THE READING MIND:

A Cognitive Approach to Understanding How the Mind Reads.

Daniel T. Willingham, Author of *Why Don't Students Like School?* The Reading Mind: A Cognitive Approach to Understanding How the Mind Reads. **Daniel T. Willingham,** Author of *Why Don't Students Like School?* The Reading

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PRAISE FOR *THE READING MIND*

"Daniel Willingham pulls back the curtain on the fascinating process of reading, explaining the discoveries of cognitive science in clear, accessible prose. For the many fans of *Why Don't Students Like School*, Willingham's new book offers more of the rigorous yet enjoyable science writing we love."

—Annie Murphy Paul, author of *The Brilliant Blog*

"This is a superb book. Willingham's ability to make cognitive research on reading coherent and comprehensible is exceptional. I wish that it had been available when I taught courses about research on reading to education doctoral students. This book should be standard fare in every doctoral education course on reading."

—**Isabel L. Beck**, professor emerita, School of Education, University of Pittsburgh

"What goes on in the mind as we read? How do people learn to read? What motivates some to read more than others? Does reading online differ from reading books? For those curious about these questions, and for those who care about children learning to read and growing as readers, this delightful, easy-to-read book explains this highly complex topic through fascinating studies and lively examples. With probing questions after each chapter, *The Reading Mind* will make a terrific book club read or textbook."

—Ellen McIntyre, dean and professor, College of Education, University of North Carolina, Charlotte

"This is the book we've been waiting for. Willingham captures the magic of reading while simultaneously demystifying how we read. He brings key experimental findings to light as he takes us on the journey from recognizing individual words to constructing meaning from text. Beautifully written, clear and accessible, yet still embracing complexities rather than shying away from them—this book is essential reading for anyone interested in how we read."

—Kate Nation, professor of Experimental Psychology, University of Oxford; fellow and tutor in Psychology, St. John's College

"Yet again, Daniel Willingham proves himself genius extraordinaire at translating research to practice! At once a brilliant tutorial on how the bitwise investigations of the research lab have evolved into the ever more powerful and comprehensive models that now dominate cognitive science, and a blueprint for educational excellence, this book is a must for educational practitioners, policymakers, and students. No more top-down

versus bottom-up reading wars: language, literacy, and knowledge are all of one piece and so, too, must be their development."

—Marilyn Jager Adams, visiting scholar at Brown University

"Dan Willingham has done it again! This is another of his essential books for educational professionals, and anyone else interested in the reading process—sharing the cognitive science and practical implications of research in the domain of reading. No one does this kind of book better than Willingham!"

—Keith Stanovich, author of *Progress in Understanding Reading* and *The Rationality Quotient*

"This book is like a Malcolm Gladwell for anyone who is fascinated with how the mind works in literacy development. Willingham mixes his wonderful sense of humor with examples that are simply fun to read while conveying very important concepts about reading. Students will love it; parents will understand it; and scholars will wish that they wrote it!"

—Susan B. Neuman, professor of childhood education and literacy development, New York University

"*The Reading Mind* is an indispensable exploration of not only how we read, but why we read. An easy and entertaining read that draws on the science of the brain, books, and behavior, Willingham's work will deepen your understanding of the many facets of reading and literacy, as well as how the brain processes what amounts to an astoundingly complex and historically unlikely process. *The Reading Mind* should be required reading for anyone with a vested interest in the written word."

—Kristofor Lauricella, history teacher, High School for Youth & Community Development, Brooklyn, New York

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A Cognitive Approach to Understanding How the Mind Reads

DANIEL T. WILLINGHAM

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This book is dedicated to five of my teachers
who taught me to love reading:
Gene Doherty, Joan Goodman, Joyce Gustafson,
Richard Liewer, and Janet Stellenwerf.

We are absurdly accustomed to the miracle of a few written signs being able to contain immortal imagery, involutions of thought, new worlds with live people, speaking, weeping, laughing. We take it for granted so simply that in a sense, by the very act of brutish routine acceptance, we undo the work of the ages, the history of the gradual elaboration of poetical description and construction, from the treeman to Browning, from the caveman to Keats. . . . I wish you to gasp not only at what you read but at the miracle of its being readable.

Vladimir Nabokov, *Pale Fire*

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ABOUT THE AUTHOR

Daniel Willingham earned his B.A. from Duke University in 1983 and his Ph.D. in Cognitive Psychology from Harvard University in 1990. He is currently Professor of Psychology at the University of Virginia, where he has taught since 1992. Until about 2000, his research focused solely on the brain basis of learning and memory. Today, all of his research concerns the application of cognitive psychology to K–16 education. He writes the "Ask the Cognitive Scientist" column for *American Educator* magazine, and is the author of *Why Don't Students Like School?* (Jossey-Bass, 2009), *When Can You Trust the Experts?* (Jossey-Bass, 2012), and *Raising Kids Who Read* (Jossey-Bass, 2015). His writing on education has appeared in 14 languages. His website is www.danielwillingham.com.

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THE READING MIND

Introduction

The Chicken Milanese Problem

Agenda for the Introduction

To consider the question "how does the mind read?" More specifically, to understand why it is a terrible scientific question, and why we pose it anyway.

Picture this commonplace scene. I was on an airplane, reading E. L. Doctorow's *Billy Bathgate* on my Kindle. The following passage is found near the end of the book, and when I read it, I softly gasped.

Before he got through it I was hearing the distant sound of police sirens, and it was so arduous for him to speak it that he died of the effort: "Right," he said. "Three three. Left twice. Two seven. Right twice. Three three."[1]

My goal in this book is to account for what happened in the few moments it took me to read those 43 words.

