



Debunking myths about co-opted reading science

Researchers who conduct reading science push back on the idea that a single teaching approach will cure America's literacy problems. Comprehension is the next big hurdle.

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Robin Chenoweth: This time last year, many Americans reacted in shock to news that probably shouldn't have surprised them.

NBC Nightly News: The numbers are alarming. Only about 33% of America's fourth-graders can read proficiently. Now districts are taking a hard look at what went wrong and how they can reverse it.

Hopeville: How to Win the Reading Wars: "Rules need to change!"

"How can you not be worried sick about the future of this country? Our educational system is in crisis."

Robin Chenoweth: But the decline in national reading scores wasn't unexpected by those closest to the problem. Schools had been working for more than a year to overcome the impact of months of remote learning during the COVID-19 pandemic. Improvement wouldn't happen overnight, but many states and districts were quick to act.

NPR: Dozens of states have passed laws or implemented new policies related to evidence-based reading instruction.

NBC News: Students are getting back to basics, learning to read with an emphasis on phonics like kids did decades ago.

CBS News: California could become the next state to make the shift toward this mandated science of reading approach.

WOSU: The new department plans to require the science of reading in Ohio elementary schools. The method teaches kids to learn words by sounding them out instead of memorizing them.

Ohio Governor Mike DeWine: The science of reading is the key.

Robin Chenoweth: There's a problem with that. The science of reading is not a curriculum. It is not a prescriptive phonics-only teaching approach. It is a massive body of evidence spanning more than 50 years and thousands upon thousands of studies written in multiple languages. And it is a term that some scientists who've done those very studies feel has now been appropriated by politicians, the media and others who don't understand the scope of the science.

Shayne Piasta: The term has been used in ways where it's referencing kind of a phonics-first, phonics-only approach, which is not accurate. ... Some people are calling, we should get rid of the term because it's been co-opted now. ... I would argue that education scholars and the education community, writ large, should do a better job in defining what science of reading is so it is not co-opted to mean something that is much more narrow than what that term actually refers to.

Robin Chenoweth: What does true reading science say about how to best help all children become proficient readers — and not stop there, but lead them to a deep love of reading that will impact them over a lifetime? In this episode of the Ohio State University Inspire Podcast, we talk to Ohio State's Shayne Piasta — who has contributed to the body of reading science more than 50 research studies totaling over \$47 million — about the need for phonics but also other critically important skills that children must develop to reach the end-goal: to comprehend and act upon what they read. And two top researchers of educational neuroscience help us delve into the amazing ways that the brain works and reconfigures itself, as people learn to read. I'm Robin Chenoweth. Carol Delgrosso is our audio engineer. Inspire is a production of the College of Education and Human Ecology.

Robin Chenoweth: It's true. American fourth-graders and eighth-graders scored lower on national reading assessments in 2022. The average reading score for both groups fell 3 points compared to 2019, to 217 and 260, respectively, on a scale of 0 to 500. But what most news reports didn't explain was that those scores had scarcely budged in the last 30 years. In fact, the 2022 scores [are exactly what they were in 1992](#), with little variation in between. Here's Shayne Piasta, professor of reading and literacy in Ohio State's College of Education and Human Ecology.

Shayne Piasta: Folks talk about a crisis right now in reading education. And I see it as more of, this has been chronic. I think COVID just put more of a spotlight on it. So, we did see a dip due to COVID. I'm very confident that we will go back to where we were, but then the goal is always to actually move beyond that and be better supporting these students.

Robin Chenoweth: In fact, a report by Stanford and Harvard universities, measuring 2023 individual state achievement tests, shows that certain districts already have returned to pre-pandemic reading scores. These include several urban districts, including Chicago and Cincinnati. The report says that in districts in 30 states, students recovered one-quarter of the pandemic-era loss in reading, far exceeding what they learn in a typical year. But the gains were uneven; children in poverty and students of color remain disproportionately impacted. More data is needed, Piasta says.

Shayne Piasta: Districts are looking at their own data. And that's great, but I don't know that we have any conclusive information as to what scores are doing at this moment.

Robin Chenoweth: In 2022, and in 2019, more than a third of fourth-graders scored below the National Assessment of Educational Progress's most basic level, meaning they struggled to decode words and interpret what they read. To address that, research makes clear: Early readers do need phonics — an approach that teaches kids to correlate sounds with letters and sound those letters out to form words.

