



INTERNATIONAL
LITERACY
ASSOCIATION

Reading Research Quarterly Special Issue

EXECUTIVE SUMMARY

The Science of Reading

Supports, Critiques, and Questions

International Literacy Association | September 2020

Acknowledgments

Publishing this special issue within a six-month time frame has certainly been an ambitious effort. The original call for abstracts yielded over 70 manuscript submissions. We recruited a team of associate editors to assist with assigning reviewers (each manuscript received two) and adjudicating. Their service was invaluable, and we acknowledge them here:

Joanne F. Carlisle ■ Donald L. Compton ■ Amy C. Crosson ■ Bridget Dalton ■ David K. Dickinson ■ Patricia Enciso ■ Kathy Escamilla ■ Elfrieda H. Hiebert ■ Margaret G. McKeown ■ Annemarie S. Palincsar

We are grateful for the efforts of our reviewers and authors as well as the *Reading Research Quarterly* staff (including Susanne Viscarra) and the International Literacy Association staff and leadership (including Dan Mangan, Lara Deloza, Colleen Clark, and Wesley Ford). We are also grateful for Laura Buckley, our *RRQ* editorial assistant who helped with much of the organization of this special issue.

When preparations began for this special issue of *Reading Research Quarterly*, the term *science of reading* (SOR) was a dominant part of discourse in education. We kept hearing the term in discussions across our experiences as researchers, teacher educators, partners of local education agencies, community members, and even parents. Even the media weighed in. Those invested saw SOR as either a magic solution to education's problems or an impediment that kept historical structural inequities in place. These divisions were reminiscent of the decades-old reading wars, and few people seemed to occupy the middle ground.

We started to solicit opinions on SOR and what the term meant to people both in and outside of the field. It quickly became clear that, not only was there no single definition, there was also no consensus as to what has been cited to inform theory, research, policy, and practice in the name of SOR.

As coeditors of *RRQ*, a leading global journal that provides the latest research and scholarship on literacy, we saw an opportunity to put together a special issue of the journal focused on what's at the heart of this debate: science. Our goal for this project was never to decide which is the "right" side of the debate but to help all of us be better consumers and creators of information.

The compilation of articles in this special issue, as well as those that will appear in the second special issue in spring 2021, examine SOR through a broader, more inclusive lens. Together, these pieces bring a supportive and critical perspective to the conversations, and identify next steps for the field.

The Science of Reading: Supports, Critiques, and Questions contains 26 articles written by a total of 77 authors who represent diverse, innovative, and challenging ideas and perspectives that reframe the science of reading debate.

We asked authors, reviewers, and associate editors to focus on accuracy of statements, bridging of perspectives, and impact of manuscripts to the field. As mentioned earlier, the term science of reading can be interpreted in divisive ways. The goal of this issue is to highlight how bridging of perspectives via accurate and meaningful information can move us forward.

Although each article shares important points, there is overlap. These articles show that our research community agrees on more of the science (or sciences) of reading than not.

Seeking to Define

The International Literacy Association (ILA) defines SOR as "a corpus of objective investigation and accumulation of reliable evidence about how humans learn to read and how reading should be taught."

The authors for this special issue seem to characterize SOR as an approach that prioritizes basic science and experimental work.

For example, Graham writes, "The science of reading involves studying how reading operates, develops, is taught, shapes academic and cognitive growth, affects motivation and emotion, interacts with context, and impacts context in turn. It includes genetic, biological, environmental, contextual, social, political, historical, and cultural factors that influence the acquisition and use of reading."

Similarly, Alexander writes, “As someone who has been conducting empirical studies of reading for 40 years, I see the science of reading as contributing to a vast interdisciplinary store of critical information about reading-related skills, processes, antecedents, and outcomes, representing linguistic, cognitive, social, cultural, neurological, and psychological dimensions.”

Following suit, Petscher et al. state, “The ‘science of reading’ is a phrase representing the accumulated knowledge about reading, reading development, and best practices for reading instruction obtained by the use of the scientific method.... Collectively, research studies with a focus on reading have yielded a substantial knowledge base of stable findings based on the science of reading. Taken together, the science of reading helps a diverse set of educational shareholders across institutions (e.g., preschools, schools, universities), communities, and families to make informed choices about how to effectively promote literacy skills that foster healthy and productive lives (DeWalt & Hink, 2009; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001).”

These definitions reflect the broad view of SOR conveyed across the articles in this issue as well as the important implications of how SOR is conceptualized. Yet the special issue authors consistently noted that the interpretation of SOR typically has been much narrower. SOR is often interpreted as focused solely on word reading and the role of systematic phonics instruction in supporting reading achievement, particularly for developing readers. As Alexander notes, “To see the phrase ‘science of reading’ used in such a limited and pejorative manner is bewildering.”

What is important here is that the authors almost universally emphasized that narrow interpretations of SOR (often taken up by the media to make its way into practice, policies, and schools) are problematic.

