Asia Pacific Journal of Developmental Differences
Vol. 1, No. 1, January 2014, pp 78—89
DOI: 10.3850/S2345734114000076

"Amazing Shortcomings, Amazing Strengths"

Beginning to Understand the Hidden Talents of Dyslexics

Thomas G. West [1]*

[1] *Krasnow Institute for Advanced Study, George Mason University, USA*

Editor's note. This concept of giftedness in dyslexia is one that has not yet been widely addressed within the Asia Pacific context. This is despite the recognition given to the mild dyslexia of former prime minister of Singapore, Lee Kuan Yew, a seminal force in government for over 30 years. A search for eminent dyslexics in these areas reveals only the Indian actor, Abhishek Bachchan, and the young dyslexic Malaysian pilot, Captain James Antony Tan, the youngest pilot to fly around the world, with two entries in the Guinness Book of records, who is still only 21. There are undoubtedly many more famous dyslexics who have not yet revealed their difficulties in learning, because of the potential stigma attached. This recognition of the extraordinary strengths of some dyslexics, if they are not too daunted by the difficulties they experience in school, should begin to redress the balance. Above all, identifying and supporting the problem early can reduce the potential impact on self-esteem, allowing dyslexic people to fulfill their potential and make a full contribution to their environment.

Overview of a New Awakening

In recent years, developmental dyslexia is coming to be seen, remarkably, as a significant advantage in an increasing number of fields – often linked to substantial success in design innovation, entrepreneurial business and scientific discovery. As hard as it is for many to believe, it is becoming more and more clear that some dyslexics are capable of envisioning possibilities, seeing patterns and making discoveries that are missed by even the smartest non-dyslexics.

It is also becoming increasingly clear that all of this is because of the dyslexia, not in spite of it. Currently, during a period of

* *Correspondence to:*
Thomas G. West. Institutional address: Krasnow Institute for Advanced Study, Advisory Board, 4400 University Drive, MS 2A1, George Mason University, Fairfax, Virginia 22030-4444, USA. Blog: http://inthemindseyedyslexicrenaissance.blogspot.com
Email: thomasgwest@gmail.com

new awakening, a small number of researchers are finding more evidence that dyslexia does not result from damaged "wiring" in the brain, as many have long believed. Rather, they see an alternative (a different but valuable) "wiring" pattern – one that involves early educational difficulties – but one that provides alternative strengths and capabilities generally not available to non-dyslexic brain structures.

An example of these new perspectives on dyslexia research and practice is found in the recent book *Dyslexic Advantage* by Drs. Brock and Fernette Eide, which asserts: "the brains of individuals with dyslexia aren't defective; they're simply different. These wiring differences often lead to special strengths in processing certain kinds of information, and these strengths typically more than make up for the better-known dyslexic challenges."

"We don't see the reading, spelling, or other academic challenges associated with dyslexia as the result of a 'disorder' or a 'disease.' Instead, we see these challenges as arising from a different pattern of brain organisation – [which predisposes] dyslexic individuals to the development of valuable skills" (Eide & Eide, 2011, xvii).

There are many cases of this paradoxical mix of weaknesses and substantial strengths. It is becoming increasingly apparent that these are not really unusual – and appear to be representative of an important subgroup that needs to be studied in a systematic and rigorous fashion. A good example (to be dealt with at greater length below), is one of the founders of the modern study of molecular biology. He was a classic dyslexic, with the usual reading and writing problems throughout his early education. Yet, as he as he eventually struggled through college and graduate school and progressed into laboratory work, he found that he could predict the results of many experiments. He found that he could use his powerful dyslexic imagination to see interactions at the molecular level – seeing new patterns and developing fundamental insights and new theories (in one instance, twelve years ahead of all others in the field) about the links between the human genetic code and the development of the immune system. Later, a different scientist proved experimentally that he was right and received a Nobel Prize (Tauber & Podolsky, 1997).

The US National Science Foundation has been funding a Harvard-Smithsonian study of when and where dyslexia may be an advantage in doing science, especially within astrophysics (Schneps, 2013). In the UK, the dyslexic head of the Virgin Group explained long ago that his dyslexia had been a motivator in building his group of more than 250 companies as well as giving him a "business edge" (Branson, 1999). In the field of computer graphics and simulation, dyslexic artists, scientists and technologists are often leading innovators (West, 2004, 2009)[1].

