CHAPTER 1

The Big Picture

Debates about how best to teach reading are nothing new. The reading wars, which are essentially a disagreement about the proper role of phonics in reading instruction, began almost two centuries ago (Figure 1.1).

The Whole Word Method

In the mid-1800s, education reformer Horace Mann argued against explicit instruction in letters and sounds. He described letters as "skeleton-shaped, bloodless, ghostly apparitions"[1] and advocated a whole word method instead. The **whole word method** taught children to read words as individual units based on shape.

This method gained traction, and major reading programs in the 1930s and 1940s adopted the look/say approach. *Dick and Jane*, a popular basal reading series of the time, repeated the most common high-frequency words in its stories.

Oh, Jane.
Look, Jane, look.
Look, look.
Oh, look.

Why Johnny Can't Read

Rudolf Flesch published his sensational book *Why Johnny Can't Read* in 1955. Flesch argued that phonics instruction is the most natural way to teach reading.[2] The book became a bestseller, and the reading wars intensified.

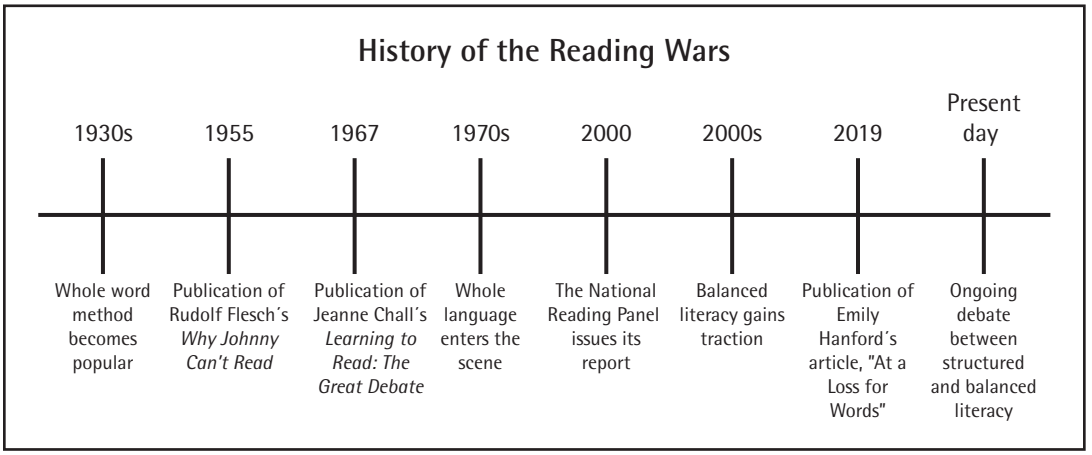

Figure 1.1 History of the reading wars.

Jeanne Chall's Research

In the 1960s, Jeanne Chall, a leading researcher from Harvard, analyzed research studies comparing different approaches to beginning reading. She studied widely used basal reading programs and observed how reading is taught in over 300 classrooms.

Her conclusion?

A focus on systematic, sequential phonics instruction is the best approach for teaching beginning readers. It produces better outcomes in word recognition in the early grades and even helps reading comprehension improve up to fourth grade.[3]

To those who described phonics instruction as lifeless and boring, Chall noted that students' engagement was independent of the program but rather depended on the atmosphere created by the classroom teacher.[4]

Whole Language

The first edition of Jeanne Chall's book, *Learning to Read: The Great Debate*, should have ended the reading wars. But they were just heating up.

In the 1970s, the **whole language** method entered the scene. Whole language proponents believe that learning to read is very much like learning to speak: it's natural. If we surround children with quality literature and environmental print, and we read aloud to them, they'll pick up reading without a lot of explicit instruction.

Ken Goodman, one of the founders of whole language, wrote: "Reading is a psycholinguistic guessing game. It involves an interaction between thought and language. Efficient reading does not result from precise perception and identification of all elements, but from skill in selecting the fewest, most productive cues necessary to produce guesses which are right the first time."[5]

The Report of the National Reading Panel

In 1997, The United States Congress convened the National Reading Panel (NRP) to determine what research had to say about reading. In 2000, the NRP concluded that five key factors are essential in learning to read: phonemic awareness, phonics, fluency, vocabulary, and comprehension.[6]

Balanced Literacy's Beginnings

Around the time that the NRP began its work, **balanced literacy** was born. Balanced literacy was an attempt to end the reading wars between the whole language and phonics camps by taking the best from each approach. It became immensely popular in the early 2000s.

