Understanding and Addressing Word-Level Reading Difficulties: An Introduction for Parents

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Today's Objectives

- 1 Understand the main components of skilled reading
- Develop a laser focus on the two levels of word reading;
 (1) identifying new words, and (2) remembering words
- 3 Learn the key skills needed for proficient word reading
- 4 Understand why some struggle in word reading
- 5 Become aware of why the most common reading approaches do not work well with many students
- 6 Learn about the instructional/intervention approaches with the best results in the scientific research literature

Introductory Concepts

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

The Big Picture in Reading

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?*



*Originated by Philip Gough and colleagues and expanded by others based upon later research. This version by David A. Kilpatrick.

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
- Today's focus will be on the word-level reading side of the Simple View equation

Implications of the The Simple View

- All skills mentioned on the earlier slide are required for skilled reading
- The skills that underlie the Simple View have been shown in multiple studies to account for 99% of the statistical variation in reading comprehension
 - Roughly translated: There are no mysterious factors lingering out there as to why some students are more skilled at reading comprehension than others—the factors are known
 - This is much like all the factors that make one a good basketball player are known: Dribbling, passing, shooting, and playing defense
- This means we should 1) spend time developing the skills known to be necessary for reading and 2) not spend time on skills that contribute little or nothing to skilled reading (e.g., developing guessing skills)

The Nature of Word Reading in Alphabetic Writing Systems

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

The Two Levels of Word Reading

Two Levels of Word-Level Reading Skill Deficits

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



The Skills Needed for Efficient Word-Level Reading

- Phonetic Decoding (correctly sounding out words)
 - Letter-sound knowledge
 - Oral-phonemic blending
- Orthographic Mapping (remembering words)
 - Letter-sound proficiency
 - Phonemic proficiency

A Question Science Needs to Answer

- Of the 20,000 to 70,000 words in your orthographic lexicon:
 - What percentage of them, upon first encounter, did you put conscious effort into remembering for the future?
- Thus, the process of remembering written words is automatic, unconscious, and occurs "behind the scenes" while reading
 - This was not true for the math facts you learned in elementary school, or learning state capitals, or the Spanish or French flash cards you used in high school and college!
- This highly efficient memory process requires explanation!
- Also, understanding this process should direct our instructional and intervention efforts and our assessments

How Our Intuitions about Reading Mislead Us: Visual Memory and Written Words

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

Visual Abilities Required For Reading

- Visual acuity and visual discrimination
 - *Can you see the letters and can you tell them apart?*
 - s:| *vs.* f:†
 - f:t i:j c:e c:o e:o h:n m:n n:r v:y v:w
 - d:b p:q
- Letter-level visual memory/recognition
 - Are letters you've seen before familiar when seen again?

Without these abilities, you won't be able to read, *but*, these abilities are normally in place by age 3 or 4

How We Remember the Words We Read

Orthographic Mapping

- The process involved in remembering words 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

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 2nd grade on, typically developing readers remember words after only 1 to 4 exposures

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, bear, BEAR, bear, 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)
- Phonemic analysis skill and letter-sound knowledge are central to this connection-forming process

How We "Map" Words "Transparent" Words

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



How We "Map" Words

Words that are "Opaque"

(i.e. words without a one-to-one correspondence)

 /n/ /ā/ /m/
 /t/ /ē/ /m/
 /c/ /ō/ /m/

 | | | |
 | | | |
 | | //

 name
 team
 comb

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*)

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



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

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?

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

The Phonological-Core Deficit of Dyslexia (also called Word-Level Reading Disability)

From the "most common cause" to the "universal cause"

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

- 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

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.

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

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/rime units linguistic/word family approach
 - 3. Words whole word approach
 - 4. Sentences/paragraphs whole language/balanced literacy
- Comparisons between and among them show the closer to the nature of the writing system, the better the results

Concerns about Traditional Approaches to Reading Instruction

- Concerns about the Classic Whole Word approach and the current Whole Language/Balanced Literacy approaches
 - These approaches do not sufficiently teach/train students in phonetic decoding skills, a skill set that characterizes all skilled readers
 - Often draws attention away from the letter sequence and the oral-phonemic sequence, both of which are essential for remembering words
- Concerns about the phonics approach
 - Does not address how students are to remember words nor does it address fluency

Implications for Prevention, and Intervention

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!

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 1st 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 tasks
 - The presumption is that they developed phonemic proficiency which presumably make them better at orthographic mapping (i.e., remembering words)

Intervention with At-Risk and Weak Readers

- Conclusions consistent with orthographic mapping
- Unless their problems with the lack of phonemic proficiency and and letter-sound proficiency are fixed, poor word-level readers don't catch up
- Phonemic proficiency appears to be necessary for sight word development and if students lack this, we don't have evidence they can *efficiently* add to their sight vocabulary (i.e., pool of known, instantly recognizable words)

Effective Teaching Approaches

Principles of Effective Instruction

Based on Findings from Inside and Outside Reading Research

- Instruction must be explicit
- Instruction should be systematic
- Adequate practice and immediate feedback
- Instruction should provide many practice trials
- Distributed learning better than massed learning
- Motivation is important
 - Keep activities fun, fast paced, brief
- Good resources from the University of Oregon
 - Coyne, M., Kame'ennui, E., & Carnine, D. (2022). *Effective Teaching Strategies that Accommodate Diverse Learners* (4th ed.). Pearson

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 $3^{rd}/4^{th}$ 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 nonphonological strategies, that will not help them with future word identification nor memory for words

Train the skills needed for orthographic mapping - Part 1

- This requires an explicit and systematic approach to teaching the code, with adequate practice opportunities
- There are many good phonic intervention programs; I'm not as familiar with Tier 1 programs
 - There may be some great ones, e.g., including Blachman et al., *Road to Reading*
 - Three great resources for teachers and teachers in training:
 - Beck, I. L., & Beck, M. E. (2013). *Making sense of phonics, second edition: The hows and whys*. New York: Guilford.
 - Chall, J. S., & Popp, H. M. (1996). *Teaching and assessing phonics: Why, what, when, how*. Cambridge, MA: Educators Publishing Service.
 - Moats, L. C. (2020). Speech to Print: Language Essentials for Teachers (3rd Ed.). Brookes Publishing.
 - What about on Direct Instruction?

Train the skills needed for orthographic mapping - Part 2

- This also requires an explicit and systematic approach to teaching phonemic skills
- There are many good Tier 1 phonemic awareness programs
 - Road to the Code
 - Ladders to Literacy
 - Phonemic Awareness in Young Children
 - Heggerty Phonemic Awareness Curriculum
 - Equipped for Reading Success
 - Rosner Auditory Motor Program (free public domain)
- Tier 2/3 seems to require more in-depth PA training than Tier 1
 - LiPS (not Seeing Stars)
 - PhonoGraphix
 - Discover Reading (limited availability)
 - Heggerty Phonemic Awareness Curriculum
 - Equipped for Reading Success
 - Rosner Auditory Motor Program (free public domain)

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*
- 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
- The most highly effective intervention outcomes addressed all three of the following: 1) phonemic awareness, 2) letter-sound skills, and 3) reading practice
 - Studies that neglected any one of these three had lesser results