A dyslexic professor at Columbia University has written the book, The Great Ocean Conveyer, about how he was able to integrate complex information (in a manner similar to many other dyslexics)

[1] *Note: Some sections from this edition, with other writings, have been modified for inclusion in this paper.*

from extremely diverse sources to understand the way historic changes in ocean currents have led to abrupt climate change in the past. In the preface, he explains, "As a dyslexic, I receive my most valuable information and ideas from what I hear and diagrams I see rather than what I read on the printed page" (Broecker, 2010, ix-x).

A world famous professor of paleontology, dyslexic himself, says that he tries to teach his graduate students how to "think like a dyslexic" so they can see patterns invisible to others, making discoveries long thought impossible. The rest is "just memorization," he says, without significant discovery or true innovation (Horner, 2007)[2]

Very recently, in an especially striking example, the British electronic intelligence agency GCHQ announced publically, "Dyslexia is Britain's secret weapon in the spy war: Top code breakers can crack complex problems because they suffer from the condition. GCHQ bosses say those with the disorder see things in codes others do not. The Cheltenham-based agency has set up a dyslexia support group." One agency official noted that "dyslexia may in other circumstances be regarded as negative – but most people only get to see the full jigsaw picture when it's nearly finished while the dyslexic cryptographists can see what the jigsaw looks like with just two pieces" (Mail Online, July 13, 2013). Long aware of the important contribution of distinctive dyslexic talents (along with other forms of "different thinking"), GCHQ had held its first "Diversity Day" as early as June 2006. However, the agency had rarely been so public about these considerations until they were raised by recent comments from MPs on the Commons Intelligence and Security Committee.

While many are still skeptical, an increasing number of researchers believe that learning from the lives of highly successful dyslexics and visual thinkers can lead to new insights and approaches that will help dyslexics and non-dyslexics alike -- profoundly transforming fundamental ideas about education and work in a time when computer technologies are rapidly turning the world upside down and the established professionals seem to have lost their way. Accordingly, they say it is high time for us to begin to recognize and understand and learn how to deal with these puzzling extremes in talent – the unexpected academic weaknesses that seem often to be associated with special capabilities and success in both life and work. Low level weaknesses should not be allowed to prevent high level accomplishment. Schools, they say, almost never teach or test what dyslexics are good at – but life does.

Early Puzzle

From the time of the earliest researchers (in the 1890s) until Samuel Torrey Orton (in the 1920s) and Norman Geschwind (in the 1980s), the central puzzle of dyslexia has always been the linkage of high ability in some areas with remarkable and unexpected difficulties and disabilities in other areas. For more than a century we have recognized this

[2] *Filmed by NHK cameraman (Tokyo, Japan) on site of dinosaur dig, far northern central Montana on Canadian border, about 9 minutes, July 5, 2007.*

pattern, but have generally focused on only one aspect. With the best of intentions, we have learned much about how to fix the problems that dyslexics experience but we have done almost nothing to develop a deeper understanding of the varied and hard-to-measure talents that many dyslexics possess (Geschwind & Galaburda, 1987).

As we have noted, highly successful dyslexics nearly always say that their accomplishments and special ways of seeing come directly from their dyslexia – not in spite of their dyslexia. More researchers are now saying that we should take them at their word and give credence to what they say. Most professionals in the field have long agreed that talents are important, but eventually they almost always come to focus exclusively on the serious business of reading and academic remediation alone.

In contrast, more and more researchers are feeling a sense of personal responsibility to dyslexics as a group. They feel the need to substantially change the course of what is being done within the field. They believe there is a need to seriously embrace a radical change soon or there will be no change at all – allowing additional generations of dyslexics to suffer needlessly – as well as wasting the distinctive talents that are sorely needed by the larger society and economy as we enter an age of great uncertainty on many fronts. They recognize that we badly need the big picture thinking and original insights that seem to be the signature contributions of the most successful dyslexics. (It is a paradox, among many paradoxes, but it may be that those who would appear, initially, to need the most help are, in time, may be those most likely to be able to help the most.)