Taken together, the articles in this special issue suggest that SOR is both a *body of knowledge* (defined broadly by researchers and scholars) and an *interpretation of that body of knowledge* (often defined narrowly by audiences outside the academy). The authors in this special issue push back on the idea that SOR be characterized by support for or opposition to phonics instruction.

Again, as Alexander writes, “The reality is that reading does not begin or end with phonics or whole-word instruction (Seidenberg, 2013). It is far broader and more complex. Reading, broadly conceived, is any interaction between a person—be it a child, adolescent, or adult—and written language (Pearson & Cervetti, 2013). That interaction can involve written language at many levels, from words and sentences, to paragraphs, to entire volumes (Shanahan, 2019). Also, reading can be performed for many reasons, from purely personal to largely academic, and in many contexts, both in and out of school, as well as online or in print.”

Hence, the aim of this special issue is to impact the field by advocating for a broader interpretation of SOR that can affect policy and practice and result in curricula decisions, legislation, and even teacher licensing requirements in ways that this narrower view has (which many of the articles in this special issue question).

This is not to suggest that there are no differing views regarding SOR. This collection of articles purposefully represents different stances and were reviewed by scholars representing different stances. As Petscher et al. note, “Researchers often frame the science of reading from contrasting applied epistemological perspectives. Thus, two scientists who approach the science of reading with different epistemologies will both suggest that they have principled understandings and explanations for how students learn to read; yet, the means by which those understandings and explanations were derived are often distinct.”

Here, we hope the varied perspectives presented results in an engaging discussion that can move the field forward in ways that simple agreement would not.

Key Findings

The articles chosen for this issue contribute to the SOR discussion in different ways. They can be categorized as culminating in two key findings.

1. Multiple Studies Focus on Deepening Our Understanding of What Typically Is Seen as the Core of the SOR: Phonics Instruction

For example, Petscher et al. describe the strong evidence for explicit and systematic foundational skill instruction, providing a big-picture view. Ehri provides a more focused look at phonics and why it is helpful. She uses her research to emphasize the importance of reading words by sight, with phonics serving the role of linking spellings of words and lexical representations. Kearns explores nuances related to phonics instruction, investigating whether the English orthography is consistent enough to warrant explicit instruction of syllabication rules.

Scanlon and Anderson review 25 years of work, suggesting “that using both phonics- and context-based information facilitates the ability to build sight vocabulary, which in turn enables readers to turn their attention to the most important goal of literacy learning: meaning construction.” Seidenberg et al. and Solari et al. both consider the translation of findings to classrooms more broadly. For example, they suggest that the science of statistical learning in quasi-regular domains has shown that readers combine implicit learning of the mappings of the orthography (i.e., how spellings are likely to be pronounced) with learning from explicit instruction that accelerates the implicit learning, but such views provide complexities related to translation to classrooms.

Overall, this work deepens understandings of what is currently discussed as SOR (even within the media) and has consequences for instruction.

2. The Majority of the Articles Within This Special Issue Push to Expand Conceptualizations of SOR

This perspective contrasts to the singular focus on phonics and word reading. Articles such as those by Petscher et al. and Cervetti et al. represent efforts to provide an updated big-picture view on SOR. Both of these author teams suggest the importance of not only foundational skills but also “a complicated constellation of skills and knowledge that impact reading comprehension” (Cervetti et al.). These include academic language instruction, comprehension strategy instruction, multifaceted language interventions, explicit instruction in key vocabulary, and text discussions. Hence, the SOR that best moves the field forward and serves learners is one that attends to more than just foundational skills.

Overall, the studies within this issue suggest a *broad conceptualization of SOR* to unite what science conveys about literacy. Articles suggest that SOR should include findings on the role of *language comprehension* (Cervetti et al.; Phillips Galloway et al.; Silverman et al.), *writing* (Graham), *content and background knowledge* (Cabell & Hwang; Kaefer), and *instruction* (Shanahan). Articles also suggest that SOR should take a more expansive view of reading that acknowledges its complexity (Compton-Lilly et al.) and the challenges readers face, particularly within digital literacy (Alexander).

Importantly, authors also push a more expansive view of *readers*, attending to the different ways that readers (and their families and communities) experience literacy and literacy instruction and acknowledging structural inequities. These readers include English learners

(Goldenberg), emergent bilinguals (Noguerón-Liu), and Black students (Milner) as well as struggling readers (Peng & Goodrich) and students with dyslexia (Elliott).

Related to this, authors suggest that lenses related to *equity and social justice* should be central when investigating and considering SOR (Compton-Lilly et al.; Hattan & Lupo; Hoffman et al.; Milner; Noguerón-Liu; Mosley Wetzel et al.; Phillips Galloway et al.). As Milner points out, “Who builds knowledge, what counts as knowledge, and why knowledge is constructed in the science of reading” are important questions that should underlie experimental studies and translation of findings. Framed within [Overcoming Racial Injustice: A Call to Action](#), a joint statement from ILA and the editors of *RRQ*, the *Journal of Adolescent & Adult Literacy*, and *The Reading Teacher*, published in the July 2020 issue of all three journals, we see these additions as particularly important.

