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Professional Article

"Why Can't I Read?"

Current Research Offers New Hope to Disabled Learners

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"Little kids are tender individuals, easily frustrated and ashamed of deficient reading skills once they notice that many of their classmates read so effortlessly."
—Researcher G. Reid Lyon,
The Washington Post, 1996

The new teacher was alarmed to discover that so many of his third-graders were hapless readers—seemingly stymied by the written word. But he was certain that wonderful stories, engagingly told, could unlock the mysteries of print for any child. So he lavished upon his students the riches of literature, steeped them in the magic of good books. When June rolled around, however, he was deeply dismayed to find that the very same children who could barely read in September—fully one-third of the class—were no less lost as they headed home for summer break.

"Their reading remained slow and effortful, the time it took to read text was so great that they could not remember what they read, and their spelling was still lousy," the teacher recalled several decades later. "The only change I could discern was that their motivation to learn had waned, and their self-esteem had suffered substantially."

The teacher felt he had failed his young charges. He abandoned the classroom—but not the profession. Today, he is a leading voice for science-based interventions for struggling readers.

G. Reid Lyon of the National Institute of Child Health and Human Development (NICHD) told the story above to Congress in 2000 as he made a case for more and better research on how kids learn to read and why so many bright children can't crack the code. The big challenges, he says, are twofold: one, to unravel the secrets of learning disabilities that keep kids shut out of literacy. And two, to overcome those disabilities with proven interventions. In a world driven by the written word, the damage done by untreated reading problems can be devastating—to kids, to families, to society.

"Reading disability is not only an educational problem," Lyon wrote in the *Washington Post* in 1996. "It is a major public health and economic concern."

A "Cocktail" of Disabilities

Children humiliated by their inability to overcome their learning problems also tend to develop behavioral and emotional disorders. Kids with learning problems are twice as likely to drop out of school; a disturbingly high number end up with criminal records.
—Pat Wingert and Barbara Kantrowitz,
Newsweek, Oct. 27, 1997

In recent years, a lot of old theories about learning disabilities have been discredited. Among the ideas that science has trashed: That learning disabled (LD) kids see backwards or upside-down and hence are more likely to reverse letters and numbers (not so, researchers now say). That boys are more likely to be LD (girls just don't get identified as often because they tend to behave nicely). That learning disabilities stem from poor parenting or laziness (not a whiff of truth). That LD kids will "grow out of it" (in fact, learning disabilities are lifelong conditions).

Ever since learning disabilities were officially recognized by the federal government in the late 1960s, researchers have been chipping away at the myths. But suddenly, in the mid-1990s, a couple of scientific advances coincided to revolutionize the field. Powerful new technologies have let research teams at the University of Washington and Yale capture real-time images of the brain at work. And the monumental Human Genome Project, which mapped the infinitely complex genetic code, has helped unmask other clues for these and other NICHD-funded teams.

Learning disabilities, it turns out, stem from faulty wiring in the brain. LD kids—far from slacking off—are working mightily when they tackle even the simplest language tasks. In fact, in a 1999 test involving word pairs, they used nearly five times the brain area as other kids, the UW team found. The brain imaging tools reveal a clear "neural signature"—that is, a distinct pattern of brain activity for disabled readers. "If you have a broken arm, we can see that on an X-ray," Yale researcher Sally Shaywitz told *Education Week* in September 1999.

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"These brain-activated patterns now provide evidence for what has previously been a hidden disability."

The other big new finding: Learning disabilities have a genetic link. Just as kids can inherit olive skin, migraines, or musical talent from Grandma, so, too, can they inherit her learning disorder. Of the 20 genes associated with the reading process, UW researchers Jennifer Thomson and Wendy Raskind recently singled out several possible sites on five different chromosomes that have been implicated in reading and writing disorders.

These discoveries constitute a death blow to the widely held notion that learning disabilities don't really exist—that kids with normal intelligence who struggle to learn just aren't trying hard enough or aren't getting enough support from Mom and Dad. As knowledge about learning disabilities has grown, so have the numbers. Fewer than 800,000 kids were identified as LD in the mid-1970s. But by the middle of the 1990s, that figure had swelled to 2.5 million, according to the U.S. Department of Education. By the new millennium, LD kids accounted for half of all placements into special ed.

