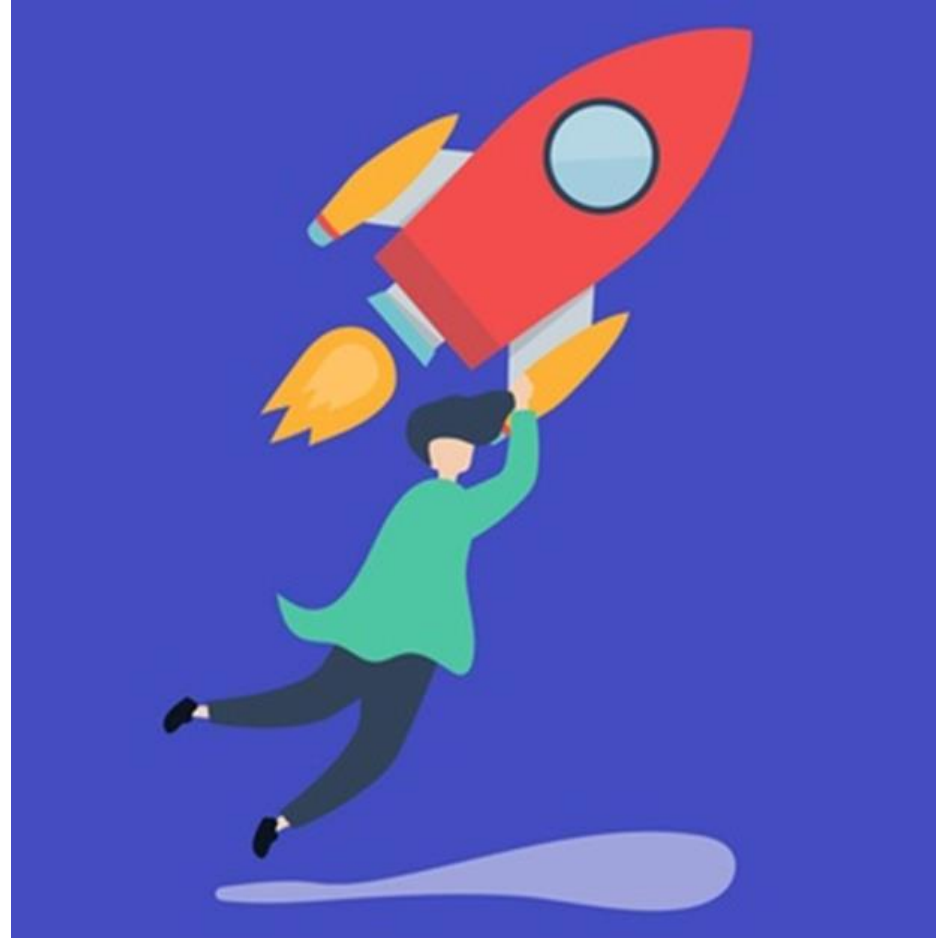


# Reading success / struggle: A perfect storm

- A great deal hinges on being able to read. It is **important**.
- It's a skill that is **biologically unnatural**.
- It draws on the strength and integrity of the **oral language system**.
- It needs to be **taught**, not caught.
- Once children start falling behind, it becomes exponentially **difficult to catch them up**. Few schools have the resources for this.
- There are **behavioural and emotional consequences** for children (primary and secondary) whose reading skills are not at grade level.
- Much reading failure can be **prevented**.
- Being part of the **social end economic mainstream** is very difficult without strong reading, writing, and spelling skills.



# Why is teaching reading like launching a rocket?





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### The Science of Language and Reading – The Secondary School Perspective

The Science of Language and Reading – The Secondary School Perspective

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# SOLAR: The Science of Language and Reading

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**Pamela C. Snow**   
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## Abstract

Reading ability is profoundly important, for individuals and for the societies of which they are a part. Research indicates that we should be successfully teaching 95% of children to read, yet, in reality, high rates of reading failure are common in western, industrialized nations. In large part, this reflects a failure to translate into practice knowledge derived from the scientific study of reading and reading instruction and, indeed, to the rejection in some circles of the notion that there is a science of reading, in the same way that there is a science of memory, learning, and cognition. In this article, I suggest the Science of Language and Reading (SOLAR) framework as a way of positioning oral language as a central driver of reading acquisition. The SOLAR framework is illustrated via the Language House schema, which considers the social-emotional contexts for language acquisition and reading instruction, alongside the ongoing development of prosocial interpersonal skills and mastery of sufficient language and reading skills by early adulthood to be able to function as part of the social and economic mainstream. I argue that speech-language therapy has much to offer to the promotion of evidence-based early reading and writing instruction and support, given the linguistic nature of reading and the high comorbidity between language and reading difficulties and social-emotional disturbances in childhood and adolescence.

Open access:

<https://doi.org/10.1177/0265659020947817>




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kinds of clever



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