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Chapter 3

Visual Thinkers and Nobel Prizes

Recognition in the Old Tradition

" 'I didn't expect ' a Nobel Prize 'at all,' he said, 'in part because of the nature of the work. There was less science [and more engineering] in it than the things customarily honored by the prizes.'" This is the observation of Jack S. Kilby (Texas Instruments) co-inventor of the integrated circuit, on being notified of his award in October 2000.

The Nobel Prize for chemistry awarded at the same time to Alan J. Heeger (UC-Santa Barbara) and Hideki Shirakawa (University of Tsukuba) for their work on conductive polymers also reflected the recognition of broad effects rather than pure science. " 'We're very excited,' said Daryle H. Busch of the American Chemical Society, 'because this award is in the old tradition. That is, it was given for work that has a very substantial impact on society.' " ¹

The shift back to an earlier tradition by the Nobel Prize committee may reflect a growing recognition in the larger world of the deep value of applied work of broad impact as opposed to the highly theoretical work of relatively low impact which has commanded such high prestige in recent decades.

Thus these changes might be read as the small beginnings of a larger and more gradual swing back toward a greater respect for hand and eye and image building in the brain.

For some time the major contributions of visual thinkers have been eclipsed in many fields by theoretical approaches that did not lend themselves to pictures or images or imagined models and hands-on manipulation. For a long time, we have been told with confidence that visual approaches were old fashioned and somehow primitive. Modern

scientists and mathematicians, we have been told, did not need images. Pictures and diagrams were for non-professionals and lay persons.

But we may now see that things may be going back the other way. With new visualization technologies, and a new sense of missed opportunities with the old narrow methods, researchers in many fields are becoming aware that in order to do really creative work, they may need to go back to visual approaches once again. So, perhaps, we come back again to the place where much of the most advanced and creative work is done by visual thinkers using visual methods and technologies. Once, again, pictures are not only for children.

Reassessing Visual Roots at Green College

Quiet indicators of these powerful changes are beginning, here and there, to gain broader attention. In one instance, on a bleak and rainy Saturday in November 2000, a small but historic conference took place at Green College, Oxford University. With observations that will gladden the hearts of many strong visual thinkers, the conference presentations focused on high-level achievements in the arts and the sciences within families over several generations. Titled "Genius in the Genes?" and sponsored by the Arts Dyslexia Trust, the conference included an associated exhibition of art and scientific work from eight families. All these families showed evidence of high visual and spatial talents along with troubles with words. Several members of each family were also dyslexic.

In a view that is contrary to most of the generally held beliefs in educational testing and recent educational reform, the speakers indicated that very high level and creative achievement in the sciences has often come from the neurological resources linked to success in the arts. The speakers indicated that some of those who have excelled most in their scientific achievements are from families with varied visual and spatial talents--ones which often have troubles with words. As we are becoming increasingly aware, there does seem to be a kind of trade off--very early brain development (largely controlled by genetic factors), seems to gain unusual visual and spatial proficiencies at the cost of some lack of proficiency in some language system.

Consequently, there may be various family members who have special strengths in art, design, computer graphics, visual mathematics, mechanics or engineering--yet may have unusual difficulties with reading, spelling, arithmetic, rote memorization or foreign languages. It is all part of a familiar pattern--which is continually repeated with variations generation after generation. The pattern continues through families, parents to children, always different in details but frequently similar in the overall pattern of high visual strengths with notable language difficulties.

The pattern has often been observed, but little studied in any systematic way. Many SIGGRAPH members and their families are familiar with this sort of pattern. But this should not be surprising, The chosen occupation becomes a kind of filter. For example, the pattern is not uncommon among artists and designers, craftsmen and mechanics, surgeons and radiologists, architects and engineers. Even when the occupation may not be a give away, the hobbies often are.