Much has changed in recent years that would suggest that these fundamental changes in perspective may be much closer to taking place: a small conference of foundations, researchers and highly successful dyslexic individuals and their families took place in April 2013 – which has built considerable momentum in this direction; the increasing influence of the "positive psychology" movement (Seligman, 1990); efforts to integrate dyslexia research with work psychology research (in the UK and elsewhere); books, articles, blogs and websites devoted to "the dyslexic advantage." (Eide & Eide, 2011)

William J. Dreyer – Case Study of a Dyslexic Discoverer and His Grandson

Sometimes, a longer look at a particular case can indicate the potential of these major reversals in perspective. The passage below is excerpted from the oral history project at the California Institute of Technology in Pasadena. The speaker is the late William J. Dreyer, Ph.D., who is increasingly recognized as one of the major innovators in the early days of the biotech revolution that is now washing over all of us. In September 2007, one of his inventions was placed in the National Museum of Health and Medicine in Washington, D.C. – the first gas-phase automated protein sequencer, which he patented in 1977. The sign over the machine on exhibit reads: "The Automated Gas-Phase Protein Sequencer: William J. Dreyer and the Creation of a

New Technology."

"I knew I was different in the way that I thought, but I didn't realize why I was so dumb at spelling ... and rote memory and arithmetic. The first time I realized how different ... brains could be ... was when I bumped into Jim Olds at a dinner party back in the late sixties. Jim ... was a professor here [at the California Institute of Technology] ... famous for his pleasure center work. A speaker talked about the way we think and compared it to holography. Jim was across the table from me. I said, 'Oh, yes. When I'm inventing an instrument or whatever, I see it in my head and I rotate it and try it out and move the gears. If it doesn't work, I rebuild it in my head.' And he looked at me and said, 'I don't see a thing in my head with my eyes closed. 'We spent the rest of the evening trying to figure out how two professors – both obviously gifted people at Caltech in the Biology Division – could possibly think at all, because we were so different. So then I took this up with Roger Sperry [Nobel Laureate and near lab neighbor] and I realized that I had some amazing shortcomings as well as some amazing gifts" (Caltech, 1999)[3].

A strong visual thinker and in many ways a classic dyslexic, Dreyer developed new ways of thinking about molecular biology. With his powerful dyslexic visual imagination, he could somehow see the molecules interacting with each other. Sometimes he was almost entirely alone. He (with his colleague J. Claude Bennett) advanced new ideas based on new data about how genes recombine themselves to create the immune system. These ideas turned out to be many years ahead of their time.

Most did not like this new theory because it conflicted with the conventional beliefs held by most expects in the field in those years. "It was so counter to the dogma of the time that nobody believed it," his widow, Janet Dreyer, explained (Dreyer, J., 2005). Dreyer's approach also used a form of scientific investigation ("peptide mapping") with which most immunologists were then entirely unfamiliar. "Knowing what we know now pretty much any biologist would look at Bill's data and say that is what it has to mean. But few could understand it then," she noted. However, gradually, they all learned to think the way Dreyer thought. Then, it was obvious that Dreyer (and Bennett) had to be right.

To See What Others Cannot See

In his earlier school days, Dreyer had the usual reading, writing, memory and other academic difficulties experienced by most dyslexics. Throughout his career, he avoided reading and writing whenever possible. But in time, he was able to make it to college and even graduate school – where he developed his own ways of learning and began to find roles that that made use of his strengths while he learned to get help in his areas of weakness.

He joined a study group. The others in the group all took careful notes in the lectures. He took no notes. He just sat there while he listened and observed carefully. Then after the lecture, they provided him with the detailed data, and

[3] *PDF at http://oralhistories.library.caltech.edu/108/. Roger Sperry, mentioned in this quotation, was Caltech Hixon Professor of Psychobiology 1954-1984. Sperry was awarded the Nobel Prize in Physiology or Medicine in 1981.*

he told them what it all meant. "He was giving the big picture and all the major concepts, ..."explained Janet Dreyer. Eventually, surviving a major life-threatening illness made him realize it was time to refocus his life – and then his fascination with laboratory work began to draw him in.

