Advances in Reading Intervention

Research to Practice to Research

The Extraordinary Brain Series, XIV

edited by

Carol McDonald Connor, Ph.D.,
Arizona State University
Tempe

and

Peggy McCardle, Ph.D., M.P.H.
Peggy McCardle Consulting, LLC
Seminole, Florida

PAUL H. BROOKES PUBLISHING CO.®
Baltimore • London • Sydney

Contents

About the Editors ix
About the Contributors xi
The Dyslexia Foundation and the Extraordinary Brain Series xxiii
Acknowledgments xxvii

Part I Introduction **1**

Chapter 1 Research to Practice to Research: The Importance of Reciprocity to Building Better Interventions
Carol McDonald Connor and Peggy McCardle 3

Chapter 2 An Overview of Reading Intervention Research: Perspectives on Past Findings, Present Questions, and Future Needs
Maureen W. Lovett 7

Part II Basic Considerations for Reading Intervention: Behavior, Neurobiology, and Genetics **23**

Chapter 3 The Growth of Self-Regulation in the Transition to School
Frederick J. Morrison 25

Chapter 4 Innovative Data Summary Measures Provide Novel Insights on Reading Performance
Christopher W. Bartlett, Andrew Yates, Judy F. Flax, and Linda M. Brzustowicz 37

Chapter 5 The Role of Rapid Automatized Naming in Reading Disruption: An Application of the Cusp Catastrophe
Georgios Sideridis, George K. Georgiou, Panagiotis G. Simos, Angeliki Mouzaki, and Dimitrios Stamovlasis 49

Chapter 6 Eye-Movement Research in Reading: Enhancing Focus on the Development of Reading and Reading Disabilities
Brett Miller 61

Chapter 7 Neurobiological Bases of Word Recognition and Reading Comprehension: Distinctions, Overlaps, and Implications for Instruction and Intervention
Laurie E. Cutting, Stephen Kent Bailey, Laura A. Barquero, and Katherine Aboud 73

Chapter 8 Integrating Neurobiological Findings in Search of a Neurochemical "Signature" of Dyslexia
Stephanie N. Del Tufo and Kenneth R. Pugh 85

Chapter 9 The Genetic Classroom: How Behavioral Genetics Can Inform Education
Sara A. Hart 99

Integrative Summary 1: The Future of Reading Research: New Concepts and Tools and the Need for Detailed Genetic and Neurobiological Contexts
Nadine Gaab 111

Part III Reading and Writing Interventions: Research to Inform Practice...117

Chapter 10 What Practitioners Think and Want to Know
Joan A. Mele-McCarthy 119

Chapter 11 Literacy in the Early Grades: Research to Practice to Research
Carol McDonald Connor 129

Chapter 12 Addressing Dialect Variation in Early Reading Instruction for African American Children
Nicole Patton Terry...143

Chapter 13 Reading Development Among English Learners
Nonie K. Lesaux 155

Chapter 14 Students with Reading Difficulties Who Are English Learners
Melodee A. Walker, Philip Capin, and Sharon Vaughn 167

Chapter 15 The *Letra* Program: A Web-Based Tutorial Model for Preparing Teachers to Improve Reading in Early Grades
Juan E. Jiménez...181

Chapter 16 Struggling with Writing: The Challenges for Children with Dyslexia and Language Learning Difficulty When Learning to Write
Vincent Connelly and Julie E. Dockrell 197

Chapter 17 Fostering the Capabilities that Build Writing Achievement
Rui A. Alves and Teresa Limpo.................................209

Chapter 18 Effectiveness of a Beginning Reading Intervention: Compared with What? Examining the Counterfactual in Experimental Research
Michael D. Coyne 221

Integrative Summary 2: Translating Reading Research into Effective Interventions for All Children Who Struggle with Reading
Julie A. Washington 231

Part IV Finale: Looking to the Future 237

Chapter 19 Innovation and Technology that Can Inform Reading Interventions
David J. Jodoin 239

Chapter 20 Reading Intervention in Perspective
Donald L. Compton and Laura M. Steacy 249

Excerpted from Advances in Reading Intervention: Research to Practice Research
by Carol McDonald Connor, Ph.D., & Peggy McCardle, Ph.D., M.P.H.
Brookes Publishing | www.brookespublishing.com | 1-800-638-3775

Chapter 21 Moving Forward in Reading Intervention Research and Practice
Peggy McCardle and Carol McDonald Connor 261

Index 273

About the Editors

Carol McDonald Connor, Ph.D., Senior Learning Scientist, Learning Sciences Institute, P.O. Box 872111, Arizona State University, Tempe, Arizona 85278