Four Nobel Prizes

One of the speakers at the Green College conference was Patience Thomson, the former head of Fairley House School for dyslexics in London and later a publisher, Barrington Stoke, of “books for reluctant readers.” She spoke of her family where there are many visual-spatial occupations in the arts and the sciences and no less than four Nobel prize winners. She explained that all of the prize-winning achievements have a high visual component. Thus, in a most remarkable example of the larger pattern, in this extended family the exceptional visual and spatial capabilities that have contributed to so much creativity and innovation, seem to be balanced by problems in other specific areas.

On her side of the family, the Nobel Laureates are her grandfather Sir William Bragg (1862-1942) and her father Sir Lawrence Bragg (1890-1971). They received a joint prize for x-ray crystallography. On her husband's (David Thomson) side, the Nobel Laureates are his grandfather Sir Joseph Thomson (1856-1940) for discovery of the electron and his father Sir George Thomson (1892-1925) for discovery of electron defraction.

She spoke of her famous father and the other outstanding scientists in her remarkable family, her gifted children, and the way the power of visual-spatial thinking has colored their lives and has contributed to many of the considerable achievements in the family. Along with the scientists among the Braggs and the Thomsons, there have been several artists, architects, TV producers and computer experts and one actor along with a number of other occupations where the role of visual-spatial proficiencies is not so obvious.²

However, in five generations of these families, with many children and grandchildren, there have been a number who have been dyslexic or mildly dyslexic. There are many great grandchildren who are "too young to tell." Along with the award medals and family photographs, the exhibition showed drawings and paintings by family members including a self portrait by Sir Lawrence Bragg.

An indicator of the enduring importance of Lawrence Bragg's work is that when James Watson wrote *The Double Helix*--about his discovery of the structure of DNA with Francis Crick--he asked Bragg to write the Foreword to his book. The use of x-ray crystallography pioneered by the two Braggs was fundamental to understanding the structure of this molecule that carries all genetic information.³

The Art in Medicine

Another speaker at the Oxford conference was Terence Ryan. Dr. Ryan described what turned out to be his own life story as man who was a leader in his field of medicine (dermatology) but had unusual difficulties with his early education and his medical education because of his dyslexia. For example, with exams, he would usually recognize accurately symptoms and conditions but would sometimes come up with the wrong Latin names.

However, in his practice and clinical observations, he found he could be a leader and innovator because he could recognize disease patterns that his medical colleagues could not easily see. He suspected that he had greater powers of visual observation than many

of his associates. He also thought his dyslexia helped him to be more flexible and innovative in his thinking, coming up with theoretical approaches quite different from others in his field.

As an example of the creative inverted thinking that dyslexics sometimes exhibit, he described one of his own theories that is still controversial. Generally, it is taught that skin grows as its lowest layers and older cells allow themselves to rise to the top layers to slough off at the surface. He explained that from his point of view, cells would be unlikely to allow themselves to automatically rise to the top layers--as they would thereby be moving further and further away from their food supply in the bottom layers. Consequently, he uses the novel alternative explanation that the cells which rise to the top are in fact inadvertently pushed out of the way by other cells which are in fact making their own way down toward the nutrient supplies in the bottom layers. In many ways the final results are the same, but the actual process is quite different. Consequently, his associates see him as one of the important "lateral" thinkers in the field.

In spite of his extensive educational difficulties, his medical career has been highly successful. Now retired, he was Clinical Professor of Dermatology at Oxford University and Vice Warden of one of the Oxford Colleges. He has been president of many of the national and international professional societies in his field as well as being active in establishing regional dermatology training centers in Africa and Central America. He is "not easily confined by definitions" which has helped him break new ground and produce about 400 publications.

As a hobby, Dr. Ryan does colorful flower paintings--often exploiting visual ambiguities in which it may not be clear whether a garden stair goes up or down or whether a flower is inside or outside a frame.