The articles in this special issue also emphasize that SOR should include more work on *teacher development* and *privileging teacher expertise* (Hindman et al.; Hoffman; Mosley Wetzel et al.; Vaughn et al.) as well as developing *infrastructure* to support SOR instruction (Woulfin & Gabriel) and *translational methods* (Seidenberg et al.; Solari et al.) to make SOR instruction effective.

In short, a key contribution of this special issue is to clarify that it is not enough to consider the collection of experimental studies conceptualized within SOR; instead, this special issue pushes a broader conceptualization.

An overview of each of the 26 articles is provided in the Appendix.

Looking Forward

Work continues on *RRQ*'s second special issue on SOR, slated for release in the spring of 2021. As of this writing, 31 pieces are still in peer review, including some held over from this first release. The response to the initial call was so extensive that the volume of resulting manuscripts exceeded the tenable schedule for meeting the original publication date. We take this response as confirming an intense interest in the topic of SOR across the entire spectrum of literacy researchers.

We look forward to the important discussions that we will have as a community as we consider the varied perspectives and knowledge conveyed by these articles. Given that we are experiencing a global pandemic with serious consequences for education, uniting our knowledge base in moving the field forward is critical to serving readers and their communities.

—Amanda P. Goodwin & Robert T. Jiménez
Editors, *Reading Research Quarterly*

1. “Using Context as an Assist in Word Solving: The Contributions of 25 Years of Research on the Interactive Strategies Approach” by Donna M. Scanlon and Kimberly L. Anderson

summarizes results from six experimental studies to suggest the “value of teaching students to use both alphabetic and contextual information in word solving in interactive and confirmatory ways.” Unlike the position advocated by SOR groups who criticize use of the three-cueing system, Scanlon and Anderson emphasize that “the thrust of our argument is that the use of context can be a valuable assist for word solving both when a student’s knowledge of the code is still developing and when inconsistencies in English orthography result in only an approximate pronunciation of a word. In either situation, successful word solving that includes a careful interrogation of the letters in the word supports the orthographic mapping required for skilled word learning. Additionally, the word-solving process itself becomes generative as it helps to familiarize the student with new letter–sound correspondences and orthographic patterns that can then be applied in decoding even more new words, thus expanding the power of the self-teaching mechanism (Share, 1995).” This work, which includes studies of K–4 students, showed the effectiveness of the Interactive Strategies Approach, indicating “that using both phonics- and context-based information facilitates the ability to build sight vocabulary, which in turn enables readers to turn their attention to the most important goal of literacy learning: meaning construction.”

2. “The Sciences of Reading and Writing Must Become More Fully Integrated” by Steve Graham

emphasizes the reciprocal relationship between reading and writing. Graham argues that the science of reading needs to be integrated with the science of writing. Specifically, he writes, “As the theory and supporting evidence [he] reviewed demonstrated, reading and writing are connected and mutually supportive. Engagement and instruction in one results in improvement in the other. As a result, advancements in the study of reading and writing cannot be maximized if the sciences of reading and writing continue to operate in largely separate fashions.” This work reviews theories and studies, particularly meta-analyses, that have shown that writing instruction improves reading outcomes and that reading instruction improves writing outcomes. It then discusses future research needs and suggests links to classroom instruction.

3. “The Science of Learning to Read Words: A Case for Systematic Phonics Instruction” by Linnea C. Ehri

reviews a line of experimental research that has highlighted the role of orthography in reading. Supporting the importance of systematic phonics instruction, Ehri writes, “The way that contributes most to reading and comprehending text is reading words automatically from memory by sight. The evidence shows that words are read from memory when graphemes are connected to phonemes. This bonds spellings of individual words to their pronunciations along with their meanings in memory.” In other words, “decoding is a means of getting spellings of words into memory so they can be read by sight.” Interestingly, this work shows that “when spellings attach to pronunciations and meanings in memory, they enhance memory for vocabulary words.” Ehri provides additional nuance in understanding of how words are read and links to instruction.

4. “It’s Time to Be Scientific About Dyslexia” by Julian G. Elliott argues that the lack of clarity in terminology weakens our understanding of dyslexia. Elliott writes, “Despite the vast proliferation of scientific research, our understanding of dyslexia is marked by serious weaknesses of conceptualization, definition, and operationalization that are not only unscientific, but also result in impoverished practice in schools, social inequity in both understanding and provision for many struggling readers, and ultimately, reduced life chances for millions of students worldwide.” Elliott identifies four broadly different conceptions of dyslexia and calls for clarity of terms, suggesting use of *dyslexia* to represent severe and persistent decoding difficulties to support improved building of understandings and links to practice.

