

**Understanding Word-Level Reading Problems:  
Implications for Instruction and Intervention**

**Literacy Promise Conference**  
March 26, 2022

David A. Kilpatrick, PhD  
*State University of New York at Cortland*

---

---

---

---

---

---

---

---

1

**Objectives for Today**

- 1 Understand the main components of skilled reading
- 2 Learn the key skills needed for proficient word reading
- 3 Understand why some struggle in word reading
- 4 Become aware of why the most common reading approaches do not work well with many students
- 5 Learn about the instructional/intervention approaches with the best results in the scientific research literature

My real goal is to "whet your appetite" to embark on a course of self-study so you can become a "conduit" of empirical reading research to your schools.

---

---

---

---

---

---

---

---

2

**Key Terms to Understand this Presentation**

- ▶ Auditory vs. phonological
- ▶ Phonological vs. phonemic
  - Phonemic awareness
- ▶ Orthography and orthographic
- ▶ Phonological awareness vs. phonics
- ▶ Decoding
  - Phonetic decoding and word-level reading
- ▶ Sight word and sight word vocabulary
  - Also called orthographic lexicon
- ▶ Advanced phonemic awareness ("abandoned" term)
  - Skill (phonemic proficiency) vs. task (PA manipulation tasks)

---

---

---

---

---

---

---

---

3

Introducing the Field of the Scientific Study of Reading

- ▶ The reading research field is huge
  - Tens of millions of our tax dollars are spent on this research every year!
  - Over 1,000 scientifically-oriented research reports and reviews appear in English every year
- ▶ Flies under the radar of education-related fields
  - Studies of teachers and university professors in:
    - General education, special education, literacy education, ELL education - even school psychology

---

---

---

---

---

---

---

---

4

FINDINGS FROM READING RESEARCH  
WORD-LEVEL READING SKILL DEVELOPMENT  
AND WORD-LEVEL READING DIFFICULTIES

---

---

---

---

---

---

---

---

5

The Largely “Untapped” Intervention Research

*Early support for the notion of RTI*

- **TIER 1:** Prevention research in 1980s–1990s
  - 50%–75% reduction in reading problems
    - (reviewed by the *National Reading Panel*, 2000)
- **TIER 2:** Vellutino, et al. (1996) *Journal of Educational Psychology*
  - Reduced RD kids down to 3% under 30<sup>th</sup> %ile & 1.5% under 16<sup>th</sup> %ile!
  - Results maintained 3 years later
- **TIER 3:** Torgesen et al., (2001) *Journal of Learning Disabilities*
  - Severely RD 3<sup>rd</sup> to 5<sup>th</sup> graders (average score = bottom 2%)
  - Average improvement was 14 SS points; then 18 points 2 years later
  - 40% discontinued from special educational reading support
  - Replicated with older students and adults
    - There is no ‘statute of limitations’ on reading improvement

