Essentials

of Assessing, Preventing, and Overcoming Reading Difficulties

David A. Kilpatrick

WILEY
To Dr. Philip J. McInnis, Sr., In Memoriam

A pioneer in applying research findings to classroom practice

and

To Carol Byrnes-Troendle, In Memoriam

A resource teacher whose energy, enthusiasm, and dedication were an inspiration to all who knew her
CONTENTS

Series Preface xv
Preface xvii
Acknowledgments xxi

One Introduction 1
The Unfair Race 1
The Importance of Reading 2
The Gap Between Reading Research and Classroom Practice 4
The Unfortunate Reality About Reading Research:
   Nobody Knows About It! 4
Why Is There a Gap Between Research and Classroom Practice? 6
The Powerful Research Results We Have Been Missing 11
Acknowledging and Responding to the Gap Between Research and Practice 14
Summary 20

Two How We Teach Reading and Why It Does Not Work With Struggling Readers 23
A Very Brief History of Reading Instruction 24
Why Our Current Approaches to Reading Instruction Are Ineffective With Struggling Readers 26
The Visual Memory Hypothesis of Word Reading 30
The Three Cueing Systems Model of Reading 35
The Phonics Approach to Reading 41
Summary 42
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three</td>
<td>A Practical Framework for Understanding and Assessing Reading Skills</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>The Simple View of Reading</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Types of Reading Difficulties/Disabilities</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>The Components of Reading</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>The Components of Word-Level Reading</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>The Components of Linguistic Comprehension</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>77</td>
</tr>
<tr>
<td>Four</td>
<td>Understanding Word Recognition Difficulties</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>The Importance of This Chapter</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Introducing Orthographic Mapping</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>How Skilled Word Reading Develops</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>The Early Stages of the Reading Process</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Learning to Read Irregular Words</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>The Research on Orthographic Mapping</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>How the Phonological-Core Deficit Hinders Reading Development</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Word-Reading Fluency and Orthographic Mapping</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Students Whose Native Language Is Not English</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Answers to the Questions Posed About Reading Difficulties</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>129</td>
</tr>
<tr>
<td>Five</td>
<td>Understanding Reading Comprehension Difficulties</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Specific Reading Comprehension Impairment</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td>What Is Required for Skilled Reading Comprehension?</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Reader Abilities</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Text Factors</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>Task Factors</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>Students Whose First Language Is Not English</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>145</td>
</tr>
<tr>
<td>Six</td>
<td>Assessing Phonological Processing Skills</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>An Introduction to Intervention-Oriented Assessment of Reading</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Issues in Assessing Phonological Skills</td>
<td>154</td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Pages</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Seven</td>
<td>Assessing Phonics Skills</td>
<td>182</td>
</tr>
<tr>
<td></td>
<td>Orthographic Knowledge</td>
<td>183</td>
</tr>
<tr>
<td></td>
<td>Assessing Phonics Skills</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>196</td>
</tr>
<tr>
<td>Eight</td>
<td>Assessing Word Identification and Reading Fluency</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>The Assessment of Word-Reading Skills</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Untangling the Confound Between Word Recognition and Word Identification</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>Word Identification Subtests</td>
<td>208</td>
</tr>
<tr>
<td></td>
<td>The Assessment of Word-Reading Fluency</td>
<td>212</td>
</tr>
<tr>
<td></td>
<td>Types of Fluency Tasks</td>
<td>214</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>219</td>
</tr>
<tr>
<td>Nine</td>
<td>Assessing Reading Comprehension and Related Skills</td>
<td>222</td>
</tr>
<tr>
<td></td>
<td>Reading Comprehension Assessment</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>Tests of Reading Comprehension</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>Tests of Listening Comprehension</td>
<td>233</td>
</tr>
<tr>
<td></td>
<td>Assessment of Skills That Contribute to Reading Comprehension and Listening Comprehension</td>
<td>235</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>244</td>
</tr>
<tr>
<td>Ten</td>
<td>Effective Approaches for Preventing Reading Difficulties</td>
<td>247</td>
</tr>
<tr>
<td></td>
<td>Prevention: Removing the Hurdles Before the Race Begins</td>
<td>247</td>
</tr>
<tr>
<td></td>
<td>Experimental Support for Phonological Awareness Instruction</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Experimental Support for Explicit and Systematic Letter-Sound Instruction</td>
<td>265</td>
</tr>
<tr>
<td></td>
<td>Practical Considerations Regarding Teaching Letter-Sound Skills and Phonics</td>
<td>269</td>
</tr>
</tbody>
</table>
CONTENTS

The Centrality of Phonology in Word Reading 275
Phonological Awareness Training Programs 276
Preventing Literacy-Related Language Difficulties 280
Summary 283

Eleven Effective Approaches for Overcoming or Minimizing Reading Difficulties 286
Intervention with Word-Level Reading Difficulties 289
Popular Reading Interventions With Modest or Minimal Results 293
Reading Intervention Research With Minimal to Modest Results 301
The Phonological Awareness Intervention Continuum 302
Reading Intervention Studies with Highly Successful Results 304
Specific Programs Used in Highly Successful Outcome Studies 318
Addressing Comprehension Difficulties 322
Making It Work: Practical Intervention Issues 326
Summary 329

Twelve Case Illustrations 332
Mild Dyslexic Pattern 333
Severe Dyslexic Pattern 334
ELL Student 336
Compensator Pattern 337
Mixed Type 340
Hyperlexic Type 342
Summary 343

Thirteen Reading Difficulties and Learning Disability Identification 344
Far Fewer Students with SLD? 345
Characteristics That Suggest an Educational Disability—Part 1: SLD in Word-Level Reading 346
Characteristics That Suggest an Educational Disability—Part 2: Reading Comprehension 348
CONTENTS

General Guidelines for Identifying a Reading Disability 349
Summary 357

Afterword 359
Glossary 361

Further Reading 367
References 369
About the Author 399
About the Online Resources 400
Index 401
Reading difficulties represent one of the most common referral issues in schools. School psychologists, literacy specialists, special education teachers, and other educational professionals are routinely called upon to evaluate students with reading problems and to generate intervention plans. The present volume is designed to assist such professionals by opening up a vast and largely untapped body of empirical research on reading acquisition and reading difficulties. There have been literally thousands of research studies in the last four decades on all aspects of reading, but only small bits and pieces seem to make their way out of the scientific journals and into our K–12 classrooms.

To illustrate this, studies of the most common intervention practices used for struggling readers show that those interventions result in an average improvement of 2 to 5 standard score points. By contrast, some of the research coming from federal intervention grant initiatives indicate average improvements of 12 to 25 standard score points that are maintained at 2-, 3-, or 4-year follow-ups (see Chapters 10 and 11). The fact that we are not seeing average gains like these in our schools demonstrates why I referred to this research as “largely untapped.”

In 1997, after I had been a practicing school psychologist for nearly a decade, Dr. Philip J. McInnis, a former president of the New York Association of School Psychologists, introduced me to the top scientific journals publishing research on reading. Being an adjunct lecturer in psychology at the time, I had access to these journals, which allowed me to vigorously pursue this area. In addition, McInnis asked me to travel with him for a few summers to his workshops in school districts around the northeastern United States. These districts had been using his Assured Readiness for Learning program. McInnis’s program simply involved translating the research with the best-available outcomes into a practical curriculum for teachers. I got to meet administrators and teachers who were very excited to share how they had dramatically reduced the number of struggling readers in their schools. McInnis used to publicly claim that his program would...
reduce the number of struggling readers by 50%. Privately he said it was closer to 75%. I asked why he did not say this publicly. He replied that educators had a hard enough time believing his 50% claims so he felt he would lose all credibility if he publicized the actual results! Although McInnis’s claims may sound outlandish to the average educator, they are not. Some of the most successful studies reported in the literature have demonstrated across-the-board reductions in the number of struggling readers by 70%–80% or more (e.g., Shapiro & Solity, 2008; Vellutino et al., 1996). McInnis had such good results because was applying approaches from research studies that had displayed similar impressive results. McInnis passed away in March of 2002, and his highly effective program has been largely inactive and not promoted since that time.