The environment held nothing more remarkable than black marks on a white screen, yet somehow I was mentally transported to another world, indeed, to a world quite alien to me: New York City some 30 years before my birth, populated by gangsters. How does the mind create a mental world from black marks? And why would I care enough about Otto "Abbadabba" Berman—a real-life gangster portrayed sympathetically in this novel—to gasp when he's murdered?

The approach I'll take to answering these questions is cognitive. I'll describe what the mind is doing as we read, but I'll seldom consider what

the brain is doing. That may sound shortsighted (the mind is, after all, what the brain does), but it's a common scientific approach taken over the last fifty years. Computer science offers an analogy. You can describe the steps of a calculation—say, figuring out the date of the next lunar eclipse viewable in Toronto—without describing what's happening in the electronic guts of the computer during this calculation. In the same way, I'm going to describe the steps by which your mind reads without specifying how the brain carries out those steps.

Cognitive psychologists commonly tackle large, daunting questions by breaking them down into smaller, more manageable questions. We do that by thinking through what *had* to happen in order for some bit of mental work to get done.

What had to happen between my seeing the letters on the screen and my emotional reaction to the events in an imagined world? I had to see the letters and identify them. I had to assemble the letters into words, and then the words into sentences, which I comprehended by applying grammatical rules. My emotional reaction entails not just comprehension, but memory. "He died of the effort" prompts pity only if you feel like you know Berman. So over the course of the novel I must have built and updated a sort of personality picture of this character. And of course memory is needed to organize the sequence of events into a coherent sense of the plot.

So, will this skeletal outline of what happened as I read *Billy Bathgate* serve as a starting point for a theory of reading?

How Do You Make Chicken Milanese?

Even my crude analysis shows that "what happens when we read?" is a bad scientific question, the type of question psychologists usually don't pose. Why? Think of all the millions of activities your mind can direct: you can guess the cost of a paperweight you see in an antique store, ride a child's tricycle for comic effect, make Chicken Milanese, invent a plausible excuse for missing your neighbor's son's middle school play, and so on. For each of these we might pose the question "What's happening in the mind when you do that?" But scientists don't. The reasons that scientists don't ask how you cook Chicken Milanese inform what I've included and excluded in this book, so it's worth describing these reasons in some detail.

The first reason is that task descriptions are not quite as simple as I've made out. I said "let's consider what had to happen" as I read that passage from *Billy Bathgate,* and then I said something like "you have to perceive the letters, and understand the words," and so on. The history of psychology shows that it's easy to be fooled when you try to describe a task.

Here's a simple example. When we read it feels as if we move our eyes smoothly—we sweep from the start of a line to the end, and then snap back to the far left of the page for the next line. That impression is easily disconfirmed by watching the eyes of another person as she reads. Her eyes don't move smoothly, but instead jump from one spot to the next, usually a distance of seven to nine letters.[2] That's so easily observed it's probably been known for centuries. But even that observation—jumping movements, not smooth tracking—is an incomplete description. In fact, your eyes are not always pointing at the same letter when you read.[3] About half the time each eye looks at a different letter. They may even be slightly crossed.

The implications of this fact for an understanding of reading are not obvious. I raise the issue to point out that researchers have been working at an account of reading for over a century, and they are still finding ways of improving their description of *what's actually happening* when someone reads—not how they do it, but what they are doing. That's one reason psychologists usually don't try to explain really complicated behaviors. They figure that they probably shouldn't be confident they can adequately describe what they are explaining.

Suppose we give up on the idea that we'll have a perfect description of what people actually do during a complicated task, and we decide to settle for a provisional description. That's not a bad strategy—as we learn more, our description of the task will improve. One thing we're pretty confident about is that a complex task will require many different cognitive processes. My off-the-top-of-the-head analysis of reading called for vision, memory, grammatical analysis, language comprehension, and emotion. Any one of these mental processes is known to be terribly complicated.

Consider seeing letters. One challenge is that letters can take on quite different appearances, varying in size, typeface, and typographical emphasis (bold, italic, etc.) (Figure I.1). How does my visual system treat these very different-looking objects as equivalent?

Figure I.1. One letter, different fonts. These letters must all be interpreted as equivalent, even though they look different.
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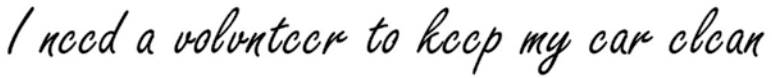

Figure I.2. Ambiguous letters. Although I'm sure you read this sentence easily, if you look closely you'll notice the "e"s in the word "need" are the same shape as the "c" in "clean." And the same shape is interpreted as a "v" and as a "u" in the word "volunteer."
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Worse yet, the very same shape might be interpreted as representing different letters, depending on the surrounding context (Figure I.2). So we need to do more than define what makes an "A" an "A"; we need to specify the context in which it will be seen as an "A."

Finally, note that we've taken for granted that we're looking at black characters on a white background. How could it be otherwise? But what dictates that "the black bits define the objects, whereas the white is background"? Differentiating objects from their background is so embedded in our visual system that we seldom notice that it's an issue, unless we're looking at one of those clever images where the object and background are ambiguous (Figure I.3).

Now suppose the complicated work of identifying letters is complete, and I've assembled the letters into words. My mind is trying to sort out the meaning of what I've read. One problem is that some words have multiple meanings. In the *Billy Bathgate* passage, Berman starts his brief speech with the word "Right." What did I think he meant when I read that word? Morally correct, as in "the right thing to do"? Or perhaps agreeing with the facts of the matter, as in "You got that right." Or appropriate, as in "the right tool for the job." A few words later Berman uses the word "left" and so it becomes clearer that when he said "right" he was probably signifying a direction. But before I read "left," what did I