KCRW: Children: Hips.

Teacher: Tap it.

Children: H-I-P-S

Teacher: One more time; one more time.

Children: H-I-P-S

Robin Chenoweth: The curricular restructuring in many states focuses on phonics. It's the latest in the nationwide tug-of-war, dating back to the 1840s, about how to best teach reading. But if you consider the science, Piasta says phonics is just one of several of what are called "code-focused skills" that emerging readers must develop to be successful. Her early research centered on these skills, in part determining that children should know at least 18 capital letters and 15 lowercase letters before kindergarten. That benchmark was adopted by the federal Head Start Program.

Shayne Piasta: It's not as easy of a task as we might think it is ... Letters aren't equally easy or difficult to learn. So, a letter like W tends to be really challenging for kids and might need more instruction than ... the letter B.

Robin Chenoweth: But there's more to code-focus than just phonics. Besides corresponding letters with sounds, learners also must develop phonemic awareness, or recognize letter sounds in spoken words. As they begin mastering these skills, phonics instruction helps them to read and spell. But they also must develop fluency at reading words, both common, at-a-glance "sight words" and those they have practiced sounding out. These are approaches that Ohio State University has for years taught to its preservice teachers.

Shayne Piasta: The code-focused skills are critically important. And I think we've gotten better and better at supporting those. ... I always say that phonics is absolutely necessary but

insufficient on its own. And so, I think this focus on the phonics piece is really coming from the idea of the reading wars that have happened over decades. This idea of, we either teach phonics or we immerse kids in high quality literature and teach phonics only when necessary. ... I do think there's a need, in schools or in districts to do more in terms of providing systematic, explicit, phonics instruction within their comprehensive reading or literacy program. But we should not only be doing that. Language and comprehension and conceptual knowledge are really, really key in order for us to understand what we read and make meaning from what we read.

Robin Chenoweth: For children taught using a phonics-only approach, the evidence shows that some of them will later struggle to reach the ultimate goal — comprehending what they read. A longitudinal study by Elizabeth Hadley at University of South Florida might provide some clues about why. Hadley followed children from pre-K through first grade, from 2020 to 2022, then compared their emerging reading skills to same-aged students she studied pre-pandemic.

[Elizabeth Hadley](#): What we see here is that the phonics and foundational skills and the grammar and writing, there aren't as big of differences here, right? We don't have as large amounts of learning loss.

Robin Chenoweth: This despite that those children spent part of that time learning remotely. Even without in-person teaching, their phonics skills were similar to those of the control group. But, critically, by the end of first grade, the students' reading comprehension fell significantly compared to the pre-pandemic group.

Elizabeth Hadley: By the end of first grade we can see that comprehension... that's about a 5 point, 6-point difference in comprehension skills...5-points, 6-points of learning loss.

Robin Chenoweth: That could mean trouble down the line for American children. Shayne Piasta.

Shayne Piasta: It could be that kids are gaining mostly in these foundational skills. And when we're going to see the big differences are going to be in reading comprehension, which of course, is what's most important.

Robin Chenoweth: Comprehension is part of a second category of skills — called meaning-focused skills — that some new reading programs might short-change. These are less understood and much harder to teach, Piasta says. They include vocabulary, understanding spoken language and making inferences about ideas in the text. Piasta's latest research explores how to help students progress beyond just decoding words — to comprehend and act upon what they read. More about that in bit. Let's first try to unravel what goes on in the brain when someone learns to read.

Rebecca Gottlieb: My name is Rebecca Gottlieb. I'm a human developmental psychologist and educational neuroscientist. I'm working at the University of California, Los Angeles, in the center for dyslexia, diverse learners and social justice. I'm an assistant researcher.

Robin Chenoweth with Rebecca Gotlieb: So, you wrote that decoding written language is highly unnatural. Why is that?

Rebecca Gotlieb: That's exactly right. Our brains didn't evolve to read. Instead, we compensate for it by having high quality reading instruction to help each new reader build a reading brain. Homo Sapiens evolved roughly 200,000 years ago. There's substantial uncertainty about the timing, when skills like spoken language, or analogical, inferential thinking evolved. But that was much earlier than reading skills. Humans have only been reading for about 6,000 years. From an evolutionary perspective, reading is too recent of a cultural invention to have changed the way our brains are naturally built. So what educators are doing when they're teaching students to read is literally helping each new reader build a reading brain through a process that Stanislas Dehaene has called neuronal recycling, in which parts of the brain that evolved for other tasks, totally unrelated to reading, tasks related to vision and auditory processing and speech and affect, are repurposed. And new connections are formed across them to enable us to read.