Carol McDonald Connor is a professor of psychology at Arizona State University and a distinguished research associate at the Florida Center for Reading Research. Her research focuses on examining the links between young children's language and their literacy development with the goal of illuminating reasons for the perplexing difficulties that children who are atypical and diverse learners have with developing basic and advanced literacy skills. Most recently, her research interests have focused on children's learning in the classroom—from preschool through fifth grade—and developing technology and interventions to improve teacher efficacy and students' reading outcomes. Awarded the Presidential Early Career Award for Scientists and Engineers (2008), the Society for Research in Child Development, Early Career Award (2009), and the Richard Snow Award (American Psychological Association, 2008), she is the principal investigator for studies funded by the U.S. Department of Education, Institute for Education Sciences, and the National Institute of Child Health and Human Development. She is also editor of the *Journal for Research in Educational Effectiveness* (Impact Factor 3.15) and associate editor for *Child Development* (Impact Factor 4.1).

Peggy McCardle, Ph.D., M.P.H., Owner, Peggy McCardle Consulting, LLC, 14465 86th Avenue, Seminole, Florida 33776

Peggy McCardle is a private consultant and an affiliated research scientist at Haskins Laboratories. She is the former chief of the Child Development and Behavior Branch of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), U.S. National Institutes of Health, where she also directed the Language, Bilingualism, and Biliteracy Research Program and developed various literacy initiatives. Dr. McCardle is a linguist, a former speech-language pathologist, and, in her remote past, a classroom teacher. The recipient of various awards for her work in federal government, including a 2013 NICHD Mentor Award, she also was selected in 2013 to receive the Einstein Award from The Dyslexia Foundation. Her publications address various aspects of public health and developmental psycholinguistics (e.g., language development, bilingualism, reading, learning disabilities). Dr. McCardle has taught scientific and technical writing and has extensive experience developing and coediting volumes and thematic journal issues.

Excerpted from Advances in Reading Intervention: Research to Practice Research
by Carol McDonald Connor, Ph.D., & Peggy McCardle, Ph.D., M.P.H.
Brookes Publishing | www.brookespublishing.com | 1-800-638-3775

An Overview of Reading Intervention Research

Perspectives on Past Findings, Present Questions, and Future Needs

Maureen W. Lovett

Three decades of work in the relatively young science of reading intervention research have been productive, revealing many positive findings about how to intervene with children and adolescents who struggle to learn to read because of dyslexia, reading disabilities, or other causes. There appears to be compelling evidence that effective intervention for readers struggling with acquiring basic reading skills should include 1) explicit, systematic, phonologically based instruction with ample opportunities for practice and cumulative review; 2) systematic instruction on all levels of written language structure, from subsyllabic and sublexical dimensions to different text and discourse structures; 3) instruction and scaffolded practice to promote the application and transfer of newly acquired skills to new materials; 4) modeling, teaching, and mentoring of specific reading, self-regulation, and self-monitoring strategies; 5) an integration of decoding and spelling to stress the reciprocity of these activities; and 6) daily attention to vocabulary growth and comprehension development using a variety of appealing and complex texts. The amount of empirical evidence for these recommended ingredients of effective reading intervention decreases with list placement, although all can be considered to have good supporting evidence.

There are also data to suggest that improvement in reading skills may continue, with long-term investments in instruction and effort, into adulthood but that the "gap" between struggling and typical readers is rarely if ever completely closed for more severe cases of dyslexia. Some residual symptoms of reading disability (RD) tend to persist into adulthood, even with strong literacy

Excerpted from Advances in Reading Intervention: Research to Practice Research
by Carol McDonald Connor, Ph.D., & Peggy McCardle, Ph.D., M.P.H.
Brookes Publishing | www.brookespublishing.com | 1-800-638-3775

and educational outcomes (Bruck, 1992; Shaywitz et al., 1999). We also know that early intervention for children at risk of reading-acquisition failure appears to be an excellent investment of time and resources, as it generally yields very positive outcomes (Denton, Fletcher, Taylor, Barth, & Vaughn, 2014; Foorman, Francis, Fletcher, Mehta, & Schnatschneider, 1998; Wanzek & Vaughn, 2007, 2008). Early intervention, with adequate infrastructure within the school and the availability of later "booster" interventions when needed, has been shown to be effective (Al Otaiba et al., 2014). Adolescents and adults with limited reading skills, in contrast, are far more difficult to remediate (Vaughn & Fletcher, 2010; Vaughn et al., 2012) and require a far greater investment of resources over time. It is important to recognize, however, that it is not too late for the remediation of older readers if effective intervention is available, along with group support and the reader's motivation to improve reading skills (Lovett, Lacerenza, De Palma, & Frijters, 2012).