Balanced literacy has no agreed-upon definition; the balanced literacy I describe is rooted in Ken Goodman's work. Teachers typically teach beginning readers using predictable leveled books, which contain many words with sound-spellings that students have not yet been taught. In order to identify these words, students must use MSV: cues from context or pictures (meaning), cues from the structure of the sentence (syntax), or cues from the letters on the page (visual).This is known as **three-cueing.**

I was a balanced literacy teacher. I used running records to assess my students' reading levels and taught them to read using leveled books. I thought that children learn to read by reading, so my first graders spent most of the literacy block reading leveled books at their independent level.

I feared that too much phonics instruction would get in the way of comprehension and fluency, so I was careful not to overdo it. I taught phonics in fewer than 10 minutes a day during our word study lessons. If students were reading and encountered a word with a pattern we hadn't examined yet, I encouraged them to use the picture or context to "solve" the word.

Most of my students appeared to read their predictable books fluently, applying phonics with varying levels of success and moving through the guided reading levels.

When I had students who floundered, I increased their diet of leveled books and encouraged their parents to read more to them at home. I am sorry to say that I did not consider that something in my approach could have been wrong.

Emily Hanford's Reporting

In 2017, APM Reports released an audio documentary called "Hard to Read," with correspondent Emily Hanford, about why so many children with dyslexia have a hard time getting the help they need in school. The following year, Hanford reported that many educators either don't know what research reveals about how reading works or actively resist it.

It was Hanford's follow-up audio documentary "At a Loss for Words," published in 2019, that finally got my attention. A teacher commented on my website, asking what I thought about Hanford's reporting. When I read the transcript of the documentary, this paragraph jumped out at me:

> For decades, reading instruction in American schools has been rooted in a flawed theory about how reading works, a theory that was debunked decades ago by cognitive scientists, yet remains deeply embedded in teaching practices and curriculum materials. As a result, the strategies that struggling readers use to get by—memorizing words, using context to guess words, skipping words they don't know—are the strategies that many beginning readers are taught in school. This makes it harder for many kids to learn how to read, and children who don't get off to a good start in reading find it difficult to ever master the process.[7]

I was taken aback by Hanford's condemnation of three-cueing (not to mention completely insulted by her use of the word "guess"), but I was also relatively sure that a journalist could not know more about how reading works than an experienced teacher. I planned to write a post refuting "At a Loss for Words," point by point.

On each of my daily walks, I tried to formulate what was sure to be a convincing rebuttal. But I never got very far; as it turned out, I didn't know as much about how reading works as I thought I did.

I began looking into the research myself. It didn't take long to discover that Hanford was right.

THE MODERN READING WARS: BALANCED VERSUS STRUCTURED LITERACY

Hanford's continued reporting has inspired me and countless others to take a closer look at balanced literacy, which is still the most prominent method for teaching reading in kindergarten through second grade in the United States.[8]

The ultimate goal of balanced literacy is to teach children to love reading. The ultimate goal of structured literacy is to teach children how to read.

Most balanced literacy teachers teach phonics, but this instruction is often unsystematic and disconnected from the other reading and writing their students do. Balanced literacy is defined in terms of *activities that we do:* reading aloud, shared reading, guided reading, and independent reading.

Structured literacy is an umbrella term coined by the International Dyslexia Association. It refers to an approach that provides systematic, explicit instruction in the alphabetic code. Structured literacy is focused on the *elements that we teach*: phonology, sound-symbol relationships, syllables, syntax, semantics, and morphology.[9]

Perhaps the most striking difference is the emphasis of each approach. Balanced literacy focuses on meaning right from the start. The ultimate goal of balanced literacy is to teach children to love reading. Structured literacy's early emphasis is the code. While it would be wonderful if children learned to love reading, the ultimate goal of structured literacy is to teach children *how* to read.