Since 1997 I have also endeavored to integrate the reading research into my assessment practices. I developed what I call intervention-oriented assessment, which involves determining why a student struggles in reading. The reading research field has fairly well-established knowledge about the component skills needed for success in reading, and I have tried to align my assessment practices with those findings. Chapters 6 through 9 are a reflection of those efforts.

What I believe to be the most important contribution of this book is the presentation of orthographic mapping in Chapter 4. Orthographic mapping refers to the mental process readers use to store written words for later, instant retrieval. Orthographic mapping explains how students turn unfamiliar words into instantly accessible sight words, with no sounding out or guessing. This is something that weak readers do very poorly, and as a result, they have limited sight vocabularies and limited reading fluency. Now in its third decade of empirical validation, orthographic mapping is the “holy grail” of reading education. Students who are good at remembering the words they read (i.e., orthographic mapping) develop skilled word-level reading, whereas those who do not, become weak or “disabled” readers. Orthographic mapping represents a very large part of reading acquisition and should guide curricular decisions, evaluation practices, and intervention approaches. Indeed, the highly successful research results described above came from studies whose interventions were consistent with our understanding of orthographic mapping.

Many folks reading this volume will simply want the “bottom line” in terms of what needs to be done for assessing and remediating reading. I understand this kind of thinking, given our busy professional lives. However, our educational system has many long-held beliefs about reading that are fully entrenched in our curricula, textbooks, and general thinking. Simply presenting the “bottom line” will not likely promote change.
It is for this reason that I have decided to “pull back the curtain” to reveal not only what we know, but also the science behind how we know it. Nonetheless, this volume contains much practical information related to assessment and intervention, so those looking for the bottom line should find precisely the kind of information they are looking for.
One

INTRODUCTION

THE UNFAIR RACE

Picture yourself attending a high school track meet. The athletes are lining up for the 1,600-meter race, which requires four laps around the track. There are six lanes on the track, and you notice that in one lane is a set of high hurdles and in another lane is a set of low hurdles. The other four lanes have no hurdles. When the gun sounds, the runners in the two lanes with the hurdles are soon behind the other runners and continue to get farther behind as the race progresses. The runner in the lane with the high hurdles is the farthest behind. As the race goes on, the gap widens. There is almost no likelihood that either of these runners will catch up with the others. The whole event seems surreal and quite unfair—even painful to watch.

This scenario has close parallels to the development of reading skills among our K–12 students. The top two-thirds of students, as represented by the four lanes without hurdles, take off down the track and have nothing hindering them from running. The bottom third has differing degrees of hindrance based upon how high their hurdles are. Just as one-third of the runners had hurdles, the National Assessment of Educational Progress indicates that each year, about 30% to 34% of fourth graders in the United States read below a basic level.

Efforts to help these weaker readers have been geared toward teaching them how to jump more efficiently over their hurdles. This volume is not about helping children become better and more efficient hurdlers. It is about removing the hurdles from the track before the race even starts. It is also about removing hurdles still ahead of the runners once the race has begun.

DON’T FORGET

This volume is not about helping children become more efficient hurdlers. It is about removing the hurdles from the track.
The goal of this book is to open up the vast and extensive world of empirical research into reading acquisition and reading disabilities. Surprisingly, this large and heavily grant-funded scientific endeavor has not had sufficient impact on the fields of general education, literacy education, special education, and school psychology (see more on this later in the chapter). Yet school psychologists, literacy specialists, and special educators play a large role in evaluating children with reading difficulties. They are called upon to make recommendations about how to best address the learning needs of poor readers. This volume will provide educational professionals with the tools and knowledge they need to pinpoint the reasons why a given student is struggling in reading. It will also provide recommendations that result in highly successful interventions.

THE IMPORTANCE OF READING

It is difficult to overestimate the importance of reading for success in school and in life. Reading is essential for all academic subjects. Science and social studies require textbook reading. Many math tests, including state-level assessments, require students to read word problems. Poor reading virtually guarantees poor writing skills. Art, music, health, and physical education classes sometimes require background reading and written projects. As a result, reading affects a student’s entire academic experience. How well children succeed in school affects their future endeavors in life (Miller, McCardle, & Hernandez, 2010). While we all know of cases to the contrary, it is normally the students who do well in school who are more likely to go to college and have greater career opportunities.

Poor reading can also affect school behavior (McGee, Prior, Williams, Smart, & Sanson, 2002; Morgan, Farkas, Tufis, & Sperling, 2008; Tomblin, Zhang, Buckwalter, & Catts, 2000; Willcutt et al., 2007). Many children who are poor readers display behavior problems. There appears to be a two-way relationship between poor reading and at least some of the behavior problems we see in schools (Morgan et al., 2008). Significant reading difficulties appear to put students in later elementary school at a higher risk for depression (Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003). Students who are poor readers in
third grade are 4 times more likely to become high school dropouts compared to skilled readers (Hernandez, 2012). At a 30-year follow-up of over 1,300 adults who had been diagnosed with a reading disability at age 7, McLaughlin and colleagues found that these adults were less likely to have obtained post–high school degrees and were more likely to attain lower levels of income than those who were average or better readers at age 7 (McLaughlin, Speirs, & Shenassa, 2014).

School districts are fully aware of the impact reading has on students. Millions of dollars are spent every year on general educational and special educational reading remediation. Despite this, poor readers generally remain poor readers (Jacobson, 1999; Maughan, Hagell, Rutter, & Yule, 1994; Morgan et al., 2008; Protopapas, Sideridis, Mouzaki, & Simos, 2011; Short, Feagans, McKinney, & Appelbaum, 1986; Sparks, Patton, & Murdoch, 2014). Studies of both general and special educational remedial reading indicate that these efforts have not been effective at normalizing reading performance (Bentum & Aaron, 2003; Jacobson, 1999; Moody, Vaughn, Hughes, & Fischer, 2000; Rashotte, McPhee, & Torgesen, 2001; Swanson & Vaughn, 2010; Torgesen, Rashotte, Alexander, Alexander, & MacPhee, 2003).

It would be easy to conclude from this that there is a substantial portion of students, perhaps due to neurodevelopmentally based reading disabilities, who are simply unable to develop normal reading skills, regardless of the nature of the remediation. However, there is ample empirical evidence to challenge such an assumption. For example, in a large study funded by the National Institute of Child Health and Development (NICHD), researchers were able to reduce the number of children who require ongoing general or special educational remediation from the national average of about 30% down to 3% (Vellutino et al., 1996). In another NICHD-funded study, researchers showed that a large percentage of third through fifth graders with severe reading disabilities could reach an average reading level, and stay there (Torgesen et al., 2001). In fact, it has been shown in multiple empirical studies that a large proportion of students at risk for reading difficulties, as well as students with severe reading disabilities, can develop and maintain normalized reading skills when provided with the right kind of intervention (Alexander, Andersen, Heilman, Voeller, & Torgesen, 1991; Lennon & Slesinski, 1999; Rashotte et al., 2001; Shapiro & Solity, 2008; Simos et al., 2002; Torgesen, 2004a; Torgesen et al., 2001, 2003; Torgesen, Wagner, Rashotte, Herron, & Lindamood, 2010; Truch, 1994, 2003, 2004; Vellutino et al., 1996).