---

---

---

---

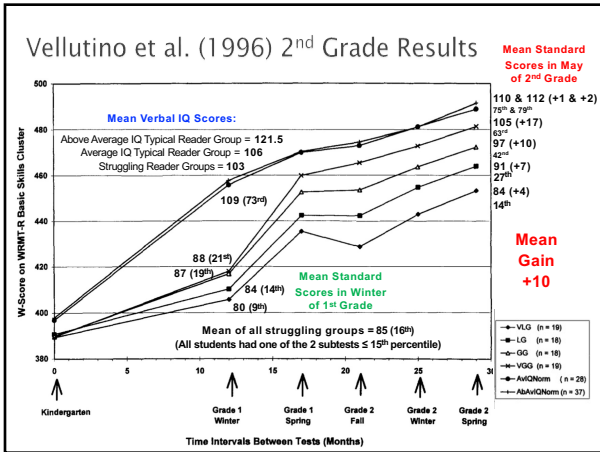
---

---

---

---

6




---

---

---

---

---

---

---

---

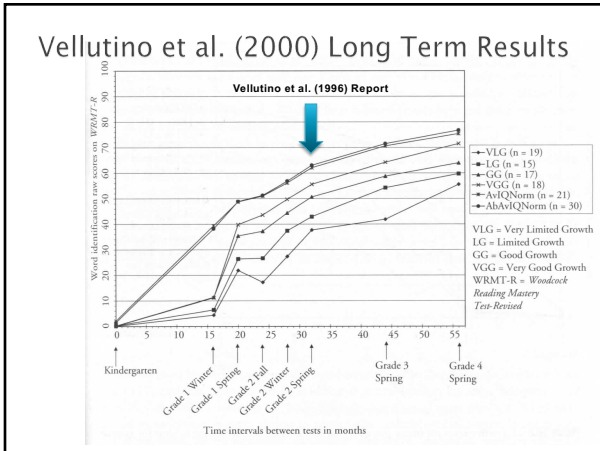
---

---

---

---

7




---

---

---

---

---

---

---

---

---

---

---

---

8

### Example from Torgesen et al. (2001)\*

Immediate results (2-year follow up in blue)  
 Note: Both intervention groups combined

Skill	Standard Score Gains Rounded to nearest whole number
1) Phonemic decoding skill	1) WRMT-R Word Attack <b>24 (22)</b>
2) Untimed real word context-free word identification	2) WRMT-R Word Identification <b>14 (18)</b>
3) Timed real-word reading tasks	3) TOWRE Sight Word Efficiency <b>5 (12)</b>
4) Paragraph reading fluency	4) GORT-III Rate <b>3 (0)</b>

**Note: GORT Rate raw score tripled**

\*Torgesen, J. K., Alexander, A. W., Wagner, R. K., Rashotte, C. A., Voeller, K. K. S., & Conway, T. (2001). Intensive remedial instruction for children with severe reading disabilities: Immediate and long-term outcomes from two instructional approaches. *Journal of Learning Disabilities, 34*(1), 33-58, 78.

---

---

---

---

---

---

---

---

---

---

---

---

9

# The Big Picture in Reading

---

---

---

---

---

---

---

---

10

The Simple View of Reading

Reading Comprehension is the product of:

LANGUAGE COMPREHENSION  
and  
WORD-LEVEL READING

- A question to ponder with any student is:  
*What if you read it to him or her?*

---

---

---

---

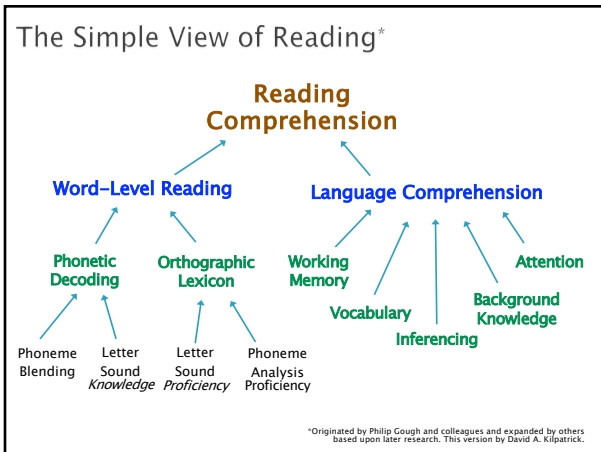
---

---

---

---

11



---

---

---

---

---

---

---

---

12

### Scientific Support for The Simple View

- The Simple View of Reading has received support from over 100 *direct* studies and several hundred *indirect* studies
- Research shows the Simple View applies to:
  - All ages levels
  - All skill levels
  - All educational disabilities
  - All languages studied
  - All students learning to read a non-native language

---

---

---

---

---

---

---

---

13

### The Value of the Simple View for Educators

- Understand the reading process in terms of each of the components and how they work together
- Make sense of reading difficulties based upon the areas of struggle
- Design assessments and organize and interpret assessment results
- Guide instructional decisions in terms of knowing what skills need to be taught (general education) or remediated (special instruction)