It's not that no one learns to read with balanced literacy instruction; about 40 percent of children learn to read as long as they receive broad instruction. But for at least 50 percent of all students, explicit, code-based instruction is absolutely essential for learning to read, and a systematic approach is advantageous for *all* students.[10]

Scientifically-Based Research

The science of reading is not a philosophy. It is not a "phonics first and only" approach. Nor is it a program or curriculum.

DEFINING THE SCIENCE OF READING

The Reading League is an organization whose mission is to promote the use of evidence-aligned instruction. It defines the **science of reading** as:

> a vast, interdisciplinary body of scientifically-based research about reading and issues related to reading and writing. This research has been conducted over the last five decades across the world, and it is derived from thousands of studies conducted in multiple languages. The science of reading has culminated in a preponderance of evidence to inform how proficient reading and writing develop; why some have difficulty; and how we can most effectively assess and teach and, therefore, improve student outcomes through prevention of and intervention for reading difficulties.[11]

If you remember just one thing from that definition, let it be this: the science of reading is a body of research. A body of research is not a pendulum swing or a fad. It just is. Even if discussions of the science of reading disappear from social media, the research will remain.

A body of research is not a pendulum swing or a fad. It just is.

WHY MANY TEACHERS DON'T STUDY RESEARCH

As a teacher, I pored over professional books as often as I could. If someone had asked me if my teaching methods were based on research, I would have replied, "Oh yes! They're based on the writings of Fountas and Pinnell, Lucy Calkins, Regie Routman, and Sharon Taberski." These authors' books left me encouraged and inspired. I had no idea that much of what I read was based on a faulty theory of how reading works.

It didn't occur to me to track down a true research article; I hardly knew what one was. Besides, after a long day of teaching, I wouldn't have had the mental energy to decipher one. I would have agreed with the authors of *The Reading Glitch*: "The average scientific report is as digestible as a bowl of cold sauerkraut."[12]

If you feel the same way, take heart! I wrote this book to give you a clear understanding of the research and how to apply it.

RESEARCH-BASED VERSUS EVIDENCE-BASED

Research-based practices are teaching methods based on what we've learned from research. **Evidence-based practices** are based on the research as well, but these practices have also been proven to work in a controlled setting. Just because a teacher or author calls something research- or evidence-based, doesn't mean that it is. Ask for proof; ask for links to the scientifically-based research.

Once you get your hands on a full research article, you may not have the time, energy, or (let's be honest) interest in reading through dozens of pages. Do the following to get the gist of the article:

- Read the abstract and discussion/implications sections, which will give you a lot of valuable information.
- Look at the study participants. Find out what intervention they received. How was the intervention different from what the control group received?
- Finally, check what outcomes were measured. How were they measured? What was the effect size?

STATISTICAL SIGNIFICANCE AND EFFECT SIZE

Comprehending the jargon of a research study is difficult, but you're well on your way if you have a general understanding of two concepts: statistical significance and effect size.

If the results of a study are statistically significant, you can be confident that the results of the intervention aren't due to chance alone. **Statistical significance** is measured using *p*. The smaller the *p* value, the greater confidence you can have that the results weren't random.

Statistical significance doesn't mean much if the effect size is low. **Effect size** is a way of measuring the size of the difference between two groups: the students who received the intervention and the students who did not. An intervention could be many different things. It could be teaching a specific method for reading multisyllabic words or having students reread their decodable texts with a partner for 10 minutes a day. The effect size tells us whether the intervention actually made a difference in student learning.

For example, imagine that a researcher wants to find out whether explicit instruction in phonemic awareness improves reading outcomes. The researcher gives a pretest to two groups of similar students. One group receives the intervention (explicit phonemic awareness instruction) in addition to regular reading instruction. The control group only receives regular instruction. When the students are tested again six months later, the researcher finds an effect size of 0.5.

Cohen's *d* is one of the most common ways to measure effect size. Usually an effect size of below 0.2 does not have much practical significance. Values between 0.2 and 0.5 are considered to be small effects, values between 0.5 and 0.8 are considered to be medium effects, and values over 0.8 are considered large.[13] The higher the effect size, the greater the likelihood that the practice will accelerate student learning.

THE IMPORTANCE OF CONVERGING EVIDENCE

It's important to find *multiple* studies that point to a particular conclusion. This is called **converging evidence**, which is present when different and independent sources support a single conclusion.