The ways kids can be disabled vary. In her classic book, *Learning Disabilities: Theories, Diagnosis, and Teaching Strategies*, Janet Lerner, a professor of education at Northeastern Illinois University, identifies several types of learning disabilities:

Dyslexia: Unusual difficulty sounding out letters and confusing words that sound similar; the most common form of disability

Dysgraphia: Difficulty expressing thoughts on paper and with the act of writing itself; characterized by problems gripping a pencil and unreadable penmanship

Dyscalculia: Incomprehension of simple mathematical functions; often, a child won't perceive shapes and will confuse arithmetic symbols

Lerner then goes on to describe several related problems that tend to turn up in the same kids:

Dyspraxia: Difficulty performing complex movements, including muscle motions needed for talking

Auditory discrimination: Trouble distinguishing similar sounds, or confusing the sequence of heard or spoken sounds

Attention deficit disorder: Extreme hyperactivity and distractibility; many children with learning disabilities suffer from ADD as well

Dysnomia: The inability to recall the names or words for common objects

Visual perception: The inability to differentiate between foreground and background, as well as similar- looking numbers, letters, shapes, objects, and symbols; problems may include habitually skipping over lines of text

Although learning disabilities have distinct names, they typically occur in clusters rather than in isolation. People who have trouble reading, for instance, very often have trouble writing, too. Other problems, such as attention deficit disorder, complicate the picture even further. For example, 30 percent of people with learning disabilities also struggle with ADD. "Disabilities don't fit into neat categories," Pat Wingert and Barbara Kantrowitz explain in a 1997 Newsweek piece. "They are more likely to be a cocktail of disability types and associated problems."

Brain Waves

Learning disabilities encompass a wide range of disorders in listening, speaking, reading, writing, and mathematics that are frequently accompanied by . . . deficits in attention and social behavior.
—G. Reid Lyon, National Institute of Child Health and Human Development

Of the various disorders, dyslexia is by far the most common (hence, the most widely studied and well understood). Estimates of dyslexia among students range from 5 to 20 percent, nationwide. Shaywitz, who conducted a long-term study of 450 Connecticut kids beginning in 1983, categorized 20 percent of the children as reading disabled. That's one in five kids, adding up to at least 10 million children across the U.S. The University of Washington, in a 2000 press release, puts the proportion of dyslexic kids at between 5 and 15 percent of all students.

Many researchers posit a continuum of disability. Where each child falls on that continuum depends on a unique blend of genes, environment, and what

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Thomson and Raskind call "stochastic processes"—what most of us term "chance events." Lyon contends that among the typical 20 percent of troubled readers (those who have "substantial difficulties" learning to read), only about half are truly dyslexic. And that's where a grey mist rolls in to cloud the landscape of diagnosis and treatment. With this "disability," hidden behind the façade of a smart child who is very often clever and creative, the designation of "LD" can be tough to make. And what about normal IQ kids who struggle to read, yet don't have that telltale "neural signature"? Sorting out the infinite gradations of learning difficulties can boggle the best of teachers.

Lyon and others argue that countless kids are being mistakenly labeled as disabled—that with the right instruction at the right time, these at-risk students would be spared the trauma of special ed placement and all the emotional baggage it carries. Unnecessary special services can be a costly drain in this era of budgets worn thin by tax revolts, slumping markets, and rising energy prices—an era when many schools are hard-pressed to fund separate programs for lagging learners. Timely teaching with scientifically supported strategies can negate the need for pricey intervention for all but the most disabled.

"Researchers suspect there's a window between the ages of five and seven when the underlying skills of reading are most easily learned," Kantrowitz and Anne Underwood wrote in a 1999 *Newsweek* article. They note that a kindergarten teacher can accomplish in 30 minutes what a fourth-grade teacher would need two hours to do.

Extrapolate those figures to the sixth or seventh grades—the time when many LD kids finally start getting help—and you begin to get a sense of the costs of waiting. Notes Lyon: "Unless children are identified and provided with appropriate interventions by the second or third grade, their chances of 'catching up' in reading are reduced dramatically. This does not mean that we cannot succeed with older students. We can, but the cost in both time and money is essentially tripled."

Read the research literature about what kind of intervention LD kids need, and you'll find two words turning up again and again: "early" and "appropriate." No one really argues about what "early" means. As noted above, the jury is in on third grade as the pivot point for long-term reading proficiency. But when you take up the topic of what's "appropriate," you'd better put on a heat shield. That's because you've dropped a match into the most explosive cauldron of educational philosophy: whole language versus phonics. The decades-old debate about direct instruction versus discovery learning crystallizes clearly in the field of reading disabilities. Here's why: A mounting body of evidence shows that struggling readers—both the truly disabled as well as the chronically confused—lack a skill that is absolutely essential to the reading process: phonemic awareness. Simply put, it's the ability to hear the individual sounds in spoken words. The typical disabled reader can't distinguish those sounds (called phonemes), so she fails to make the next leap—linking sounds to letters. Without these basic building blocks, the rest of the reading skills—decoding, word recognition, and reading comprehension—are all but impossible.