5. “The Cognitive Element Model of Reading Instruction” by Peng Peng and J. Marc Goodrich “propose[s] a cognitive element model of reading instruction that provides a novel framework for considering how to embed supports for cognitive processes within evidence-based reading instruction.” They describe the model and then explore intervention work suggesting potential effectiveness. As Peng and Goodrich write, “We reviewed recent relevant rigorous intervention studies that used approaches similar to our cognitive element model and reported promising effects on improving responsiveness to reading intervention among both typically developing and struggling readers. Moreover, as these studies demonstrated, working memory training can be embedded relatively easily into existing evidence-based reading instruction, curricula, and activities, suggesting that the element model may have the potential to provide a cost-efficient, promising reading intervention framework, especially for struggling readers who show little response even to very intensive evidence-based reading instruction.” Such work extends SOR to consider supports for struggling readers by taking a different approach than currently considered.

6. “What Research Has Revealed About Readers’ Struggles With Comprehension in the Digital Age: Moving Beyond the Phonics Versus Whole Language Debate” by Patricia A. Alexander extends the conceptualization of reading purposefully to include digital reading and challenges that readers face when reading in such contexts. “Those challenges include information saturation, the proliferation of misleading and malicious online content, the struggle to use valid evidence to support claims, and the tendency to treat complex issues in an overly simplistic fashion.” Alexander argues that “the scientific study of reading in its many manifestations has been crucial in bringing such challenges to light and in offering guidance for addressing them, too.” Alexander also suggests three recommendations for addressing these challenges: “(1) Draw on students’ personal interests and experiences as the foundation for instruction. (2) Guide students to use smart technologies in smart ways. (3) Foster student interactions and collaborations around meaningful problems using diverse text mediums and genres.”

7. “Building Content Knowledge to Boost Comprehension in the Primary Grades” by Sonia Q. Cabell and HyeJin Hwang highlights the importance of content and linguistic knowledge in supporting reading achievement. They write, “In this article, our aim was to help the field transcend narrow conceptualizations of the science of reading that often view linguistic comprehension (C) as synonymous with building language skills. Indeed, strengthening students’ language skills, including vocabulary, at the earliest grade levels is critical for reading for understanding (Foorman et al., 2016), but it is only part of the picture. Building content knowledge is also essential, because the main determinant of understanding a text is how much knowledge a reader brings to reading (Anderson & Pearson, 1984). In the context of knowledge building, language and knowledge can grow together to have a synergistic effect on linguistic comprehension and eventual reading comprehension.” Cabell and Hwang review theory and experimental research in K–2 classrooms as well as initial intervention findings suggesting promise of “knowledge building in English language arts instruction (i.e., content-rich instruction) [that] can support language and content knowledge, leading to better linguistic and reading comprehension.”

8. “Building Infrastructure for Improving Reading Instruction” by Sarah Woulfin and Rachael E. Gabriel takes a different focus and argues for the importance of three infrastructural pillars (curriculum, professional development, and leadership) that are mutually supportive of reading instruction. The authors write, “Rather than seesawing from rhetoric and resources associated with different approaches to reading instruction, policymakers and reformers should examine the coherence, transparency, and feasibility of infrastructure. In particular, they should collect and analyze evidence on educators’ experiences with and responses to the pillars of infrastructure. For example, what are teachers’ and leaders’ perceptions of the strengths and gaps of new reading instructional materials? To what degree are teachers engaging in in-classroom reading coaching targeting the content and routines of the curriculum? It is critical not only to obtain data on the outcomes of implementing the SOR but also to obtain data on conditions for implementation and the processes unfolding during implementation.” This work suggests important conditions that are needed to facilitate implementation of SOR instruction.

9. “Lost in Translation? Challenges in Connecting Reading Science and Educational Practice” by Mark S. Seidenberg, Matt Cooper Borkenhagen, and Devin M. Kearns discusses many of the issues related to bridging the findings of basic research to practice. The authors state, “We have three concerns about current efforts to use this science to improve reading outcomes. First, there is a need for additional translational research to establish closer connections between theory and practice. We know more about the science of reading than about the science of teaching based on the science of reading. Second, we are concerned about how reading science has been characterized in educational contexts: It can be oversimplified in ways that slow progress by seeming to sanction practices that are only loosely connected to it. Finally, the science of reading is a moving target because it continues to progress. Theories have grown increasingly complex and counterintuitive, creating additional translational challenges.” The authors illustrate these concerns with many examples, including an interesting example related to how readers read words, arguing for a combination of “implicit learning of the statistical structure of mappings between form (orthography and phonology) and meaning” and “explicit instruction [that] can be seen as enabling statistical learning, and timely, targeted instruction [that] can further accelerate it.” Overall, this article emphasizes the complexity of reading and how nuanced understandings of the research and context can inform translation of findings to classrooms.

