intellect, creativity, accomplishment, and genius

The Bell and the Candle Snuffer

Gaussian Distribution

Gentlemen: Allow me to begin with a bell, though not in this instance a metallic bell of the type that rings in church steeples or is swung by town criers. I have in mind, rather, something of a more abstract or mathematical sort: the bell shaped curve. This type of bell, one plotted as a graph on paper to describe a random distribution, was first discovered - described may actually be a better word - in 1733 by a French mathematician named Abraham de Moivre.

A Huguenot, de Moivre had fled to London to avoid the persecution of Protestants then taking place in France. Tossing coins into the air, he found that variations from the expected or "normal" heads/tails distribution of fifty/fifty fell in a pattern, or standard deviation from the mean which, when charted on paper, took on the symmetrical shape of a bell.

The pattern, which seemed to lend order to randomness, impressed de Moivre. A religious man, he regarded this apparent contradiction - order in the midst of disorder - as God's work, part of the Creator's "original design".[1] Whether or not the bell shaped curve is part of the Creator's "original design" I am not at this moment prepared to say. But regardless of

the position one takes on this theological issue, the bell-shaped curve has long since emerged as the standard model for plotting statistical variation. It represents a normal, or so-called, Gaussian distribution, named after the German mathematician Carl Friedrich Gauss, who first provided its mathematical underpinning toward the end of the eighteenth century. Gauss demonstrated that as things vary, they tend to hover near a median point and scatter from it in predictable fashion. (Gauss, incidentally, was a prodigy and genius who conceived almost all of his major mathematical discoveries by the age of seventeen.)

The bell-shaped distribution can also be applied to individual variations in human characteristics. For example, if the height of a random group of individuals is taken, most people fall near the median, or center of the graph, with those who are short represented by a slope falling off to the left and those who are tall a parallel slope to the right. The handful of individuals who are extraordinarily small - midgets, dwarfs, and the like - form the narrow left rim of the bell's profile - while the six foot ten or seven foot geeks of the sort who play professional basketball - form the opposite rim on the right.

A similar outline would be produced were we to take weight. Scrawny individuals - high fashion models, marathon runners, anorexics etc. - would form a rim on the left side of the bell shaped graph and the grossly obese a rim on the right. Most other physical attributes could be charted in comparable fashion.

As we might expect, human characteristics other than the strictly physical are more problematic. Measuring them introduces an element of

subjectivity and is thus considerably less certain, though that fact has hardly prevented social scientists from venturing to do so, often with considerable success. The random distributions they have usually found tend also to take the shape of a bell-shaped curve. The earliest endeavors in this regard were efforts to measure intelligence.

Intelligence Testing

Intelligence testing began almost a century ago (in 1908) in France with something called the Binet-Simon test. A few years later - in 1916 - Lewis M. Terman, a Stanford University psychologist, produced an American version, known as the Stanford-Binet scale, variations of which are still in use. Terman adopted a concept first developed by a German who later emigrated to the United States, William Stern - the now familiar IQ. Stern defined the quality he was attempting to measure, that is to say, intelligence, as "a general capacity of an individual consciously to adjust his thinking to new requirements" as well as "a general mental adaptability to new problems and conditions of life."

The Stanford-Binet test was designed to be used primarily with children. How a child fares on the test determines the child's "mental age", which, when compared with others, establishes the IQ. IQ tests of one sort or another, as well as more specific and narrowly tailored aptitude tests such as the SAT's, law school and medical school exams, etc. which came along later, have survived and continue in use because, while imperfect, they serve an obvious need. In varying degrees, all have demonstrated correlations between the scores received and later performance in particular areas.