---

---

---

---

---

---

---

---

14

### Established Subtypes of Reading Difficulties Based

		Word Identification	
		Strong	Weak
Language Skills	Strong	Typical Reader	Dyslexic (also "compensators")
	Weak	Hyperlexic	Mixed Reading Disability (GVPR)

---

---

---

---

---

---

---

---

15

The Nature of Word Reading in Alphabetic Writing Systems

---

---

---

---

---

---

---

16

- The Alphabetic Principle and the Nature of Alphabetic Writing
- Chinese writing vs. alphabetic writing
  - We do not write words!
    - We write sequences of characters designed to represent sequences of phonemes in spoken words
  - Poor access to the phonemes makes reading alphabetic languages very difficult
  - Phoneme skills are needed for BOTH sounding out new words AND remembering the words we read

---

---

---

---

---

---

---

17

The Two Levels of Word Reading

---

---

---

---

---

---

---

18

### Two Levels of Word-Level Reading Skill Deficits

- 1) The ability to identifying unfamiliar words by sounding them out
- 2) The ability to remember the words they read

*As we will see (and contrary to our intuition), the first level of skill is required for the second*

---

---

---

---

---

---

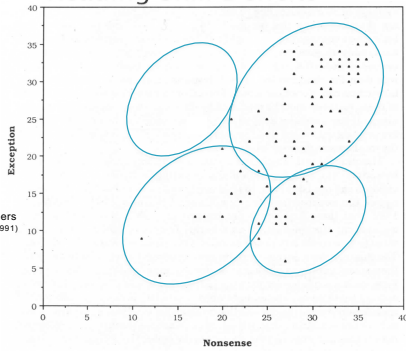
---

---

19

### Two Levels of Word-Level Reading Skill Deficits

Study of 93  
1<sup>st</sup> through 3<sup>rd</sup> graders  
From Gough & Walsh (1991)




---

---

---

---

---

---

---

---

20

### Two Levels of Word-Level Reading Skill Deficits

- 1) The ability to identifying unfamiliar words by sounding them out
- 1) Skilled readers are good at learning letter sounds and blending and applying those two skills
- 2) The ability to remember the words they read

*As we will see (and contrary to our intuition), the first level of skill is required for the second*

---

---

---

---

---

---

---

---

21

## How We Remember the Words We Read

---

---

---

---

---

---

---

---

22

Sight Word Vocabulary is NOT Based on Visual Memory/Visual Skills

- Input and storage are not the same thing
  - Input is visual, storage is orthographic (via a phonological process)
- Findings from the 1970s
  - Correlation between word reading & visual memory: zero to weak
- 1960s to 1980s miXeD cAsE sTuDiEs
  - Adams' comment about debating with students
- Word reading correlates strongly with phonological skills
- Note how we sometimes "block" on names of people and things (visual memory), but never written words
- Most students who are deaf struggle tremendously with word level reading - this is difficult to explain if it is visual memory
- Neuroimaging studies show different activation patterns for visual memory and orthographic memory

---

---

---

---

---

---

---

---

23

Orthographic Mapping

- ▶ The *process* involved in encoding into long-term memory for later, instant and effortless retrieval
  - Also applies to word parts, not just words
- ▶ Orthographic mapping is the mechanism that builds the sight vocabulary/orthographic lexicon
- ▶ Other than visual input of the letters into the system, it is not a visual memory process

---

---

---

---

---

---

---

---

24



### David Share's Self-Teaching Hypothesis

- ▶ We teach ourselves most of the words we know
- ▶ Orthographic learning occurs one word at a time
  - As students sound out new words, orthographic connections are formed
    - When newly encountered words are not sounded out, they are poorly remembered
- ▶ Self teaching does not refer to teaching ourselves “the code,” but presumes you know the code and can use it reliably
- ▶ Orthographic learning is implicit – it typically does not involve conscious thought or effort
- ▶ From 2<sup>nd</sup> grade on, typically developing readers remember words after only 1 to 4 exposures