A Village of Millers and Clock Makers

The Green College exhibition also included information about a family from the village of Blockley, Gloucestershire, England. Blockley was the home of small industries and craft workers long before the Industrial Revolution. Most of the town lies along the spring-fed, "never failing" Blockley Brook, "once a very vigorous stream, which, for a thousand years or more, drove many mills."⁴

This family showed remarkable continuity over many generations of involvement with occupations that require a high degree of visual and spatial talent--construction and operation of these small leased mills in the village over hundreds of years as well as barrel making and clock making. One clock made by a family member was in use in a church in a nearby village from 1695 until 1962.⁵

In 1658, one of the family (William Warner) emigrated to America (settling in the Philadelphia area) where his descendants continued for generations in occupations and businesses that required talent in mechanics, invention, engineering, art and craft. For example, Joseph Warner was a silver smith in the middle of the 18th century.

It happens that this writer is a descendent of this family on his mother's side. Although at the conference I spoke mainly of the visual-thinking scientists who preceded the Braggs and Thomsons, the Green College exhibition did include oil paintings by my artist parents (Anne and Charles West) and sculpture by son Jonathan. It may be no surprise that within this visually-oriented extended family, there are several possible or diagnosed dyslexics, including myself.

Seeking Family Patterns

I have to admit that when I was originally urged to submit samples of family art for the Green College exhibition, I was interested--but also reticent. I thought it would be interesting to look at our immediate family and then go back several generations to see what I could find. I think many families with high visual talents with or without dyslexia wonder about this sort of thing.

As we noted previously, the neurologist Dr. Norman Geschwind said the dyslexia trait would not be so common and would not persist generation after generation (in its varied forms) if it were not good for something. So, I wondered, did it persist in our own family? What was it good for?

My own parents were both artists. They met in art school. Some would expect (not entirely seriously) that this alone might be a strong predictor of some degree of dyslexia in their children (as well as visual talents). I wondered what forms it might take in each generation. So, I thought I would provide a few examples in the exhibition to provoke discussion about the possibilities. Perhaps it will provoke discussion among other visual thinkers and their families as well. (In the process, I realize that my book, *In the Mind's Eye*, is in some ways an attempt to answer the question, "what is it good for?")⁶

Always at the Leading Edge

Viewing visual strengths and verbal difficulties over many generations (through many changes in technologies and economies) can be remarkably instructive. Accordingly, we may be led to ask whether it is true, as some believe, that many of the early dyslexics and strong visual thinkers with language problems quit their schools and conventional towns as quickly as they could and headed for the sailing ships and wind or water powered mills, the railroads and telegraph lines, the gold mines and oil fields.

Did they mostly leave places like London, Boston and Philadelphia -- and seek their fortune (in disproportionate numbers) in places like Australia, New Zealand, Canada, Texas, Alaska and California? Did all the Swedes who could not read (and so were not permitted to marry), really immigrate to America (as one Swedish researcher speculates)?

We may ask how varied strong visual traits have contributed over time to both school difficulties and to remarkable innovations and inventions, within a shifting technological context? Why do these individuals seem always to be out in front of everyone else, especially when they can move ahead with the minimum of book learning and paper

credentials -- while using their special visual-spatial abilities, creative imagination and hands-on skills -- often taking great risks?

Why do so many of today's technologists and entrepreneurs seem to fit this pattern? Why do there seem to be so many of these individuals in places like Silicon Valley? Whatever the time or place, some individuals seem to find ways to get away from the traditional books and the old ways by creating things that are entirely new. It seems to be a pattern that would be familiar to individuals and families where strong visual thinking is common. Perhaps it is worth looking at some of these families over time to see whether there is evidence of these enduring traits over generations--visual thinkers doing the things they can do best in whatever technological context is made available by their time and place. The patterns may be more clear and enlightening than we might have expect.

¹ Suplee, "Six Awarded Nobel Prizes," *Washington Post*, October 11, 2000, p. A2. (This article appeared in *Computer Graphics* in February 2001, and, in a different form, on LDOOnline (www.LDOOnline.org) in April 2001.)

² Caroe, *William Henry Bragg*, 1978.

³ Watson, *Double Helix*, 1968.

⁴ Cotswold Wardens, *Country Walks*, 1991.

⁵ Icelly, *Blockley Through Twelve Centuries*, 1974, 1996.

⁶ West, *Mind's Eye*, 1997.