Critical Issues in the Science of Reading: Striving for a Wide-Angle View in Research

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Abstract
This report reflects a panel presentation and discussion at the 2020 Literacy Research Conference focused on the science of reading (SoR). Each panelist presents a summary of the presentation and incorporates the comments of the Literacy Research Association (LRA) members attending the session virtually and posting in the chat room. Each presentation takes a critical stance on the possibilities for expanding the lens for the SoR. Concerns are raised regarding the narrow interpretation of the SoR and impact of this narrow conception on research, theory, and practice.

Practitioners, policymakers, and the public look to science for guidance in making important decisions. We have seen this in the science of climate change and more recently in the science of epidemiology with the COVID-19 crisis. The public's trust in science is

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compromised when policy takes leaps beyond the claims that are warranted by the science, when the rhetoric does not match the reality, when commercialization and profit become part of the equation, and when scientists begin to target each other rather than the science under scrutiny. Over the past several years, we have witnessed the rise of "the science of reading" (SoR) as a particular set of claims argued as truth by some but questioned by others (Goodwin & Jiménez, 2020). The associated uncertainties have sparked division and even confusion in the field of reading research and practice.

At the 2020 conference of the Literacy Research Association, a panel was assembled by the conference planners (Gwen McMillon and David Yaden) to examine "Critical Issues in the Science of Reading: Striving for a Wide-Angle View in Research." The organizers felt that the term "SoR" was being interpreted so narrowly in the literature to refer to the structure of English and code oriented reading instruction that the larger contributions of scientific research applied to learning to read were being ignored. The panel consisted of four literacy scholars and a discussant/facilitator. The format for this session was designed to be interactive with the four presenters given 3–5 min to address the topic of the "SoR" and "striving for a wide-angle view" from their unique perspectives. Sonia Cabell focused on attending to the scientific understandings of content knowledge and background knowledge in reading. Sandra Barrueco addressed the need for the SoR to focus on linguistically and ethnically diverse learners. James Hoffman drew attention to the consequences of a narrow interpretation of the SoR on teacher preparation. Etta Hollins expressed concerns for disparities in learning outcomes for traditionally underserved groups as the restricted view of the SoR may perpetuate systemic racism and linguistic supremacy in teaching practices. Finally, the discussant for the session, David Pearson, challenged the field to adopt a wider lens for the SoR as a *full and complementary portfolio* of epistemological, methodological, and ethical tools and perspectives. The discussion was then opened for participation to all those attending the session. Under the COVID-19/pandemic conditions and the "remote conference" structure, the "chat room" from Zoom was used to capture the comments, questions, and contributions of the participants.

We organized this report according to the content of the four presentations. Each author's original comments are complemented by additional insights based on the contributions from those participating in the session and draw on the transcribed version of the session reflecting entries in the chat. As we refer to the comments in the chat, we identify the contributors by name as their names appeared. We conclude with comments from the moderator.

Background Knowledge and Content-Rich English-Language Arts (ELA) Instruction

Sonia Q. Cabell

The national discussion on the SoR in the primary grades (*K*–2) has primarily focused on children's ability to decode words. Although automatic decoding is an essential

part of reading text, there is also clear consensus that listening comprehension—often referred to as language or linguistic comprehension—is critical to successful reading comprehension (Castles et al., 2018; Hoover & Tunmer, 2018). Many scholars have investigated contributors to listening comprehension by examining ways to improve the components of language, such as vocabulary, syntax, and morphology. Yet, efforts to improve these component language skills have exerted their greatest effect on proximal language skills (i.e., taught words) rather than on more generalized language skills as measured by standardized tests (Silverman et al., 2020).