If this is the case, why are we not capitalizing on these findings?
THE GAP BETWEEN READING RESEARCH AND CLASSROOM PRACTICE

There are several reasons why our K–12 schools are not making use of the kinds of encouraging findings described above. In what follows, some of the most important ones are presented.

An Illustration of the Gap Between Research and Practice

Since the release of the Report of the National Reading Panel in 2000, phonological awareness has gained popularity in the literacy-teaching repertoire of early elementary school teachers. Phonological awareness refers to an awareness of the sound structure (syllables, phonemes) of spoken language. There has been an explosion of materials, programs, and opportunities available regarding phonological awareness. One might even consider phonological awareness to be an educational fad. Consider the following quote by Nancy Lewkowicz in the *Journal of Educational Psychology*:

The ability to perceive a spoken word as a sequence of individual sounds, which has been referred to recently as phonemic awareness, phonological awareness, and auditory analysis skill, is attracting increasing attention among reading researchers. The high correlation between this ability and success in reading is by now well established. (p. 686)

This quote appears to support the emerging interest in phonological awareness in recent years. In reality, this quote does no such thing—the quote is from 1980! It seems there was a lag time of about 20 years from when the scientific findings regarding phonological awareness became “well established” and when it became popular in schools. Actually, phonological awareness training was popular in the 1970s and early 1980s, but ironically it began to decline not long after Lewkowicz’s comment just quoted. It fell out of use, apparently as a result of changes in reading philosophies in the 1980s and 1990s, even though researchers continued to study the role of phonological awareness in reading. This example serves to illustrate just how large the gap between research and practice can be. It was well established by 1980 that phonemic awareness was an essential element for successful reading, but there were nearly two decades in which it was not being incorporated into literacy instruction.

THE UNFORTUNATE REALITY ABOUT READING RESEARCH: NOBODY KNOWS ABOUT IT!

In 1999, the American Federation of Teachers (AFT), the second-largest teachers’ union in the United States, published *Teaching Reading IS Rocket Science*
(American Federation of Teachers, 1999). This book stated that a “chasm exists” between the scientific research into literacy and classroom practice.

Fast-forward 10 years to July 2009 at the international conference for the Society for the Scientific Study of Reading. R. M. Joshi, a professor of literacy from Texas A&M, was presenting to about 40 researchers in a breakout session I attended. Joshi displayed results from a survey of college literacy instructors who teach and train public school teachers to teach children to read. His data showed that, as a group, these literacy instructors were unfamiliar with the scientifically oriented research on reading. For example, 80% confused phonemic awareness with phonics. The reaction in the room was astonishing and uncharacteristic of a room full of scientists. There were audible gasps and moans, as if Joshi had announced that a beloved member of the society had passed away. The reactions suggest that the researchers in the room were confronting the reality that their life’s work was not making its way out of the scientific journals and into our K–12 classrooms.

Other studies have shown that K–3 general education teachers (Cunningham, Perry, Stanovich, & Stanovich, 2004), reading teachers/literacy specialists (Moats, 1994, 2009), special education teachers (Boardman, Argüelles, Vaughn, Tejero Hughes, & Klingner, 2005), teachers-in-training (Ness & Southall, 2010), Head Start teachers (Hindman & Wasik, 2008; O’Leary, Cockburn, Powell, & Diamond, 2010), and English as a second language (ESL)/English language learner (ELL) teachers (Goldfus, 2012) are generally unfamiliar with the scientific findings regarding reading acquisition and reading difficulties. Sally Shaywitz, a neuroscientist and reading researcher who heads the Yale Center for Dyslexia and Creativity, expressed frustration over “the relative lack of dissemination and practical application of these remarkable advances” (2003, p. 4).

Joshi’s study appeared later that year in a special issue of the Journal of Learning Disabilities that was devoted to addressing the gap between reading research and classroom practice (Joshi, Binks, Hougen, et al., 2009). Another study in that special issue found that undergraduate and graduate textbooks on literacy that were designed to prepare teachers drew very little from the empirical findings on reading (Joshi, Binks, Graham, et al., 2009).

It would be easy to conclude that college professors and textbook authors are to blame for this gap between research and practice. However, such finger-pointing would be overly simplistic, unfair, and quite unproductive. The problem is that the fields of early childhood education, literacy, and special education all have their own journals and textbooks. Most of the scientific research on reading is outside the journals in those fields. In an article about dyslexia for reading specialists, Erika Gray laments: “Unfortunately, many of the
articles and studies on this disorder are published in journals teachers rarely read” (2008, p. 116).

An example that is closer to home for school psychologists may bring the issue into focus. In a report in *School Psychology Review*, Nelson and Machek (2007) surveyed 497 school psychologists’ knowledge and graduate training regarding the research related to reading acquisition and reading difficulties. Their results indicated that knowledge about the scientific findings on reading is quite limited within our field. This raises the question as to why there is such limited knowledge of reading research among those who need it the most.

**WHY IS THERE A GAP BETWEEN RESEARCH AND CLASSROOM PRACTICE?**

There are several reasons that reading research is not well known to educational professionals. One is the fact that scientific journals are inaccessible unless one lives near a university library. Once educators get their degrees, they lose access to the journals. Second, even if the journals were accessible, where would one begin? There have been thousands of research reports on reading acquisition and reading difficulties in the last 40 years, spread across over 100 journals (see Rapid Reference 1.1). It would be the proverbial needle in a haystack problem trying to find the most relevant information. While preparing this chapter, a search on the term “dyslexia” in the PsycINFO database, which is comprised primarily of scientific research journals like those in Rapid Reference 1.1, yielded 6,875 articles. The term “phonics” returned 1,309 results and “phonological awareness” and “phonemic awareness” combined to yield 3,659. The terms “visual word recognition” and “visual word identification” had 1,471 hits and “reading comprehension” returned 12,731 articles! The needle in a haystack analogy is no exaggeration.

Every year, there are hundreds of newly published, scientifically oriented research reports on reading. Even the researchers themselves struggle to remain current in their niche areas within the broader field of reading research. Books are more accessible than journals, and there are dozens of books written by reading researchers that cover many facets of the scientific study of reading. Most of these books, however, are technical books written for others in the field and presume much prior understanding on the part of the reader. Also, they are not typically available in catalogs or on websites aimed at teachers, administrators, and school psychologists. Books that accurately review reading research written for educational professionals are surprisingly scarce. A list of such books is provided in the “Further Reading” section at the end of this volume.
### Rapid Reference 1.1 Journals That Report Empirical Research on Reading

Reading/literacy journals that publish only empirical studies on reading acquisition and/or reading difficulties

- Annals of Dyslexia
- Dyslexia
- Journal of Research in Reading
- Reading and Writing: An Interdisciplinary Journal
- Scientific Studies of Reading
- Written Language and Literacy

Reading/literacy journals that routinely publish empirical studies on reading acquisition and/or reading difficulties

- Journal of Literacy Research
- Literacy Research and Instruction
- Reading Psychology
- Reading Research Quarterly

Non-literacy-related journals that regularly include empirical studies on reading

- American Educational Research Journal
- Applied Psycholinguistics
- Assessment for Effective Intervention
- Australian Journal of Learning Difficulties
- Brain and Language
- British Journal of Educational Psychology
- Cognition
- Cognitive Psychology
- Cortex
- Journal of Child Psychology and Psychiatry
- Journal of Educational Psychology
- Journal of Experimental Child Psychology
- Journal of Experimental Psychology: Human Perception and Performance
- Journal of Experimental Psychology: Learning, Memory, and Cognition
- Journal of Learning Disabilities
- Journal of Memory and Language
- Journal of Research on Educational Effectiveness
- Language, Speech, and Hearing Services in Schools
- Learning and Instruction
- Learning Disabilities: A Contemporary Journal
- Learning Disabilities: A Multidisciplinary Journal
A sampling of journals that occasionally include empirical research on reading acquisition and/or reading disabilities:

- Applied Neuropsychology
- Australian Journal of Language and Literacy
- Australian Journal of Psychology
- Behavior and Brain Function
- Behavior Research Methods, Instruments and Computers
- Biological Psychiatry
- Biological Psychology
- Brain
- Brain Research
- British Educational Research Journal
- British Journal of Developmental Psychology
- British Journal of Psychology
- Canadian Journal of Experimental Psychology
- Child Development
- Cognitive Brain Research
- Cognitive Neuropsychology
- Cognitive Science
- Contemporary Educational Psychology
- Developmental Neuropsychology
- Developmental Psychology
- Developmental Science
- Early Childhood Research Quarterly
- Educational and Child Psychology
- Educational Psychology Review
- European Journal of Cognitive Psychology
- Exceptional Children
- Exceptionality
- International Journal of Disability, Development and Education
- International Journal of Language and Communication Disorders
- Journal of Behavioral Education
- Journal of Child Neurology
- Journal of Cognitive Neuroscience
- Journal of Communication Disorders
- Journal of Deaf Studies and Deaf Education
- Journal of Educational and Developmental Psychology
- Journal of Educational Research
- Journal of Educational and Developmental Psychology
- Journal of Educational Research
- Journal of Psychoeducational Assessment
- Journal of Research in Childhood Education
- Journal of School Psychology
- Journal of Special Education
- Journal of Speech, Language, and Hearing Research
- Journal of Vision
Language and Cognitive Processes
Learning and Individual Differences
NeuroImage
Neurology
Neuron
NeuroReport
Neuropsychologia
Neuropsychology
Proceedings of the National Academy of Sciences
Psychological Bulletin
Psychological Review
Psychological Science
Psychology in the Schools
Remedial and Special Education
Review of Educational Research
Scandinavian Journal of Educational Research
Scandinavian Journal of Psychology
School Psychology Quarterly
School Psychology Review
Trends in Cognitive Science
Vision Research

The Most Important Scientific Discovery You Have Never Heard Of

Another problem with translating research into practice is that one of the most significant discoveries about reading is absent from nearly every presentation of reading research to those outside the research community. This is the discovery and empirical validation of orthographic mapping, which is the process students use to turn unfamiliar written words into instantly accessible “sight words” (Ehri, 1998a, 2005a, 2014; Kilpatrick, 2014a; see Chapter 4). How does an unfamiliar word become a familiar sight word? Why do poor readers have limited sight vocabularies? Orthographic mapping answers these questions. When reading research is presented, whether in books or other documents such as the National Reading Panel (NICHD, 2000), the
focus is on phonemic awareness, phonics, fluency, and reading comprehension. Absent from such presentations is information on (a) how a student develops a large and instantly accessible pool of sight words, and (b) why some students have such limited sight vocabularies (see the Caution regarding the term sight word).

In this book, a sight word refers to a word that is instantly recognized regardless of whether it is phonically regular or irregular. Thus, a sight word is a known or familiar written word as opposed to a word that is unfamiliar and needs to be sounded out or guessed. A sight vocabulary refers to the pool of words that an individual can instantly and effortlessly recognize.

**DON’T FORGET**

Questioning a Scientific Approach to Reading

An additional factor that has hindered the adoption of reading research findings is the apparent distrust of the scientific study of reading by some prominent authors in the literacy field (Goodman, 1989, 2005; Smith, 1999). They are advocates of the three-cueing systems model of reading. The three-cueing systems model represents the foundation of the approach to reading that has gone by various names such as the literacy-based approach, whole language, and balanced instruction (Goodman, 2005). This philosophy of literacy has had an enormous impact on reading instruction since the 1980s. Some high-profile proponents of this approach argue against most of the methods used in the current enterprise of reading research (Goodman, 1989, 2005; Smith, 1999). Various scientists (e.g., Ehri, 1998b; Stanovich, 1993) have catalogued the vociferous efforts by some advocates of whole language to steer teachers away from the scientific findings on reading. The point here is not to malign proponents of the whole language approach to literacy. They have clearly dedicated their careers to helping children develop a love of literacy. Rather, the point is to recognize one of the significant reasons why there exists such a gap between reading research and classroom literacy instruction.
The Contentious Environment of the “Reading Wars”

In 1955, Rudolph Flesch published *Why Johnny Can’t Read* and made a presentation at a large reading conference claiming that phonics was superior to the classic whole word type of instruction. He concluded his presentation by saying that teachers who did not use phonics were communists! In 1955, McCarthyism was in full swing.

History repeated itself around 1990 at an International Reading Association conference. M. J. Adams read a report from a research review that indicated that phonics and phonemic awareness were essential for skilled reading. A whole-language advocate was the next speaker, and he was visibly upset by Adams’s presentation. He said to the crowd: “Someone get a silver bullet and shoot this woman, she’s a vampire!” Dr. Philip McInnis was in the audience and recounted the story (personal communication, July, 1998). Reading researcher Linnea Ehri (1998b) and a reporter for the *Atlantic Monthly* (Levine, 1994) also chronicled the incident. McInnis indicated that he was puzzled that an educated person would say something so bizarre; everyone knows a silver bullet is for a werewolf and a stake through the heart is required for a vampire (McInnis, personal communication, July, 1998).

Humorous anecdotes aside, such outlandish comments illustrate the heated debates about reading over the last few decades. Yet, we have a way of resolving such debates: the scientific method. Matters of importance should be “settled by research rather than by proclamation” (Ehri, 1998b, p. 100). However, scientific findings are not always met with enthusiasm in the atmosphere of the Reading Wars, which has fostered defensiveness rather than an openness to new findings.

Summarizing the Causes of the Gap Between Research and Practice

We have identified several reasons why reading research is not making its way into K–12 contexts: inadequate training of teachers and school psychologists, inaccessibility of the research journals, the sheer volume of the research, limited available books summarizing the research for teachers, the efforts by some to dissuade educators from paying attention to the research, and the limited openness resulting from the Reading Wars. There are likely other reasons, but these seem sufficient to account for much of the problem.

THE POWERFUL RESEARCH RESULTS WE HAVE BEEN MISSING

The most encouraging findings from the research are not about small improvements in struggling readers. They are about a revolution in how we understand
literacy development and reading difficulties. The following are descriptions of studies with highly successful outcomes in at-risk readers and students with reading disabilities.

**Prevention in At-Risk Students**

The National Reading Panel (NICHD, 2000) reviewed numerous studies regarding kindergarten instruction that substantially reduced the number of struggling readers. The basic gist is that if you provide kindergarteners with (a) direct and explicit phonological awareness training, (b) ample letter-sound instruction, and (c) if you teach the connections between those two, you will substantially reduce the number of students struggling in reading at the end of first, second, and even later grades. To illustrate, Shapiro and Solity (2008) did explicit and systematic phonological awareness training and letter-sound instruction with low socioeconomic status (SES) students and compared their findings to a school matched for SES and beginning skills that was doing “business as usual” kindergarten instruction. They found that by the end of first grade, the number of struggling readers in the school that represented the experimental condition was 75% lower than in the comparison school.