The late British psychologist, Hans Eysenck, who wrote voluminously as well as authoritatively in this field, stressed the following: "IQ tests predict extremely well scholastic success, both at school and university; they predict occupational success, both for blue collar and white collar jobs; they predict success in the armed forces, the police and in government jobs generally."[2]

Testing Under Attack

Nonetheless, as you are doubtless aware, controversy continues to envelope testing, not just the IQ test but aptitude testing as well. The SAT's and graduate record exams, comparable tests taken by law school and medical school applicants, as well as tests screening applicants for employment, have all come under attack. Individuals, as well as spokesmen for groups who fare poorly, habitually blame the tests, rather than their own shortcomings. They claim that the tests are unfair: that they are culturally skewed, or that they are biased in favor of individuals from upper income homes, or who come from educated families, or that they fail to measure drive or creativity, or that some people are simply good test takers while others of equal talent do badly under conditions associated with stress.

Important elements of the educational establishment are particularly fond of disparaging standardized tests on cultural grounds. A couple of years ago, at its convention in New Orleans (in 2001), the influential Modern Language Association debated a resolution denouncing standardized testing. The resolution asserted that "high stakes' tests invariably discriminate against students from poor, working-class, and minority families". The resolution, which passed by a lopsided margin of 107 to 11, added that they

"provide an ideological rationale for the perpetuation of inequality".[3] What is especially noteworthy about this curious resolution is that the tests were *not* denounced on the grounds that they were technically flawed, misapplied or that they didn't measure what they claimed to measure. Rather, they were criticized only on the basis that they reflected social conditions of which the educators disapproved.

A day or two after writing the above, I happened to be reading a book entitled *Washington*, the memoirs of the late Meg Greenfield, the brilliant lady who ran the *Washington Post's* editorial and op-ed pages for almost three decades. There were a couple of lines there I thought quite apropos. Here is what she wrote about growing up: "I was taught that you could only be free and have dignity and self-respect if you were responsible for what you did....I can imagine myself taking off in a space capsule before I would say I didn't win because the game was rigged against me." I thought that summed the matter up quite succinctly.[4]

A Structure of Intellect

Testing is hardly the only part of this general field on which there is controversy. Argument begins with the fundamentals, namely with the question of what intelligence actually is and what it means. The prevailing - though by no means universal - answer given by contemporary psychologists is that intelligence as such exists, if at all, only as a theoretical or hypothetical construct. In this view, there is no such thing as a general, overall, or unified intelligence (or "g-factor" standing for "general intelligence" as it is sometimes referred to). Rather, there exist a variety of distinct intellectual

abilities.

This notion was first advanced by J.P. Guilford, who held a chair at the University of Southern California in the middle decades of the twentieth century. Guilford theorized that intelligence embraces as many as 120 specific abilities, comprising what he termed a "structure of intellect". Most contemporary students of the subject postulate fewer categories. Robert Sternberg, a Yale psychologist, for example, proposes only three separate facets: analytical intelligence, creative intelligence and practical intelligence.

Another influential variation has been put forward by Howard Gardner, at Harvard. He lists seven separate types of intelligence: visual-spatial, musical, verbal, logical-mathematical, interpersonal (or social) intrapersonal (or introspective), and bodily-kinesthetic. Gardner believes that each of these qualities resides in a different and specific area of the brain. An inference flowing from the theory is that a high talent in a particular type of intelligence is due to a greater than usual development in a specific brain section.

That some individuals are enormously gifted in certain skills while being normal or even inferior in others is apparent and unchallenged. Muhammad Ali once conceded that "I said I was The Greatest; I never said I was the smartest". Some otherwise quite ordinary individuals have a brilliant musical ear and talent. There are even individuals with an extraordinarily developed sense of smell and taste. The wine critic Robert Parker is able to identify wines in blind tastings of particular vineyards and vintages that he has not sampled for ten or more years.

While high performance in specialized areas may indeed be related to

select portions of the brain, what is less evident is their relationship to intelligence as it is normally understood. Intelligence as a concept seems to lose meaning if it is stretched to encompass the special and differentiated ability of a musician, poet, or quarterback.