A wide-angle view is needed when considering listening comprehension. In addition to language skills, the background knowledge that a person brings to a text is another essential contributor to listening comprehension, as described by theoretical models of comprehension (e.g., Stafura & Perfetti, 2017). Background knowledge about a given topic helps readers to make inferences, and to integrate new knowledge learned from the text with prior knowledge, to achieve a deeper level of comprehension (e.g., Pearson & Cervetti, 2015). Without the necessary background knowledge, it is difficult to adequately comprehend what is being read, much less learn from it. Language and knowledge are related, with some regarding vocabulary as the tip of the iceberg of a person's conceptual knowledge (Anderson & Freebody, 1981). Thus, intentionally and strategically building that knowledge could serve to accelerate language learning.

Yet, systematically building knowledge is often omitted from the discussion on the science of how to teach reading in the primary grades. In educational practice, knowledge has largely been viewed as needing to be activated prior to reading. But no amount of activation can help a student access knowledge that she doesn't already possess (Neuman, 2019). Thus, systematically building knowledge must be a central goal in the primary grades. Unfortunately, content area instruction often receives relatively little time and attention during these critical early years of schooling (e.g., Tyner & Kabourek, 2020).

One way that large public school districts in the United States have addressed this problem in the past decade is through implementing content-rich ELA instruction (Wexler, 2019). A key goal of a content-rich ELA approach is to leverage literacy instruction to cumulatively learn content related to the natural and social world. Although this is not a replacement for robust science and social studies instruction in the primary grades—a point reiterated in the Zoom chat by Greg McVerry—it is nonetheless a valid approach that infuses systematic content area learning into literacy instruction. Key features of this approach entail (1) planning units of study around content-area concepts (e.g., plants, farms, the human body), (2) using conceptually coherent text sets for student reading and for interactive read-alouds across a range of topics to intentionally build knowledge in a logical sequence, (3) explicitly teaching categorical relationships among words and concepts, and (4) engaging students in content-based discussion and writing activities designed to reinforce knowledge building (Hwang, Lupo, et al., 2020).

Experimental approaches that integrate literacy and content knowledge instruction (in either ELA or in the content areas) in elementary school settings have

demonstrated significant, moderate-to-large effects on students' vocabulary and comprehension, including generalized comprehension outcomes measured by standardized tests (Hwang, Cabell, & Joyner, 2020). When closely examining the extant literature on *K*–2 content-rich ELA instruction, there are only a handful of published studies that are experiments or quasi-experiments meeting the What Works Clearinghouse standard of rigor from which a causal inference can be drawn (Institute of Education Sciences, 2017). Although this is a small pool, these studies show promising effects on students' language and knowledge, with some significant effects on generalized comprehension and science knowledge (Connor et al., 2017; Kim et al., 2021; Neuman & Kaefer, 2018; Vitale & Romance, 2012).

Beyond these studies, investigators are currently examining widely used, commercially available content-rich ELA core curricula. In two randomized controlled trials conducted recently by my team, we found that when teachers in large urban districts in the United States used a kindergarten content-rich ELA curriculum (i.e., *Core Knowledge Language Arts: Knowledge Strand*; Core Knowledge Foundation & Amplify Education, 2017), there were significant effects on student learning not only on the words and knowledge taught in the program but also on more generalized measures of children's vocabulary and science knowledge (Cabell & Hwang, 2020). These effects on standardized measures are rare in interventions that focus on improving language alone (Silverman et al., 2020).

The evidence base thus far is small, yet promising, and demonstrates that content-rich ELA instruction can serve as an important context for simultaneously building students' language and knowledge in the primary grades, with the ultimate goal of improving students' comprehension. Future studies are needed in this area that examine nuances in this approach, as well as implementation across multiple school years, because knowledge and language take time to build (Neuman, 2006).

In the session's Zoom chat, two key issues were raised. The first is: *What type* of knowledge counts? Referencing a recent article (Hattan & Lupo, 2020), Courtney Hattan encouraged attendees to think beyond content knowledge and stated, "We certainly need to broaden the definitions of knowledge and center varying forms of knowledge, especially students' assets." For example, educators can value and recognize the funds of cultural knowledge (Moll et al., 1992) and linguistic knowledge (Orellana, 2015) that students already possess.