---

---

---

---

---

---

---

---

25

### Linnea Ehri's Orthographic Mapping Theory

- ▶ Sight words are highly familiar spellings (i.e., letter sequences), regardless of the visual look of the word
  - e.g., bear, BEAR, **BEAR**, *bear*, **bea**r, *BEAR*, **bea**r, *bear*, BEAR
- ▶ Sight words are anchored in long-term memory (LTM) via a connection between something well established in LTM (the word's pronunciation) and the stimulus that needs to be learned (the letter sequence in the word's spelling)
- ▶ Phoneme-level analysis and letter-sound knowledge are central to this connection-forming process

---

---

---

---

---

---

---

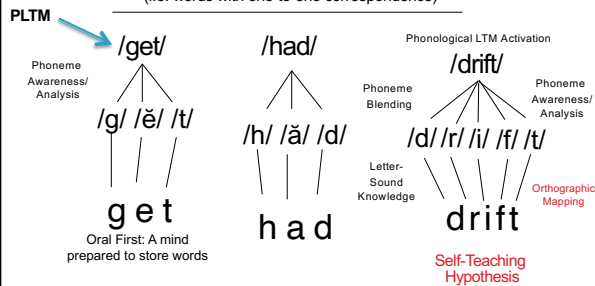
---

26

### How We “Map” Words

“Transparent” Words

(i.e. words with one-to-one correspondence)




---

---

---

---

---

---

---

---

27

## How We “Map” Words

Words that are “Opaque”  
(i.e. words without a one-to-one correspondence)

/n/ /ā/ /m/       n a m e	/t/ /ē/ /m/       t e a m	/c/ /ō/ /m/       c o m b
---------------------------------	---------------------------------	---------------------------------

---

---

---

---

---

---

---

---

28

## What about irregular words?

- Irregular and opaque words take a little longer to learn
  - Only 1–2 extra exposures for typical readers; many more for RD
- Most irregular words are off by only one element
  - E.g., *said, put, comb, island*; multiple violations are rare: *of, one, iron*
- Irregular words are not a challenge for orthographic mapping
  - “Exception words are only exceptional when someone tries to read them by applying a [phonetic] decoding strategy. When they are learned as sight words, they are secured in memory by the same connections as regularly spelled words . . .” (Ehri, 2005 p. 171–172)
- Many regular words require mapping “adjustments” like irregular words
  - Silent e words, vowel digraphs, consonant digraphs are all opaque
  - Multisyllabic “regular” words with vowel reduction require mapping adjustment, much like irregular words (e.g., *holiday, market*)

---

---

---

---

---

---

---

---

29

## How Words are Learned for Instant, Effortless Retrieval

- ▶ Orthographic mapping requires:
  - **Letter–sound proficiency**
  - **Phonemic proficiency**
  - The ability to establish a relationship between sounds and letters unconsciously while reading
  - Note that phonemic proficiency skill is not easily estimated on the PA assessments we use
    - Except the PAST and the WIAT-4 *Phonemic Proficiency* subtest

---

---

---

---

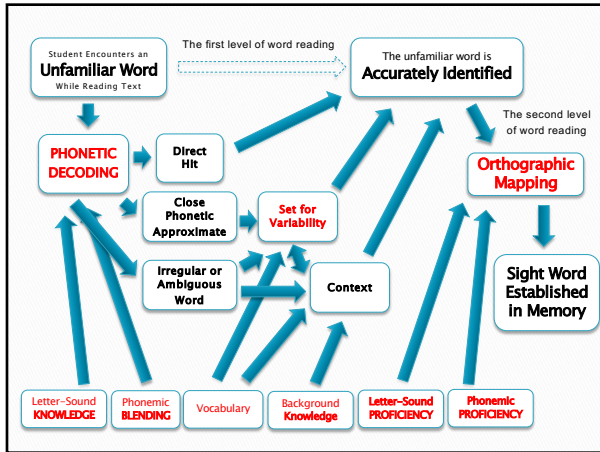
---

---

---

---

30




---

---

---

---

---

---

---

---

31

### Effective Use of Flash Cards

From the Perspective of Orthographic Mapping

- ▶ Introduce the word orally first
- ▶ Segment into phonemes verbally (no letters)
- ▶ Emphasize each phoneme
- ▶ Ask for letters associated with phonemes
- ▶ Build a “phonological framework”
  - Focus first on regular letter–sound connections
- ▶ Elaborate if possible
- ▶ Then work that word into a stack of flash cards