**Early Intervention**

Vellutino et al. (1996) intervened in the spring of first grade with 74 students who were at risk for reading difficulties. They represented the lowest 9% of students who did poorly on letter names, letter sounds, and basic phonological awareness in a kindergarten screening the year before. The intervention consisted of intensive phonemic awareness training, systematic instruction in phonics, and the opportunity to read connected text. By the end of the 15-week intervention, 67% of these most severely at-risk students scored at or above average on tests of word-level reading (above the 30th percentile), and these results were maintained 3 years later (Vellutino, Scanlon, & Lyon, 2000). For those not up to an average level, an additional 8 weeks of tutoring was provided in the fall of second grade, resulting in only 15% of the original at-risk students continuing to score below the 30th percentile at the end of second grade. Vellutino et al. (1996) projected their results across the original population of students screened in kindergarten from which these at-risk students were drawn. Assuming their intervention would work with less involved cases (and research suggests it would, e.g., Fletcher
et al., 1994; Stanovich & Siegel, 1994), they indicated that with such an intervention available, only 3% of the total population they drew from would score below the 30th percentile and of those, only half (1.5%) would score below the 16th percentile.

**Intervention With Older Students**

Torgesen et al. (2001) intervened with 60 third through fifth graders with average IQ scores and very severe reading disabilities. Their mean standard score for word-level reading on the Woodcock Reading Mastery Test–Revised (WRMT-R) was in the bottom 2% nationally. Following intensive instruction in phonemic awareness and phonics and the opportunity to read connected text, these students made average gains of 14 standard score points on the WRMT-R Word Identification subtest and 20 to 27 points on the Word Attack subtest. These results were maintained at 1- and 2-year follow-ups. Most startling was that nearly 40% of these students with severe reading disabilities required no ongoing special educational reading help after the intervention.

Some of the most common approaches used with poor readers (e.g., repeated readings, READ 180, Reading Recovery; see Chapter 11) tend to display improvements that range from 3 to 5 standard score points. With such small gains, these children rarely catch up. However, there is ample research to show that weak readers can progress far beyond that, with a fairly large percentage developing normalized reading skills, even for students who previously scored in the bottom 2% to 3% of the population. There is no suggestion here that reading problems can be eliminated entirely. However, based on the studies with the most successful outcomes, it seems that a large majority of reading difficulties/disabilities can be prevented or corrected, and for those not normalized, reading performance can be much higher than traditionally thought.

Vellutino, Scanlon, Zhang, and Schatschneider (2008) pointed out that the entire enterprise of Response to Intervention (RTI) was the result of trying to capture the incredible results from the Vellutino et al. (1996) and Torgesen et al. (2001) studies previously described. Yet, when RTI was translated into a process and a framework, the instructional techniques that produced these great results were left behind. Chapters 10 and 11 describe these techniques in detail.
described. However, in developing the framework and process of RTI, the highly effective intervention methods that provided such outstanding results were left behind. Teachers and school psychologists now struggle to figure out those elusive researched-based approaches needed for effective RTI. Chapters 10 and 11 present those approaches.

**ACKNOWLEDGING AND RESPONDING TO THE GAP BETWEEN RESEARCH AND PRACTICE**

Millions of our tax dollars are spent each year on reading-related research. On one level, these research grants have been a huge success because researchers now have a very good understanding of the nature of reading acquisition and of reading disabilities. However, on another level, the whole enterprise has been a failure because children are not benefitting from these important findings.

Although this situation may be difficult to believe, it is nonetheless a fact that desperately needs to be addressed. Reading research has had minimal impact on professional fields that could benefit from its findings, such as education, literacy, special education, and school psychology. This is despite the fact that the reading research field is comprised of scientists from many different fields (see Rapid Reference 1.2, list C), including each of those just mentioned. These researchers are not part of some academic “fringe.” They come from Harvard, Yale, Oxford, Cambridge, and dozens of top universities around the world. To illustrate, three different colleges at Harvard University—the Medical School, the School of Arts and Sciences (Department of Psychology), and the School of Education—have all made tremendous contributions to the scientific research on reading. The same can be said of other institutions. Reading researchers are awarded countless millions of dollars in research grants each year. One would expect a field comprised of scientists from many disciplines, top universities, and many countries would be more widely known and have a greater influence on educational practices. However, studies show that this research has been having limited impact on our K–12 students. Based upon U.S. government statistics, the finding that nearly one-third of fourth graders read below a basic level has been stable for decades. While it is true there will always be a “bottom third” of a distribution, the reality is that the status of being “bottom third” does not presume a functional level. For example, the bottom third of NBA players are still excellent basketball players.
**Rapid Reference 1.2 Where Does Our Scientific Knowledge of Reading Come From?**

Note: All lists are alphabetical.

### A. Languages

The following is a sample of languages for which there are hundreds of scientific research studies related to reading acquisition and reading difficulties.

<table>
<thead>
<tr>
<th>Arabic¹</th>
<th>Greek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese²</td>
<td>Hebrew¹</td>
</tr>
<tr>
<td>Dutch</td>
<td>Italian</td>
</tr>
<tr>
<td>English³</td>
<td>Japanese⁴</td>
</tr>
<tr>
<td>Finnish</td>
<td>Korean⁴</td>
</tr>
<tr>
<td>French</td>
<td>Norwegian</td>
</tr>
<tr>
<td>German</td>
<td>Portuguese</td>
</tr>
<tr>
<td>Russian</td>
<td>Spanish</td>
</tr>
<tr>
<td>Serbo-Croatian⁵</td>
<td>Turkish</td>
</tr>
</tbody>
</table>

**Notes:**

1. Arabic and Hebrew writing are often studied because they are halfway between an alphabetic and a syllabic form of writing (in syllabic scripts, characters represent syllables, not individual sounds). Those writing systems only represent the consonants of spoken words and typically not the vowels. Wrds r wrttn lk ths.

2. Chinese written language is **logographic** not **alphabetic**. That means, roughly speaking, that Chinese characters represent whole words, whereas the characters in an alphabetic script (i.e., letters) represent sounds within words.

3. By a wide margin, English is the most commonly studied written language.

4. Japanese and Korean are of interest to researchers because they each use two different writing systems. Japanese uses **syllabic** and **logographic** scripts, and Korean uses **alphabetic** and **logographic** scripts.

5. Serbo-Croatian is of interest because it is a language that uses two different alphabets that do not completely overlap. Some of the letters that are the same in both alphabets represent the same sound in the spoken language. Other letters between the two alphabets look the same but represent different oral...
sounds. Finally, some letters are unique to each alphabetic script. This situation provides scientists with interesting controls on the relationships between letters and sounds.

**B. Countries**

The following list is a sampling of countries that routinely contribute to the scientific research into reading acquisition and reading difficulties.

- Australia
- Belgium
- Brazil
- Canada
- China
- Finland
- France
- Germany
- Greece
- Israel
- Italy
- Japan
- Korea
- The Netherlands
- Norway
- Spain
- Sweden
- United Kingdom
- United States

**C. Disciplines**

The following are academic disciplines represented among reading researchers.

- Deaf education
- Education
- Linguistics
- Literacy/reading education
- Medicine—neurology
- Medicine—pediatrics
- Medicine—ophthalmology
- Optometry
- Psychology—behavioral
- Psychology—cognitive
- Psychology—developmental/child
- Psychology—educational
- Psychology—experimental
- Psychology—neurology
- Psychology—psycholinguistics
- Psychology—school
- Special education
- Speech/language pathology

**Note:**

Worldwide, more scientific research on reading comes out of departments of psychology than any other discipline.
Rapid Reference 1.3 A Sampling of Common Types of Methods Used to Study Reading

General Research Designs
- Experimental
- Cross-sectional
- Correlational
- Case study
- Quasi-experimental
- Longitudinal
- ABAB and lag designs
- Multiple case study

Statistical Analyses Commonly Used
- Correlational analysis
- Factor analysis
- Structural equation modeling
- ANOVA/ANCOVA/MANOVA
- Path analysis
- Latent growth curve modeling
- Multiple regression
- Principal components analysis
- ROC curve

Types of Research Participants
- Children who are typical readers
- Pre-readers
- Students at risk (pre-K to grade 1)
- Students at every elementary grade level
- Middle school readers
- High school readers
- ELL students
- Adult skilled readers
- Adult ELL readers
- Adult literacy participants
- Adults with head injury or stroke
- Dyslexics
- Hyperlexics
- Individuals with mixed reading difficulties
- Individuals with speech or language impairment
- Individuals who are deaf or hard of hearing
- Individuals with intellectual disabilities
- Individuals with emotional disturbance
- Individuals with autism or other syndromes (e.g., Williams syndrome)
Specific Experimental Methodologies

Methods Used Primarily in Reading Comprehension Research

**Sentence Reading** The participant reads sentences with certain semantic and syntactic structures.

**Paragraph Reading** This is similar to sentence reading, but with more opportunity for reading extended text, and can include a greater number of comprehension-related elements.