A second, related question was asked by Lara Handsfield, "*Whose* knowledge counts?" This indeed is the perennial question that inevitably is raised during a discussion about building students' knowledge. When thinking specifically about the science and social studies context, Lauren Padesky wondered, "Who gets to decide what content is worthy of study in the content-rich ELA classroom? Science and social studies topics are obviously critical, but whose stories and ideas are getting attention?" While there are certainly no agreed-upon answers here, some argue that, regardless of whose knowledge is taught, it is important to have shared topics of knowledge to which all individuals are exposed to foster societal discourse (Hirsch, 2016). When there is a lack of consensus on issues as critical as what or whose knowledge to teach,

it may be that we don't know where to begin, so we don't move forward. But as Gina Cervetti eloquently put it, "ignoring knowledge is not the answer; opening the envelope of what counts is the answer."

Let's widen our lens on the science of how to teach reading in the primary grades beyond its current focus on improving decoding ability, which is necessary but not sufficient for reading proficiency. In addition, let's widen the lens on how to improve listening comprehension to consider ways to simultaneously build both language and knowledge during ELA instruction. And remember, it doesn't take away anything from reading instruction to also make it content rich.

Issues in Language Research and Measurement: A Wide-Angle View With Linguistically Diverse Children and Communities

Sandra Barrueco

The proportion of linguistically and ethnically diverse communities continues to expand over time (U.S. Department of Education, 2021). For example, nearly one in three young children in the United States are Dual Language Learners (DLLs), who are children who range in their English proficiency in English and who have a parent who speaks a language other than English. In addition, pockets of growth of the DLL populations of greater than 40% have been evidenced in some states over a 5-year period (e.g., Park et al., 2017; U.S. Department of Education, 2021). To address this increase, four "wide-angle" recommendations for strengthening research practices and approaches with DLLs are provided, consistent with the conference's resolute theme of "collaborate for impact."

First, the field must collectively commit to engaging in research with linguistically diverse communities by contributing to the advancement of theories, pedagogy, interventions, methodologies, measurement, and more. As the literacy research field continues "striving for a wide-angle view in research," it is a call to *everyone* in the field to thoughtfully, carefully, and steadfastly engage in linguistically diverse research and to develop knowledge, skills, and contributions with these communities. The alternative is continued status quo of awaiting advancements rather than propelling them; post hoc incorporations of linguistic diversity considerations in theory, methods, practice, and interpretations; and marginalization of these communities in research and, ultimately, evidence-based practice.

Second, policy implications based on research advancements are urgent concerns for the field, as evidenced in this plenary session's dynamic chat session. Participants described a need (1) to strengthen the utilization of the full array of literacy research for developing policies (rather than a narrowed focus); (2) to enhance mechanisms and dialogue among researchers, organizations, communities, and policymakers; and (3) to attend to issues related to policy, advocacy, and politics. The dialogue was consistent with the conference's call for the "identification of 'pockets of hope' to

collectively develop and implement plans and projects *that will impact the field* [emphasis added]" (McMillon, 2020, p. 6). The application of research for strengthened policy development is a particularly key issue for DLLs, where developments have been made while much work remains. For example, federal requirements to improve screening and assessment practices of young bilingual children throughout the United States (including the tribal and migrant communities) have been implemented in Early Head Start and Head Start (U.S. Department of Health and Human Services, 2016). In addition to incorporating our research, the policy included US$3.5M yearly in fiscal supports to implement and sustain the new requirements for DLLs.

Third, the field must commit to comprehensive literacy research in strong collaboration with linguistically diverse communities themselves in addition to policy stakeholders. To make deep and innovative advancements, the field's developments should not and cannot be narrowly focused nor developed solely in an academic silo. "Rotating our lens" in partnerships among families, schools, and research and emphasizing the central expertise of family systems is needed (McWayne et al., 2019).