Ideally, you will find a **meta-analysis**. A meta-analysis summarizes the results of multiple independent studies to yield an overall effect size. A high quality meta-analysis is arguably the best way to determine whether a teaching practice is effective.[14]

WHEN RESEARCH DOESN'T HAVE THE ANSWERS

As psychologist Steven Dykstra explains, some of our practices are based on bullseye science, which is as close to absolute truth as science gets. Bullseye science tells us that good readers are proficient at decoding. It tells us that phonemic awareness is important for success in reading. It tells us that teaching phonics is better than not teaching it. However, "You can't teach just in the bulls-eye. There isn't enough there to get the job done. You're going to have to make choices and decisions with the best evidence and reasoning available."[15]

Science hasn't answered all our questions. For example, we know phonics is important, but science doesn't give us a scope and sequence, a pacing guide, or the exact terminology to use.

Most of what teachers do in the classroom is an interpretation of the science. The teacher's job is to learn the science and make the best possible teaching decisions in light of it.

The Simple View of Reading

The Simple View of Reading (SVR) is a theoretical model that was developed by Gough and Tunmer in 1986 to simplify what is needed for a student to become a strong

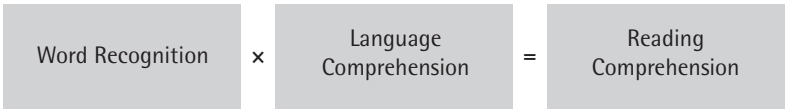

Figure 1.2 The Simple View of Reading (SVR).

reader. According to the SVR, word recognition times language comprehension equals reading comprehension (Figure 1.2).[16]

This simple theory has been supported by research many times in the decades since.[17] No one has been able to falsify it.[18]

The Simple View of Reading does not assert that the reading process is simple; it merely separates the complexity into two parts. I consider it a bird's-eye view of the skills reading requires. See Table 1.1.

The SVR shows that you don't have to choose between the phonics and meaning camps; students need proficiency in both word recognition *and* language comprehension to understand what they read.

The SVR also contradicts three-cueing. When I was a balanced literacy teacher, I assumed that having my students identify the words using context, pictures, or partial phonics was appropriate because they were still arriving at the words. In fact, however, they were not truly reading the words. A score of "0" for word recognition times "1" for language comprehension still equals "0." There was no reading comprehension because they were not actually reading.

Table 1.1 Examining the Simple View of Reading

Domain	Definition	Underlying Competencies
Word Recognition (Also called Decoding)	The ability to read isolated words quickly and accurately[19]	• Letter-sound knowledge • Phonemic awareness • Phonic decoding • Orthographic knowledge • Sight recognition
Language Comprehension (Also called Linguistic Comprehension or Listening Comprehension)	The ability to understand the oral language in a text if someone else reads it aloud[20]	• Background knowledge • Morphological awareness • Syntactic awareness • Vocabulary • Inference making • Perspective taking • Text structures • Comprehension monitoring