10. “Reading Wars, Reading Science, and English Learners” by Claude Goldenberg argues that although English learners (ELs) have been a sideshow in SOR, the larger literature provides important guidance in supporting reading instruction for ELs. Specifically, Goldenberg identifies similarities in learning to read in a second language to learning to read in one’s first language. He also, importantly, identifies differences related to ELs’ limited English proficiency. As Goldenberg writes, “The implication for the science of reading, or more precisely, a possible science of teaching reading for ELs, is quite clear: What is known about effective literacy instruction for non-ELs is the foundation of effective literacy instruction for ELs. However, attention must be paid to students’ English oral language proficiency as it relates to what students are expected to read and how they are to engage during classroom activities.... That said, it would be a mistake to assume that ELs, or any students, need only explicit instruction or that all will need the same degree of English-language support. There are diverse instructional needs and individual differences among ELs, as there are among non-ELs.” Interestingly, Goldenberg’s article highlights that many of the scaffolds designed for ELs also support non-ELs, suggesting that attending to language proficiency is an important SOR consideration both for ELs and for all students more generally.

11. “Does English Have Useful Syllable Division Patterns?” by Devin M. Kearns analyzes whether two syllable division rules are consistent enough within the orthography to be taught. Here, “the utility of the two most frequently taught patterns [VC|CV and V|CV] was examined in a corpus analysis of 14,844 words from texts used in grades 1–8.” Results suggested relative consistency for the VC|CV pattern but a lack of consistency for the V|CV pattern. What is important is that “the unreliability of VCV may not justify the effort required to use the strategy.” Kearns pushes on an often-used instructional move: teaching syllabication rules. As Kearns writes, “The results do not augur well for the idea of teaching readers to use syllable division patterns. When reading texts, application of this effort-intensive strategy requires a time-consuming departure from the text itself. If the patterns were highly consistent, it would mitigate the negative effect of the effort and time needed to apply them. They are not consistent, so the time required does not have a strong justification.... There is a variety of strategies for helping students read long words that do not involve syllable division patterns. These strategies have supporting evidence and avoid the issues of utility and cognitive load raised by syllable division.” This work adds nuance to understanding phonics instruction.

12. “How the Reading for Understanding Initiative’s Research Complicates the Simple View of Reading Invoked in the Science of Reading” by Gina N. Cervetti, P. David Pearson, Annemarie S. Palincsar, Peter Afflerbach, Panayiota Kendeou, Gina Biancarosa, Jennifer Higgs, Miranda S. Fitzgerald, and Amy I. Berman uses findings from the Reading for Understanding initiative to offer “evidence regarding the significance of the listening comprehension component of the [simple view of reading], often overlooked by advocates of the science of reading. This research has documented the importance of early oral language skills, which support both decoding and listening comprehension in young readers and plays a critical role in students’ success as readers as they move through school. In addition, [Reading for Understanding] research has identified a complicated constellation of skills and knowledge that impact reading comprehension as students advance in school.” This includes academic language instruction. Overall, the authors push on the narrow conceptualization of SOR and also suggest that multicomponential language interventions may be helpful, as they “have tended to be more effective in improving reading and listening comprehension than single-component interventions have (e.g., Connor et al., 2018).”

13. “When Did You Learn It? How Background Knowledge Impacts Attention and Comprehension in Read-Aloud Activities” by Tanya Kaefer emphasizes the importance of taking a nuanced approach when exploring instruction related to SOR. Generally, the role of background knowledge in reading has been stressed, but “what remains an open question for the science of reading, however, is how and when this background knowledge ought to be developed.” In this study, 92 kindergarten participants were “tested on familiar information (i.e., activated knowledge), taught novel but relevant information (i.e., provided knowledge), or taught novel but irrelevant information (i.e., neither activated nor provided knowledge), prior to reading a story.” Results suggest that all conditions supported basic comprehension but that advanced comprehension was facilitated by the activated knowledge condition. As Kaefer states, this study “represents an important step in understanding how the impact of common pedagogical activities, such as prereading discussions, can fluctuate based on individual differences among students. Given the diversity of life experiences and background knowledge in the classroom, it is essential to understand how these factors impact learning, so we may better serve students’ reading development.”

14. “A Confluence of Complexity: Intersections Among Reading Theory, Neuroscience, and Observations of Young Readers” by Catherine F. Compton-Lilly, Ayan Mitra, Mary Guay, and Lucy K. Spence emphasizes that reading is complex and multifaceted. The authors explore “a confluence of complexity across: (a) theoretical models of reading based on empirical research, (b) emerging information related to the brain and reading, and (c) research findings based on close observations of young learners.” This embracing of the complexity of reading “challenges instructional approaches (e.g., structured literacy) that deny or ignore the multidimensional and networked nature of young learners’ reading processes and/or unique literacy learning trajectories.” This work also takes an equity lens, emphasizing that “the differences among individuals and groups, their practices, their interactions, and the unpredictability that accompanies being human—disrupts the possibility of narrow and universally applicable solutions for helping all students become readers.” The authors “argue for complex solutions that honor the complexity of reading.”