Soon, with his remarkable ability to visualize the molecular interactions (using his dyslexic imagination), the young Bill Dreyer became a star in the laboratory. While in graduate school in Seattle, Washington state, and while working at the National Institutes of Health (NIH) in Bethesda, Maryland, he could tell his professors and colleagues which were the best experiments to do. Somehow he knew how to proceed and where to go in this brand new field of study that came to be known as protein chemistry. He was seeing patterns and connections the others were not seeing. Like many highly successful dyslexics, Dreyer could thrive in the leading edge of a new field. Like so many dyslexics, Dreyer seemed far better suited to creating new knowledge than he was in memorizing old knowledge.

At this time, his professors and section heads would write the grants, get the funding and write the research papers with him and for him based on his ideas and observations. "The money just came. Because he was doing good work, grants would just be there for him," observed Janet Dreyer. He was happy at NIH but eventually (after a previous Caltech offer had been refused) in 1963, Caltech persuaded Dreyer to come to Pasadena as a full professor at the age of 33. Clearly, the value of his pioneering work had been recognized.

However, later, because of the further development of his new and increasingly heretical ideas, William Dreyer could not get funding from academic or foundation sources for inventing his new instruments. His department head would get irate phone calls from professors from other institutions complaining about Dreyer's publications and talks. He gave many talks at the time, making some attendees angry, although others could see the importance of his innovative observations. "He was on the lecture circuit then and he [gave these talks] a lot." Of course, these were not really unproven theories, explained his widow Janet. She pointed out that Dreyer was sure of his ground because he had the data to prove the veracity of his ideas. "It was not merely a hypothesis in that paper, it was real data." However, it was data in a form so new and so alien that almost everyone in the field could not understand what he was talking about. In time, these professors, and all their students, came to see, much later, that William Dreyer had been right all along.

Because he could not get funding from the usual sources, Dreyer went to private companies to manufacture the innovative instruments he had designed and built himself – something quite unusual and discouraged at the time but now wildly popular among universities hoping for a share of large royalty payments. Seeing the potential for his inventions (and their scientific impact) but having a hatred of administration and corporate politics, Dreyer came to be the "idea man" for seven new biotech companies (including Applied Biosystems).

Years later, when Susumu Tonegawa was

awarded a Nobel Prize (Physiology or Medicine, 1987) for work he had done in Switzerland, his innovative sequencing work proved (through experiments that were illegal in the US at the time) that Dreyer and his colleague had been correct in their predictions many years earlier. In the words of two scientific historians of this period: "This experiment marked the point of no return for the domination of the antibody diversity question by nucleotide studies: it was Susumu Tonegawa's final proof of the Dreyer-Bennett V-C translocation hypothesis through the use of restriction enzymes" (Tauber & Podolsky, 1997, 207).

Family weaknesses, Family Strengths

Later in his life, Dreyer taught molecular biology to his grandson who was clever with computers but had been having a very hard time in high school because of his own dyslexia. The grandson went to live with his grandfather. Employing the grandson as a kind of apprentice, Dreyer would start each work day (using a form of applied just-in-time learning) saying something like: "I want you to write this little search program for me today but first let me explain the biology you need to know to do this task." In time, working with Dreyer, the grandson skipped the latter part of high school, most of college, all of graduate school and was doing advanced "post-doc" level work writing computer programs, doing advanced programming developing databases, graphic user interfaces (GUIs), and other tools.

The grandson also used sophisticated scientific information visualization techniques to help link various human traits to sections of the genetic code. In doing this work, he noted that he used his "visual thinking ability to design the architecture of the programs ... visualizing the components in his head, trying it out and fixing what doesn't work, before I write the code – much like my grandfather..." He is not only doing high level work; as Dreyer and others pointed out, the grandson was in fact working at the leading edge – co-authoring peer-reviewed journal articles (King, in Roden, 2005, Hart, 2006). Indeed, one of the grandson's work colleagues only got his own Ph.D. degree (and a required publication) because the grandson was able to write a tutorial and GUI that helped a member of the colleague's required publication review committee better understand the significance of the advanced work done by the colleague (Dreyer, Dreyer & King, 2001-2004)[4].

Much later, after years of post-doc level work without even a high school diploma, the grandson decided it was time to go to college. He chose a university with very challenging standards but also an extremely good system for supporting his dyslexia—which presented continuing problems throughout his four years of study. This happened to be the University of California at Berkeley. In May of 2013, the grandson, Brandon King, graduated in Cognitive Science with honors and distinction.

