



*A Scientific
Revolution
in Reading*

Why Our Children
Can't Read
And What We Can Do About It

**Diane
McGuinness,
Ph.D.**

Foreword by
Steven Pinker

"A superb achievement . . .
This clearly written and authori-
tative work is *the* work to read
for parents and teachers
who wish everyone in our
democracy to be able to read."

E. D. Hirsch, Jr.,
author of *Cultural Literacy*

Why Our Children Can't Read

and What We Can Do About It

A SCIENTIFIC REVOLUTION
IN READING

DIANE MCGUINNESS

A TOUCHSTONE BOOK

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Every writing system is an abstraction and every transcript is an artifact.
Speech can be represented by graphical means only very imperfectly.

—Florian Coulmas, 1989

FOREWORD

Man has an instinctive tendency to speak, as we see in the babble of our young children; while no child has an instinctive tendency to bake, brew, or write. More than a century ago, Charles Darwin got it right: Language is a human instinct, but written language is not. Language is found in all societies, present and past. All languages are intricately complicated. Although languages change, they do not improve: English is no more complex than the languages of stone age tribes; Modern English is not an advance over Old English. All healthy children master their language without lessons or corrections. When children are thrown together without a usable language, they invent one of their own.

Compare all this with writing. Writing systems have been invented a small number of times in history. They originated only in a few complex civilizations, and they started off crude and slowly improved over the millennia. Until recently, most children never learned to read or write; even with today's universal education, many children struggle and fail. A group of children is no more likely to invent an alphabet than it is to invent the internal combustion engine.

Children are wired for sound, but print is an optional accessory that must be painstakingly bolted on. This basic fact about human nature should be the starting point for any discussion of how to teach our children to read and write. We need to understand how the contraption called writing works, how the mind of the child works, how to get the two to mesh.

It is a national tragedy that this commonsense understanding has been so uncommon. We are turning into a nation of illiterates, the victims of misguided ideas about the nature of reading and how to teach

it. All the familiar techniques were devised before we had a scientific understanding of reading, and they are based on theories that we know are wrong. Parents and policymakers are bewildered by contradictory advice from a slew of well-meaning but uninformed romantics, oversimplifiers, entrepreneurs, and quacks.

The book you are now holding is a profound and wonderfully readable essay on reading and writing and how they should be taught. Diane McGuinness is an applied scientist in the best sense of the word—not a self-appointed “expert” spouting mumbo jumbo, but someone who works by the guidelines: know what you’re talking about, think clearly and logically, and try to let the world tell you whether what you are saying is true. She combines these virtues with style, vigor, insight, and compassion. Anyone who has tried to teach children will recognize the vignettes in this book.

Modern illiteracy is a story of needless misery and waste. *Why Our Children Can’t Read* is part of the solution and one of the most important books of the decade. Read it for your own pleasure and enlightenment, and buy copies for the people in control of your children’s education.

—STEVEN PINKER

Professor and Director of the Center
for Cognitive Neuroscience, MIT
Author of *The Language Instinct*
and *How the Mind Works*

PREFACE

When you think back on your schooldays, funny things stick in your mind. These memories stick because of experiences that jolt you into vivid consciousness. My earliest memories were of first grade, probably because I spent a lot of time in the cloakroom that year. I have forgotten the crimes. My main misfortune was to finish my work too quickly and get into trouble. It seemed nothing could be done about this. The whole class worked on the same assignment at the same time. My mother was called in for a conference with Miss Chenette, my teacher at James Madison elementary in Pasadena, California. They had a discussion about skipping me a grade, but Miss Chenette said I was too immature.

I learned to read in Miss Chenette's class, although I don't remember how. I would never have remembered even this fact except for an experience with a neighborhood boy of twelve who couldn't read. Early most Sunday mornings, I used to read him the comics section from the Sunday paper. "But everyone can read," I remember saying. I decided that there must be something wrong with him. If I'd had a larger vocabulary I would have thought he was "retarded."

How was it that I could read and he couldn't? These are the twin mysteries of reading research. Fortunately, we have solved the most important one—why children fail. So far, scientists have not studied the reasons why children *don't* fail.

This early experience plus the contrast between my education in the California school system and my children's superb education in Hertfordshire, England, fostered my interest in education. I was witness to

what *could be* versus what *is*. However, I didn't realize at that time that 80 percent of English children were shut out of this experience.

A specific interest in reading and literacy came about through serendipity in the form of being in particular places at the same time as particular people. Phyllis Lindamood was one of my students at the University of California at Santa Cruz. She did her senior thesis project on blind readers learning Braille and introduced me to her parents' work with poor readers. Based on their work, Phyllis predicted that blind people would fail to learn to read Braille to the extent that they are unable to *hear* individual sounds in words. This hypothesis was overwhelmingly supported. The Lindamoods' work on the importance of auditory analysis to reading was virtually unknown by the scientific community at that time. Today, this work has been recognized as one of the major breakthroughs in reading research of this century.