Robin Chenoweth: Teachers, Gotlieb and her colleagues say, are entrusted with the Herculean job of helping young brains build an entirely new circuit.

Rebecca Gotlieb: It can be hard to disentangle the multiple cognitive and linguistic and perceptual and self-regulatory skills that are all happening at once in service of active reading, but neuroscience can help us tease some of that apart. We're seeing the brain sciences validating what many educators have known intuitively that supporting reading development means supporting multiple different skills. ... From a neural perspective, we know that learning to read is this beautiful and incredibly complex task. It involves building connections across all four lobes of the cortex and subcortical regions and even the cerebellum, or what's often called our evolutionarily older brain. And this complexity reflects the fact that reading involves visual and linguistic and cognitive and affective processes, and areas of the brain that are involved in each of those have to be harnessed, repurposed and connected to one another, in order to support the act of reading.

Robin Chenoweth: So, the reading brain is a bit like a symphony, with different parts firing and networks coordinating to produce knowledge and meaning-making for the reader. The more the components rehearse their parts, the more defined those pathways become.

Rebecca Gotlieb: There are these multiple, different areas that are involved in the brain to support reading, and they each have to be connected in this very delicate way. So, it's easy to see how challenges could emerge when we think about just how complex that process is, from a neural perspective. So, understanding the multiple different reasons that reading challenges can emerge is really important so that we don't miss students who are struggling with reading, so they don't get overlooked. And so that we are matching students who are struggling with reading with the types of supports that they need in particular.

Ola Ozernov-Palchik: My name is Ola Ozernov Palchik. I am a research scientist at the McGovern Institute for Brain Research at MIT. And I also teach at Harvard Graduate School of Education.

Robin Chenoweth with Ola Ozernov-Palchik: Can you tell what's going on in the brain of a child when they are starting to put those sounds together? Can you watch that? Is that something that's been done?

Ola Ozernov-Palchik: Studies looking at as early as infancy, found that there are atypical phonological processing in the brains of children who are at risk for reading difficulties. Studies that took infants within the first few months from birth, and they played speech sounds to them. For example, they would play something like bah, bah, bah, dah, bah, bah, bah.

Robin Chenoweth: A noninvasive electroencephalogram cap, or EEG, on the babies' heads measured responses in their brains to the shift in sounds.

Ola Ozernov-Palchik: And they found that infants who were at risk based on familiar history of dyslexia —there's genetic predisposition for dyslexia —so had sort of these attenuated responses. Their brains were not as good at picking up at that change between "bah" and "dah." ... When you start kindergarten, and you sort of try to map their speech sounds and representation of the speech sounds to letters, that is where a lot of children with dyslexia are having difficulties in those skills. And we know again, there are a lot of other multiple, multiple functional MRI studies showing reduced activation in that specific system — in this temporoparietal system.

Robin Chenoweth: The temporoparietal region, above and behind the left ear in most people. The temporal region helps process spoken and written sounds and the parietal region maps speech sounds and letters in the brain. These are firing right now in your brain as you listen, but also when you read.

Ola Ozernov-Palchik: Those are the regions that kind of are able to hold the speech sounds and working memory and manipulate them and process them simultaneously. ... As a child is kind of learning phonological awareness and learns that the words are made of the speech sounds — that the speech sounds are kind of like units that can be manipulated to make new words — those are the brain regions that are active.

Robin Chenoweth: And then there's the very nimble left fusiform gyrus, or visual wordform area. It intersects the visual and language regions of the brain. It's kind of a neurological highway interchange between these different parts. Amazingly, it transforms itself to deal with the demands of reading.

Ola Ozernov-Palchik: Because of those pre-existing connections, it becomes specialized for this automatic identification of letters and words. That is the only region that shows experiential differences from pre-readers to readers. So, if you see the brain of a baby that's listening to a

book, you'll see these language regions, temporal and frontal language regions, activating. You'll see the phonological, superior temporal regions activating. You'll see the visual regions activating because they're following the book and they're looking at the pictures. But you're not going to see activation in the visual word form area. You only see activation in the visual word form area when a child starts to recognize letters as those meaningful units and mapping them to the speech sounds and later it's directed to meaning.