Despite substantial advances, many aspects of effective treatment for dyslexia and other reading problems remain to be identified. There exists fairly strong evidence on how to teach decoding and word identification skills, but the field has not made sufficient progress in how to accelerate the growth of word-reading efficiency and text reading fluency. Research has revealed some general parameters of what constitutes effective comprehension instruction, but we still lack a comprehensive blueprint of how to help a struggling reader with poor oral language skills or a struggling English learner (EL) become a good comprehender and how to measure that end goal. There are gaps in which our understanding about RD and effective intervention falls short, gaps made more salient by new developments in related areas of cognitive, learning, and education sciences that could but have not influenced thinking and practices. Some areas of concern in intervention research and practice warrant closer scrutiny and discussion. These areas are summarized in the following sections and are also identified in others' contributions to this volume.

THEORY AND DATA TO PRACTICE: DO OUR THINKING AND OUR LANGUAGE ABOUT INTERVENTION NEED EXPANDING? WHAT IS THE ROAD MAP?

We, as researchers and practitioners, may be imposing constraints on our progress by the way in which we think and talk about reading intervention. It is important for the interventionist's perspective to encompass more than the desired growth of a reader on progress measures of instructional response. We may envision our end goal for struggling readers as construction of Perfetti's (1999) cognitive blueprint of the skilled reader (Figure 2.1) or Scarborough's (2001) intertwined rope of reading development (Figure 2.2) blending ever more tightly the automatized and strategic strands of oral and written language skill components. Regardless of the model that is embraced, it is important to ground instructional approaches

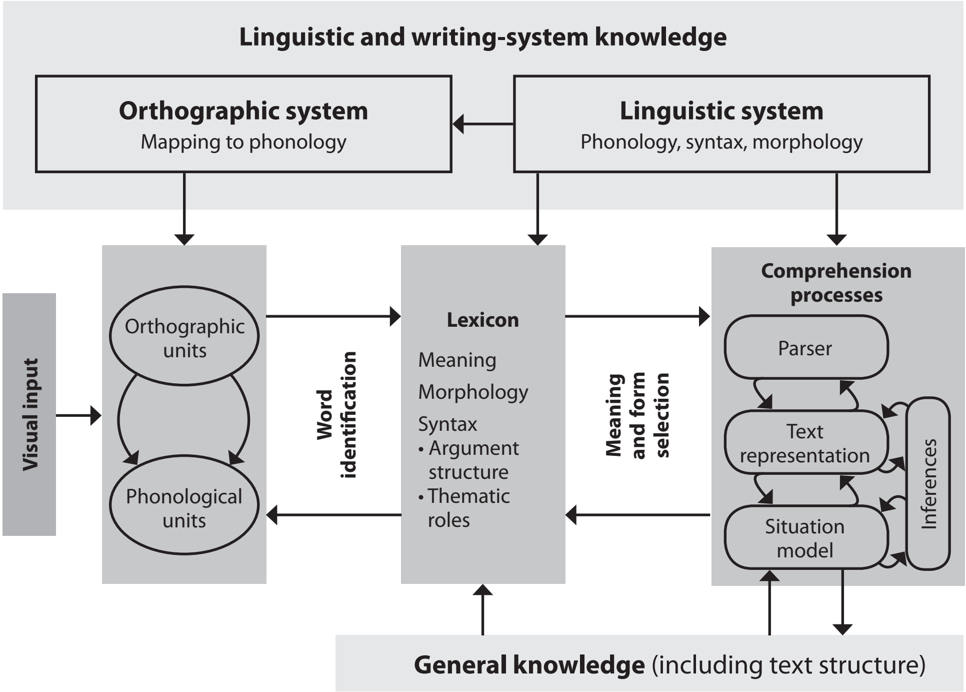
Linguistic and writing-system knowledge
Orthographic system
Mapping to phonology
Linguistic system
Phonology, syntax, morphology
Visual input
Orthographic units
Phonological units
Word identification
Lexicon
Meaning
Morphology
Syntax
• Argument structure
• Thematic roles
Meaning and form selection
Comprehension processes
Parser
Text representation
Situation model
Inferences
General knowledge (including text structure)

Figure 2.1. A blueprint of the skilled reader. (Perfetti, 1999)

and intervention programs in a coherent, evidence-based model of reading behavior. Effective instruction requires a detailed road map of where teachers and learners are headed.

Research has revealed that acquiring expertise on a complex skill requires thousands of hours of practice (Chi, Glaser, & Farr, 1988; Lesgold & Welch-Ross, 2012). Building a reading brain requires years of learning and practice. As Wolf (2007) and Dehaene (2009) both eloquently remind us, nothing in the course of human evolution equips humans to absorb language through the visual system. Yet neuroimaging studies show functional neural circuitry that, through learning and practice, has become beautifully attuned to the reading process (see for example, chapters by Cutting, Bailey, Barquero, & Aboud, Chapter 7; Del Tufo & Pugh, Chapter 8).

