Understanding the Role of Phonemic Proficiency in Boosting Reading Skills in Struggling Readers

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Today’s Objectives

1. Understand the three types of learning required for word-level reading
2. Understand the two levels of word reading and the skills required for each
3. Understand the difference between phonemic tasks and phonemic skills
4. Understand the Phonemic Proficiency Hypothesis
5. Understand the basis of poor word reading skills
6. Understand how to improve reading skills
Review of Key Points from Previous session

- Poor word reading is due to the phonological-core deficit
- Words do not remember written words based on visual memory
- The three-cueing approach does not represent how skilled readers read
- Words are primarily learned during reading of real text
- Memory for words occurs via an implicit, unconscious process called orthographic mapping
- Orthographic mapping connects pronunciations to printed letter strings (the opposite direction of information flow from phonic decoding)
- Despite its superior results compared to whole word and three-cueing approaches, phonics instruction still yields too high a rate of struggling readers
My Experience Reading Research Articles

- On the issue of the precise relationship between phonological awareness and reading
- On the issue of precisely how do we remember words
- Verbal feedback from researchers
- My comments to Dr. Linnea Ehri
Key Terms to Understand this Presentation

- Phonological vs. phonemic
- Orthography and orthographic
- Phonological awareness vs. phonics
- Sight word and sight word vocabulary
  - Also called orthographic lexicon
Objective 1:
Understand the three types of learning required for word-level reading

Skilled Word Reading Requires Three Types of Learning
Three Types of Learning Required for Word-Level Reading

1) Paired-Associate Learning (PAL)

2) Statistical Learning

3) Orthographic Mapping

- These are typically not distinguished from one another, by teachers or researchers
- Each plays a different role in word-level reading acquisition
- Not acknowledging these different learning processes can negatively affect assessment and instruction
Paired–Associate Learning (PAL)

- Involves associating two things so that the presence of one activates the other
  - Language/labeling involves verbal PAL

- Foundational for learning letter names and sounds
  - Letter learning involves visual–phonological PAL
  - The visual half of that equation is not the problem

- *Not* the basis for written word learning
  - Yet many teaching methods seem to presume this

- Learning is explicit (i.e., conscious learning)

- Dozens to hundreds of exposures needed for accuracy–based *mastery*, hundreds to thousands for *automaticity*
Statistical Learning

- Involves deriving patterns from multiple incidences
- Statistical learning is generally implicit learning
- Skilled readers never taught the “six syllable types” learn them anyway via statistical learning
  - (e.g., dack vs. dake vs. dar)
  - Many other orthographic patterns learned this way
  - Source for build up of general orthographic knowledge
- Unclear how many learning “trials” are needed
  - It may vary depending on specific types of patterns
- Poor readers do not display efficient statistical learning when it comes to reading
- Statistical learning is currently a “hot” area of study
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
- New learning requires only 1–4 exposures
  - Much, much faster than PAL or statistical learning
- Differs significantly from statistical learning
  - Orthographic mapping involves connections between specific pronunciations and *specific* letter strings (written words)
  - Statistical learning *generalizes* patterns from multiple instances
## Three Types of Learning Required for Word-Level Reading

<table>
<thead>
<tr>
<th>Type of Learning</th>
<th>Role in Word Reading</th>
<th>Effort</th>
<th>Domain</th>
<th>Speed of acquisition</th>
<th>Skills Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paired–Associate Learning</td>
<td>Letter Names &amp; Sounds</td>
<td>Conscious</td>
<td>Specific to specific</td>
<td>Dozens to hundreds or even thousands of exposures</td>
<td>Visual discrimination &amp; memory phonological memory</td>
</tr>
<tr>
<td>Statistical Learning</td>
<td>Deriving common patterns—supports phonic decoding</td>
<td>Implicit</td>
<td>Generalize from specific examples</td>
<td>Unknown—likely dozens to hundreds of exposures (may vary by pattern type)</td>
<td>Currently under study</td>
</tr>
<tr>
<td>Orthographic Mapping</td>
<td>Remembering specific words and word parts</td>
<td>Implicit</td>
<td>Specific to specific</td>
<td>1–4 exposures</td>
<td>Letter–Sound proficiency Phonemic proficiency</td>
</tr>
</tbody>
</table>
Confusion Due to Not Knowing About the Three Types of Learning

- Learning to read words is *not* via PAL
  - Neither phonic decoding nor instant recognition are based on PAL, once the letters are mastered
  - We need to think how to best use flashcards
- Deriving patterns via statistical learning is no substitute for orthographic learning
  - The former primarily helps with phonic decoding
  - Children can/should be taught the common patterns
  - Irregular words by their nature break these patterns
  - All regular and irregular words are specifically mapped (*word-specific knowledge* in the Simple View of Reading)
Objective 2:
Understand the two levels of word reading and the skills required for each