---

---

---

---

---

---

---

---

32

### Sight Vocabulary and Reading Fluency

- *Sight words* are effortless & pre-cognitive—words “pop out”
- The elusive key to reading fluency appears to be:
 

**SIGHT VOCABULARY SIZE**

  - With a large sight vocabulary:
    - Most (or all) words “pop out”; reading is *fast* and *accurate*
  - With a limited sight vocabulary:
    - Reading is effortful and often inaccurate because too many unfamiliar words require attention and strategic decoding
- *But what about RAN and reading experience?*

---

---

---

---

---

---

---

---

33

Why is Word Reading Easy for Some Students and Very Difficult for Others?

---

---

---

---

---

---

---

---

34

Important Note About Dyslexia

- Multiple definitions – organizations and popular
- “Researcher Definition”:
  - Word-level reading difficulty despite adequate opportunity or effort (and not due to blindness, deafness, emotional disturbance, brain damage, or extremely low IQ)
  - All else is popular lore that’s been with us for over 100 years
  - Not all researchers like that term due to the popular baggage attached— “word-level reading disability” (WLRD) is an alternative

A problem translating research to practice:  
*Where do we draw the line?*

---

---

---

---

---

---

---

---

35

The Phonological-Core Deficit of Dyslexia

From the “most common cause” to the “universal cause”

*“[A]lthough some individuals with dyslexia have weaknesses in a variety of areas, impaired phonological processing appears to be a universal cause of dyslexia.”*

Ahmed, Y., Wagner, R. K., & Kantor, P. T. (2012). How visual word recognition is affected by developmental dyslexia. In J. S. Adelman (Ed.), *Visual word recognition: Vol. 2. Meaning and context, individuals and development* (pp. 196-215). New York, NY: Psychology Press.

- 1) Weakness in one or more of the following (often more than one—sometimes all of these):
  - Phonemic awareness/analysis
  - Phonemic blending/synthesis
  - Rapid automatized naming
  - Phonological working memory
  - Nonsense word reading & letter-sound knowledge acquisition
- 2) Well established with no substantive alternatives

▶ This is consistent with our phoneme-based writing system

---

---

---

---

---

---

---

---

36

### Let's Not Accidentally Sell Kids Short

- ▶ *IDEA disability categories do not cause word-level reading difficulties!*
  - Students with low intelligence and low language skills can become good word-level readers
    - It may take longer, but the same underlying skills are required
  - There has been a noticeable shift by researchers away from the term "dyslexia" to the term "word-level reading disability" for various reasons, including that it is more portable across disabilities
  - Our goal is when they graduate high school, their reading comprehension is as high as their language comprehension
  - Thus, the answer to the question "Why is this student struggling in reading" is never a IDEA designation—the answer should be one or more of the following:

---

---

---

---

---

---

---

---

37

### English Language Learners

- ▶ Hundreds of studies with consistent findings
  - Findings support the Simple View of Reading
  - Word reading develops similarly to native speakers (in the absence of the phonological-core deficit)
  - Perhaps brief time lag, depending on age, previous reading acquisition, similarities across languages, etc.
  - PA transfers across languages
  - Comprehension lag (5–6 years) due to language development

---

---

---

---

---

---

---

---

38

### Why Our Most Popular Reading Approaches Make it Harder to Learn to Read

---

---

---

---

---

---

---

---

39

The Four Classic Reading Approaches

- ▶ Clear delineation between them based on the instruction's unit of focus
  - ▶ Teachers may sample strategies from multiple approaches
- ▶ They fall along a continuum of unit size
  1. **Letters/graphemes** - phonics approach
  2. **Word parts/rhyme units** - linguistic/word family approach
  3. **Words** - whole word approach
  4. **Sentences/paragraphs** - whole language/balanced literacy