Localization of Brain Function

The localization of brain function is in itself a matter of controversy. Some prominent scholars, like Steven Pinker, a professor of evolutionary psychology at MIT, are convinced that the brain is genetically programmed. They liken it to a hard-wired collection of modules capable of being located as well as characterized and which are fixed in place very early in life. Other scientists conceive of the brain as more flexible, a phenomenon referred to as "neural plasticity". Under this concept, the brain is seen as a sort of versatile bio-computer led by the cerebral cortex, which is able to adapt and configure itself in response to both external and internal stimuli.

Perhaps the most bizarre story relating to this area of research is the strange odyssey of Albert Einstein's brain. After Einstein's death in 1955, his remains were cremated but, with his family's assent, his brain was retained by Thomas Harvey, the pathologist at the Princeton Hospital where the great physicist died. Harvey was an eccentric Quaker who had a reputation as a competent pathologist but also as a poor manager. Einstein's executors and other interested parties expected Harvey to have the brain examined by prominent neurologists, and Harvey did in fact send slides and pieces to a number of scientists for inspection. However, little of consequence had happened by the time four years later when Harvey departed from both the

Princeton Hospital and his wife.

Then began what would turn out to be a forty year excursion to various places and jobs throughout the country, with Einstein's brain packed in two alcohol-filled jars along as part of the luggage. In 1996, by then 84 years old, and having gone through two more wives and virtually penniless, Harvey contacted Sandra Witelson, a well-known Canadian neuro-psychologist at McMaster University in Hamilton, Ontario. Harvey asked whether she would be interested in examining the brain. Dubious at first, she eventually agreed, and Harvey traveled to Ontario and left her with fourteen pieces of the brain - more, he claimed, than he had ever left with anyone. Witelson also somehow managed to track down and retrieve additional slides that Harvey had left with others.

The results of her investigation were published in the British medical journal *Lancet* in 1999.[5] She noted several oddities: the parietal lobes, which are located in the rear upper section of the brain and are thought to be linked to spatial and mathematical reasoning, were unusually large. In addition, something called the Sylvan fissure took a unique detour, and a gorge called the *parietal operculum* appeared to be missing on both sides of the brain. Witelson hypothesized that the absence of these hollows enabled Einstein's neurons to connect with one another more easily. She concluded by saying that she could find no other brain embossed like Einstein's in any of her control subjects or documented in published collections.

Not surprisingly, the *Lancet* article raised a great hullabaloo in both the popular press and among scientists. Many of the latter criticized her methodology and one even questioned whether the brain was actually

Einstein's. Others, including Steven Pinker, lauded her work. "It is strangely fitting", he wrote, "that the brain that unified the fundamental categories of existence ... should now be helping us unify the last great dichotomy in the conceptual cosmos, matter and mind".[6]

Witelson raised another interesting question: whether the mind of a mathematical genius operates in a different fashion than that of normal individuals. "Einstein's own description of his scientific thinking", she wrote in her report, "was that 'words do not seem to play a role', but there is 'associative play' of 'more or less clear images of a visual and muscular type'". She implied that such an unusual mode of thought must stem not from experience but from a distinct genetic advantage.

Inheritance vs. Environment

Controversies on whether the functioning of the brain is hard-wired or of a plastic nature are mild compared to those concerning the relative importance of inheritance versus environment in intellectual development. The debate is hardly new. As early as 1869, Sir Francis Galton, published an influential work called *Hereditary Genius.* Galton was one of those extraordinarily versatile and brilliant Victorians; he was an explorer, surveyor, inventor, statistician, anthropologist and psychologist. He was also a member of a remarkable family, being the grandson of Erasmus Darwin, a prominent physician, and the second cousin of Charles Darwin. Other relations included Josiah Wedgewood, the chemist and ceramicist, and Thomas Wedgewood, a physicist and inventor.

The stature of Galton's own family undoubtedly influenced his views

on hereditary genius, though he modestly omitted mentioning it in his writings. He did list many others, including the Bernoullis, seventeenth and eighteenth century French mathematicians; the Cassinis, Italian and French astronomers; the Hershels, English astronomers and physicists, and the Jussieus, French botanists and naturalists.