The recent success of the first nationally representative study of its kind with Migrant and Seasonal Head Start (comprised primarily of DLL children and immigrant families) resulted from a commitment from its inception to co-construct every aspect of the study with both families and educators—inclusive of theory development, research questions and design, implementation, and more (Barrueco, 2019). Further, a comprehensive approach to examining multilingual language and literacy processes was employed in this multistage cluster investigation incorporating stratified randomized sampling with over 1,400 participants. Existing DLL measures (such as bilingual child assessments and parent–child reports) were utilized and new ones developed (such as parents' and teachers' vital perspectives on DLL development and teacher preparation, as well as classroom observations of linguistic, literacy, and cultural supports and instruction; Barrueco et al., 2016; Barrueco et al., 2017; Caswell et al., 2019). With initial federal funding from the Office of Planning, Research, and Evaluation and now supported by a Spencer Research-Practice Partnership grant, the work of analyzing results with practice and policy relevance continues in full collaboration with the community.

Finally, the field must commit to utilizing, examining, and developing measures with solid psychometric, linguistic, and cultural properties with *all* children, including DLLs (Barrueco et al., 2012). Such measures would result in (a) appropriate referrals, identification, estimation, and opportunities for instructional support; (b) holistic evaluation of pedagogical approaches, training, programs, and interventions; and (c) research innovations, encompassing methodological advances and translation into practice and policy. As such, it is critical for the field to be aware that a label or description of "reliable and valid" is not necessarily true. Rather, there is extensive variability among multilingual measures, with some measures even inappropriately presenting data obtained from the English version for the Spanish one. In 2012, over one third of Spanish measures for young children were inadequate, including the most

extensively used measures in research, practice, and policy (Barrueco et al., 2012). For example, a number of assessments continued to be rudimentary translations or worse. Other measures had undergone the detailed qualitative and quantitative processes essential for appropriate measurement development (such as language and content expert panels, item and latent statistical analyses to identify potential biases, statistical equivalence approaches, and more). An example is the Preschool Languages Scales-fifth edition in English and its Spanish-Bilingual Edition. Positively, there are many well-developed measures available and others on the way. The field can, and the field should, utilize them. With inroads made in various areas of literacy, further DLL measurement development is particularly needed in comprehension and knowledge development (Barrueco & Fernández, 2015), which were domains deeply discussed during the plenary presentations and participant chat.

Advancing a broadened perspective in language and literacy initiatives with diverse communities requires the type of commitment displayed during the plenary session. It was prominent in the powerful presentations provided by fellow speakers and the chat box exploding with participants' individual and collective expertise. Building upon such dedication and knowledge with a broader array of researchers "collaborating for impact" with DLLs can propel the field even further. In doing so, partnerships among researchers, policymakers, and community members must continue to be cultivated with careful attention made to DLL measurement approaches. Uniting a "wide-angle view" with a "rotated lens" will yield a clearer road ahead for our science, practice, and policy endeavors with and for linguistically diverse children.

Science That Silences in Literacy Teacher Preparation

James V. Hoffman

In 1994, Ron Carver founded and served as the first President of the Society for the Scientific Study of Reading. Ron was committed to the application of quantitative research traditions to understanding "reading" as a psychological process. As a doctoral student at the University of Missouri at Kansas City, I served as Ron's research assistant for 2 years. Ron introduced me to the Literacy Research Association (then the National Reading Conference) at the 1975 conference in Kansas City.

Ron died in 2004 at the age of 65. He had a huge influence on my career and on my understanding of educational research. I studied with him. I published with him. And I often disagreed with him—something he appreciated in our relationship. While I obviously cannot speak for him, I am confident that he would have been outraged by the claims being made in the name of the SoR toward teachers, teaching, and teacher preparation. Ron was a fervent humanist and a no-nonsense researcher. He would not have been silent in the face of warrantless claims but would have publicly and professionally spoken out in defense of real science and against the baseless mandates that place unreasonable constraints on our literacy teaching practices.