Researchers point to this deficit as the missing piece in the puzzle of dyslexia among children who have "average or above average intelligence, robust oral language experience, and frequent interactions with books," to use the language of Lyon. He notes that many of the children studied under the NICHD-funded research have been read to regularly since infancy, have well-developed speaking vocabularies, and "can quickly understand and discuss in rich detail" the content of text read aloud to them. Yet they "flounder" when they try to read age-appropriate material on their own.

The nub of the problem lies in whether kids can grasp the "alphabetic principle" on which the English language rests. To read the language, Lyon explains in the *Washington Post*, one must "unlock the relationships" between 40 sounds and 26 letters. A decade of NICHD research has taught us, he says, that "in order for a beginning reader to learn how to map or translate printed symbols (letters and letter patterns) to sound, he or she must intuitively understand that speech can be segmented, and that segmented units of speech can be represented by printed forms"—an awareness that to most of us seems "so easy and commonplace that we take it for granted." But recent findings in

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university laboratories have turned up a juicy tidbit: It is not the ear that helps children understand that a spoken word like "cat" is divided into three sounds and that these sounds can be mapped onto the letters /c/, /a/, and /t/. Rather, it is the brain. "In many individuals," Lyon says, "the brain is not processing this type of linguistic phonological information in an efficient manner."

A study from Yale published in the July 15, 2002, issue of the journal *Biological Psychiatry* found that dyslexia is linked to a particular region of the brain, which shows disruptions in affected children. The researchers found that dyslexic children compensate by learning to read with other parts of their brains. "Dyslexic children can't use the highly specialized area (of the brain) that is activated in good readers and therefore don't read automatically or fluently," lead author Bennett Shaywitz told Hannah Gladfelter Rubin of *Education Daily* in July 2002.

"Because they develop compensatory systems on the front and right side of the brain, they read more accurately over time, but remain slow readers."

Based on these and other findings—including the report of the National Reading Panel—Lyon and colleagues argue convincingly for early reading instruction that's rich in lessons about the sound-letter relationship.

"Disabled readers must be presented highly structured, explicit, and intensive instruction in phonics rules and the application of the rules to print," he says. "Longitudinal data indicate that systematic, structured phonics instruction results in more favorable outcomes in reading than does a context emphasis."

Contrary to the old-style "drill-and-kill" approach to phonics in which kids sat at their desks, dazed by mind-numbing flash cards and other rote exercises, instruction in the sound-letter link can be developmentally appropriate—even fun. Researcher Virginia Berninger, who directs the Multidisciplinary Learning Disabilities Center at the University of Washington, has developed a package of materials with The Psychological Corporation called PAL (Process Assessment of the Learner). Published in 1998 by Harcourt Brace & Company, the PAL *Guides for Intervention: Reading and Writing* offer a collection of research-based "sound games" and "looking games" for first- and second-graders that take only about 10 minutes and boost kids' word skills significantly.

Researchers are in agreement, though, that a curriculum that is all phonics and no context ("real reading in real books") is a loser. Just as the National Research Council stressed in its important 1998 report, *Preventing Reading Difficulties in Young Children*, "balance" is the place to be. "A number of NICHD studies being conducted at different research sites have all reported that a balanced instructional program composed of direct instruction in phonological awareness, phonics, and contextual reading is necessary for gains in reading skills to be achieved," Lyon says. "Without a doubt, we have found that teaching methods that are based upon only one philosophy, such as 'the whole-language approach' or 'the phonics method,' are counterproductive for children with reading disabilities. No matter how bright the child and how interesting the reading material, a child will not learn to read unless he or she understands how print is translated into sound. Likewise, no matter how much phonological awareness and phonics knowledge a youngster has, the child will not want to engage in reading and writing unless it is meaningful and interesting and taught in an exciting and vibrant fashion."

Dyslexia and the Three Tiers

There are chemical differences in brain function of dyslexic and nondyslexic children during sound-processing tasks.
—University of Washington press release, May 24, 2000

On the green-treed UW campus under the grey skies of Seattle, Professor Berninger's team has come up with a promising plan to help schools teach all learners to read. Along with her UW colleague Scott Stage, as well as Donna Rury Smith and Denise Hildebrand of The Psychological Corporation, Berninger recommends a three-tier model designed to prevent, diagnose, and treat reading problems. The model, which translates the lofty findings of researchers into everyday classroom

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practice, seeks to cut off most reading problems at the pass—that is, stop them before they gather momentum. The idea is to blend scrutiny of students and instruction in a continuous tapestry—assess and intervene, assess and modify, assess and treat. This tightly woven fabric of assessment and instruction aims to keep nonreaders from slipping through school unnoticed, year after year. Under this plan, most kids will conquer reading in the regular classroom; only the most disabled readers will require diagnosis and special ed placement.