**Open-Ended Responses** The participant reads a single sentence or a lengthy passage and the experimenter asks open-ended questions requiring a verbal response from the participant.

**Multiple Choice** The participant reads a sentence or paragraph then reads and answers multiple-choice questions.

**Cloze Questions** A sentence or brief paragraph is read in which there is a blank space indicating a missing word. The participant must supply a reasonable word to indicate comprehension of the sentence or paragraph.

**Literal and Inferential Questions** Different types of questions are asked to determine various levels of understanding of a passage.

**Garden Path Passages** A sentence or passage is read that leads the individual to expect something in the final sentence, and there is a twist in that final sentence that tends to catch weaker readers unaware, but does not catch stronger readers.

Methods Used in Both Reading Comprehension Research and Word-Level Reading Research

**Eye Movements** This technique measures the precise timing and tracking of eye fixations during reading. An advantage is that with many eye-movement studies, individuals read connected text, which directly parallels normal reading behavior. A special issue of *School Psychology Review* (2013, vol. 42[2]) provides an introduction to eye-movement research in reading.

**Reaction Time** This tests how quickly a student responds to a stimulus, typically reading a word or pressing a button indicating yes/no response. This is commonly used with lexical decision and masked priming tasks (see below).

**Homograph/Homophone Reading** Homographs are words with different meanings that are spelled the same (e.g., dove/dove; bass/bass) and homophones are words pronounced the same but with different spellings (I'll/aisle; their/there). Such words are sometimes used in comprehension research to add ambiguity to sentences. Also, such words are used to test their effects on word-level learning and retrieval.

**Morphological Tasks** The participant interacts with morphological elements in words, such as the root, prefixes, suffixes, indicators of verb tense, and so forth.
Semantically Ambiguous Words  Semantically ambiguous words (e.g., ring, match) can be used to assess sentence comprehension.

ERP  Event-related potentials (ERP) are electrophysiological responses in the brain that follow a particular stimulus. These are used to help determine the timing and location of responses in various areas of the brain during reading.

Brain Scanning (fMRI, MEG/MSI, PET)  Unlike traditional static MRI or CT scans, there are techniques that can look at the brain in action as individuals perform basic cognitive tasks, such as listening, speaking, or reading. These include functional magnetic resonance imaging (fMRI); magnetoencephalography (MEG), which is combined with an MRI to produce magnetic source imaging (MSI); and positron emission tomography (PET). These have been used to evaluate different aspects of the reading process among skilled readers, beginning readers, average readers, and struggling readers.

Neurological Studies  These involve examining individuals, typically adults, who had been competent readers but who lost some or most of their reading skill as a result of a stroke or head injury.

Genetic Studies  These can range from family studies of the incidences of various types of reading and reading-related problems to a direct examination of the human genome. Multiple large-scale twin studies in multiple countries have contributed to understanding the genetic bases of reading difficulties.

Methods Used Primarily in Word-Level Reading Research

Context-Free Word Identification  The participant is asked to read words from a list, either timed or untimed. Or, words are flashed on a computer screen one at a time.

Nonsense Word Reading  Pronounceable nonsense words (e.g., prute, spreng) are read either from a list or one word at a time on a computer screen. This is designed to determine an individual’s phonic decoding ability.

Passage Reading Fluency  Students read normal, connected text, and the evaluator makes note of reading speed, reading accuracy, and prosody (i.e., intonation, emphasis).

Lexical Decision  A participant responds as quickly and accurately as possible to yes/no response keys indicating whether a string of letters is a word, or whether a word belongs in a semantic or phonological category (e.g., Is pair a fruit? Is splanch a word? Does been rhyme with seen?).

Masked Priming  A target word is flashed on the screen for a fraction of a second and is preceded and/or followed by another stimulus, which is called a mask. The mask could be a set of characters following the word (e.g., #######) to cancel out any after image on the retina to ensure a very precise exposure time. The mask could also be another word or set of letters that will either facilitate or hinder the speed or accuracy of the participant’s recognition of the target word (e.g., pear flashed quickly before pair vs. zqrm flashed before pair).
Homophone and Pseudohomophone Reading Words are used that sound the same (homophone) but are spelled differently (e.g., right/write, close/clothes) to evaluate orthographic knowledge during reaction time or masked priming tasks. Pseudohomophone tasks involve nonsense words that are spelled to sound like real words (e.g., brain/brane, wait/wate) and are commonly found in lexical decision tasks (e.g., Is brane a body part?).

Orthographic Choice Task The participant is asked to determine which alternative spelling is correct (e.g., Which of the following is a fruit: pair, pare, or pear?).

Wordlikeness Task The participant is asked to indicate which of the following nonsense words displays a spelling pattern most like real words (plmk vs. bock, rrin vs. rinn).

Use of Different Fonts, Mixed Case, or Degraded Appearance Words are printed in very different fonts (e.g., avenue, avenue), mixed case (hApPiLy), or with degraded visual appearance (e.g., only parts of the letters show through a screen or mask).

SUMMARY

There is a vast amount of empirical research on literacy acquisition and reading disabilities that has been largely untapped by those working in schools. This is due, in part, to the sheer volume of this research and its inaccessibility. Many educational professionals in general and special education can benefit tremendously from this information, not to mention developers of reading series and intervention materials. This book is designed to communicate the most important findings from that vast research. The focus will be on applying the most relevant research findings to assessing, preventing, and correcting reading problems.

TEST YOURSELF

1. According to the National Assessment of Educational Progress, approximately what percentage of fourth graders read below a basic level?
   (a) 3%–5%
   (b) 8%–10%
   (c) 13%–15%
   (d) 30%–34%
2. Since ____, it has been well established that phonological awareness is critical for reading.
   (a) 2000
   (b) 1995
   (c) 1990
   (d) 1980 or earlier

3. Professors of literacy routinely make use of the empirical reading research when training future teachers.
   (a) True
   (b) False

4. School psychologists generally have a good working knowledge regarding empirical reading research.
   (a) True
   (b) False

5. Which one of the following is not a likely reason why there is a gap between reading research and classroom instruction?
   (a) Teachers’ unwillingness to change the way they teach
   (b) Lack of easy access to the research
   (c) The overwhelming amount of research available to sift through
   (d) Attempts by some high-profile literacy experts to discourage teachers from incorporating practices based on scientifically oriented research findings

6. What appears to be “the most important scientific discovery that educators have not heard about”?
   (a) The research findings about phonics
   (b) The research findings about reading comprehension
   (c) The research findings about how readers build a sight vocabulary
   (d) The research findings about English language learners

7. What is orthographic mapping?
   (a) Making sure all letter-sound relationships are systematically introduced in a developmentally appropriate fashion in a kindergarten curriculum
   (b) A strategy for enhancing spelling instruction in younger students
   (c) A strategy for enhancing spelling instruction in older students
   (d) In reading, the mental process used to store words for later, instant retrieval

8. Prevention research indicates that we can reduce the number of struggling readers by:
   (a) 10%–12%
   (b) 15%–18%
   (c) 20%–25%
   (d) 50%–80%
9. What does the best intervention research suggest about the most severely reading-disabled students (i.e., the bottom first to third percentiles)?
   (a) While milder cases of reading difficulties can be corrected, the amount of growth potential among the most severely reading disabled is quite limited.
   (b) With the right kind of intervention, we can expect that these individuals make 4 to 6 standard score point gains on nationally normed reading tests.
   (c) These students can make an average of about a standard deviation of improvement based on nationally normed reading tests.
   (d) The outcomes are so variable that no estimate can be made.