He would not have been silent. Nor should we. The claims advanced in the public media (e.g., Hanford, 2019), in *Education Week* articles (e.g., Schwartz, 2019), and through foundations like the National Council on Teacher Quality (e.g., Drake & Walsh, 2020) regarding the poor quality of literacy teacher preparation and lack of attention to content in particular are not just flawed and unfounded in evidence—they are anti-scientific. This coordinated attack on public education is based on misinformation that does not hold up under the scrutiny of their own proclaimed standards for scientific evidence (see Hoffman et al., 2020).

Our universities are threatened directly by the National Council on Teacher Quality's (NCTQ) partnership with *US NEWS and World Report* through the ranking of university programs based on the NCTQ "scorecard" for fitting into their interpretation of the SoR (Greenberg & Walsh, 2012). This is high stakes territory for the business of higher education. While I have taken pride in the fact that the institutions I have been associated with have consistently received "F"s on our report cards, this is not a matter to make light of. The pressure to conform is very high. Policy mandates are shaping the practice of literacy teacher preparation—not research.

Many of the most renowned scholars in our field and their work have been dismissed with claims of whole language associations. It is McCarthy era like. Programs like the Literacy Collaborative, the Calkins' Units of Study, Reading Recovery, and others have been dismissed in recent publications as ineffective—without any evidence to support that claim. Running records and miscue analysis are now framed by NCTQ as inappropriate for teaching and teacher preparation. The NCTQ proposes, as an alternative to these assessment tools, commercial tests authored by proponents of the SoR agenda as represented in the NCTQ assessments of quality teacher preparation. Who speaks out in defense of our profession? The SoR has silenced us.

I argue here that the wide-angle lens we need to take up toward the SoR is a focus on the very real consequences of this movement. We (as in the members of the Literacy Research Association) have an agenda, a research agenda that we need to pursue. This agenda is directed toward equity, design, and imagination (Hoffman et al., 2020). We should be paying attention to this agenda, but how can we in the context of these attacks? Our research journals are filled with important theoretical, conceptual, and practice-based writing on culturally and linguistically sustaining pedagogies. What does all this research matter if teachers have no degrees of freedom to adapt their teaching in caring for and responding to their students' literacies?

The situation is horrific in the State of Texas. Every teacher in the state is being required to participate in "training" on the SoR following Louisa Moats's (2005) Language Essentials for Teachers of Reading and Spelling (LETRS) program—a program that earned the International Dyslexia Association's highest accreditation level but has scant effectiveness data to support it and no data to warrant a massive "inoculation" of teachers. Even in the midst of the pandemic, when the governor of the State of Texas halted the state-wide testing program, there was no pause in the SoR trainings.

All preservice teachers in Texas are now required to pay for and pass a standardized test developed by Pearson based on the SoR standards (Gewertz, 2020). The Pearson

exam follows 80 plus competencies issued by the State of Texas that frame literacy and teacher knowledge in the discourse of the SoR. Of course, we (as literacy teacher educators) are responsible for preparing our students for the exam while trying to push back on narrow constructions of what counts as literacy and literacy teaching.

One of the test sections in the exam requires a constructed response (an essay) composed in response to a case profile with data presented on a child's rapid letter naming, nonsense word reading, and more data that objectify rather than humanize the child. The respondent is basically asked to identify what's wrong with this child and what a teacher should do to fix the problem. This is what I learned to do in the late 1960s—position learners as having problems in need of fixing by a teacher who is prepared to fill in the gaps. The deficit discourse generated through this process is devaluing of readers and their strengths. Further, the SoR agenda is taking us back to the study of "reading" in isolation from oral language, writing, language diversity, and cultural identities—a battle that we have taken up over the past decades and on which we have made enormous progress. If you look at the basis for the test construction, you will see that it is explicitly drawing on the standards from the International Dyslexia Association. The International Literacy Association's standards are not even mentioned.