Most famous of the families Galton cited were the Bachs. Galton wrote that "There are far more than twenty *eminent* musicians among the Bachs; the biographical collections of musicians give the lives of no less than fifty-seven of them". The compositions of Johann Sebastian, Karl Philipp Emanuel, Johann Christian, and Wilhelm Friedemann Bach still appear regularly on concert programs.

Galton maintained that the higher an individual's natural ability, the greater would be the odds that he would have distinguished relatives. He also argued that since the statistical likelihood of genius appearing randomly in families is infinitesimal, the sort of familial clusters he cited could not possibly be attributed to chance. He concluded, finally, that mental characteristics are as much inherited as physical ones. Although they appear obvious, Galton's ideas run counter to the ideological egalitarianism and passion for social leveling that now dominate academic circles. Thus contemporary critics are predisposed to attribute clusters of brilliance in families to cultural advantages rather than genetics. How cultural factors can account for high talent in subjects like mathematics, physics or musical composition remains to be explained, however.

Intelligence and Class

A new study, published just this month in the professional journal

Psychological Science, claims to have found that "environmental deficits" overwhelm genetic potential in poor families. The study, led by Eric Turkheimer of the University of Virginia, asserts that the effect of environment on IQ is four times stronger in poor families than in wealthy ones. Skeptics see the research as a politically motivated effort to bolster early education programs like Head Start, which have lately been undermined by indications that environmental factors are inconsequential. Robert Plomin, a geneticist at King's College in London, who has studied 4,000 pairs of identical twins, says his own research contradicts Turkheimer's findings. "In study after study, the evidence is overwhelming that there is a substantial genetic input to IQ", he attests. Plomin's findings show little difference regardless of the socio-economic status of the population studied.[7]

Intelligence and Race

The relationship between race or ethnicity and intellect is a subject now considered so sensitive and emotionally charged that dispassionate scholars, fearing being tarred as racist, understandably avoid it. Arthur Jensen in the 1970's and Richard Herrnstein and Charles Murray, authors of *The Bell Curve*, in the 1990's, were pilloried and received death threats for research that indicated that Asians and whites have higher general intelligence levels than blacks and Hispanics. (Jensen actually required police protection.) With serious researchers staying away, much of what is currently written in the area is likely to be of an ideological or polemical cast rather than objective scholarship. The result amounts to a sort of *de-facto* censorship.

A reasonable argument can be made that areas of study that are inflammatory or hold the potential of stirring up social unrest or violence are best avoided. On the other hand, in the long run knowledge is likely to prove more salutary than ignorance. Aside from whatever intrinsic interest the subject holds, further exploration could well produce data useful to the formulation of important educational policies.

A Circular Dynamic

Be all that as it may, accumulating evidence has led to a wide consensus that inheritance plays a dominant role in intellectual accomplishment. This belief has received heavy buttressing from modern linguistic scholarship. Research in this field has demonstrated that so called "deep grammar" is embedded within genetically determined neural structures. Other experiences impinging upon us from birth are almost certainly sorted in similar fashion. At the same time, almost everyone agrees that a circular dynamic exists between the genetic and experiential components of intelligence.

Buddhist-style meditation provides one curious example. Studies on the effect of meditation were not taken seriously by Western scientists until lately. But recent studies have indicated that intense meditation can actually cause physiological changes in brain chemistry. University of Wisconsin researchers have detected heightened activity in several areas of the left prefrontal cortex, after what they refer to as "expert" meditation. The change lasted for several months.[8] .