Brandon's grandfather, William Dreyer, died of cancer in the spring of 2004. One of the enduring passions of his later work had been to try to understand the

[4] *Additional clarifications and further details were provided by Brandon King via email, March 23, 2009, available from Thomas G West.*

relationship between his dyslexia, his visual thinking and the high levels of creativity he had experienced in his own life and work. Dreyer's interest led to his participation in a small conference on visualization technologies, creativity and dyslexia held at the National Library of Medicine in Bethesda, Maryland. This author's second book, Thinking Like Einstein, is dedicated to: "William J. Dreyer, 1928-2004, molecular biologist, strong visual thinker, prescient inventor, instrument maker, who loved to fly high to see what others could not see, frequently alone."

Magnificently Ill-Adapted Engines of Discovery

The story of the life of William Dreyer and his grandson, Brandon King, brings into sharp focus the considerable advantages, in the right setting, of the dyslexic kind of brain – at least of certain variations within the great diversity of dyslexic brains. (Of course, this story also strongly suggests what sometimes might be possible employing nontraditional educational approaches such as apprenticeship or home schooling.) We can see that this kind of brain – seemingly so magnificently ill-adapted to conventional education – can (sometimes) be a powerful engine of insight, innovation and discovery.

This kind of brain may cause many problems in early schooling but it may also, sometimes, raise some individuals rapidly to the top of a new field of knowledge – pushing forward way beyond the many who are conventionally successful students but who find it hard to conceive of anything really new or really important. Perhaps they cannot see through to the novel, unexpected solution because they have learned too well exactly what the teacher wanted them to learn, what was expected on the conventional test. Perhaps they cannot easily unlearn what they have been taught.

In another example, one high-achieving researcher at NIH, with three professional degrees, in law, medicine and pharmacology, once admitted that he was aware of his own limitations, constrained beneath a kind of glass ceiling. He was aware that in spite of all his success and academic accomplishments, he "was not dyslexic enough" to do really original, creative and important work – as he had seen in his dyslexic colleagues. (Personal communication, R.S., March 2000.)

With stories such as these, we can begin to understand that these visual-thinking dyslexics do indeed see the world differently. They think differently. They are not like non-dyslexics. They are not like each other. Often, they seem to "see things that others do not see." (This same phrase – with almost exactly the same words – reoccurs with striking frequency in many different and unconnected settings.) Yet these same individuals have great difficulty with things that are easy for almost everyone else – especially at the lower levels of education. In schools, they are constantly tested on what they are not good at – almost by definition.

Why are they never tested, we should ask, in the areas where (some and perhaps many) have enormous talent and can make major contributions in their later life and work? Can teachers and

school psychologists believe that this is possible? It is hoped that some of the stories offered here will have created a new vision of what is possible. But this new vision may also require the development of new tests and measures -- ones quite different from conventional academically-oriented measures – but perhaps ones that are better suited to the new realities of life and work, suited for the visual-thinking dyslexics but also suited for many non-dyslexics as well.

To succeed with such extremely mixed abilities, as these individuals often do, one needs to have a deep reservoir of confidence and fortitude to carry on in spite of the judgments of others that you are, in fact, really slow and lazy and stupid. To maintain the required drive, determination and sense of mission in the face of almost constant early failure and humiliation is often nothing short of miraculous. It would appear that only a comparatively small number survive these early days with enough confidence and drive to press on, against all odds, to find success in some area of special knowledge, deep understanding and passionate interest. We need to better understand the nature of this kind of success and the remarkable individuals who seem able to find their way around so many obstacles, seeking an area where they are at home with their work, often performing at very high levels of proficiency and productivity.

Those of us who are trying to understand and to help dyslexics (along with others more or less like them) must come to see that conventional academic remediation is only part of the job – and not the most interesting or important part. We need to seek ways to help dyslexics find and develop their own talents, large or small, so that they cannot be beaten down – hiding their distinctive talents along with their disabilities. One of the best ways – perhaps the only really effective way – to do this is to study the lives and work of highly successful dyslexics (in some detail and in all their great diversity) – to allow other dyslexics to see what can be done as well as showing how it can be done.