The SoR has become a policy for profit initiative that is undermining our profession and public education. As Kathleen Alley pointed out in the chat: "SOR is extremely aligned with commercial programs that make people sharing their 'research' money." This movement is taking from teachers their ethical and moral responsibility to be knowledgeable and adaptive in their teaching of literacy but rather demands that teachers follow scripted programs.

We can meet and we can discuss but what will we do? On the night before I participated in this plenary session, I attended the Black Lives Matter plenary session at the LRA conference. This was, for me, the single most powerful, inspiring, and consequential session in my 45 years of attending LRA—and I don't think I'm alone in saying this. But will we now just carry on as if this dialogue around race and the dialogue around the SoR agenda are separate and not intersecting?

The International Literacy Association has done nothing to counteract the SoR (just as they have failed to stand up against the high stakes testing movement, have failed to embrace expansive views of literacy, have failed to respond to the dyslexia agenda rolling out across the country, and have failed to lead and challenge the vicious attacks on our profession). Greg McVerry pointed out that the "Science of reading IS anti-science . . . and we cannot be an apolitical organization anymore. . . . "

If we expand our lens on the SoR to focus on its impact, we will see how teachers, teacher educators, and children—and in particular children of color—are being oppressed. Will we allow science to silence us? I am in the hope that the leaders in LRA will contribute with ideas for action. Margaret Vaughn's challenge in the chat called for such action: "How can LRA be used as a platform to promote what Jim and others are sharing—contesting current practices—advocating for teachers and students?" Darian Thrailkill also commented: "What other venues could LRA try to

participate in, spaces valued by other educational stakeholders—this research focused space is comfortable for us, how do we make inroads into spaces where teachers, parents, students, etc. are most comfortable[?]" Ultimately, it is on us to disrupt the agenda of silencing through science, by raising our collective voices with claims supported by evidence.

Issues of Race in Literacy Research and Pedagogy

Etta R. Hollins

A primary challenge in applying the SoR to practice is the perception of beginning literacy as generic and embedded in the linear, segmented, and sequential analysis of decontextualized structural linguistic units applicable to *all* learners and languages, including those languages codified as logographic, syllabic, and alphabetic and also including learners from diverse experiential backgrounds, cultures, and those with special needs such as hearing impairments. In this generic view, failures in learning to read are attributable to neurological deficiencies (Ralph & Patterson, 2005; Rastle, 2019). This perspective on the SoR prioritizes an approach that systematically advantages children with a specific cultural and linguistic socialization and disadvantages those from different cultural and linguistic traditions. Further, literacy instruction based on this perspective has the potential for systematically denying access to literacy for children from specific cultural and linguistic traditions in patterns that provide evidence of systemic racism and linguistic supremacy in teaching practices. However, a wide-angle lens on the SoR involves a more complex view of the processes for reading and learning to read that address the influence of variations in background knowledge including culture, experience, language usage, subject matter, and values that require consideration when planning reading instruction and interventions for correcting reading difficulties.

Disparities in learning outcomes for traditionally underserved groups provide evidence of systemic racism and linguistic supremacy in commonly used teaching practices. Early literacy teaching practices are often grounded in synthetic phonics instruction (Baumann et al., 2000). These practices have fostered a disproportionately negative impact on literacy development for traditionally underserved children as indicated by informal reading assessments, standardized assessments such as National Assessment of Educational Progress (NAEP) (NCES, 2017), disproportionate repeating of a grade level in elementary school, disproportionate placement in special education, and discrepancies in high school graduation rates. Evidence that the issue of low academic performance in literacy is not inherent in the culture, linguistic tradition, or life circumstances of the children is apparent in the fact that there are a few high performing elementary schools where the majority of students are from low income and traditionally underserved ethnic minority groups (The Education Trust, 2015). Further, there are a few individual teachers in low performing schools whose students perform at or above proficient in literacy (New Teacher Project, 2012, 2013).

