Can Reading Research Improve Literacy Outcomes?

Mark Seidenberg
Vilas Research Professor
Department of Psychology

Wisconsin Legislative Symposium
8/12/2020

THE UNIVERSITY of WISCONSIN MADISON

You've heard of "the science of reading"?

I'm one of the scientists.

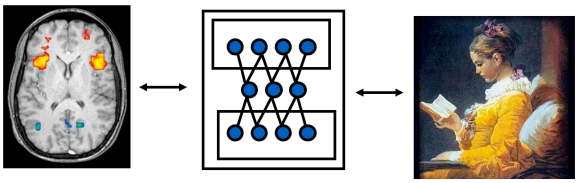
PSYCHOLOGY

Language & Cognitive Neuroscience Lab

Production · Comprehension · Reading · Dyslexia · Behavior · Brain · Development

HOME | ABOUT THE LAB | PEOPLE | PUBLICATIONS | LINKS | CONTACT | INTERNAL

LCNL.WISC.EDU

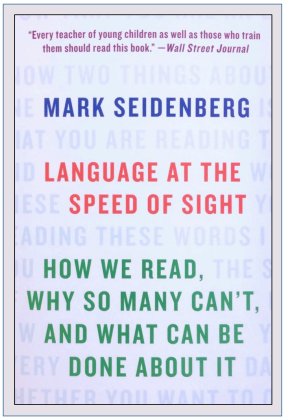


Brain circuits | Computational models | Behavior

I am concerned about literacy levels in the US, which are too low.

I believe that what has been learned from reading research could help more children succeed.

I have therefore focused on trying to connect science and education.



I wrote a book.

- Review of the science.
- Implications for education.

There will be a study guide soon.

Web site: seidenbergreading.net

Many people share these concerns.

Frustration with educational establishment, lack of progress.

Has led to pursuit of legislative remedies in many states.
Focused on incorporating "science of reading"

The effort is worthwhile—and long overdue.

The challenges are considerable.
But the potential is untapped.
And the needs are great.

Common sense belief:
Educational problems require educational solutions

Talk to the Ed Schools. Talk to DPI.

Why talk to me?

Is basic research on brain and behavior even *relevant*?

I'd like to tell you about some research.
And then look at its connection to education.

Orthographic Effects on Rhyme Monitoring

Mark S. Seidenberg
Psycholinguistics Program
Columbia University

Michael K. Tanenhaus
Center for the Study of Cognitive Processes
Wayne State University

Three experiments examined the role of orthography in rhyme detection. Subjects in Experiments 1 and 2 monitored lists of aurally presented words for a word that rhymed with a cue word. The critical variable was whether the target word was orthographically similar or different from the cue word (e.g., *pie–tie* and *rye–tie*, respectively). In Experiment 1, monitor latencies to detect orthographically different rhymes were longer than latencies to detect orthographically similar rhymes, whether cue words were presented aurally or visually. Experiment 2 replicated this orthography effect using only auditory presentation of the cue word and a larger sample of items. In Experiment 3, orthographic similarity yielded shorter reaction times to decide that two words rhymed and longer reaction times to decide that they did not rhyme. The results are interpreted in terms of some recent models of semantic memory.

A long time ago.

Subject listens to pairs of words. Decide if they rhyme: yes or no?

No reading. No writing. Only listening. It's very easy. How long do they take to decide?

BONE	STONE	yes	faster
KNOWN	STONE	yes	slower
TRAIN	STONE	no	

(These are examples: there were many pairs of each kind)

Finding: Spelling affected use of spoken language.

Conclusion: Spelling and sound are closely associated.

A related study.
Used a "phonemic awareness" task: say "split" without the "/p/"
Participants were middle school readers

Say "crab" without the "b"

Say "tub" without the "t"

Say "lamb" without the "m"

Say "sword" without the "s"

Landerl, Wimmer, Frith (1997)

Here too: knowledge of spelling changes use of spoken language

Note: does not happen with illiterate participants.

The brain: The rhyming study done with transcranial magnetic stimulation (TMS)

How Does Learning to Read Affect Speech Perception?

Chotiga Pattamadilok,[1] Iris N. Knierim,[2] Keith J. Kawabata Duncan,[3] and Joseph T. Devlin[3]
[1]Unité de Recherche en Neurosciences Cognitives, Université Libre de Bruxelles, B-1050 Brussels, Belgium, [2]Max Planck Institute for Human Cognitive and Brain Sciences, Research Group "Neurocognition of Rhythm in Communication," 1A 04103 Leipzig, Germany, and [3]Cognitive, Perceptual and Brain Sciences and Institute of Cognitive Neuroscience, University College London, London WC1E 6BT, United Kingdom

Main finding: spelling effect arises in SMG, a part of the speech circuit.

Conclusion:

Print and speech are not just closely associated.
They are integrated in the brain. Intertwined. No longer separated.

Those studies showed: print → speech

What about the other direction?

Is knowledge of spoken language used in silent reading?

Permit me to give you a parking permit.

The Beatles are more popular than Jesus.

I just can't bare to see that movie again.

That's a pretty fine looking sute you've got there.

DEMO of actual experiments on seidenbergreading.net.
Try it out on your friends and family!

What the research studies actually show.

The subjects are skilled readers.
They are reading silently.
They make errors (or are slowed down) because they use the sounds of words.
Not out loud. In their heads.