The story of Bill Dreyer and his grandson shows clearly the mixed problems and great potential of dyslexic individuals and dyslexic families in a most modern, scientifically-sophisticated and technologically-advanced context. The talents that many dyslexics exhibit are powerful and valuable assets (frequently hidden and misunderstood) in a rapidly changing world. These individuals may appear to be slow and backward, but in many cases they are way ahead of nearly everyone around them, those who are mostly blind to what visual thinking dyslexics can do and what they can contribute.

Over the years, more and more dyslexic individuals have become aware of their own special talents as they confront their long-hidden weaknesses and humiliations. Many are finally coming to understand the positive aspects of their own mixed abilities well enough to give themselves permission to talk about and think about things they no longer need to see as only failures and weaknesses to be hidden and denied. They have discovered that it does not go away just because you pretend it is not there.

Fathers are realizing that they cannot

drive it out of their sons by ever more rigid discipline. Rather, they are learning that it is best to confront it, face on, with the new realization that there are hidden talents to be acknowledged (and used) as well as fears that will increasingly fade away in the clear light of day.

Learning to see the positive side can be powerful indeed. Of course, there is still a great deal of work to be done, but it can be focused on increasing strengths rather than decreasing weaknesses. It is urgent at this time to outline the kinds of things that need to be done – to take seriously, at long last, the varied talents and considerable strengths of dyslexics. The time is right. The time is late. The time is long overdue. Those on the front lines – the teachers, tutors, parents, advocates and school psychologists–those who have cared the most, those who have been able to understand when no one else did--unfortunately, they have often done less than they could have done because they have attended to only half of the job. They have too often focused on fixing the problems – and have totally ignored the development of talents. This should change – and we hope that it will change soon.

References

Branson, R. (1999). *Dyslexia: Dyslexic Genius, Parts 1 and 2.* Documentary, Twenty Twenty Television for UK Channel Four.

Broecker, W. (2010). *The Great Ocean Conveyor: Discovering the Trigger for Abrupt Climate Change*. Princeton and Oxford: Princeton University Press.

Caltech (California Institute of Technology), (1999). *Oral History Project, session one, tape 1, side1, interview of February 18, 1999 with Shirley K. Cohen*, published by Caltech Archives 2005.

Dreyer, Dreyer & King, (2001-2004). *Multiple conversations with William Dreyer, Janet Dreyer and Brandon King*, 2001-2004.

Dreyer, Janet Roman, Ph.D., molecular biologist, second wife and widow of William J. Dreyer. Interview with Thomas G. West, June 28, 2005.

Eide, B. L., & Fernette F. (2011). *The Dyslexic Advantage: Unlocking the Hidden Potential of the Dyslexic Brain*. New York: Hudson Street Press.

Geshwind, N. & A. M. Galaburda, (1987). *Cerebral Lateralization: Biological Mechanisms, Associations and Pathology*. Cambridge, Mass.: MIT Press.

Hart C. E., Sharenbroich, L., Bornstein, B. J., Trout, D., King, B., Mjolsness, E. & Wold B. J. (2005). A mathematical and computational framework for quantitative comparison and integration of large-scale gene expression data. *Nucleic Acids Research*, 33(8), 2580-94.

Horner, J. (2007). Video interview, Thomas G. West and John (Jack) Horner, Personal collection, NHK DVD, not broadcast, Thomas G. West.

Mail Online, July 13, 2013. *Dyslexia is Britain's secret weapon in the spy war*. http://www.dailymail.co.uk/news/article-2362793/Dyslexia-Britains-secret-weapon-spy-war-Top-codebreakers-

crack-complex-problems-suffer-condition.html
Reid, G. & Kirk, J. (2001). *Dyslexia in Adults: Education and Employment*. New York: John Wiley & Sons, Ltd.
Roden J. C., King, B. W., Trout, D., Mortazavi, A., Wold B. J. & Hart, C. E. (2006). Mining gene expression data by interpreting principal components. *BMC Bioinformatics*, 7, 194.
Schneps, M. (2013). *Harvard-Smithsonian Center for Astro-Physics. Laboratory for Visual Learning*. See www.cfa.harvard.edu/dyslexia/LVL/
Schultz, P. (2011). *My Dyslexia*. New York: W. W. Norton & Company.
Seligman, M. E. P. (1990). *Learned optimism*. New York: Knopf.
Tauber, A. I. & Podolsky S. H. (1997). *The Generation of Diversity: Clonal Selection Theory and the Rise of Molecular Immunology*. Cambridge, Mass.: Harvard University Press.
West, T. G. (2004). *Thinking Like Einstein: Returning to Our Visual Roots with the Emerging Revolution in Computer Information Visualization*. Amherst, NY: Prometheus Books.
West, T. G. (2005). The Gifts of Dyslexia: Talents Among Dyslexics and Their Families, *Hong Kong Journal of Paediatrics* (New Series), 10, 153-158.
West, T. G. (2009). *In the Mind's Eye: Creative Visual Thinkers, Gifted Dyslexics and the Rise of Visual Technologies*. Second edition. Amherst, NY: Prometheus Books.