10. What was the major problem with the origin of RTI highlighted in this chapter?
   (a) The original developers of RTI could not decide on whether RTI should represent a three- or four-tier service delivery model.
   (b) There was no real scientific foundation for the development of RTI; it was just a clever idea.
   (c) RTI was inspired based on very strong research outcomes, but during the development of the RTI service delivery model, the instructional and intervention approaches that produced such successful results did not get widely disseminated.
   (d) The developers could not agree on whether to capitalize the t in the middle (i.e., RTI vs. RtI).

Answers: 1. d; 2. d; 3. False; 4. False; 5. a; 6. c; 7. d; 8. d; 9. c; 10. c
In the summer of 1999, I presented a 2-day workshop on reading for 85 teachers from about a dozen local school districts. At the time, orthographic mapping was referred to in the research literature by multiple names, including direct mapping (Rack, Hulme, Snowling, & Wightman, 1994), the representation hypothesis (Perfetti, 1991), the bonding or amalgamation hypothesis (Ehri, 1992, 1998a), among others. It had just begun to receive independent experimental confirmation and a growing interest among reading researchers. Since that time, it has been considered “the most complete current theory of how children form sight word representations” (Torgesen, 2004b, p. 36).

I believe that this theory of how children remember words had the potential to transform how we approach reading difficulties. I told those 85 teachers that I could envision that in 20 years, we educators would be saying something like, “Do you remember years ago how we used to have all those reading problems? Now we have so very few.” Given the value of this developing understanding of word learning, coupled with the research on the highly effective intervention approaches that were consistent with orthographic mapping, I naively assumed that we were on the verge of a revolution in literacy education. Yet, for the next 16 years, I presented to teachers and school psychologists from dozens of school districts in several states, and this information seems to have remained the best kept secret in education. This is despite the fact that most of this research was the result of federal grant initiatives and was published in top educational, psychological, and even medical journals by researchers from top universities. In the 16 years since my 1999 “prediction” of a revolution in reading, we appear to be no further ahead than we were at that time. It is my hope that this book will function as a conduit between the scientific research on reading and our K–12 classrooms.

In the same year I made my prediction to that group of teachers, the American Federation of Teachers stated there was a “chasm” between reading research and classroom practice (American Federation of Teachers, 1999). Four years later, Dr. Sally Shaywitz from Yale Medical School and the Yale Center for Dyslexia
and Creativity wrote: “As a result of extraordinary scientific progress, reading and dyslexia are no longer a mystery; we now know what to do to ensure that each child becomes a good reader and how to help readers of all ages and at all levels” (Shaywitz, 2003, p. ix.). Shaywitz went on to say, “Alas, much of the time this new information appears to be a well-kept secret” (p. 6).

In my 27 years as a practicing school psychologist, I have sat across the table from hundreds of students from kindergarten to 12th grade who struggled with the skills needed to be good readers. For me, the content of this book does not represent an abstract set of research ideas and findings. It represents a reality I have been experiencing on a routine basis. As a member of the Society for the Scientific Study of Reading, I have had the fortunate opportunity to interact with a large number of reading researchers from around the world at our conferences. These are dedicated individuals who, like the teachers who are “in the trenches,” want the very best for students who struggle in learning to read. But the disconnect between the two worlds I move in could not be more pronounced, and I hope this volume provides a way to bridge that great divide.

Changing people’s perspectives regarding literacy practices that have been entrenched in our educational system for well over 100 years is a daunting task, no doubt. However, I think it can all be boiled down to one very simple set of questions. Do we continue with repackaged versions of the classic approaches that yield a high rate of struggling readers, supplemented by intervention approaches that produce an average of 2 to 5 standard score point gains on nationally normed assessments? Or, do we shift to scientifically validated approaches that can prevent 75% to 80% of the reading difficulties that we see as well as produce 12 to 20 standard score point gains among students with reading problems? It would seem that the choice is quite clear. The next step is to figure out a way to let the educational community know that this choice even exists.
This glossary contains many of the terms used in this book. Bold words within the definitions indicate an entry for that term elsewhere in this glossary.

**Alphabetic principle** The insight that the oral sounds in spoken words are represented by letters in print. It forms the basis of both **phonic decoding** and **orthographic mapping**.

**Balanced instruction** A viewpoint in literacy education that says that we should teach students using a combination of traditional **phonics**, **whole-word**, and **whole language** approaches. However, it tends to generally be the whole language approach re-named (Goodman, 2005) with some extra phonics.

**Basal reader** The conventional textbooks or reading series used to teach reading.

**Blend** A combination of two or three consonants in which the sounds of each consonant can be heard. Examples of beginning blends include: *br, gr, pl,* and *str*. Examples of ending blends include: *rt, st, rd, nd,* and *sk*. Compare with **digraph**.

**Blending** The process of combining sounds to pronounce a word. Blending skills are required for **phonic decoding**.

**Compensators** Students with strong verbal skills with a mild **phonological-core deficit** who compensate in their reading based upon strong language skills. They are often not recognized as having reading difficulties.

**Decoding** A term used in the broad sense to refer to correctly identifying words, whether familiar or unfamiliar. In a narrow sense, decoding refers to determining an unfamiliar word. Due to the inconsistent uses of the term, it was not used in this book except in the phrase **phonic decoding**.

**Digraph** A combination of two letters designed to represent a single sound. Common consonant digraphs include *ch, ph, sh,* and *th,* but also *gn-, kn-, wh-,* and *-mb.* Compare with **blend**. Common vowel digraphs include *ee, oa, ea.*
Diphthong  When two vowels are together and each vowel provides a contribution to the resulting sound (e.g., oi in oil and oy in boy [with y functioning as a vowel]).

Dyslexia  A condition in which an individual struggles with word reading despite adequate effort and instruction. There is no standard for precisely how weak the word-reading skills need to be in order to be considered dyslexic. Nearly all cases of dyslexia are caused by the **phonological-core deficit**. Dyslexia is a psychological and medical term, not an educational term. For this condition, IDEA uses “SLD in basic reading.” In our culture, dyslexia has a mystique about it and many misconceptions. It simply refers to poor word-level reading, and speculations about visual-spatial-perceptual deficits have been inconsistent with research findings.

Grapheme  A single or multiletter unit that corresponds to a single phoneme. Most graphemes are a single letter (e.g., t = /t/), but some involve two or more letters (e.g., sh, th, oo, oa; the -igh in high and -ough in though).

Hyperlexia  A condition in which a student is proficient in word-level reading but displays poor reading comprehension due to weak language skills. Hyperlexics have been referred to as “word callers.”

Letter-sound knowledge  The ability to recognize the phonic attributes of consonants, vowels, blends, digraphs, and vowel combinations. This is foundational to both **phonic decoding** and **orthographic mapping**.

Literacy-based approach  This term is often used interchangeably with whole language. It is an instructional approach using children’s literature to teach literacy rather than basal readers or other traditional readers.

