Reading is one of the most studied aspects of human psychology.

Much is known about:
- how a proficient reader reads
- how novice learners acquire reading skill
- what the brain is doing to support reading
- what causes reading difficulty
- what kind of instruction works best
If we know so much about reading, how come there are so many poor readers?

Reading Problems Emerge Early
(Good et al., 2002)

Reading Failure Can Be Prevented
(Torgesen, 2002)
The Simple View of Reading

\[ R = D \times C \]

"Capacity for reading comprehension is determined by ability to decode text and ability to comprehend spoken language."

-Phil Gough

Language: Words and Rules
(Pinker, 1999)

- Speech sounds
- Meaningful word parts
- Word meanings
- Spellings
- Social rules and patterns of language use
- Sentence and inter-sentence meanings
- Sentence structure

Scarborough’s “Rope” – A Model of Reading Development

- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge

- Phonological Awareness
- Decoding (and Spelling)
- Sight Recognition

SKILLED READING: fluent execution and coordination of word recognition and text comprehension.
1. Background Knowledge

“Spin relaxation proceeds conventionally, independent of the annealing protocol, in the ferromagnet.”

2. Vocabulary

“We can see ectopias in the left inferior, posterior junction of the occipital and parietal lobes of the left cerebral hemisphere.”

-- (a neuroimaging report)
3. Language Structure/Syntax

“He did not trust the woman not to trust him. And he did not want to be mistrusted now.”

(Langston Hughes, “Thank You Ma’am”)

Language Structure: Reference

4. Verbal Reasoning, Inferencing

“It was clear after we started with Gatsby toward the house that the gardener saw Wilson’s body a little way off in the grass, and the holocaust was complete.”

- F. Scott Fitzgerald
5. Literary Knowledge: Narrative

The Story Frame

- beginning
- middle
- end

When and where did it happen? Who is it about? What is the problem?

First, next, then, after

How is the problem solved? How does it end?

5. Literary Knowledge: Informational

Varied Purposes:
- To describe or define.
- To tell a sequence or an order of events.
- To report a class-example relationship.
- To explain the reasons for an assertion or to explain a cause-effect relationship.
- To compare and/or contrast things and ideas.

Example: Argument Structure

Assertion or Opinion

Major Cause or Reason

Contributing Reason

Contributing Reason

Contributing Reason

Closing Statement
Scarborough’s “Rope” Model

LANGUAGE COMPREHENSION
- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge

SKILLED READING: fluent execution and coordination of word recognition
and text comprehension.

SKILLED RECOGNITION: increasingly automatic

NOTE: Word Recognition is NOT
Primarily a Visual Skill!
- Generic visual-spatial skills are virtually unrelated to reading and spelling.
- Language abilities are the best predictors of reading and spelling.
- Rote visual memorization, visual tracking, and visual-motor drills have little to no impact on reading
- Structured language teaching works best.

How Do We Learn to Read Words?
(Seidenberg, 2013, 2017)
A Model for the Brain Circuit for Reading (Component Processes)

Phonological processing: correspondence between letter and sound [yellow]

Relay station: Cross-modal integration

Graphemic analysis: word forms/orthographic patterns

Phonological processing: articulatory mapping

How We “Map” Words for Long-Term Memory (Kilpatrick, 2015)

/red/ /haz/

/red/ /hāv/

/red/ /haz/ have

/red/ /hāv/

How We “Map” Words for Long-Term Memory (Kilpatrick, 2015)

A girl named Len is a man
That walked at the White House
George Washington worked in
The White House to but
One thing that didn’t come
There period was
Phoneme Awareness – Lowest 25-30%
Show Weaknesses as a Group (Fletcher et al., 2019)

Phoneme Awareness: How Many Speech Sounds?

- ice ________
- coin ________
- weight ________
- song ________
- few ________
- sigh ________
- creep ________
- quaint ________
- fox ________
- chew ________

What Does This Illustrate?