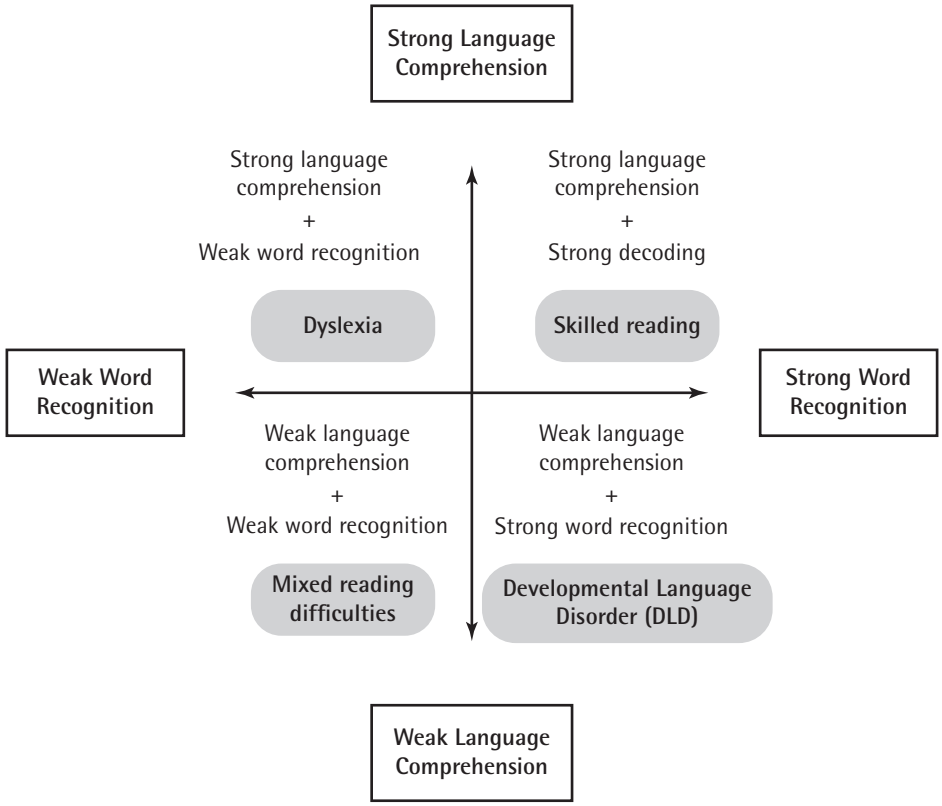

Figure 1.3 The Simple View of Reading is useful for defining different types of reading difficulties.

Finally, the SVR helps define different types of reading difficulties.[21] As you can see in Figure 1.3, just one quadrant (the top right) represents a skilled reader. The other three quadrants show the three types of reading difficulties.

Scarborough's Reading Rope

Developmental psychologist and researcher Hollis Scarborough created the rope (see Figure 1.4) in 1992 as a visual metaphor to help parents and teachers understand the complexities involved in learning to read. Scarborough's Reading Rope consists of two bundles, language comprehension and word recognition. The strands of each bundle are the subskills of the two domains.[22]

In Scarborough's view, the most important feature of the rope is its emphasis on the change over time in the nature of the relationships among the developing strands and bundles. If any strand gets frayed, it can hold back the development of other strands and weaken the entire rope.[23]

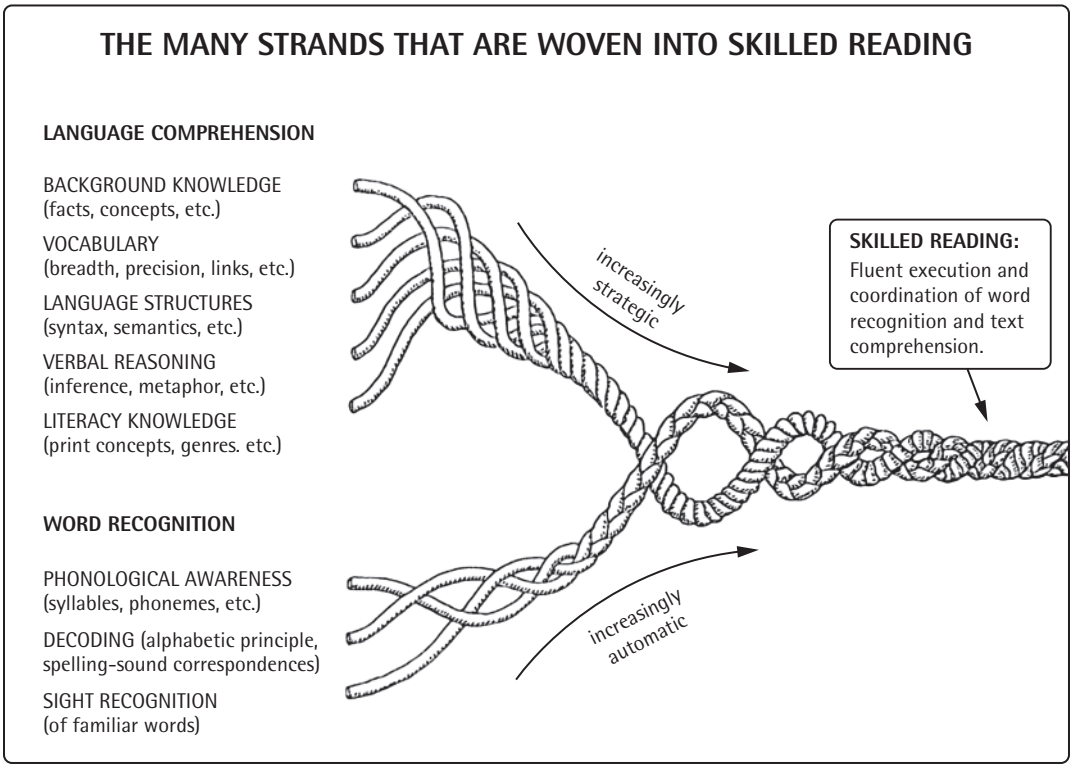

Figure 1.4 Scarborough's Reading Rope.
Image by Hollis Scarborough, published by Guilford Press