Robin Chenoweth with Ola Ozernov-Palchik: I read that it also was the region of the brain that recognizes faces.

Ola Ozernov-Palchik: Exactly. ... It's really kind of the expert recognition region that are both for faces and objects and letters — really, any visual stimuli that you have to identify automatically and rapidly, and immediately map to some sort of meaning.

Robin Chenoweth: As she said earlier, for kids at risk for dyslexia, brain studies show differences very early on. That makes a compelling case for the early screening that many states have instituted, Ozernov-Palchik says. But neuroscience tells us even more. Some learners' brains will compensate for the atypical responses that show up in f-MRIs.

Robin Chenoweth with Ola Ozernov-Palchik: I'm just curious about that percentage of ones that are showing they might be at risk, but then don't have a problem. Is something different happening to them that causes them to yet go on and read? And is that something that can be replicated?

Ola Ozernov-Palchik: That's a fascinating question, again within both an educational realm... because we're trying to understand what works for whom under what circumstances? So, we try to understand do children with a profile of risk, what is going on that helps them to overcome that risk, really, and become typical readers? And we know that obviously, receiving good, explicit, targeted instruction is one of those things. We know that there are a lot of protective factors, such as socio-economic status that tend to buffer children from having worse literacy outcomes. ... On a brain level, there is one brain region that sort of continuously kind of pops out as a compensatory region. It's called inferior frontal gyrus. So, it tends to be more active, either on the left or on the right for individuals who end up having better reading outcomes.

Robin Chenoweth with Ola Ozernov-Palchik: So, their brains, different parts of the brains are taking over and figuring out how to do the reading anyway? Is that what you're saying?

Ola Ozernov-Palchik: Exactly. Yes.

Robin Chenoweth with Ola Ozernov-Palchik: That's fascinating. It can be overcome, then?

Ola Ozernov-Palchik: We know that most children who have dyslexia can develop typical reading skills, yes. Given targeted, explicit, systematic, intensive instruction. And we know that their brains must be doing something when they're getting those things.

Robin Chenoweth: That temporoparietal region that showed less activity in babies at risk for dyslexia? Studies show that it and other networks begin to respond given the right instruction.

Ola Ozernov-Palchik: You see more activation; you see structural differences of this network. And also there is sort of compensatory recruitment of additional regions, possibly on the right hemisphere homologue of those reading-network or inferior frontal regions are recruited to a greater extent in response to intervention. So, the brain can also adapt, and it can also sort of bypass.

Robin Chenoweth: This can be achieved using phonics in addition to developing the other code-focused skills that we mentioned earlier. But to Shayne Piasta's point, phonics is not enough on its own. Though it's also a matter of debate, Ozernov-Palchik says, only about 10% of children have dyslexia. But 60% of children are not proficient at reading. It will take more than phonics to change that. That has led Ozernov-Palchik to look to the brain for those aha! moments that every teacher hopes for.

Ola Ozernov-Palchik: What processes are involved in comprehension, specifically — the light bulb moment within that language network? It's not clear. ... I'm hoping that my research, by sort of illuminating the neural mechanisms of individual differences in reading comprehension, can shed some light on why children fail to comprehend, despite potentially having, you know, typical reading skills? So they can actually decode the words on the page. Despite potentially having the vocabulary and the linguistic knowledge. What is happening? And how we can sort of differentiate a child who is struggling to comprehend, because they don't have the background knowledge, for example, versus a child who's struggling to comprehend because they don't have the inference skills?

Robin Chenoweth: Here's UCLA's Rebecca Gotlieb.

Rebecca Gotlieb: There is this common misconception that has had damaging effects that the science of reading promotes phonics as the be all and end all. But that couldn't be further from the truth. What we know from the science and especially the neuroscience, is that reading involves all kinds of different aspects of language. And students need instruction in the phonological aspects, but also in orthography and semantics and syntax, and in understanding the alphabetic principle, in morphology and metacognition. ... Decoding is absolutely, unequivocally necessary. But it's not sufficient. It's through comprehension that we really unlock full literacy, the kind of reading that allows youth to realize their potential, that allows them to express their own perspectives and understand others' perspectives, and advocate for themselves and their communities and be transported to different worlds and different times.