If we are working to help dyslexic readers build the same fundamental reading system and neural circuitry that typical readers have achieved, are there truly different instructional routes to that end? Are there multiple variations on the same routes to build the same cognitive system and its integrated neurobiological substrates? An effective intervention approach flows from a master plan that understands the architecture of the reading system that it is helping to build. And if there *is* a unified blueprint (or set of blueprints) for building a fluent reading system—one that produces optimal functionality—it

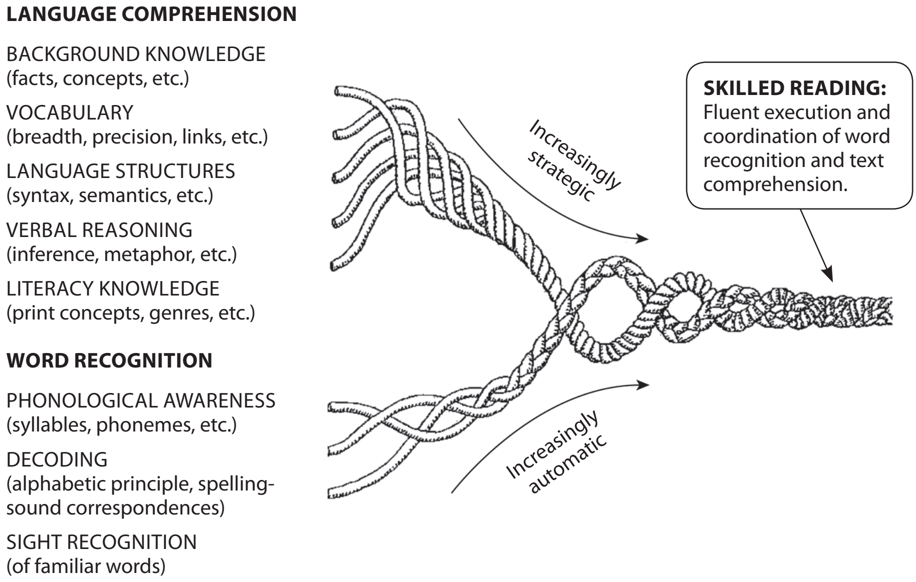
LANGUAGE COMPREHENSION
BACKGROUND KNOWLEDGE
(facts, concepts, etc.)
VOCABULARY
(breadth, precision, links, etc.)
LANGUAGE STRUCTURES
(syntax, semantics, etc.)
VERBAL REASONING
(inference, metaphor, etc.)
LITERACY KNOWLEDGE
(print concepts, genres, etc.)
WORD RECOGNITION
PHONOLOGICAL AWARENESS
(syllables, phonemes, etc.)
DECODING
(alphabetic principle, spelling-sound correspondences)
SIGHT RECOGNITION
(of familiar words)
Increasingly strategic
Increasingly automatic
SKILLED READING: Fluent execution and coordination of word recognition and text comprehension.

Figure 2.2. Learning that is multidimensional with a focus that changes over time. (Scarborough, 2001)

is important to have a deep understanding of the learning processes necessary to become a skilled reader.

HOW WELL DO WE UNDERSTAND THE LEARNING MECHANISMS INVOLVED IN TYPICAL READING ACQUISITION, COMPREHENSION DEVELOPMENT, AND THE ATTAINMENT OF SKILLED READING?

Compton and colleagues recently suggested that we may have forsaken reading theory in the name of "quick-fix" interventions for children with RD (Compton, Miller, Elleman, & Steacy, 2014). They specifically argue that the skills and knowledge we set as intervention goals are quite different from the inductive and generative learning processes that characterize typical reading development. Interventions for dyslexia have focused on the response to explicit instruction on language structures and language patterns, with scant attention paid to implicit learning inside and outside of the instructional context. But how could instructional variables be manipulated to facilitate implicit learning in a population that is speculated to be deficient in aspects of implicit learning that impact early reading development (Vicari et al., 2005)? Some have suggested that it is a failure in the *interaction* of implicit lexical learning and explicit learning about phonology–grapheme mappings that underlies atypical reading development (Folia et al., 2008).

Insufficient attention in intervention to implicit learning and building robust lexical representations may account for the frequent postintervention finding of solid gains in word-reading accuracy but not in word-reading efficiency. Compton and colleagues contend that

> skilled readers develop and rely on complex "context-dependent" decoding rules to build fully specified lexical representations, whereas children with RD tend to develop and rely on simplistic "context-independent" decoding rules that fail to promote fully specified lexical representations. We define context-independent connections as subword orthographic-phonological connections that are insensitive to word position and surrounding letters, less implicit, and slow and arduous to apply. (2014, p. 60)

Rapid, efficient word recognition is the foundation of skilled reading and requires the establishment of a robust system of lexical representations. Many foundational skills become integrated with reading development (Ehri, 2005, 2014; Rosenthal & Ehri, 2008; Scarborough & Parker, 2003) to allow efficient word recognition, which in turn allows the development of higher order comprehension and fluency (Perfetti, 2007; Perfetti & Stafura, 2014). Although there exists strong evidence of effective strategies for teaching word identification to struggling readers, our exclusive focus on explicit instruction may have caused us to overlook aspects of intervention that could be important to achieving gains in the quality of lexical representations and greater word-reading efficiency.