How the Brain Learns to Read

Stanislas Dehaene, a cognitive neuroscientist, has lamented that "it's a shame that teachers know more about the workings of their car than they know about the working of the brain of their children."[24] If you'd like all the particulars, check out Dehaene's book *Reading in the Brain*. I share only the most essential information here.

WHAT HAPPENS WHEN A PROFICIENT READER READS A WORD

Functional magnetic resonance imaging (fMRI) measures small changes in blood flow when different parts of the brain are activated. Through this technique, scientists have observed what happens when a person reads a word. There is not just one area of the brain that lights up when a person reads, because different parts of the brain must work together for reading to occur. Scientists have observed that when a person reads a word, activity unfolds from the back of the brain to the front, looping several times.

1. Upon seeing the word, the visual information enters the brain via the occipital lobe at the back of the brain.

2. The information quickly moves into an area in the left hemisphere called the visual word form area. Dehaene calls it "the brain's letterbox." The brain's letterbox is where you store letters, letter combinations, and words you know by sight.
3. Finally, there's an explosion of activity into at least two networks in the left hemisphere. One network concerns meaning, and the other concerns pronunciation.[25]

The brain's letterbox is an area that exists before a person learns to read. Before reading, it reacts to faces and objects instead of words. When a person learns to read, however, faces and objects trigger brain activity in the other side of the brain. When people describe reading instruction as rewiring the brain, this is what they're talking about. Dehaene calls this "a sort of reorganization when children learn to read."[26] You could also say that the area used for picture recognition is hijacked and moved to another part of the brain so that the original area can be repurposed for recognizing words.

WHY YOU SHOULD NOT TEACH WORDS AS WHOLE UNITS

Because proficient readers recognize words in a tiny fraction of a second, it might seem like you read words as wholes. According to Dehaene, "It's just an illusion. The brain still processes every single letter and doesn't look at the whole shape. Whole word reading is a myth, basically."[27]

I used to advocate a "sight word first" method of teaching beginning readers. It felt easier to teach beginners to memorize a set of words instead of expecting them to "sound it out." I was right about one thing; this method does feel easier, at least at first. Unfortunately, students will hit a wall when their brain reaches its capacity for storing these images.

HOW TO REWIRE THE BRAIN

Unlike learning to speak, learning to read is not a natural process. Your students' brains must be trained to connect their visual system with their spoken language system. The important question is: How does this happen? In other words, how do you rewire the brain? According to Dehaene, learning letter-sound correspondences is the fastest way for students to learn to read words and comprehend what they read.[28]

Teaching students to memorize words or identify them without attending to each letter is a big mistake because it directs brain activity toward an inadequate circuit of the brain in the right hemisphere.[29]

Rewiring the brain happens quickly for some and slowly for others. However, all of your students' brains learn to read the same way. Dehaene states, "It is simply not true that there are hundreds of ways to learn to read. Every child is unique . . . but when it comes to reading, all have roughly the same brain that imposes the same constraints and the same learning sequence."[30]

How We Learn Words

As a literate adult, you recognize 30,000 to 70,000 words by sight.[31] How? People used to believe that readers used shapes of words or visual features of letters to store words in memory, but too many words have similar shapes to make this feasible. In addition, you instantly recognize the same word whether it's in uppercase, lowercase, or even mixed case.

Consider the word *bear*. The upper and lowercase letters are entirely different, but you recognize the word whether it's written as bear, BEAR, or BeAr. Whether the word is written in cursive, print, or a different font, you recognize it automatically.

Word learning is not a visual memory process. Instead, written words are stored in memory when **graphemes** (single letters or groups of letters that represent sounds) are connected to **phonemes** (the smallest units of speech in spoken words that can distinguish one word from another) along with meaning.