Biographical Sketch

Thomas G. West is the author of *In the Mind's Eye: Creative Visual Thinkers, Gifted Dyslexics and the Rise of Visual Technologies* (Prometheus Books), selected as one of the "best of the best" for the year by the American Library Association (one of only 13 books in their broad psychology, psychiatry and neuroscience category).

In the Mind's Eye was published in Japanese translation in as *Geniuses Who Hated School*. A Chinese translation was published in 2004 and a Korean translation was released in 2011. West's second book is *Thinking Like Einstein*: Returning to *Our Visual Roots with the Emerging Revolution in Computer Information Visualization*. Dyslexic himself, Mr. West has been invited to provide presentations for scientific, medical, art, design, computer and business groups in the U.S. and overseas, including groups in Australia, Canada, New Zealand, Hong Kong, Taiwan, Dubai and twelve European countries. Mr. West is associated, as board advisor or board member, with several organizations, including the Krasnow Institute for Advanced Study at George Mason University, the Dyslexic Advantage organization, the Siena School and the Wye River Upper School, among others.

Recent invited conference lectures or keynotes have included: Magdalen College Oxford, Harvard and MIT, University of California at Berkeley, University of Malta, University of Trieste, the Arts Dyslexia Trust in London and an education conference in Dubai, United Arab Emirates. Early in 2013, West gave a talk on creative visual thinking, computer graphic information visualization and dyslexia at Pixar Animation Studios in Emeryville, California – and presented a Director's Colloquium on a similar topic for scientists and staff of NASA Ames Research Center (at Moffett Field in California's Silicon Valley).

Postscript

Important alternative research trends and perspectives have been becoming more apparent recently. The Dyslexic Advantage organization (with which this writer is associated) has recently formulated a strategy for research progress built around the following series of observations:

It is increasingly clear that dyslexic individuals do not only differ from non-dyslexics in the ways they process written language. Rather, they differ in the ways they process almost all kinds of information. Consequently, researchers now see that they will need to study more than reading and writing.

In addition, dyslexic individuals are seen to share common strengths as well as areas of difficulty – and these strengths usually involve brain functions unrelated to reading. Indeed, the strengths of dyslexics provide the reason that there are so many dyslexic individuals in the human population – that is, the dyslexic wiring pattern in the brain has been selected over long periods of time as a favorable trait and this provides the basis for achieving such high prevalence.

Increasingly, researchers are becoming more aware that dyslexia is a late-blooming profile. The strengths of dyslexics are often more apparent later in development than the strengths of many non-dyslexics. Consequently, because these strengths are more apparent in adults than children – when the nervous system is fully matured – it is now seen as important to study dyslexic adults, including those who are excelling in their lives and work as well as those who continue to have difficulties.

Another important observation within the Dyslexic Advantage perspective is that it may be inherently difficult to measure the things that many dyslexics are good at. Dyslexic individuals often excel in complex high-level cognitive tasks. Consequently, researchers believe they need to develop more creative research approaches and testing methods capable of measuring these high-level skills and talents. These researchers are learning to re-examine dyslexic children in light of what they have learned about the mature adult dyslexic brain. This way, they hope to be able to better understand the true nature and significance of what they observe in the earlier stages of development.

To emphasize this last point, the Dyslexic Advantage organization has chosen to adopt the image of the butterfly as the institutional logo and symbol – believing that one can only see what the dyslexic brain is "trying to become" by considering its mature form. If one were to study caterpillars only, one would never guess that this fat, ugly worm with so many legs is ultimately destined to fly high and far on wings of iridescent beauty. (Personal communications, Dyslexic Advantage, October 2013.)

Thomas West
1 November 2013