15. “Bringing the Science of Reading to Preservice Elementary Teachers: Tools That Bridge Research and Practice” by Annemarie H. Hindman, Frederick J. Morrison, Carol McDonald Connor, and Joseph A. Connor argues that “whereas the scientific evidence base on reading acquisition and instruction is largely clear on what subskills students need to develop, it is less clear on how to most effectively teach those subskills, particularly when teachers have 25–30 young students with disparate background knowledge and interests in the same classroom and are also addressing other academic and social skills.... As a result, educators, particularly those new to the field, need more specific, precise guidance on how exactly to bring the SOR into their classrooms.” The authors suggest the lattice model of reading development provides a multifaceted, dynamic view that can inform teacher education, specifically preservice teacher education, which they suggest should be learner centered, knowledge centered, and community centered. They advocate for “embedding preservice training with focused, targeted interventions around reading instruction that have supported experienced teachers” such as the Individualizing Student Instruction and Story Talk programs that provide “preservice elementary-grade teachers [with] multiple, highly focused, classroom-based opportunities for deliberate practice and feedback to be ready to teach reading.” This work adds a preservice teacher development lens to the SOR literature while also emphasizing the complexity of reading.

16. “Beyond Decoding: A Meta-Analysis of the Effects of Language Comprehension Interventions on K–5 Students’ Language and Literacy Outcomes” by Rebecca D. Silverman, Erika Johnson, Kristin Keane, and Saurabh Khanna

investigates trends across 43 language comprehension elementary interventions, considering potential differences in effects depending on participant and intervention characteristics. According to the authors, “Findings suggest positive effects on custom measures of vocabulary, listening comprehension, and reading comprehension, but not on standardized measures of these outcomes. Results also indicate positive effects for English learners and promise for multicomponent interventions and those that include technology. Much more research is needed on how best to support language comprehension for underserved populations (e.g., students from low-income backgrounds) and how interventions can be optimized to support generalizable language and literacy outcomes.” Like others in this special issue, Silverman et al. push on narrow conceptualizations of SOR and suggest the importance of teaching language comprehension.

17. “What Constitutes a Science of Reading Instruction?” by Timothy Shanahan

emphasizes the point suggested by many in this issue: SOR is helpful to establishing instructional guidelines, but that SOR instruction is needed. As Shanahan writes, “If our goal is to determine how best to teach reading, then we must rely on data that evaluate the effectiveness of teaching, rather than depending solely or even mainly on studies of reading processes or of other non instructional phenomena, which are then applied to teaching through analogy or logical deduction or from premature conclusions drawn from empirical investigations that do no more than describe or correlate. The role of basic research in shaping instruction quite appropriately lies either in identifying pedagogical innovations that can be evaluated through studies of instruction or in providing evidence that further buttresses or explains the results of such experimental pedagogical study.” This work adds a critical lens to how SOR informs instruction and calls for more instructional work.

18. “Disrupting Racism and Whiteness in Researching a Science of Reading” by H. Richard Milner IV

challenges the field to consider race when interpreting and investigating SOR: “Drawing from critical theories in education, the multicultural education movement, and a developing conceptual framework that [Milner] calls disruptive movement to advance a racial justice agenda in the science of reading, [he] questions who builds knowledge, what counts as knowledge, and why knowledge is constructed in the science of reading.” As Milner writes, “Acknowledging the importance of students’ language and literacy skill development in their very early years of life, educators may set Black students up for failure when they refuse to recognize or do not have the frames to identify the language and literacy assets, strengths, skills, dispositions, mind-sets, and practices that these students already possess and bring into a classroom. With an empirical and analytic framework that only sees what is missing, what is ‘wrong’ with these students, Black students’ experiences in schools become dehumanizing from the very start of school....because the majority-White (80%) teachers in U.S. schools..., as well as those who study them, only or mostly see how these students are not like them or their own children.” Aligning with [Overcoming Racial Injustice: A Call to Action](#), a joint statement by the International Literacy Association and the editors of *RRQ*, the *Journal of Adolescent & Adult Literacy*, and *The Reading Teacher*, Milner critically considers what SOR (as it has typically been construed) means to scholars and readers of color, and more importantly, he provides a vision for what it could and should be.

19. “Contesting Science That Silences: Amplifying Equity, Agency, and Design Research in Literacy Teacher Preparation” by James V. Hoffman, Michiko Hikida, and Misty Sailors

takes a critical view on how SOR has integrated research on teacher education. The authors write, “We argue that the mantra of ‘science of reading’ is being used to silence the voices of literacy teacher educators and teachers rather than to invite the collective exploration of possibilities for re-imagining teacher preparation, an essential part of the scientific process. The effects of this silencing go beyond the profession and impact the public’s access to information and their understanding of the complexities of literacy teaching and the preparation of literacy teachers.” These authors share findings drawn from a large and dynamic database of research on literacy teacher preparation (over 600 empirical studies that were published between 1999 and 2018).” Issues of equity, agency, and design are also addressed. Ultimately, the authors share what they suggest is “the science that matters in growing more powerful literacy teacher preparation practices [that] is the version of science that invites us to imagine, dialogue, design, and innovate.”