Imagine that you encounter an unfamiliar medical term, such as *sphenopalatine ganglioneuralgia* (the brain freeze you get after eating ice cream too quickly). The first time you see these words, you won't recognize them instantly. You'll need to slowly sound them out. You will probably need to do this multiple times. But after you've decoded the words enough times, you'll read them automatically. It's not because you've memorized how they look; it's because the spellings are bonded to their pronunciations in your memory.

ORTHOGRAPHIC MAPPING

This mental process is called **orthographic mapping**. According to David Kilpatrick, "orthographic mapping is the process readers use to store written words for immediate, effortless retrieval."[32] Put more simply? Orthographic mapping is the process readers use to remember words.

Each word has three forms: its sounds, spelling, and meaning. Through orthographic mapping, readers connect sounds and letters of words, along with meaning, as instantly recognizable words.[33]

Researchers call these instantly recognizable words "sight words." Unlike the common belief that sight words are words we must memorize because they are irregular, **sight words** are any words recognized automatically, without needing to sound out or guess.

Orthographic mapping is a mental process, not a skill we can teach or something we can include in our lesson plans. However, we can teach the skills that allow it to occur.

HOW TO BECOME PROFICIENT AT ORTHOGRAPHIC MAPPING

Orthographic mapping takes time. If it was instant, you wouldn't see kindergartners sound out the same word after just reading it on the previous page. And you

wouldn't need to sound out *sphenopalatine ganglioneuralgia* multiple times before recognizing the term instantly.

Orthographic mapping is a mental process, not a skill we can teach or something we can include in our lesson plans. However, we can teach the skills that allow orthographic mapping to occur. These are phonemic awareness, letter-sound correspondences, and phonic decoding. Once students become proficient at orthographic mapping (usually by third grade), they only need to read a word 1–4 times to recognize it instantly.[34]

WHY THIS MATTERS

All of this explains why early readers benefit from systematic phonics instruction that includes practice reading decodable texts (texts that primarily include the sound-spellings they've been taught). When students are taught to read using predictable leveled texts instead, they simply memorize the pattern and use picture cues. This type of "reading" bypasses orthographic mapping because students hardly need to look at the words.

THE FOUR-PART PROCESSING MODEL FOR WORD RECOGNITION

The four-part processing model explains how the brain reads and understands words. When looking at a word (see the bottom right of Figure 1.5), you first activate the orthographic processor (an area of the brain where you store images of letters and letter combinations) and the phonological processor (an area of the brain where you

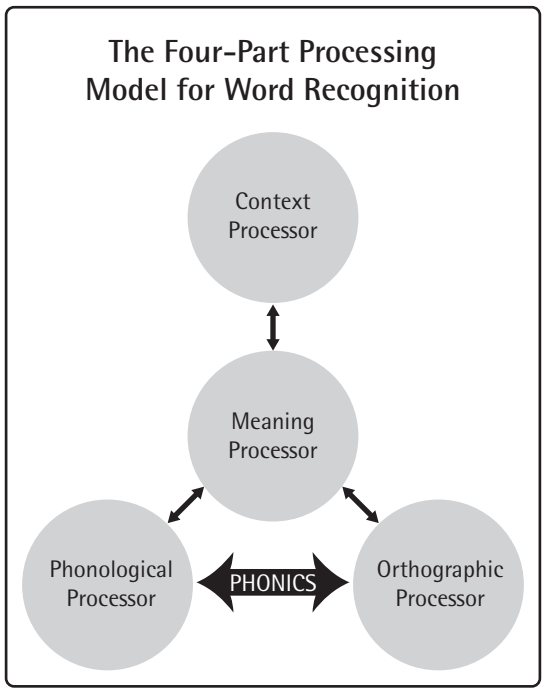

Figure 1.5 The four-part processing model for word recognition.

store speech sounds). In other words, you connect the sounds to the letters as you read the word in a fraction of a second. Once you've read the word, you activate the meaning processor to generate possible word meanings. Finally, you use the context processor to help you establish the meaning of the word in its particular context.[35]

While this model is a simplification of how reading works, it's a helpful reminder of the importance of phonics when teaching reading. Word identification comes before comprehension.