Soon after this, I got an invitation from the Orton Dyslexia Society to present a paper at a conference on sex differences in reading. This prompted me to make connections between the research on poor readers and my own research on the development of perceptual and cognitive skills of boys and girls. This meeting was a major turning point. I met Isabelle Liberman, one of the great pioneers in reading research, who strongly influenced my thinking. I also benefitted enormously from future conferences and a close association with the Orton Dyslexia Society, which has consistently supported good scientific research on reading.

Later, I joined the faculty at the University of South Florida. One day, in a class on cognitive psychology, I outlined in detail what the next major step in reading research should be. The following week, some students met me in the hallway, and said: "We want to do it"—meaning the "next step."

Two of these students were Carmen Adams (later to become Carmen McGuinness when she married my son Geoff) and John Donohue. Carmen, Geoff, and John are still intensely involved in reading research, and Carmen, in particular, in program and curriculum development for reading instruction. No one realized at the time where this initial project would take us, nor how many hours (years) of testing, data entry, data analysis, and the endless revisions of research reports that would follow. The outcome of this collaboration has been beyond our wildest dreams.

This book is the culmination of that work, which has continued for nearly a decade, as well as a synthesis of modern research on reading. It describes a revolution in teaching methods that so far has escaped the notice of most educators. This revolution is the result of four major discoveries or principles:

1. From paleography and structural linguistics, we have learned that all writing systems are based on the syllable structure of the language for which they were written. The way a writing system is designed determines how it should be taught.

2. From cognitive and educational psychology, we have learned that children must be trained to hear the individual sounds (phonemes) of their language. They must be able to disconnect or “unglue” sounds in words in order to use an alphabetic writing system.

3. From an analysis of the structure of the English alphabet code, we have discovered that it encompasses four systems of mapping logic: simple reversibility (1-to-1 mapping), and various forms of propositional logic (1-to-1(2), 1-to-many, and many-to-1 mapping).

4. From research in the classroom and the clinic, we have discovered that when the sequence of reading and spelling instruction is compatible with the logic of the alphabet code *and* with the child’s linguistic and logical development, learning to read and spell proceeds rapidly and smoothly *for all children* and is equally effective for poor readers of all ages.

Only a handful of reading programs are based on one or more of these principles. These programs are unlike anything that is seen in the classroom or taught in teacher training colleges. This revolution is outside the current debate between “whole language” and “phonics.” Neither of these methods, *no matter what form they take*, is based on even one of these principles.

True scientific research on literacy only began about twenty-five years ago. What this means is that every “theory” or “model” or “method” of teaching reading, past or present, has been based either on human reason alone, or on empty theorizing or “fads,” rather than on solid scientific research. Because of this, success in learning to read is largely accidental, due to parental input, or the intelligence, talent, and integrity of the classroom teacher, plus the chance connection

between the parent's or teacher's ability and the aptitudes of particular children. Learning to read in every English-speaking country is like a lottery. It doesn't have to be. New programs described in this book allow us to teach anyone to read at any age.

This book examines new data on the analysis of writing systems which reveal how they are constructed, and, therefore, how they must be taught. It reviews the scientific evidence on the subskills important to mastering an alphabetic writing system, along with exciting new research on reading programs that work for *everyone*, including children and adults who can't read a word.

To help you with technical terms, there is a Glossary at the end of the book. A standard format for pronouncing the sounds of the English language follows this Preface.

Please note that all names of persons in examples are pseudonyms.

This book would not have been possible without the support of some very special people. In addition to those mentioned earlier, I also want to express my appreciation to my agents, Felicity Bryan, who believed in this book, and Peter Ginsberg, who, with great kindness and tact, guided me through revisions to make the book more salable. Susan Arellano at The Free Press has been a superb editor, asking just the right questions to force me to have a better perspective of the non-specialist reader. Her ability to remain focused over hours of discussion is amazing and incredibly gratifying to an author. Without her input and enthusiasm this book would have been much more dull and academic than it is.

I owe a special debt of gratitude to Carol Tavis and Steven Pinker, who liked and understood earlier drafts when nobody else did. Thanks a million. Writers write in a vacuum, and without this encouragement, I probably would have given up.

I am especially grateful to Peter Bryant and the Department of Psychology at Oxford University, who gave me a home for five months while I did research for this book. Thanks also to the staff of the Bodleian Library, who responded graciously to my many questions and requests. Thanks to my daughter Julie, who gave me home and hearth at Oxford, and who listened so patiently while I struggled to put new insights and discoveries into words.

Last, but not least, special thanks to the teachers, the parents, and the children with whom I have had the privilege to work over the years. It's their voices that make this book and its message come alive.