The Two Levels of Skilled Word Reading
Two Levels of Word-level Reading

1) The ability to sound out unfamiliar words
   - The “phonological route” in the Dual Route Theory
   - Researchers call this *phonological recoding, decoding*, or applying *grapho-phonemic correspondences* (GPCs)
   - Based primarily on letter–sound skills & phonemic blending
     - Also aided by knowledge of phonically regular patterns

2) The ability to remember words
   - The basis for the “direct route” in Dual Route Theory
   - Instant, *effortless* recognition
   - Words are remembered via orthographic mapping
   - Based on phonemic analysis skills and letter–sound skills
   - Unrelated to visual memory
Word Reading Level 1: Accurately Sounding Out Unfamiliar Words

• All skilled readers of alphabetic writing systems learn this skill, whether we teach them or not
• Most weak readers do not naturally develop this skill
• Phonics instruction can reliably develop this skill if a student has sufficient basic phonological skills
• Promotes word memory in typical readers (Share’s theory of orthographic learning) but not weak readers
• The term “phonics” is a lightening rod for controversy, yet is required for skilled reading
  • National Reading Panel’s (NRP) definition of phonics: “... the acquisition of letter–sound correspondences and their use to read and spell words”
Word Reading Level 2: The Ability to Efficiently Remember Words

- Requires Level 1: Skill at sounding out new words
  - David Share’s self-teaching hypothesis
- Letter-sound skills and phonemic skills also central
- Not addressed by any current reading approaches
  - Exposure only produces word memory for those already possessing word memory skills
- Weak readers may become competent at Level 1 (sounding out words), but virtually never at Level 2 (efficiently remembering words)
Objective 3: Understand the difference between phonemic tasks and phonemic skills

Phonemic *Tasks* vs. Phonemic *Skills*
Phonemic TASKS vs. Phoneme SKILLS (Part 1)

- We need to move from a *task* mentality to a *skill* mentality
- Two types of phoneme tasks: *synthesis* and *analysis*
  - Each plays a different role in reading
  - *Synthesis* is primarily blending, *analysis* can involve many different tasks (segmentation, manipulation, isolation, etc.)
- *Skills* are unseen constructs we try to access via *tasks*
- There are many phoneme *tasks* but only two *skills* are needed for reading
**Phonemic TASKS vs. Phoneme SKILLS**

*(Part 2 – Synthesis/Blending)*

- **Synthesis** – putting phonemes together to activate words (or word parts or nonsense words)
- Tasks primarily include: *blending* and *addition*
- Synthesis/blending tasks involve *activation* rather than *awareness* per se
- We should not call this phoneme awareness but rather simply phonological/phonemic blending
  - Analysis and synthesis (blending) play different roles in the reading process – lumping them together compromises clarity in communicating concepts
Phonemic TASKS vs. Phoneme SKILLS (Part 3 Phoneme Analysis)

- **Phoneme analysis** – pulling apart words or word parts into constituent phonemes
- Appears to represent true “awareness” (unlike blending)
- Tasks include:
  - Rhyming
  - Segmentation
  - Manipulation
  - Alliteration
  - Isolation
  - Categorization/Identification
  - Note: There are two to six variants on each of these tasks
- Question: What are each of these telling us?
- Answer: Nothing *specific* about the reading process; only *generally* that there are phonological issues interfering
Let’s Get Specific: The Phoneme SKILLS Necessary for Reading

• Based upon the orthographic learning research, there are only two phonemic skills needed for competent reading:
  • BLENDING (required for sounding out words)
  • SEGMENTING * (required for remembering words)

*BUT, segmentation TASKS do a poor job of assessing the segmenting SKILL needed for proficient reading
  – Segmenting SKILL must be highly automatized and unconscious for efficiently remembering words
  – Timed segmentation TASKS are not sensitive to this SKILL
  – I prefer “phonemic proficiency” to avoid confusion
Blending:
“The skill of blending is needed to decode unfamiliar words.”

Segmenting:
“Phonemic segmentation helps children remember how to read and spell words . . .” (emphasis added)
**Linguistic skill**

- Phonological Blending

**Academic skill**

- Letter-Sound Knowledge/Skills

**Linguistic skill**

- Phoneme Awareness (Analysis)

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**PHONIC DECODING**

Identify Unfamiliar Words

*(Word Identification)*

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**ORTHOGRAPHIC MAPPING**

Permanent Word Storage

*(Word Recognition)*
Objective 4:
Understand the *Phonemic Proficiency Hypothesis*

The Phonemic Proficiency Hypothesis
of Orthographic Learning
Current Evidence for The Phonemic Proficiency Hypothesis

Orthographic Learning Research
Integrating Ehri’s & Share’s theories logically demands this (separately they do not)

Dyslexia Research & Clinical Experience
In light of the orthographic learning research (i.e., exactly why is poor PA so disruptive to the development of a sight vocabulary)

Phonemic Awareness Literature
The few correlational studies that directly examined proficiency

Word Reading Intervention Research
When considering the approaches used measured against normative gains
A Common Misconception About Reading: “Children Learn to Read in Different Ways”

- This notion confuses *teaching* and *learning*
  - Teaching is what we do—learning is what their brains do
- We TEACH reading in different ways; they LEARN to read *proficiently* in only one way
  - It’s amazing there’s even one way our brains read so efficiently
    - Perceive words in 1/20th of a second
    - Read 150–250 words a minute
    - Have 30,000 to 70,000 words in our instant, orthographic lexicon
    - Add new words to that lexicon after 1 to 4 exposures
  - There are not 2, 3 or 4 ways our brain is set up to do that!
- All skilled readers have the same basic skills
  - All skilled readers can read nonsense words, even if not taught phonics
  - All skilled readers have large and continuously expanding sight vocabularies
Reading Words vs. Learning Words

- *Reading* words means you correctly identify words.

- *Learning* words means you remember words for later, instant and effortless retrieval.

- *Learning* words fosters fluency – simply *reading* words does not.

- Phonics programs teach those with dyslexia to *read* words; efficiently remembering words often does not naturally follow.
  - Typically developing readers begin to efficiently *learn* words once they are taught the code or figure it out on their own.
The Alphabetic Principle

- Alphabetic writing is phoneme-based writing
- 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 Difference Between Phoneme Awareness and Phonemic Proficiency

- “Awareness” implies conscious attention
  - Many tasks get at conscious phoneme awareness, such as phoneme segmentation tasks
  - Fuzzy connection between PA and reading
- Proficiency refers to automatic access to phonemes
  - This is instant access, automatic, or unconscious
  - Only instant responses to phoneme manipulation tasks assess this
  - Very clear relationship between PA and reading
Orthographic learning theories require it
A self-evident observation requires it
Correlational studies support it
Intervention research, using normative performance to determine efficacy, demonstrates its value
David Share’s Self-Teaching Hypothesis

- We teach ourselves most of the words we know.
- Orthographic learning occurs one word at a time.
- Orthographic learning is implicit – typically does not involve conscious thought or effort.
- As students sound out words, they are forming orthographic connections.
  - When newly encountered words are not sounded out, they are poorly remembered.
- 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 segmentation and letter-sound skills are central to this connection-forming process
How We “Map” Words

PLTM

/sat/
/s/ /ã/ /t/

was/
/w/ /ũ/ /z/

said/
/s/ /ĕ/ /d/

Oral First: A mind prepared to store words

Phoneme Awareness/Analysis

Close phonetic approximate plus semantic context

Phonological LTM Activation

Phoneme Blending

Letter-Sound Knowledge

Orthographic Mapping

Self-Teaching Hypothesis

Phoneme Awareness/Analysis

Letter-Sound Knowledge

Orthographic Mapping
Many regular words, *all* irregular words, and *many* multisyllabic words require mapping “adjustments”

**Regular words**
- Silent e words, vowel digraphs, consonant digraphs are require adjustments

**Irregular words**
- Irregular consonants, vowels, and digraphs or rimes

**Multisyllabic words** (regular and irregular)
- Multisyllabic “regular” words with vowel reduction require mapping adjustment, much like irregular words (e.g., *holiday, market*)

**Skilled readers with letter–sound proficiency and phonemic proficiency accomplish all of this quite well!**
How Phonemic Proficiency Produces Efficient Orthographic Mapping

- Orthographic mapping requires:
  - Letter–sound proficiency
  - Phonemic proficiency (this goes well beyond what is tested on our universal screeners)
  - The ability to establish a relationship between sounds and letters unconsciously while reading

- To do what Ehri’s theory says we are doing in the time limited situation Share’s theory says we are doing it, letter–sound proficiency and phonemic proficiency are an absolute necessity
  - There is no other logical conclusion
Vaessen & Blomert (2010)
- 1400 students, grades 1–6, over 200 at each grade
- Phonemic manipulation – accuracy and timing
- High frequency words and low frequency words
  - Low frequency words estimate size of sight vocabulary
- PA accuracy and high frequency words, correlations dropped off quickly
- PA timing showed steep continued growth 1–5
- PA timing and sight vocabulary correlated .5 or higher right up to 6th grade

Other studies with hundreds of children showed timing provides a better index of the phonemic skills underlying reading
Research Support for Phonemic Proficiency and Sight–Word Learning

- Studies I’ve done
- 132 1\textsuperscript{st} graders
  - Phonemic manipulation – accuracy and timing
  - TOWRE–2 Sight Word Efficiency
  - Instant responses to PA and SWE = +.58
  - Accurate, non–instant responses = +.004
- 60 5\textsuperscript{th} graders
  - Instant responses to PA and SWE also = +.58
  - Accurate, non–instant responses = -.25
- Similar result with 26 high school students
  - Nearly identical to 5\textsuperscript{th} grade results
Objective 5:
Understand the basis of poor word reading skills

Why Some Children Struggle in Word-Level Reading
The Phonological–Core Deficit of Dyslexia

- From “most common cause” to “universal cause”
- Weakness in one or more of the following:
  - Phonemic awareness/analysis
  - Phonemic blending/synthesis
  - Rapid automatized naming
  - Phonological working memory
  - Nonsense word reading, letter–sound knowledge acquisition
- Poor word–level readers do not reach automaticity in phonemic skills and thus do not develop phonemic proficiency
In the early 2000s, Joseph Torgesen indicated that fluency is largely a function of ones:

**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
The “Path” to Fluent Word Reading

- **Word reading fluency** is primarily based on the . . .
- Size of the **sight vocabulary/orthographic lexicon**, which is based on . . .
- How skilled a student is in remembering words (**orthographic mapping skills**) combined with reading experience, and orthographic mapping is based on . . .
- **Letter–sound proficiency/automaticity** (unconscious access to the sounds letters represent) AND
- **Phonemic proficiency/automaticity** (unconscious access to phonemes in spoken words)
- This latter skill is a universally missing element
- (Develops in typical readers, but not in struggling readers)
The Developmental Relationship Between Phonological Skills and Word-Level Reading

**Phonological Skill Development**

1. **Early Phonological Awareness**
   - Rhyming, first sounds, syllable segmentation

2. **Basic Phoneme Awareness**
   - Blending and segmentation

3. **Advanced Phonemic Awareness/Proficiency**
   - Automatic, unconscious access to phonemes in spoken words

**Word Reading Skill Development**

1. **Letter Names and Letter Sounds**
   - Phonological storage and retrieval

2. **Phonic Decoding and Encoding (Spelling)**

3. **Orthographic Mapping**
   - Efficient memory for printed words; rapid sight vocabulary expansion
Objective 6: Understand how to improve reading skills

Intervention for Word–Level Reading Difficulties (Dyslexia)

In Light of the Phonemic Proficiency Hypothesis
Using standard scores to determine effectiveness

This results in three groups of intervention results

- **Minimal results group**: 0 to 5 standard score improvements
  - Mostly 2–4 points
- **Moderate results group**: 6 to 9 standard score improvements
  - Mostly 6–7 points
- **Highly successful group**: 10 to 25 standard score point improvements
  - Mostly 14–17 points
These three groups approached instruction differently!

- **Minimal Group (0 – 5.85 SS improvements)**
  - None formally trained phonological awareness/analysis
  - Most did explicit, systematic phonics
  - All provided reading practice with connected text

- **Moderate Group (6–9 SS improvements)**
  - All did explicit, systematic phonics
  - 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 point improvements)**
  - Aggressively addressed and “fixed” PA issues using advanced PA training
  - All did explicit, systematic phonics
  - All provided reading practice with connected text
An Important Inference, But Not a “High” Inference

- The studies with the largest outcomes in all likelihood developed phonemic proficiency
  - A few studies specifically said so, most did not

- However, based upon
  - My 20 years experience
  - Dr. Philip McInnis’ 30 years before me
  - Dr. Stephen Truch’s 30 years experience with hundreds of dyslexics

- PA manipulation accuracy develops in nearly all students (99%+) when trained and automaticity nearly always follows

- Conclusion/assumption: In the highly successful studies, students developed the automaticity

- Case example: The growth of fluency in the Torgesen et al. (2001) study (the study that prompted Tier 3 of RTI)
Summary

• Word–level reading is driven by phonemic skills
  • This is based upon the alphabetic nature of our writing system
• Skilled readers are all good at phonic decoding and orthographic mapping – neither is optional
• Fluency is primarily a function of sight vocabulary size
• Phonemic proficiency appears to be foundational to orthographic mapping and thus reading fluency
• 1) Orthographic learning research, 2) correlational studies of phoneme proficiency, and 3) the studies with the most highly effective word–reading intervention outcomes support the centrality of phonemic proficiency in reading skill
• Thus, phonemic “awareness” is not enough