- Speech sounds are not directly represented with single letters
  - box = /b/ /o/ /k/ /s/
  - weight = /w/ /ā/ /t/
- Whole words are coarticulated; sounds are “hidden” in connected speech
- Phoneme awareness is an acquired, unnatural skill; even literate adults are not proficient
A Phoneme is a Sound AND a Mouth Gesture

Phonemes are shaped by the mouth according to the sounds that surround them. What do you feel your mouth doing with /d/ as you say these words?

desk
dream
ladder
would you

Why Phonemes are Elusive

“elephant”
“egg”
“echo”

Confusing Sounds That Have Similar Features

fan  pet  wait  dream
wait  chunk  blade
pet  egg  sled
egg  dig  chunk
sled  did  coach
coach  stick  fright
fright  mob  rope
rope  log  shine
shine  snowing
**English Consonant Phonemes**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Bilabial</th>
<th>Labio-dental</th>
<th>Inter-dental</th>
<th>Alveolar</th>
<th>Palatal</th>
<th>Velar</th>
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<tr>
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<td>/b/</td>
<td>/t/</td>
<td>/d/</td>
<td>/k/</td>
<td>/g/</td>
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<td>/n/</td>
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<td>/v/</td>
<td>/θ/</td>
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<td>Glides</td>
<td>/y/</td>
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<td>Liquids</td>
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**Automatic Word Recognition**

- Accurate, efficient phoneme awareness underlies memory for “sight” words
- Visual shape memory is critical for LETTER learning, but plays virtually no role in WORD reading (beyond visual acuity)
- Orthographic images in memory are abstractions requiring only basic visual acuity

**Evidence: You Can Read These**

Mental graphemic images

Mental graphemic images

Mental graphemic images

Mental graphemic images

Mental graphemic images

Mental graphemic images

Mental graphemic images
Phonology and Spelling

“...phonology, although important for all aspects of literacy learning, is even more critical in learning to spell than in learning to read. Orthographic knowledge is laid over a phonological foundation. If that phonological foundation is weak, orthographic skills cannot develop sufficiently to support good spelling and compensate for the underdeveloped phonological skills.”

--Cassar, Treiman, Moats, Pollo & Kessler, 2005

How We Recognize Words

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<th>Units of Analysis</th>
<th>unreachable</th>
<th>word</th>
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<td>un-reach-able</td>
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<td>syllable</td>
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<tr>
<td></td>
<td>u-n-r-e-a-ch-a-b-le</td>
<td>grapheme</td>
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<tr>
<td></td>
<td>u-n-r-e-a-c-h-a-b-l-e</td>
<td>letter</td>
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The Base Layer of Phonics: Phoneme-Grapheme Correspondences

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<td>witch</td>
<td>w</td>
<td>i</td>
<td>tch</td>
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</tbody>
</table>
This Is Not Phonics Instruction...

O
one
once
only
out
open
on
off

E
eye
eat
end
every
even

Words Are Not Recognized by Configuration!

shape
Word Recognition Depends On Fast, Accurate, Phoneme-Grapheme Mapping!

Don't know that word? Well just keep reading (or peak at the pictures) and see what might make sense here…

Context Does NOT Drive Word Recognition or Printed Word Memory

“…Don’t know that word? Well just keep reading (or peak at the pictures) and see what might make sense here…”

“We have lots of information technology. We just don’t have any information.”
What Content Does the Most Effective Instruction Include?

- Phonological awareness
- Decoding/encoding skills (explicit, systematic)
- Daily text reading to build automaticity
- Language comprehension/use
- A knowledge-building curriculum

IDA’s Knowledge and Practice Standards for Teachers of Reading

Adopted by the International Dyslexia Association (IDA) and the Center for Effective Reading Instruction (CERI)

Contratulations, Arkansas!

- You are RISING with the R.I.S.E. initiative!
- Your leaders have been bold and willing to seek and act on the best information available to us.
- Your leaders are committed to the well-being of children.
- You are an example for the nation!

THANK YOU!
“We are not where we want to be, 
We are not where we are going to be 
But we are not where we were.”  
Rosa Parks