Developing more productive approaches to reading instruction calls for teachers and researchers to develop shared perspectives and common ground. Researchers need access to documentation on teaching practices enacted over time, students' responses to learning experiences, and social arrangements in classrooms that support student learning. Teachers need trustworthy research that directly informs practice.

First, trustworthy literacy research aimed at improving teaching practices requires a shared conceptualization of the act of teaching that supports the identification and location of problems of practice. For example, Hollins (2011) describes teaching as *an interpretive practice* that involves the ongoing and continuous process of planning and enacting learning experiences and teaching practices; observing, documenting, and analyzing students' responses to learning experiences; and interpreting and applying instances and patterns of students' responses in the next learning cycle. This is referred to as the teaching cycle. When the teaching cycle is coupled with a learning cycle, it enables teachers to view challenges in learning faced by the children within one of these cycles rather than as a deficit attributed to an individual child. Such an understanding of the teaching process provides common ground for teachers and researchers to examine challenges in literacy development. Problems in teaching and learning that have been identified but remain unresolved by teachers require investigation and guidance from researchers.

Second, improving student learning requires consistent documentation of teaching practices and teachers' observations of students' responses to instruction. Presently, such documentation is not a regular professional practice for teachers as it is for other human service professions. Traditionally, teachers develop abbreviated lesson plans required by administrators and develop reflective statements when referring a student to be evaluated for special education or recommended for repeating a grade level in elementary school. However, these practices are not equivalent to the real-time and ongoing documentation of students' responses to learning experiences that reveal how, when, where, and with what they struggled. Such documentation over time can reveal patterns in the relationship among learner attributes, learning experiences, and learning outcomes that provide information for preventing or correcting reading difficulties.

Third, how teachers plan instruction is seldom the subject of research. Planning instruction is a complex process that goes far beyond the abbreviated lesson plans required by administrators. It requires deep knowledge of reading as subject matter, perspectives on learning, specific learners, and a repertoire of pedagogical practices from which to choose as appropriate for learners and learning goals. It is well established that learning is more productive when new knowledge is connected to what children know and have experienced (Gay, 2018; Gutiérrez & Rogoff, 2003; Hollins, 2015; Nash & Panther, 2019). This is important because children come from different cultures, linguistic traditions, and experiential backgrounds that influence the development of their cognitive structures and mental processes. How and the extent to which instruction is responsive to individual learners, or should be, often requires information that is not available to researchers.

Fourth, managing reading instruction and supporting student learning requires theoretically and conceptually based rituals and routines (Hollins, 2012). These rituals and routines are more than mere conveniences for organization. They teach essential skills for learning to read. Well-designed classroom rituals and routines make transparent aspects of children's academic, social, and psychological growth and development that could be otherwise obscured. An important point of inquiry for researchers is the identification of classroom rituals and routines that benefit traditionally underserved children in developing specific skills associated with learning to read using synthetic or systematic phonics instruction.

Toward a Complete SoR

P. David Pearson

My role in LRA's SoR session was to take the wide-angle lens metaphor seriously by contextualizing the SoR controversy in the broader social, cultural, and scholarly contexts in which it is currently playing out. First, a few framing comments about the role of science in American society and in educational research and policy, including literacy scholarship.

Ambivalence toward science. Science in America is both hero and villain. We have a love hate relationship with it. On the one hand, we extol it as the economic engine that provides us with greater prosperity for a wider swath of Americans across the income distribution. We brag about our overall production of wealth and greater efficiency when we compare ourselves to other economies. We even credit higher education with a central role in producing the expertise that yields the ideas, discoveries, and efficiencies that drive the prosperity we extol. On the other hand, we place limits on its roles and application. Science, yes, but only if and when it comports with our own, often flawed, notions of common sense, reason, beliefs, or the First Amendment. We accept science if it is convenient to do so but seldom when it is at odds with our version of the truth about things. I cite the persistent resistance to COVID-19 mitigation measures as compelling evidence of our fickle relationship to science as the arbiter of policies of all sorts. We also marginalize research when it bumps up against what we take to be our rights and civil liberties as American citizens. How many assertions of the right to freedom of expression, assembly, or religion have we seen for rationalizing compromises with the science of COVID-19 control?