Nonsense words  Pronounceable letter patterns that are not real words (e.g., blamp, vit, torg). Nonsense word reading tasks estimate a student’s **phonics** skills. Nonsense word spelling assesses letter-sound knowledge and phoneme awareness.

Onset  The consonant or consonants within a syllable that precede the vowel. In the words *hand*, *street*, and *tie*, the *h, st*, and *t* are the onsets, respectively. Not all syllables have onsets because many syllables begin with a vowel (e.g., *in, at, on*).

Onset-rime  A level of phonological awareness development typically more difficult than syllable-level awareness but less difficult than phoneme-level awareness. It involves separating syllables into two elements, the **onset** and the **rime**.

Orthographic mapping  The mental process used to store words for immediate, effortless retrieval. It is the mechanism for **sight-word** learning. It requires good **phonemic awareness**, **letter-sound knowledge**, and the **alphabetic principle**.
Orthography  From the Greek “straight writing,” this refers to the correct spellings of words. Orthographic skills are needed to read and spell. This term can also refer to a given writing system (e.g., English vs. German vs. Chinese orthography).

Phoneme  The smallest unit of sound within spoken words. *Sat* has three phonemes (/s/ /a/ /t/), *shoe* has two (/ʃ/ /əʊ/), and *stake* has four (/s/ /t/ /æ/ /k/). Phonemes typically match up to single letters but often do not, as these examples illustrate.

Phonemic awareness  An awareness of individual sounds/phonemes in spoken words. It represents the most precise subcategory of phonological awareness. Because letters are designed to represent spoken phonemes, phonemic awareness is the type of phonological awareness that is essential for reading.

Phonics  A system for approaching reading that focuses on the relationship between letters and sounds. Phonics helps with sounding out unfamiliar words.

Phonic decoding  The process of sounding out unfamiliar words (or nonsense words) via a letter-sound conversion process combined with phonological blending.

Phonological  While the term auditory refers to all sound input, the term phonological is limited to the sounds produced by spoken language. Poor readers typically have phonological difficulties, not broader auditory problems.

Phonological awareness  Having an awareness of sounds in spoken words, whether syllables, onsets, rimes, or individual phonemes.

Phonological-core deficit  A term used by researchers for problems with the phonological underpinnings of learning to read. This typically involves some combination of problems with phonological awareness, rapid automatized naming, phonological short-term/working memory, and/or phonic decoding. It can range from mild to severe and is the likely cause of most word-level reading problems. The phonological-core deficit can be caused by genetics, the environment (inadequate early language opportunities), or both.

Phonological proficiency  Having a high degree of skill with awareness of sounds in spoken words and quick access to those sounds (phonological awareness. i.e., good phonemic awareness and rapid automatized naming). With adequate early literacy opportunities, those with phonological proficiency develop average or better word-reading skills. Those lacking phonological proficiency struggle in reading.

Phonological sensitivity  Another term for phonological awareness.

Phonological short-term memory  See working memory.

Pseudowords  See nonsense words.
Psycholinguistic guessing game  A theory of reading that proposes that guessing ability is central to skilled reading. This is the basis for the three cueing systems model and whole language.

Rapid automatized naming (RAN)  Sometimes referred to as rapid naming, RAN refers to the skill of quickly accessing presumably rote information (numbers, letters, colors, or objects). Students slower than average with RAN typically struggle with word-level reading.

Rime  An alternative spelling of rhyme. Reading researchers use this obscure spelling to refer to the part of a syllable that contains the vowel sound and any consonant sounds that follow the vowel in that syllable. In most, bike, and you, the rimes are ost, ike, and ou. The term can refer to oral or written forms.

Self-teaching hypothesis  A view proposing that the process of sounding out unfamiliar words directs a student’s attention to the word’s spelling pattern and facilitates orthographic learning. When combined with orthographic mapping, we have a good understanding of how sight-word learning occurs.

Set for variability  The ability to correctly determine a word based upon an incorrect pronunciation of that word.

Short-term memory  See working memory.

Sight vocabulary  The pool of words that a person can identify immediately and effortlessly, without the need to sound out the word or use context clues. It does not matter if these words are phonically regular or irregular, only that they are instantly familiar when encountered.

Sight words  Any previously learned words that are part of a person’s sight vocabulary and thus are immediately recognized “on sight,” regardless of whether the word is phonically regular or irregular.

Three cueing systems model  An approach to reading instruction based on the psycholinguistic guessing game. It assumes skilled reading involves gaining meaning from print using three types of cues: (1) semantic (word meanings and sentence context), (2) linguistic (grammatical features), and (3) grapho-phonic (letters and sounds). It is foundational to the whole-language, literacy-based, and balanced instruction approaches, as well as Reading Recovery and the Leveled Literacy Intervention.

Title I  Federal funding for general educational remedial help. Services based on Title I have gone by different names at different times in different locations.

Vowel digraph  When multiple letters form a single vowel sound (e.g., ee, oa, igh).

Whole language  A three-cueing systems–based reading approach that emphasizes the integration of all aspects of language (reading, writing, speaking, and
listening) and the use of authentic reading and writing activities (including children’s literature). This is not the same as the **whole-word reading method**.

**Whole-word reading method** A traditional reading method in which children learn words as whole units, with little or no emphasis on phonetic analysis. It has also been called the *look–say method*, the *basal reading approach*, and the *sight-word method*. It is not the same as *whole language*.

**Working memory** The temporary memory buffer that holds the information we are thinking about at any given point in time. Working memory can be distinguished from **short-term memory**; the former involves a more active, central executive component, whereas the latter is more passive and phonological in nature. **Short-term memory** is slightly more affiliated with word reading and working memory is slightly more affiliated with reading comprehension. However, this distinction is based on large factor analyses. The overlap is so great that a distinction cannot be reliably made in individual evaluations. Poor working memory contributes to weaknesses in math, writing, but also word-level reading and reading comprehension.
FURTHER READING

All of the following resources provide the reader with additional opportunities to read about the findings from the interdisciplinary field of reading research. Items with an asterisk can be easily accessed via an Internet search using the author’s name, the article title, and the publication.

NONTECHNICAL AND SEMITECHNICAL PRESENTATIONS OF READING RESEARCH

FURTHER READING


MORE TECHNICAL AND EXTENSIVE OVERVIEWS OF THE FIELD OF READING RESEARCH


OLDER/DATED RESOURCES THAT CONTINUE TO PROVIDE EXCELLENT INFORMATION

School Psychology Review special issue in 1995, volume 3. (Free online to members of the National Association of School Psychologists.)
REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


Torgesen, J. K. (2004a). Lessons learned from the last 20 years of research on interventions for students who experience difficulty learning to read. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 355–382). Baltimore, MD: Brookes.


REFERENCES


REFERENCES


ABOUT THE AUTHOR

David A. Kilpatrick, PhD, is an Assistant Professor of Psychology for the State University of New York, College at Cortland, and a New York State Certified School Psychologist with the East Syracuse-Minoa Central School District. He received his Bachelor of Arts in psychology from the State University of New York, College at Cortland, a Master of Arts in theological studies from Gordon-Conwell Theological Seminary near Boston, MA, and a PhD in school psychology from Syracuse University.

David has been a practicing school psychologist for 27 years and has conducted well over 1,000 evaluations of students with reading difficulties. He has presented reading workshops to teachers and school psychologists in several states. He conducts research on the component skills involved word-level reading development with a focus on reading difficulties. In addition to his interests in psychology, David is a part-time professional magician and has done over 2,000 magic shows since 1986.

David and his wife Andrea have five grown children and three grandchildren. They live near Syracuse, NY.

Other books by David Kilpatrick:
