

Brain Building

The best way to overcome learning difficulties is to exercise the most weakened functions.

By Norman Doidge

Twenty-three years ago, Barbara Arrowsmith Young, a Peterborough, Ontario, graduate student in psychology with a disabling learning disorder — she couldn't even read an ordinary clock — was isolated and filled with despair.

Though gifted in other ways and driven, she had a brain disorder that left her unable to verify meaning of any kind, in either intellectual or social contexts. The part of the brain that helps us understand relationships between symbols — thought to be the angular gyrus — was not functioning.

Novelists often depict cynical characters who believe they live in a world without meaning and mock those around them who think life has significance. Her problem was the opposite. She sensed meaning everywhere, but could never verify it. She spent her life feeling: "I don't get it."

Often, she would review more than 20 times simple conversations she had heard, and even then would grasp them only fleetingly. Her deficit was like that of someone who had had a stroke in the part of the brain where the temporal, parietal and occipital lobes meet.

Feeling desperate, all conventional treatments having failed her but believing there must be a way to strengthen her weak area, she went to work inventing a treatment that would eventually release her from her cognitive difficulties.

Arrowsmith Young has quietly and modestly spent the last 23 years developing brain exercises for the commonest learning disorders. She has developed specific exercises for each of the 19 brain areas that underperform in people with learning disabilities.

In contrast, many of the most advanced U.S. programs, such as the new FastForWord reading program, appear to address only two brain areas.

Arrowsmith Young is a woman of extraordinary intelligence and compassion, and today, Arrowsmith School, a unique institution in Toronto, is one of the most advanced schools for learning disorders anywhere.

It is part one-room schoolhouse filled with warmth and encouragement, part high-tech lab-school filled with computers and brain exercise programs. Improvement is scientifically measured daily.

Because she has developed exercises for so many areas and has had 23 years' experience working with them, Arrowsmith Young can tailor a mental exercise program for individual students. This is essential because most children with problems learning have different types of learning dysfunctions.

Her innovative work has already helped fortunate hundreds, as it will in my opinion one day help millions.

Before her own treatment, like many 'learning-disabled-gifted' individuals, Arrowsmith Young's mind was full of disparities.

She had a brilliant ability to sense relevance (a frontal lobe function) and an extraordinary memory, but couldn't understand math, grammar or logic because she couldn't properly connect symbols.

She couldn't, for instance, relate the hour and minute hands of a clock.

Severely dyslexic, she couldn't make out letters and learned to read from right to left. She had no spatial sense, was always getting lost, and had no tactile sense on her left side (and hence was always bruising herself there).

Knowing something was wrong cognitively, she gravitated toward studying psychology, managing to survive graduate school by means of her powerful memory and by sleeping only four hours a night.

Most learning-disorder treatments were — and still are — based on 'working around' or 'compensating' for the problem.

Thus, someone with trouble reading is told to listen to audio books, and someone who is slow is given more time on tests or told to drop subjects. But Arrowsmith Young had so many severe problems there was no working around them.

Then her late husband alerted her to the work of Russian psychoanalyst and neuropsychologist Alexander Luria, who during the Second World War studied soldiers with head wounds, mapping the brain by observing which cognitive functions were destroyed by particular injuries.

When she read Luria's book *The Man with a Shattered World*, which described a wounded man who had the same deficits she had — including the inability to read a clock — she felt he was describing her life.

Her breakthrough was to link Luria's work with that of Professor Mark Rosenzweig, who studied rats in stimulating and non-stimulating environments. Rosenzweig found that the brains of the stimulated rats had more neurotransmitters, were heavier and had better blood supply than those from the less stimulating environments.

He was one of the first scientists to demonstrate neuroplasticity, the notion that nerve cell activity can produce changes in the function and structural wiring of the brain.

Arrowsmith Young isolated herself and began working, week after week, non-stop to exhaustion, with only brief breaks for sleep, at mental exercises of her own design, with no guarantee they would lead anywhere.

Her exercises were the opposite of compensations: Instead of working around the problem, they actually exercised the weakened area, progressively.

One exercise involved cards of clock faces set at different times, with the time written on the back. She started with two-handed clocks, which were a great challenge, and worked her way up to adding hands for seconds and ones for a 60th of a second.

At the end of it, not only could she read clocks faster than normal people, but the effect generalized to her other difficulties at relating symbols.