---

---

---

---

---

---

---

---

40

Concerns About the Efficacy of Phonics

- Explicit and systematic phonics instruction displays superior results to whole word or whole language (three cueing, guided reading, balanced instruction)
  - This is true for all children as a group, but results "wash out" in the top two thirds of students by 3<sup>rd</sup> to 4<sup>th</sup> grade
  - Bottom third shows ongoing benefit over time
- Too many, however, never "catch up"
- A small percentage cannot seem to learn via phonics
- No built-in mechanism or theory about fluency and building a sight vocabulary

---

---

---

---

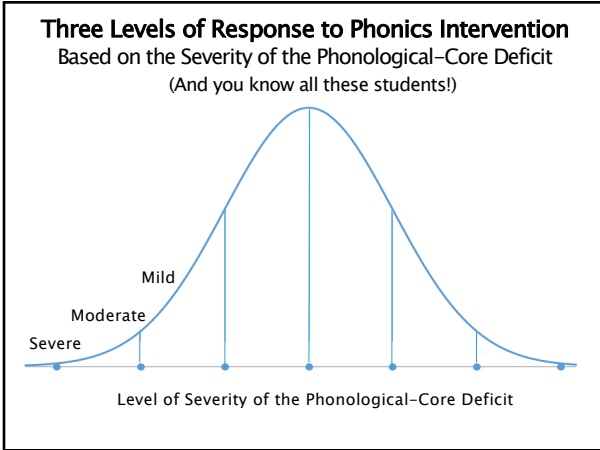
---

---

---

---

41




---

---

---

---

---

---

---

---

42

# Implications for Prevention, and Intervention

---

---

---

---

---

---

---

---

43

## Prevention Research Results (Tier 1) K-1 Phonological Awareness Instruction

- ▶ Overall improvement in reading scores
  - ▶ Average of 8 standard score point equivalent
    - (Standard score point equivalent based upon effect sizes comparing groups, not national norms)
  - ▶ Results did not always last after 1-2 year follow ups
- HOWEVER . . .
- ▶ At-risk students averaged a gain of the equivalent of 13 standard scores!
  - ▶ Gains increased to an average of 20 point equivalent at 6 month to 2 year follow ups!

---

---

---

---

---

---

---

---

44

## Prevention of Word-Level Reading Difficulties

- ▶ Tier 1 instruction - What is effective K-1?
  - KEY COMPONENTS
  - Phonological Awareness
  - Letter-Sound Knowledge
  - Connecting phonological awareness to word-level reading
  - Good teaching techniques based on general learning principles
    - Seems to be the focus of RTI efforts
- ▶ Early, rigorous development of PA and LS skills in K-1 dramatically reduces the number of struggling readers

---

---

---

---

---

---

---

---

45

### The Phonemic Proficiency Intervention Continuum

- ▶ **Minimal Group (0 – 5.85 standard score point improvements)**
  - None formally trained phonological awareness/analysis
  - Most did explicit, systematic phonics instruction
  - All provided reading practice with "connected text" (i.e., authentic reading)
- ▶ **Moderate Group (6–9 standard score point improvements)**
  - All did explicit, systematic phonics instruction
  - All provided reading practice
  - All trained phonological segmentation and/or blending
    - This is "basic phonological awareness" (mastered by most at end of 1<sup>st</sup> grade)
- ▶ **Highly Successful Group (10–25 standard score point improvements)**
  - All did explicit, systematic phonics instruction
  - All provided reading practice with real text
  - Aggressively addressed and "fixed" PA issues, using the more challenging PA manipulation (deletion & substitution) tasks
    - The presumption is that they developed phonemic proficiency which presumably make them better at orthographic mapping (i.e., remembering words)