I just can't bare to see that movie again.
That's a pretty fine looking sute you've got there.

People can't stop themselves from doing this.
Even though it interferes with reading!

Why? Because print and sound are so deeply intertwined in brain.

A neuroimaging study of middle school readers:

Reading Differences and Brain:
Cortical Integration of Speech and Print
in Sentence Processing Varies
With Reader Skill

Donald Shankweiler
Haskins Laboratories
Department of Psychology
University of Connecticut

Shankweiler et al., Developmental Neuropsychology, 2008

Integration of print and speech is greater for more skilled readers

Conclusions?

For skilled readers, print and sound become deeply integrated.

This is a characteristic of skilled reading.

It helps people read more quickly and accurately.

This begins to develop in childhood.

Reading depends on spoken language

Spoken language skills are very strongly related to early progress.

Spoken language deficits interfere with reading.

That's the science. Is it relevant to reading instruction?

a. If integration of print and sound is characteristic of skilled reading
b. And poor readers fail to integrate, then
c. Early instruction should emphasize connecting print and speech.

Obvious?
This issue has been the focus of decades of debate, to this day.

Instruction about print and sound is called "phonics".

Teachers have been taught that this is the path to poor reading.

That is the opposite of what this research shows.

Not just phonics: broad integration of written and spoken language

Implication One:

Teachers should know about this science. Principals, superintendents too.

They are not taught about it.

They are taught to ignore it.

"Only one perspective."
"Find what works for you and your students"
"Every child is different"

That could change. Professor Duke discussed how that is changing is MI.
What will it take to get Wisconsin on board?

Implication Two:

Research tells us things about how reading works and how children learn that cannot be determined by observation alone.

Reading is a complex process.
The machinery is hidden under the hood.
It takes systematic research to uncover the basic mechanisms.

Brain research is clearest example.

But also careful behavioral studies using other lab methods

A better understanding of how reading works → better educational practices

Why do I emphasize this?

Because teachers are taught to rely on personal observations and experience.

To figure out what works for them and their students.
That is not good enough.

Teachers' classroom experience is relevant, yes.
- motivating children
- monitoring progress
- using instruction time effectively
- managing other demands

But it is not adequate to determine
- how reading works
- which practices are effective
- why

That's why we do the science!

Teachers are essential.
Teachers are the key.

But a GREAT teacher with a BAD theory of how reading works and children learn can inadvertently make it very hard for their students to succeed.

And for them to succeed as teachers.

(high turnover within first 5 years)

How much does this contribute to low literacy in Wisconsin, and the US?

The Wisconsin State Reading Association: WSRA

Every time I testify, they show up to say the opposite.
Very effective in blocking much-needed changes.

Their expertise is based on decades of experience teaching children.
"We know how to teach reading effectively."

If that were true, we wouldn't be here having these discussions.

The science says that intuitions are not enough! In fact, can be quite misleading.

The WSRA is an obstacle to improving literacy outcomes in Wisconsin.
I challenge their expertise and their relevance to deciding how to make meaningful changes to improve outcomes..

They are not adequately representing the interests of teachers or children or Wisconsin.

Implication Three:

Reading depends on spoken language.

Many "reading" problems are actually about spoken language that arise before children reach school age.

These too could be addressed.

Children learn to talk, then they learn to read

Children's knowledge of spoken language depends on experience:
- The language they hear
- Their own use of language to communicate

More research findings:

Children's early spoken language experience varies a lot.
Amount and variety of speech in the home and other settings.

Also, some children are learning English along with another language (e.g., Spanish, Hmong, Mandarin)

Some children speak an English dialect that is very different from the one used in school and in books.

Children with weaker knowledge of spoken language (e.g., vocabulary) have more difficulty learning to read.

They are at risk for reading problems on the first day of school.

That is not because of ineffective reading instruction.

It is because reading depends on spoken language.

So, what can be done?

1. Teachers:
Improve preparation for the job.
Provide in-service training and support

How to pay for it?
Cut back on expensive grade school curricula.
Invest in teachers, not textbooks.
Those books are hard for teachers to use. They use Pinterest.

2. Examine educational practices that magnify effects of SES
Outsourcing
middle class curricula
inequities in access to tools, resources

3. Children's language

Make spoken language development the focus of pre-K.

Expose children to language, expressions, uses of language beyond ones used in home.

Make sure children are familiar with "school language" before they get to school!

Prevention is easier than remediation

4. Better accommodations for variation in language background

Learning to read is harder for

Children who are English language learners
Children who speak a minority, "nonstandard" dialect of English

They have more to learn.
Assessments do not reflect this.
Part of the "achievement gap" is built in to this circumstance.

Schools are NOT sufficiently sensitive to this.
Mandates changes in instruction, assessment.

Summary:

Reading science has a lot to say about how reading works and children learn.

Lots to build on.

Many opportunities.

But not if we can't get in the door.

Thank you!

Language & Cognitive Neuroscience Lab

Production · Comprehension · Reading · Dyslexia · Behavior · Brain · Development

HOME | ABOUT THE LAB | PEOPLE | PUBLICATIONS | LINKS | CONTACT | INTERNAL

LCNL.WISC.EDU

Email: seidenberg@wisc.edu

Blog: https://seidenbergreading.net/

Twitter: @markseidenberg (ugh)

THE UNIVERSITY of WISCONSIN MADISON