20. “How the Science of Reading Informs 21st-Century Education” by Yaacov Petscher, Sonia Q. Cabell, Hugh W. Catts, Donald L. Compton, Barbara R. Foorman, Sara A. Hart, Christopher J. Lonigan, Beth M. Phillips, Christopher Schnatschneider, Laura M. Steacy, Nicole Patton Terry, and Richard K. Wagner

aims to consider “what constitutes evidence in the science of reading, and to offer a critical evaluation of the evidence provided by the science of reading.” These authors differentiate between points that have compelling evidence versus promising evidence versus a lack of evidence. Unsurprisingly, they note “that a large evidence base provides strong support for the explicit and systematic instruction of the component and foundational skills of decoding and decoding itself” as well as teaching of comprehension strategies, explicit instruction in key vocabulary, and text discussions. Less evidence is noted for specific programs (e.g., Units of Study) or for common instructional approaches, such as close reading, use of decodable text, sustained silent reading, multisensory approaches, and the three-cueing system, to support word recognition development. These researchers call for more research to “advance the science of reading to meet the needs of all students in the 21st century.”

21. “Rethinking the Role of Knowledge in the Literacy Classroom” by Courtney Hattan and Sarah M. Lupo

includes a critical discussion of the role of knowledge in SOR. The authors consider both how knowledge supports the reading process and whose knowledge matters. They write, “Knowledge plays a crucial role in comprehension, yet educators, researchers, and the public need to expand thinking on whose knowledge matters and reframe the knowledge gap; consider how knowledge will be activated, integrated, and revised during text processing; and reexamine what forms of knowledge are centered during instruction.” For example, they suggest moving beyond just content knowledge to attending to “cultural and linguistic knowledge, principled knowledge, strategic knowledge, knowledge of multimodal texts, knowledge of multiple text use, and conditional knowledge.” The main contribution of this article is to add nuance to considering knowledge: “Thus, we agree wholeheartedly with the notion that knowledge has an important place throughout literacy instruction and heavily influences the comprehension process. However, we caution educators, researchers, and other stakeholders to not oversimplify the role that knowledge plays in comprehension, and as a result diminish learning from texts by positioning students as deficient.”

22. “Aligning the Science of Reading With Adaptive Teaching” by Margaret Vaughn, Seth A. Parsons, and Dixie Massey adds nuance in the discussion of teaching related to SOR. The authors write, “We demonstrate that adaptive teaching is a vital characteristic of effective reading teachers and recommend that scholars—those who study reading processes and reading acquisition (i.e., SOR proponents) and those who study effective literacy instruction—work across epistemologies and methodologies to investigate the nuances of these processes in real-world classrooms, particularly in ways that eliminate homogenizing literacy practices (Campano, 2019).” This article connects the research on adaptive teaching with SOR. Here, the authors note, “in contrast to the SOR’s instruction of skills in isolation, adaptive teaching emphasizes an approach to pedagogy that focuses on teaching within authentic opportunities for learning, valuing the individuality of students, and connecting their cultural and linguistic strengths (Duffy, 2005; Fairbanks et al., 2010; Gambrell, Hughes, Calvert, Malloy, & Igo, 2011; Purcell-Gates, Duke, & Martineau, 2007; Purcell-Gates, Duke, & Stouffer, 2016). Adaptive teachers are flexible and skilled at teaching reading, using knowledge of reading acquisition and embedding instruction within students’ instructional needs and their rich literacies, cultures, and backgrounds.” The authors argue that emphasizing adaptive teaching is key “for scholars and educators to explore and examine the complexities associated with the teaching of reading that values students’ resources and backgrounds and acknowledges the complexity of teaching (Pearson & Hoffman, 2011; Vagle, 2016).”

23. “Expanding the Knowledge Base in Literacy Instruction and Assessment: Biliteracy and Translanguaging Perspectives From Families, Communities, and Classrooms” by Silvia Noguerón-Liu brings the perspectives of research with emergent bilinguals into the discussion of SOR. Noguerón-Liu synthesizes the research stemming from work with emergent bilingual students, arguing that “the complexity of the instructional, demographic, and sociocultural realities of emergent bilinguals in the United States requires solutions informed by various vantage points and perspectives. This complexity also calls for critical reading of scholarship, with attention to the generalizability of findings to emergent bilinguals, and to new developments in studies and theories.” Noguerón-Liu suggests the importance of families as partner, sharing research that “illustrated how parents and students rely on their literacy knowledge and histories prior to migration, as well as local community and school-based resources.” She also shares how extensions of oral reading assessments (i.e., considering translanguaging) can provide deeper understandings of children’s linguistic resources. Overall, a key takeaway is that when considering SOR, “a single, monolingual view of literacy is not enough to explain and support a student’s biliteracy development.”