Robin Chenoweth: But getting there will be challenging, says Ohio State's Shayne Piasta.

Shayne Piasta: It's very hard to support the meaning-focused and comprehension skills. It takes very talented and intentional teachers. It takes devoting time to that within the school day.

Robin Chenoweth: Her collaboration on studies for the Institute of Education Sciences and the National Institutes of Health explores how teachers can support language skills that lead to better reading comprehension — helping children express themselves and understand others' spoken language.

Shayne Piasta: Offering opportunities for the teacher to model these and also for kids to engage in language exchanges and talk about comprehension, whether they're listening to a book or reading something. And that can certainly happen in more large group situations. ... When we have children who are particularly having difficulties in those areas, that's where it can be helpful to intensify instruction. And one way of doing that is by doing more explicit targeted instruction in more of a small group format. ... I have been doing more and more research about supporting those meaning-focused skills.

Robin Chenoweth: Going the next step, from understanding code-focused skills like phonics to finding ways to deepen learners' comprehension.

Shayne Piasta: That's kind of been a shift in in my work and represents what we know from the science of reading in terms of, it's not an either/or. It's a both/and.

Robin Chenoweth: What's at risk if our children don't become proficient at reading? Will we continue to experience the so-called Matthew effect, where a few gain more and more skills and the rest suffer? How will that impact our country, our economy? And, conversely, in what other ways can reading change children's lives? I asked Rebecca Gotlieb.

Robin Chenoweth with Rebecca Gotlieb: Your scholarship argues that there are twin crises of literacy and well-being and that these are intertwined.

Rebecca Gotlieb: We're facing a crisis on both fronts. And I think they're interrelated. Although, that's not often enough highlighted. So on the reading front... It's not only about the reading performance; it's also about the experience of reading. Only about half of fourth graders report being confident in their reading ability. Most are barely reading outside of school, and a third report that they never talk about books out of school. And then on the social emotional side, around one in every five adolescents has seriously contemplated suicide and even higher percentages are experiencing anxiety and boredom and hopelessness at school. These problems are contributing to one another. Fear about reading or a sense of oneself as a poor reader, and unfortunately, the corollary belief that that some people then adopt that they're not intelligent can have long lasting and pervasive effects. ... We need to move towards culturally responsive and socially emotionally engaged teaching practices that encourage students to bring themselves fully to the learning experience. ... We can't treat the social emotional as an add-on or as an intervention. But instead, we need to have it baked into

everything that we're doing. We need to shift from, thinking of the purpose of education as giving students the knowledge that they'll need for their adult lives, to instead thinking about what we're doing in school as the process of scaffolding young people in becoming who they'll become.

Robin Chenoweth with Rebecca Gotlieb You wrote that the part of the brain systems involved with complex literacy tasks are the same involved with those that experience social emotions. So, there's some definite interplay, just even in how the brain is experiencing both of those things.

Rebecca Gotlieb: Reading is fundamentally a social act and it's fundamentally an emotional act. We have the power to be inspired and angered, saddened, overjoyed, bored, all kinds of range of emotions from what we read. ... There's a quote from John Dewey that I really like: The self is not something ready-made, but something in continuous formation through choice of action. I think what we want our goal to be is to be choosing every day to be readers — to be deep readers who thoughtfully and emotionally engage with texts. And we want to be helping the young people who are in our charge to develop the social emotional skills and habits of becoming deep readers.

Robin Chenoweth with Rebecca Gotlieb: Something you said just a few minutes ago is kind of sticking with me, about the fact that fewer kids are reading outside of school. I want to say — and this is just my own observation — is that adults are reading less outside of work, maybe. Is there a shift in the way we're spending our free time or the things that we're doing that might be contributing to this literacy problem that we're having?

Rebecca Gotlieb: Yeah. It's a great question and one with big implications for our democracy, our economy, and just the way we relate to our neighbors and family members and all that. We need to be engaging in deep reading, to be able to thoughtfully understand the problems that are happening around us. Whether that's, in-depth news coverage, or whether it's novels that can really transport us and help us understand the experience of others. And to your point, not only are there so many distractions these days, but also, there is a cultural trend towards engaging in ways that are more superficial. Whether that's with just short, 120-character messages, or even news coverage that's less likely to have in-depth, long-form stories. And we do so at our peril. Because it's through that deep reflective capacity that we see our humanity and find ways to improve ourselves and society.

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