Pronunciation Key for English Phonemes

Consonants		Vowels	
<i>Sound</i>	<i>Key Word</i>	<i>Sound</i>	<i>Key Word</i>
/b/	boy	/a/	hat
/d/	dog	/e/	bet
/f/	fan	/i/	sit
/g/	get	/o/	hot
/h/	hot	/u/	cut
/j/	jog	/æ/	cake
/k/	key	/ee/	seem
/l/	log	/ie/	time
/m/	man	/oe/	home
/n/	not	/ue/	cute
/p/	pan	/aw/	law
/qu/ (kw)	quit	/ou/	out
/r/	red	/oi/	oil
/s/	sit	/oo/	book
/t/	top	/oo/	soon
/v/	vet	/ar/	car
/w/	win	/er/	her
/x/ (ks)	fox	/or/	for
/z/	zip		
/ch/	chin		
/ng/	ring		
/sh/	ship		
/th/	thin		
/th/	them		
/zh/	vision		

In this book English phonemes are represented by the most probable spelling rather than the International Phonetic Alphabet, which is unfamiliar to most readers. Sounds are enclosed in slash marks. Letters are underlined. The sound /b/ is spelled b.

VOWEL+R

The phoneme /r/ is both a consonant and a vowel. The vowel /r/ is spelled er, ir, or ur. Eight other vowels can combine with /r/. Two need to be taught specifically because the /r/ alters the pronunciation of the preceding vowel: cap/car fog/for.

The other six Vowel+r combinations tend to keep the same sound and spelling pattern with or without the /r/.

/ae/-/er/	(date/dare)	/ee/-/er/	(see/seer)
/ie/-/er/	(time/tire)	/ue/-/er/	(cute/cure)
/ou/-/er/	(out/our)	/oo/-/er/	(too/poor).

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SECTION I

**WHY IT'S HARD TO LEARN
TO READ**

Chapter 1

READING REPORT CARD

The Jamesons were a model middle-class family. Jim and Pat had college degrees. Jim earned good money as an engineer, and Pat had a part-time consulting job setting up computer systems for small businesses. They were devoted parents to their three children, umpiring for little league, running car pools to diving lessons, dancing lessons, and soccer practice. They valued learning and read bedtime stories every night. They often consulted dictionaries and encyclopedias whenever one of the children introduced an unfamiliar topic. Dinner conversations were lively, and filled with accounts of the children's daily activities.

Their youngest son, Donny, started kindergarten after two years at a well-run preschool. Donny could recite the alphabet, write most of his letters, his first and last names, and could count to 2,000 if anyone would let him. In kindergarten, Donny got more practice reciting the alphabet, copying out letters, and memorizing "sight words." He could read several short words. During first grade he taught himself to read simple books and enjoyed writing stories about airplanes, guns, and robots. He got an A on his report card for Language Arts. His teacher said he was the "best reader in the class." Mom and Dad were pleased, the teacher was pleased, and Donny was pleased. As he told his Grandma: "I can read faster than anyone in the school."

In second grade the words got longer. Donny had trouble remembering all of them. He began to ask his friend, "What does this word

say?" He would try to memorize it for the next time he saw it in a story. As the year went by, he had to ask his friend more and more often. Meanwhile, his stories got more interesting, and his handwriting a little neater. This year he wrote a lot about submarines. He could spell "submarine" correctly. The word was on the cover of five books he had at home and he practiced copying it over and over again. Here is one of his stories:

The Submarine Rtet

Kpn John tol hz cru fl sdm a ked. Takr dun. The submarine sek to the osn flor. It was qit. Tha cud ker the df crjz fling ner bi. But tha yr saf.

[The Submarine Retreat. Captain John told his crew full steam ahead. Take her down. The submarine sank to the ocean floor. It was quiet. They could hear the depth charges falling near by. But they were safe.]

This particular story, replete with spelling mistakes, was up on the wall on parents' night. Jim and Pat were alarmed. In fact, they had already discussed asking the teacher about Donny's written work. The teacher told them not to worry. She pointed out that Donny was a model student. He worked very hard. She asked them to notice the excellent vocabulary in the story (she was adept at reading her students' spelling). She asked them to notice that Donny was the only child who put a capital letter at the beginning of every sentence. She said that this was "transitional spelling." The children would be taught to spell with "conventional spelling" in third grade.

In the middle of second grade the children were given a nationally normed reading test. Donny scored just below "grade level," about average for his age. His teacher was pleased, because most of the children in her class were "at grade level," just where they should be. She was proud of her record in getting most children "at grade level" over the six years she had taught second grade.

In third grade the words got longer still. The books had more pages. Donny couldn't remember lots of these words, even when he asked several times. He had to guess so many of the words when he was reading that he couldn't make sense of the story. It helped a lot if there were pictures. Pat spent more time listening to Donny read and correcting his mistakes as they went along. Despite this extra tutoring,