EHRI'S PHASES OF WORD LEARNING

No matter what grade you teach, you've surely seen a vast difference in students' literacy development. It's helpful to acquaint yourself with Linnea Ehri's phases of word learning so you can determine what your students need to learn next.

Based on her research, Ehri has described the course of learning to read and spell words as a series of four phases.[36]

The Pre-alphabetic Phase

In the pre-alphabetic phase (Figure 1.6), children have very little knowledge of letters and sounds. They may recognize their names or words in environmental print, but only by visual shape or context. If these children attempt to spell, they produce random strings of letters or letter-like forms.

Some kindergartners begin the year in this phase. To move children to the next phase, teachers should teach phonemic awareness along with letter names and sounds.

The Partial Alphabetic Phase

Many children begin kindergarten in the partial alphabetic phase (Figure 1.7), when they know the names and sounds of some letters and have limited phonemic awareness. They may begin to decode very simple words, but they are more likely to try to predict words using context or the first and last letter of words. Students may recognize

Figure 1.6 The pre-alphabetic phase.
Image by Rocio Zapata

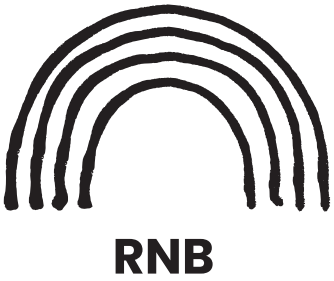

Figure 1.7 The partial alphabetic phase.
Image by Rocio Zapata

a few words by sight using the letter-sound correspondences they know. When spelling, they may spell words with just a few consonants (KR for CAR).

To help students progress to the next phase, teachers should teach their students to break words into their sounds and then spell those sounds. They should teach letter-sound correspondences and give students practice reading decodable books so they can apply this knowledge.

The Full Alphabetic Phase

Ideally, children will enter the full alphabetic phase (Figure 1.8) by late kindergarten or early first grade. During this phase, students know the sounds of all 26 letters and are learning other phonics knowledge as well. They begin to decode simple words by attending to every letter. Students in this phase learn to recognize words automatically after reading them several times. They spell words phonetically and start to remember correct spellings.

To move students along, teachers should continue to teach phoneme blending and segmenting. They should continue to teach spelling patterns as they move to more advanced phonics concepts.

Figure 1.8 The full alphabetic phase.
Image by Rocio Zapata

Figure 1.9 The consolidated alphabetic phase.
Image by Rocio Zapata

The Consolidated Alphabetic Phase

The goal is for children to enter the consolidated alphabetic phase (Figure 1.9) some time in second grade. In this phase, students know all or nearly all grapheme-phoneme correspondences. They have advanced phonemic awareness skills. When decoding, they use chunks rather than individual phonemes. Their sight vocabulary is increasing rapidly, and they are developing a proficient memory for correct spellings.

When teaching these students, teachers should help students focus on various chunks in words as they teach the reading of multisyllabic words.

Key Things to Remember

- The science of reading is a body of research related to reading and writing.
- There is not enough research to prescribe or confirm everything teachers do in the classroom; the teacher's job is to learn the science and make the best possible teaching decisions in light of it.
- The SVR simplifies what is needed to become a strong reader.
- Scarborough's Reading Rope communicates the complexities involved in learning to read.
- The brain does not have just one area responsible for reading; rather, multiple parts of the brain work together. Explicit instruction in phonemic awareness and letter-sound correspondences rewires the brain for reading.
- Readers learn to read words automatically through a mental process called orthographic mapping. For orthographic mapping to occur, the reader must connect sounds to letters along with meaning. If you teach beginners to read by memorizing words or using three-cueing, you bypass orthographic mapping. This limits your students' ability to store words for future instant retrieval.
- Children need instruction in phonemic awareness and phonics to move through Linnea Ehri's phases of word learning.

Learn More

- Read *The Reading League's Defining Guide* e-book: www.thereadingleague.org/what-is-the-science-of-reading/defining-guide-ebook/
- Read *At a Loss for Words* by Emily Hanford. www.apmreports.org/episode/2019/08/22/whats-wrong-how-schools-teach-reading
- Listen to podcast episodes about the science of reading. For an index to episodes organized by topic, visit themeasuredmom.com/podcast-index.

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