Another odd example is the finding that a statistical link exists

between educational achievement and Alzheimer's disease. The more education one has, the lower is the risk of succumbing to the disease. How advanced education can protect brain cells remains a mystery. Among the possibilities suggested are that access to higher education relates to other advantages - family wealth, better nutrition, or higher initial ability.[9]

Intelligence and Accomplishment

If charting human characteristics other than the strictly physical is less than a precise art, then adding productivity or accomplishment to the mix complicates the matter further. Dean Keith Simonton, a professor at the University of California at Davis, and a leading scholar in this area, has concluded that "The distribution of achievement is much more elitist than the distribution of intelligence...We cannot expect IQ to explain all that we need to know about phenomenal success. Too many creators and leaders are more extraordinary than their intellects would suggest."[10] Simonton uses the word "elitist" to mean that achievement shows up on a graph as asymmetrical, with a long tail extending to the right, or high end of the bell curve. Intelligence, in his view, follows a more normal distribution.

There is, it appears to me, something conceptually synthetic in this sort of dichotomy. Obviously, some individuals are wildly more productive or successful than the average. But how is intellect to be distilled out of accomplishment? A hundred and thirty plus years ago, Francis Galton already defined natural ability as including determination and energy in addition to intellectual capacity. Intensity of concentration is another quality often noted in individuals of high achievement. So at least when it come to

accomplishment, regarding intellect as a discrete quality separable from other attributes of personality seems untenable.

This fact is apparent in areas such as political and corporate leadership. American presidents are often mocked for alleged intellectual shortcomings, and in fact only two, Thomas Jefferson and Woodrow Wilson, qualify as intellectuals, and Jefferson alone as a genius. There is an anti-intellectual streak in the American body-politic that feels more comfortable with a robust and charismatic personality and old fashioned "horse-sense" than with erudition. This voter preference - call it an insight, if you choose - may not be a bad thing. A number of our most effective leaders have been men with distinctly unimpressive educational or intellectual credentials. A professional political consultant recently summed it up this way: "Being president isn't about taking the SAT test. If you look at companies, it's rarely the most IQ points that's the CEO. You can always hire as many geniuses as you need".[11]

Genius

Though the precise alchemy of intellect and personal qualities that produces success may remain unfathomable, one fact is very clear: a tiny number of individuals stands distantly beyond the mean. One possible way to picture this is by crude analogy to weight. The normal range of American males within the bell curve might extend from something like seventy pounds on the low end, 160 at the median and 400 pounds at the very high end. But in the case of ability, some individuals weigh the equivalent of a thousand or two thousand pounds. And at the peak, among the true geniuses,

who knows, perhaps ten thousand pounds, perhaps twenty thousand? The difference between a normally talented individual and a genius is, in other words, vast and essentially unquantifiable. This is an instance where the phrase "off the charts" applies quite literally.

The concept of genius is a very old one, traceable to classical antiquity. The Romans linked it to another significant idea, that of authority. A genius establishes an authoritative foundation, whether in literature, mathematics, philosophy or elsewhere. His work sets a standard by which others are judged. The nineteenth century American essayist E. P. Whipple stated the matter more poetically. "Talent", he wrote, "is a cistern; genius a fountain....Genius ... creates new combinations, discovers new laws, and acts from an insight into principles."[12]

Another, more contemporary, American author, Harold Bloom, the eminent Yale literary critic, recently published a work called *Genius,* which compiles the work of a hundred individuals he terms "geniuses of language". In it he defines the work of a genius as one which "asserts authority over me, when I recognize powers greater than my own." "The dead genius" Bloom adds, "is more alive than we are".[13]

The Candle Snuffer

The inescapably vast range of human capability prompts us, I believe, to discard the bell shaped curve in favor of a different, more accurate configuration, one resembling a candle snuffer. I mean the sort of snuffer used by acolytes to extinguish flames on candles high on the alter at the close of a church service. At one end is the small bell that snuffs out the flame;

extending outward is a long handle. While most of us ordinary folk fall within the confines of the bell, a tiny but significant number of individuals is out there on the handle, with the most brilliant toward the end and a minuscule number - the true geniuses - out at the very tip.