In education, we are equally as ambivalent toward scientific argumentation as the basis for our policies. My favorite example comes from the days of No Child Left Behind and Reading First. We adopted policies that recommended phonics first and fast by citing (albeit questionable) empirical research evidence (we blessed it with the name scientifically based reading research) from the National Reading Panel (National Institute of Child Health and Human Development, 2000), but we often delivered the research message to teachers in hire-the-hall staff development

programs that, while convenient and popular, were at odds with any and all evidence about the effectiveness of approaches to teacher learning (Wilson & Berne, 1999).

Many meanings for one term. In the current debate about the SoR, it is clear that scholars possess different meanings for the phrase. For some, it is the *basic research* done to understand how the brain works during expert reading. For some, it is *applying rigorous experimental standards to pedagogical research*. Our panelists, Sonia Cabell and Sandra Barrueco, highlighted the application of rigorous methods to aspects of reading beyond decoding—oral language, vocabulary, comprehension, and with regard for English-language learners. For still others—the presentations by panel colleagues Jim Hoffman and Etta Hollins illustrate this perspective vividly—it is acknowledging and *accepting responsibility for the dehumanizing impact of science* when it reduces the value of individuals to a single number, category, or observation. I appreciate the importance of these meanings, each of which was present across the contributions to this plenary session and the lively chat room discussion. And all have been well-represented in recent scholarly publications, most notably the recent issue of *Reading Research Quarterly* focused on the SoR. To this list, I would add my favorite personal meaning—the SoR as a *full and complementary portfolio* of episte-mological, methodological, and ethical tools and perspectives. This is a point I would have brought to this conversation quite irrespective of what anyone else had to say in our session. This is true largely because it represents a deeply held value for me across my now 55-year journey toward becoming a literacy scholar.

SoR as an inclusive portfolio. This meaning is the counterpart of the, "it takes a village to raise a child" homily. My version is, "it takes a full and complementary satchel of methods, lenses, and epistemologies to make a science of reading." I accept the premise (see National Reading Council, 2002) that it is foolish to take out one tool to examine a phenomenon as complex as the learning, development, and teaching of reading. Complexity demands complementarity in our search for explanation and improvement. So, I want

- randomized field trials, especially for policy guidance.

Just like I do for vaccinations or new medical or pharmaceutical practices. But those randomized trials are the last 10% of the story of science. We must not privilege that small portion of the scientific journey over the other 90%. We also need

- careful descriptions of phenomena in their natural settings (which biologists, chemists, and physicists have done for centuries),
- examinations of natural correlations among variables in a particular setting (so we can judge the cumulative effect of persistent covariation), and
- natural experiments (where serendipity does by circumstance what experiments do by intention).

Other tools are needed in the satchel:

- data gathered in the name of theory building and evaluation (not unlike some of the basic research mentioned earlier in the SoR) to ensure a rich pipeline of insights about how cognition interacts with culture and context to promote the magic of reading,
- design experiments—those wonderful, planful, incremental approaches to examining features of interventions in real learning situations (to ensure that we understand how things work out there),
- qualitative forays into the worlds of teaching and learning and implementation, using tools such as ethnography and critical discourse analysis, to unearth...

  - plausibilities up front,
  - consequences (both intended and unintended) on the back end,
  - up close and personal accounts of practices to provide better explanations of why things do and don't work and, when they work, what were the "active ingredients" that propelled them, and
  - situated understandings and generalizations about how and why things work the way they work where they work.

But all of these tools will be useless unless we accept the most fundamental premise about the role of research in a democracy that espouses commitments to equity, opportunity, and justice: The role of research is to improve the quality of life for all of its citizens. A lot of work left to do, but we made a good start on December 2 and 3, 2020.

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