As described in the 2001 Handbook of Psycho-educational Assessment published by Academic Press, the model works as follows:

Tier 1—Screening for Early Intervention: Every K–2 student in the school is screened to ID those who are at risk for reading and writing problems. The screening measures are brief, but research-based. At-risk children get early intervention—but not just any intervention. It should be "science-based," Berninger and her colleagues insist. By that they mean the real McCoy—a "theory-driven experiment in which competing hypotheses are tested" in search of "empirical evidence that an intervention is effective in improving student learning outcomes." (See the UW brain imaging study cited below as an example.)

Tier 2—Modifying the Regular Instructional Program and Monitoring the Progress of Students: The classroom program is modified for students who don't respond well to Tier 1 intervention. That modification might take a number of forms: adding curriculum components, changing teaching practices, revising materials, and/or providing extra skills practice. The goal of Tier 2 is to determine whether all the essential curriculum pieces are in place and being delivered effectively. To monitor progress, schools can use curriculum-based measurements. The process is guided by a multidisciplinary collaborative team using a problem-solving approach to make ongoing changes as needed. Because learning problems cut across disciplines and specialties, a team might include the school psychologist, the special educator, the speech and language pathologist, the social worker, the nurse, the principal, the Title I teacher, and the general ed teacher.

Tier 3—Diagnosis and Treatment of Referred Children: Students who failed to respond well to the first two tiers get a thorough assessment. The goals are to decide whether the child qualifies for special ed; to diagnose—based on current scientific knowledge—why the student is having trouble; and to design a systematic, coordinated treatment plan.

"Many reading and writing disabilities could be prevented or reduced in severity if a three-tier model of assessment for intervention were implemented in schools," Berninger and company assert. "The learning outcome for students with dyslexia and/or dysgraphia will be much better if schools do not wait until students fail for several years before beginning the process of assessment for intervention."

To figure out which kids are at risk and need intervention in the Tier 1 phase, the researchers recommend short screenings like the two-minute tests developed by Marilyn Jager Adams of the Harvard Graduate School of Education or the Texas Primary Reading Inventory developed at the University of Texas-Houston Medical School. (For more examples, see the online "Reading Assessment Database for Grades K–2" compiled by the Southeast Educational Development Laboratory, www.sedl.org/pubs/catalog/items/read02.html.) Berninger, too, has developed an assessment instrument as part of the Process Assessment of the Learner package, the PAL *Test Battery for Reading and Writing*, which can be used at each tier of the model.

At the Tier 3 stage, kids who haven't made gains despite the special help offered under Tier 1 or the curriculum tweaking done during Tier 2 should get an in-depth assessment for learning disabilities. Berninger recommends using what she calls a "multimodal" approach, one that draws on many sources, many tools—for instance, interviewing parents. Scouring student records. Giving all sorts of tests (standardized, normed, and criterion-referenced). Meeting with the student. Looking at portfolios and work samples.

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"A Message Of Hope"

Although biologically based, dyslexia and dysgraphia are treatable disorders.
—Virginia Berninger, University of Washington

A small but burgeoning body of research backs up the tiered approach. A statewide pilot project tested at 18 Washington schools, the Student Responsive Delivery System, is a Tier 2 model sponsored by the state office of public instruction, the Washington State Association of School Psychologists, and the Washington State Speech and Hearing Association. The model has reaped impressive gains, based on findings from the 1998–99 school year. Of the 215 students who participated in the collaborative problem-solving process, 138 students (64 percent) needed no further intervention. Their academic and/or behavioral troubles were resolved. The number of students who needed a full-blown assessment for special ed was axed by a staggering 73 percent across the pilot sites. Ultimately, only 28 students (13 percent) were placed in special ed.

Another study out of UW not only offers compelling evidence of promising strategies—it exemplifies a new generation of education research that rivals the rigor of medicine and other "hard" sciences. Fifteen 10- to 13-year-old boys in two matched groups—dyslexics and seven nondyslexics—participated in a yearlong treatment program designed by Berninger and her colleague Todd Richards to improve their skills in understanding and using the sounds of language. Reading instruction was blended into a hands-on workshop exploiting the boys' love of science. Images of their brains taken before and after the treatment found that the dyslexics' brain chemistry had changed significantly. At first, they used about four times the brain energy of their nondisabled counterparts to process sounds. Afterwards, they used only 1.8 times the brain energy—a huge leap in efficiency. The dyslexics also made big gains in reading. They all started out well below grade level. Yet, by the end, all but one could read grade-appropriate passages.

"This research offers a message of hope," Berninger said in 2000 when the findings were released. "Parents of the boys in the study told us that children who didn't read independently before are now picking up books on their own and reading them."