THE DEVELOPMENT OF READING COMPREHENSION IN STRUGGLING READERS: PROBLEMS IN DEFINITION, MEASUREMENT, AND SCALE

Although more remains to be discovered about effective practices in the remediation of word reading problems, many more basic questions remain unresolved regarding intervention for reading comprehension difficulties. Expectations have increased throughout the last 20 years for the literacy skills required in today's job markets; understanding and learning from a broad array of texts is critical for postsecondary education and employment. Yet imprecision remains in how we think about and address reading comprehension difficulties. This is not surprising given that comprehension processes are as inherently complex as any aspect of higher order thinking and reasoning.

Cognitive definitions of reading comprehension focus on active, ongoing *construction* processes of considerable complexity: The work of comprehension is to construct a coherent mental representation of what is read. Cognitive and discourse processing research have specified that both an explicit text-based model and a "situation" model appear to be built mentally by the reader, the latter combining text-based information with other knowledge (e.g., background knowledge; Graesser & McNamara, 2011). For informational text, the situation model is the informational content or subject matter being discussed. Text comprehension requires the reader to integrate his or her relevant world knowledge, and the situation model will include inferences activated by the text-based information, which are incorporated into this model (Graesser, Singer, & Trabasso, 1994; Kintsch, 1998). It is within this situation model building that learning from text occurs; thus the building of a rich, integrated situation model is critical to reading comprehension. Individual readers vary widely, however, on different central components of text comprehension that may limit their processing of text meaning and curtail the representations they build at both text-based and situational levels. These components include an individual reader's standards for coherence (i.e., the degree of coherence one needs during ongoing reading), his or her ability to create a coherent representation of text information, his or her ability to make inferences, and his or her sensitivity to structural centrality (i.e., the degree to which he or she allocates attention to information central to the author's message; Helder, van den Broek, Van Leijenhorst, & Beker, 2013). All these sources of individual differences contribute to comprehension breakdown in reading, but these very important elements of comprehension have rarely been targets of reading comprehension instruction and intervention. This is an omission of real concern.

Comprehension theorists distinguish between "online" and "offline" products of text comprehension, the former being the construction and representation processes and the latter being what is recalled or available to the reader after a text is read. Different general sources of comprehension breakdown are recognized by researchers, including weak language skills, deficient background knowledge, and limited processing resources of the individual reader (Cain, 2013; Compton et al., 2014), as well as a failure to implement effective reading practices (Helder et al., 2013; Vaughn, Klinger, et al., 2011) and a poor understanding of how texts are structured.

Assessment instruments to identify some of these central components of comprehension and measures to evaluate the growth of comprehension processes and products are still lacking. This makes it difficult to design and implement effective comprehension interventions: If the sources of reading comprehension difficulties cannot be identified through assessment, it is very difficult to target remediation of those core areas and tailor instruction so that it will be most effective in improving comprehension skills in that struggling reader. Traditional measures assess somewhat crudely the *products* of reading comprehension, or what is understood after a text is read. Some of the limitations of these standardized reading comprehension tests, including inadequate content validity and concurrent validity, have been well documented (Keenan, Betjemann, & Olson, 2008).

Attempts to assess the online *processes* of comprehension remain experimental at this point and include eye-movement tracking (Rayner, Chace, Slattery, & Ashby, 2006; see also Miller, Chapter 6), think-aloud tasks (Ericsson & Simon, 1993; McMaster et al., 2012), and neuroimaging measures (Ferstl, Neumann, Bogler, & von Cramon, 2008; Perfetti & Fishkoff, 2008). Critical comprehension processes, including generating different types of inferences, making connections across paragraphs and texts, sensitivity to structural centrality (van den Broek, Helder, & Van Leijenhorst, 2013), and building coherence (Linderholm & van den Broek, 2002), are not routinely assessed and are only occasionally targeted in reading comprehension interventions.

Finally, recent research has illuminated the extent to which comprehension processing is shaped by three different major influences: characteristics of the reader, properties of the text being read, and the instructional context of the reader (McNamara & Kendeou, 2011; Snow, 2002; van den Broek, Young, Tzeng, & Linderholm, 1999; van den Broek et al., 2013). There has been limited research and development in assessment and intervention that has operated from models at this level of specificity. This is despite their promise to support instruction tailored to the individual needs of readers with different purposes, different comprehension profiles, and in different contexts. Studies of reading comprehension development have just begun to investigate individual differences at this level of detail (Barth, Tolar, Fletcher, & Francis, 2014; Miller et al., 2014), and investigations of this type have yet to extend to research on reading disabilities.