She began for the first time to quickly grasp math, grammar, and logic. Today at Arrowsmith School, you can see kids working at computers reading 10-handed clocks in mere seconds.

In the 1970s, when Arrowsmith Young designed her program, most considered neuroplasticity a dreamy hypothesis. Yet work by this year's winner of the Nobel Prize in medicine, Eric Kandel, demonstrated how the branches between neurons could grow and change with learning.

The recent discovery by the Salk Institute's Dr. Fred Gage of brain stem cells — baby cells deep in the adult brain that can develop into new neurons — is another sign the brain can repair and regenerate itself.

Are others helped? Dan Cooper is an American. When he was 13, his math and reading skills were still at a grade 3 level, and he was told after neuropsychological testing at Tufts University that he would never read beyond grade 3 or graduate from high school.

His indefatigable mother, with a degree in special education, tried him in 10 different U.S. programs, but none helped. Refusing to give up, his mother discovered Arrowsmith School, and sent Dan to live with a Canadian family.

After three years, he was at a grade 10 level in reading and math, and went directly into his normal high school grade. He went on to graduate from college and now works in venture capital and acquisitions, and foreign trade. "I never would have achieved this without Arrowsmith," Dan says adamantly.

Jeremy, from Haliburton, Ontario, was 16 but reading at a grade 1 level when he came to Arrowsmith School. Most of his difficulties were in the left hemisphere. "My whole capacity to think was by going around words. All my thinking was in pictures. I thought everyone did that."

A writing assignment that took others 30 minutes took him four hours. He was below the first percentile for English word recognition on standard tests. His auditory memory for verbal instructions was very weak. (Children with this difficulty are often yelled at for forgetting or being irresponsible.) His handwriting was indecipherable, and his speech laboured.

Both Jeremy's parents are teachers and tried compensatory strategies to no effect. "I felt I didn't have any hope of being able to get better at reading so I stopped trying."

Learning disabilities don't affect just the classroom. "Outside of school, I couldn't read washroom signs to tell which one to use. If the kids passed around a written joke, I'd survey their facial expression, then respond accordingly."

After 14 months at Arrowsmith School, Jeremy is already reading at a grade 7 level, and his phonics are at a grade 13 level.

"The words jump off the page at me now. A door that was closed is now opening. In speech I can get to the point, and my reasoning is faster. I now have a memory for names and oral instructions. Because of my learning disabilities, all my other strengths were in a box."

Arrowsmith School tries to get kids to perform at above-average levels on the brain exercises and standardized tests before returning them to regular school. In a follow-up study, 80% of children had met their academic goals.

At Arrowsmith School, children who had been diagnosed as having attention deficit disorder and learning disabilities quietly focus on their computers. Some are on Ritalin, and some, as they get better, safely come off medication, revealing that their attention problems were really the end result of learning problems.

For more minor problems, after-school exercises suffice. For significant disorders, full-time work is required. High-functioning adults with focal problems, such as the inability to learn foreign languages, severe problems with organization, trouble following non-verbal cues, slow reading, or even clumsiness can also be helped.

Arrowsmith's work has major implications for education in an information age. Some teaching techniques abandoned in the sixties as too rigid may be worth bringing back.

Rote memorization probably strengthened visual and auditory memory (and hence thinking in language and pictures), just as an almost fanatical attention to handwriting probably helped to strengthen motor-symbol-sequencing capacities — and thus not only helped handwriting but also added speed, automaticity, and fluency to reading and speaking.

Timing is important. Neuroplasticity is at its maximum in children up to 11 years old, though fortunately teenagers and adults can still benefit after that age. Also to be considered is the emotional devastation caused by learning disorders, as they lead to a bottleneck in overall development.

Children often become depressed, troubled teenagers as they fall behind. Some withdraw, others explode with frustration. Some who make it to university crash and burn when their workload increases and career options dwindle.

Indeed, many depressed adolescents and young adults, or people not responding to psychotherapy, have unrecognized learning disabilities. Individuals can have the 19 key brain areas tested at Arrowsmith School.

(The website is www.arrowsmithschool.org. Dr. Doidge is a research psychiatrist and psychoanalyst, on faculty at Columbia University, New York, and Head, Long Term Psychotherapy at the University of Toronto. Reprinted with the permission of the National Post, Feb. 28, 2001)