---

---

---

---

---

---

---

---

46

### Intervention with At-Risk and Weak Readers

- ▶ Conclusions consistent with orthographic mapping
- ▶ Unless their problem with phonemic awareness is fixed, poor word-level readers don't catch up
- ▶ Phonemic proficiency appears to be necessary for sight word development and if students lack this level of phonemic skills we have little reason to expect word-level reading progress
- ▶ Torgesen et al. (1999):
  - "We should not assume that even skillfully administered one-to-one instruction will have a significant impact on word level skills in children who have serious phonological processing weaknesses if it does not contain sufficient depth of instruction in alphabetic reading skills."
  - Given most word-level reading problems are phonologically based, this is a very important guiding principle

---

---

---

---

---

---

---

---

47

## Effective Teaching Approaches

Tier 1 and Remedial (Tiers 2, 3, 4)

---

---

---

---

---

---

---

---

48



How to Promote Orthographic Mapping: General

- Train the skills needed for orthographic mapping
  - Train letter-sound skills to proficiency/automaticity
  - Train phoneme awareness to proficiency/automaticity
    - To a typical 3<sup>rd</sup>/4<sup>th</sup> grade level which is essentially the adult level
    - All our universal screenings stop after first grade
- Avoid word identification strategies that may accidentally undermine the development of phonic decoding and orthographic mapping
  - Those with the phonological-core deficit will "default" to the non-phonological strategies, that will not help them with future word identification nor memory for words

---

---

---

---

---

---

---

---

49

Principles of Effective Instruction

Based on Findings from Inside and Outside Reading Research

- ▶ Instruction must be explicit
- ▶ Instruction should be systematic
- ▶ Immediate feedback
- ▶ Instruction should provide many practice trials
- ▶ Distributed learning better than massed learning
- ▶ Language of instruction must be mastered
- ▶ Motivation is important
  - Keep activities fun, fast paced, brief

---

---

---

---

---

---

---

---

50

Summary

- Word-level reading is primarily phonological in nature
  - This is based upon the alphabetic nature of our writing system
  - Visual memory is not a significant contributor to word reading
- Skilled readers are all good at 1) phonetic decoding and 2) orthographic mapping, neither is optional
  - Efficiently remembering words via orthographic mapping appears to require
    - 1) letter-sound *proficiency* and
    - 2) phonemic *proficiency*
- Struggling readers lack one or both of these skills and they are the skills that need to be addressed

---

---

---

---

---

---

---

---

51

### Summary

- Fluency appears to be primarily a function of sight vocabulary size
- Reading problems are very preventable
  - Teach all kids letter-sound skills and phonemic skills in general education K-2
- Struggling readers need to address the phonological issues via instruction in 1) phonemic awareness, 2) systematic phonics, and 3) skill-appropriate reading practice
  - Avoid reading strategies that circumvent the code of written English such as heavily reliance on guessing from context, pictures, the first letter, and the overall "look" of the word

---

---

---

---

---

---

---

---

52

### Related Resources

Important Topics I Will Not Cover as Much

#### Vocabulary and Reading Comprehension:

Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing Words to Life: Robust Vocabulary Instruction* (2nd ed.). New York, NY: Guilford Press.

Oakhill, J., Cain, K., & Elbro, C. (2015). *Understanding and Teaching Reading Comprehension: A Handbook*. New York: Routledge.

#### Students who are non-native speakers of English:

Geva, E., & Wiener, J. (2014). *Psychological Assessment of Culturally and Linguistically Diverse Children and Adolescents: A Practitioner's Guide*. New York, NY: Springer.

Geva, E., & Ramirez, R. (2015). *Focus on Reading (Oxford Key Concepts for the Language Classroom)*. New York: Oxford University Press.

#### Listening resources:

Emily Hanford from American Public Media. [www.apmreports.org/reading](http://www.apmreports.org/reading)

---

---

---

---

---

---

---

---

53

### Resources for Scientifically-Based Information on Reading

- ▶ IES Practice Guides (U.S. Department of Education)
  - *Foundational Skills to Support Reading for Understanding in Kindergarten Through 3rd Grade*
  - *Assisting Students Struggling with Reading: Response to Intervention (RtI) and Multi-Tier Intervention in the Primary Grades*

---

---

---

---

---

---

---

---

54