VOCABULARY AND BACKGROUND KNOWLEDGE IN READING COMPREHENSION INTERVENTION

The language vulnerability most often associated with poor reading comprehension is limited vocabulary knowledge. Reading ability has been well documented to be substantially correlated with estimates of vocabulary knowledge (Baumann, Kame'enui, & Ash, 2003; Kamil, 2004; Nagy, 2007), and reading interventions that target vocabulary development also tend to improve reading comprehension scores (e.g., the RAVE-O [retrieval, automaticity, vocabulary, engagement with language, orthography] Program, Morris et al., 2012; Wolf, Miller, & Donnelly, 2000).

The importance of vocabulary knowledge has been made even more salient by some theoretical accounts of reading comprehension. The landscape model of text comprehension (Rapp, van den Broek, McMaster, Kendeou, & Espin, 2007) paints a picture of multiple complex, ongoing processes occurring *simultaneously* during text reading—described as a *landscape* of fluctuating patterns of activation:

> During reading, concepts continually fluctuate in the amount of attention they receive and hence in their activation. . . . These fluctuations in activation form the basis for the representation of the text in memory. *Patterns of . . . simultaneous activations of concepts* [emphasis added] determine the presence or strength of connections between the concepts in memory. (van den Broek, Lorch, & Thurlow, 1996; van den Broek, 2010)

The need for *simultaneous* activation of semantic representations and rapid access to background knowledge is critical for struggling readers, whose reading is characterized by slowed retrieval and representations of poor lexical quality (Perfetti, 2007). Van den Broek's emphasis on simultaneous and presumably rapid activation of concepts during text comprehension is congruent with evidence of brain-based reading comprehension networks that encompass several brain regions (Miller et al., 2014; Landi, Frost, Mencl, Sandak, & Pugh, 2013). The idea of comprehension depending on a network of simultaneous fluctuating activations is but one example of a potentially central component of reading comprehension that requires an expanded focus in assessment and intervention efforts and greater study in future research. A better understanding of how reading comprehension develops for able readers will inform the road map for intervention with struggling readers and facilitate better outcomes.

In a parallel vein, Compton and colleagues emphasize the need for greater appreciation of the role of background knowledge in reading comprehension problems. They review evidence, suggesting that "poor readers tend to have less well-developed knowledge structures as well as problems accessing and using their knowledge to make inferences and build coherent representations of text" (Compton et al., 2014, p. 65). These authors advocate for the next generation of reading comprehension interventions to incorporate three instructional components: 1) the provision of background knowledge about the topic prior to reading, thus allowing "microworld" (i.e., passage-specific) knowledge building during reading, 2) clustering texts around a theme to build background knowledge, and 3) providing explicit instruction in inference making and the use of background knowledge to make text inferences (Compton et al., 2014; Compton, Miller, Gilbert, & Steacy, 2013). Some of these components have been used in practice with anecdotal success, but the disciplined manner suggested here for their implementation could lead to a potentially greater impact from reading comprehension instruction.

Background knowledge is a construct with many parallels to vocabulary knowledge, and vocabulary itself involves the naming and representation of concepts (Pearson, 2010). Reading comprehension is thought to depend on an array of both automatic and strategic processes, and for the skilled reader, many inferences are made automatically—the by-product of solid networks of knowledge structures that are easily accessed and facilitate inference making (Kintsch & Kintsch, 2005). Although Figures 2.1 and 2.2 offer somewhat different conceptualizations of reading development, in both, vocabulary knowledge (the lexicon in Perfetti's model) sits reliably next to general knowledge.

Existing work offers some indications as to how reading comprehension interventions might incorporate systematic instruction and implicit learning opportunities that target the building of cohesive and well-elaborated knowledge structures and vocabulary representations. Retrieval practice and the building of flexible knowledge about words are important foci in Wolf's RAVE-O Program that are realized through engaging instruction and playful activities with multiple-meaning words, morphological structures, and speeded games (Wolf et al., 2000; Wolf, Barzillai, Gottwald, Miller, Spencer, et al., 2009). Classroom and small-group discussions can be designed to establish, elaborate, use, and connect vocabulary and knowledge representations: the Collaborative Strategic Reading approach of Vaughn and colleagues (2011) is one example.

The Word Generation Programs of Snow and colleagues, through the Strategic Education Research Partnership (SERP), provide excellent demonstrations of evidence-based principles of effective vocabulary development and knowledge acquisition applied to comprehension instruction for youth with language impairments or limited English language experience (Snow, Lawrence, & White, 2009). Focusing on controversial topics to stimulate engagement (e.g., the pros and cons of drug legalization and animal testing; see http://wordgen.serpmedia.org), the program has demonstrated efficacy with native English-speaking and language-minority youth (Snow et al., 2009).

IMPLEMENTATION AND PSYCHOSOCIAL FACTORS: THE BROADER CONTEXT OF WHAT WORKS AND WHY

Implementation and psychosocial factors play a critical role in intervention outcomes; among the most important are motivation and the individual's perception of his or her self-efficacy as a learner—effects that are likely reciprocal. Struggling readers have complex social-cognitive histories that shape their experiences of intervention and their trajectories of reading growth. We have found that interventions that target maladaptive attributions and motivational profiles *during* reading intervention result in improved reading outcomes *and* positive changes in motivation in adolescents with RD (Frijters, Lovett, Sevcik, Donohue, & Morris, in preparation). In fact, the interweaving of motivational and attributional retraining, cognitive strategy instruction, and reading remediation characterizes both our Phonological and Strategy Training (PHAST) and our Empower™ Reading intervention programs at every developmental level, from the early grades (Lovett, Lacerenza, Steinbach, & De Palma, 2014; Morris et al., 2012) through middle school (Frijters, Lovett, Sevcik, & Morris, 2013; Lovett et al., 2008) and into high school (Lovett et al., 2012).

With motivational issues in mind, our reading interventions are deliberately designed for group implementation; we have witnessed over three decades the positive impact for struggling readers of dealing with literacy learning problems in the company of peers. The impact of the instructional group is substantial, but this is an aspect of findings that is not often interpreted in intervention research reports. Instructional group effects point to the need to study how group factors can mobilize change for learners and how teacher–student and student–student affiliations contribute to outcomes. Small-group versus one-to-one intervention ratios are not a major factor in predicting response, and there is no empirical basis for advocating one-to-one intervention over small-group instruction in most cases (Vaughn, Swanson, & Solis, 2013). Neglecting instructional group dynamics, teacher–student and student–student affiliation, and the ways in which group factors can mobilize change for struggling learners limits our understanding of the contexts that facilitate the best outcomes for learners.

Systems-level factors have received some research attention in the past two decades and include teacher preparation and support, instructional coaching,

Excerpted from Advances in Reading Intervention: Research to Practice Research
by Carol McDonald Connor, Ph.D., & Peggy McCardle, Ph.D., M.P.H.
Brookes Publishing | www.brookespublishing.com | 1-800-638-3775

teacher quality, and systemic investment in literacy intervention (Moats & Foorman, 2003). In 2008, Faggella-Luby and Deshler issued a challenge for researchers who wanted their findings to be of use to practitioners:

> Researchers must carefully describe the types of learners for whom an intervention is designed, the context within which it should be taught, the content of the intervention, the pedagogy used to teach it, the fidelity required to achieve the desired outcomes, and the intensity required. (2008, p. 71)

These authors and others have reviewed the available evidence on reading comprehension instruction for adolescents with RD and identified four areas for future research efforts: 1) the need to be informed and guided by theory and theoretical models—an issue of urgent need already identified in the present chapter; 2) implementation needs, specifically a better understanding of instructional dosage requirements (i.e., length of sessions, frequency, and overall duration); 3) development of a continuum of service delivery beyond the early grades and into high school; and 4) the factors needed for successful scale-up of evidence-based interventions (Denton et al., 2010; Klinger, Boardman, & McMaster, 2013).

INTERVENTION RESEARCH PROGRAM: AN OVERVIEW

My own experience spans more than 30 years of conducting RD intervention research, work undertaken both with my group at the Hospital for Sick Children in Toronto on our own and in collaboration with our longstanding colleagues Robin Morris and Maryanne Wolf. Reference is made subsequently to a range of studies conducted with struggling readers of different ages.

In early studies comparing phonological skill-based and strategy-training approaches to the remediation of severe RD, we found that faster learning and better reading outcomes were attained when a multidimensional intervention approach was adopted—one combining direct and dialogue-based instruction, explicitly teaching children different levels of subsyllabic segmentation and training them in the acquisition, use, and monitoring of multiple decoding strategies (Lovett et al., 2000). Strategy instruction, attributional retraining, and the promotion of a flexible approach to word identification and text reading appear to be critical for achieving generalization and maintenance of intervention gains; these findings led to the development of the PHAST Reading Program (Lovett, Lacerenza, & Borden, 2000; since revised and updated to be part of the Empower™ Reading intervention programs).