24. “Resisting Positionings of Struggle in ‘Science of Teaching’ Reading Discourse: Counterstories of Teachers and Teacher Educators in Texas” by Melissa Mosley Wetzel, Allison Skerrett, Beth Maloch, Tracey T. Flores, Myra Infante-Sheridan, Jessica Murdter-Atkinson, Vickie Charlene Godfrey, and Allie Duffy suggests what is missed when SOR is followed in a narrow way. The authors explore experiences in integrating SOR directives within a program “guided by an anti-racist, social justice vision for teacher education to prepare teachers to build the critical stances, knowledge, and content to develop as strong and effective teachers and active resisters.” Importantly, this work pushes back on “position[ing] teachers and teacher educators as struggling and...[instead] present[s] “three counterstories that exhibit how teachers and teacher educators are exceeding the expectations of the framework by foregrounding more

complex, social-justice focused perspectives on readers and reading” This article adds an anti-racist, anti-oppressive, and contextualized professional knowledge lens to SOR discussions. The authors advocate that “perspectives and practices in reading instruction [that] focus on identities, values, and practice that can not only change student achievement scores in reading but also create spaces where teachers and students feel empowered and engaged. Cultivating agentive reading lives is ever more critical for students, teachers, and communities to work together to address endemic racial and other injustices in our world today.”

25. “Broadening the Lens on the Science of Reading: A Multifaceted Perspective on the Role of Academic Language in Text Understanding” by Emily Phillips Galloway, Janna Brown McClain, and Paola Uccelli

adds a sociocultural lens to SOR. The authors write, “Merging evidence from psychological models of reading comprehension, ethnographic research on language and literacy, and textual linguistics lines of research, [we take] the position that psychological models of reading comprehension often overlook written language comprehension and production as context-embedded, sociocultural processes.” What is particularly interesting about this work is that it moves the discussion of academic language from a static, skills-based approach to instead promote “critical rhetorical flexibility, or the skill to use language critically and flexibly for different purposes, in a variety of contexts, and with various audiences (Uccelli, Phillips Galloway, Aguilar, & Allen, 2020).” The authors review work showing that interlinguistic sensemaking can support students “to view the writer’s language as part of a cultural tool kit (Swidler, 1986) by investigating how writers’ uses of academic language reproduce or disrupt normative (often gendered, racialized, classed, and colonized) ways of knowing, being, and doing inquiry in academic communities of practice (Gee, 1990; Godley & Reaser, 2018; Love-Nichols, 2018; Skerrett, 2020).” The article discusses three key relevant understandings related to what academic language comprehension involves for a reader. These are “(1) familiarity with a set of academic language resources commonly found in school texts; (2) experience with the sociocultural practices of understanding and using the academic language of text within a particular sociocultural community; and, (3) alignment with or resistance to the reader identities implied by the language of the text.” Ultimately, the authors call for “innovative research and pedagogical approaches [that] are needed to broaden the conceptualization of language and reading comprehension relations from purely cognitive into one that embraces the reader’s interaction with a text as a sociocultural phenomenon.”

26. “Translational Science: A Road Map for the Science of Reading,” by Emily J. Solari, Nicole Patton Terry, Nadine Gaab, Tiffany P. Hogan, Nancy J. Nelson, Jill M. Pentimonti, Yaacov Petscher, and Sarah Sayko

focuses on the importance of translation. The authors note, “Despite scientific advances that have informed our understanding of reading acquisition and development, a profound gap exists between empirical findings and the implementation of evidence-based practices in the assessment and instruction of reading in school settings.” These authors argue that an effective model of translational science is needed because “there are many layers between basic science findings and teacher implementation that must be traversed.” They propose a road map for translation, with balanced attention, cultivating translational scientists, collective communication, and public engagement as “four critical intersections to consider for the translation of the SOR to everyday practice in classrooms and schools.” As the authors note, “We urge the multi-disciplinary scholars that make up the larger body of literacy and reading researchers to more consistently engage in meaningful ways with schools and communities and to coalesce around a research agenda that values and promotes the translation of research findings into authentic school and classroom settings.”

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Suggested APA Reference

International Literacy Association. (2020). *The science of reading: Supports, critiques, and questions: An executive summary of the Reading Research Quarterly special issue*.

About the International Literacy Association

The International Literacy Association (ILA) is a global advocacy and membership organization dedicated to advancing literacy for all through its network of more than 300,000 literacy educators, researchers, and experts across 128 countries. With over 60 years of experience, ILA has set the standard for how literacy is defined, taught, and evaluated. ILA's *Standards for the Preparation of Literacy Professionals 2017* provides an evidence-based benchmark for the development and evaluation of literacy professional preparation programs. ILA collaborates with partners across the world to develop, gather, and disseminate high-quality resources, best practices, and cutting-edge research to empower educators, inspire students, and inform policymakers. ILA publishes *The Reading Teacher*, *Journal of Adolescent & Adult Literacy*, and *Reading Research Quarterly*, which are peer reviewed and edited by leaders in the field. For more information, visit literacyworldwide.org.



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