The PHAST Reading Program was first evaluated as one part of a large multisite intervention study conducted with Robin Morris and Maryanne Wolf. The results indicated that the PHAST Reading Program and the RAVE-O Program (paired with a phonological program, Phonological Analysis and Blending/Direct Instruction [PHAB/DI]) were associated with improved reading outcomes for second and third graders with RD who varied in socioeconomic status and in intellectual functioning (Morris et al., 2012). The two multiple-component programs were associated with rates of learning and achievement gains of equivalent magnitude for children from disadvantaged circumstances and for those with IQs estimated to fall between 70 and 89 (i.e., below the average range), a demonstration of the generalizability of these results (Morris et al., 2012). Both the PHAST Reading Program and the RAVE-O Program, combined with the PHAB/DI Program, were confirmed to yield significant benefits immediately following intervention, and gains were maintained even a full year after instruction ended.

In a subsequent study, we evaluated 125 hours of small-group intervention for children with RD receiving remediation in first, second, or third grade. Robust intervention effects were obtained with effect sizes (Cohen's *d*) ranging from 0.63 to 2.08 and a median effect size of 0.89. Developmental and individual differences in response to intervention were examined, and questions about the timing of early intense intervention were considered. We learned that although earlier intervention results in greater "normalization" of reading scores, developmental effects are qualified by differential rates of growth among control participants of different ages. In addition, intervention effects on some reading outcomes are qualified by specific grade × treatment and individual differences × treatment interactions, with particular implications for lower IQ and lower vocabulary children with RD (Lovett, Frijters, Wolf, et al., in preparation). As always, interpretation of reading comprehension outcomes is dependent on the quality and adequacy of measurement, and varying rates of normalization were observed on different measures, highlighting the problems identified earlier in measuring reading comprehension and intervention-related comprehension growth.

We also evaluated intensive middle school intervention in a study of adolescents with RD, who were in Grades 6–8. Robust, positive intervention results were revealed, with effect sizes ranging from 0.34 to 0.94 on different reading outcomes. Few overall differences emerged between a PHAST intervention that combined decoding strategy training and reading comprehension instruction and one that combined decoding strategy training and multilevel fluency training (i.e., PHAST-comprehension versus PHAST-fluency focus). The program variations were developed to explore different paths to improved comprehension in adolescents with poor decoding and RD. Individual differences were examined to assess predictors of responsiveness. For adolescents with RD who have lower IQ scores or vocabulary knowledge or are more impaired in reading at entry, the type of intervention appeared to be particularly critical (Frijters et al., 2013; Lovett, Frijters, Steinbach, Sevcik, & Morris, in preparation).

We have also reported results from an intervention study with struggling high school readers (Lovett et al., 2012). Significant gains on standardized word attack, word reading, and passage comprehension tests were demonstrated following only one semester of PHAST PACES (predicting, activating prior knowledge, clarifying, evaluating through questioning, and summarizing), a reading intervention designed specifically for struggling readers in high school. Following the decoding and comprehension strategy instruction, significant gains in letter-sound knowledge and multisyllabic word reading were revealed for those involved with PHAST PACES relative to control group participants, confirming that adolescence is not too late to address basic decoding gaps. Effect sizes ranged from 0.35 to 1.21 with a median effect size of 0.63 across measures. At follow-up, passage comprehension showed continued growth among PHAST PACES graduates a full year after intervention had ended.

CONCLUSION

There is much to celebrate in the advances made in both research and practice regarding thoughtful well-designed interventions for RD and in the encouraging evidence that continued intervention for older, struggling readers can yield positive outcomes. The need for multifaceted reading interventions, with a firmer grounding in theory and evidence and more attention paid to instructional needs beyond the literacy-related ones, is obvious. As demands for literacy competencies in youth have escalated, so too have demands to design instructional programs that address the long-term learning, motivational, social-cognitive, and self-efficacy needs of today's struggling readers. These remarks end with a wish list. After more than 30 years of intervention research experience, from my perspective, the following areas require focused attention and renewed effort. We need the following:

1. Better-developed, comprehensive, cohesive road maps for providing intervention and instruction that allow for the construction of an efficient reading system. This would involve scaled remedial scaffolding for learners' different needs.
2. More evidence on how to build deeper comprehension skills in learners with vocabulary weaknesses and limited language experiences.
3. More implementation studies on reading intervention that will allow an understanding of the social and motivational contexts that promote optimal reading growth for different struggling readers.
4. An ability to harness new technologies to engage struggling readers in much more reading practice, thus providing some of the reading experience needed to achieve reading fluency and deeper comprehension.
5. Useful assessment instruments both to measure growth in vocabulary knowledge—in terms of breadth, depth, and connections—and to measure online and offline comprehension processes and their growth over time.

Excerpted from Advances in Reading Intervention: Research to Practice Research
by Carol McDonald Connor, Ph.D., & Peggy McCardle, Ph.D., M.P.H.
Brookes Publishing | www.brookespublishing.com | 1-800-638-3775