The snuffer metaphor represents a handy way to raise an additional question: whether the bell is made of a different substance than the handle. The bell is definitely metal; the handle might also be of metal but could well be made of wood. The utmost tip might be covered by yet a different material, pewter perhaps. Francis Galton believed the bell and the handle were composed of the same material; that is to say, he thought ability existed in a continuum. Genius, he contended, simply involved a more abundant supply of talent. Other observers see a substantial difference - a qualitative difference - between a genius and a person who is simply very talented.

Magicians

The mathematician Richard Kac gave a striking illustration of such a difference in describing the famous physicist Richard Feynman. Kac, who worked with Feynman at Cornell in the 1940's, wrote the following:

"There are two kinds of geniuses, the 'ordinary' and the 'magicians'. An ordinary genius is a fellow that you and I would be just as good as, if we were only many times better. There is no mystery as to how his mind works. Once we understand what they have done, we feel certain that we, too, could have done it. It is different with the magicians....The workings of their minds is for all intents and purposes incomprehensible. Even after we understand what they have done it is completely dark. They seldom, if ever, have

students because they cannot be emulated and it must be terribly frustrating for a brilliant young mind to cope with the mysterious ways in which the magician's mind works. Richard Feynman is a magician of the highest caliber."[14]

I came across another, different sort of quote, while reading about George Orwell. It comes from an obituary written by Arthur Koestler, and also distills the peculiar, idiosyncratic nature of genius. "The urge of genius", Koestler wrote, "and the promptings of common sense can rarely be reconciled; Orwell's life was a victory of the former over the latter".[15]

In a curious way, geniuses sometimes feel detached from, or not entirely responsible for, their own creative inspirations. Mozart once said of his work "I ... have nothing to do with it".[16] Genius, then, *is* different. Certainly a vast gulf separates a fine writer, even one who is absolutely first rate, from someone distinctly in the genius category - the category of a Milton, Shakespeare or Dostoevsky. Is there not a deep and palpable divide between even the most talented artist and a DaVinci, Goya, or Rembrandt? A composer to a Bach, Mozart, or Beethoven? A philosopher to a Plato, Hegel or Wittgenstein? A physicist to a Newton, Einstein, or Bohr? An inventor to an Edison, Planck or Shockley?

I believe the answer is affirmative, that genius is *sui generis,* singular and set apart. This is, in fact an idea long ingrained in Western culture: genius as a gift granted to a lucky few at birth. John Dryden, in his *Epistle to Congreve*, published in 1693, wrote:

"Time, place and action may with pains be wrought,
But genius must be born, and never can be taught".

Prodigies

Not many examples are needed to illustrate Dryden's point. A good one is Francis Galton himself. Here is a letter Galton wrote to his sister the day before his fifth birthday:

"My dear Adele,

I am 4 years old and I can read any English book. I can say all the Latin Substantives and Adjectives and active verbs besides 52 lines of Latin poetry. I can cast up any sum in addition and can multiply by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.

I can also say the pence table. I read French a little and I know the clock."

Galton's English reading at that age was extensive. When a young friend asked him for advice on what to write to his father who evidently believed himself in danger due to some political dispute, young Galton replied with a quote from Walter Scott: "And if I live to be a man/ My father's death revenged shall be."[17]

Another famous prodigy, John Stuart Mill, was, like Galton, the scion of a learned family, and was educated exclusively by his father, James Mill, a historian and philosopher. He studied Greek at three. By five he could debate the comparative prowess of Wellington and Marlborough. At six, he wrote a history of Rome. He read Plato at seven, and the whole of the historian Herodotus at eight. By then he had also mastered geometry and algebra.[18]

Probably the most famous of all examples of precocious genius is that of Wolfgang Amadeus Mozart. He could play the clavier by the age of four,

began composing minuets and other musical pieces by five, and giving public performances at six. His first published composition was out when he was seven. He was appointed a grand ducal concertmaster at thirteen. By the age of fifteen he had written sonatas, concertos, masses, symphonies, operettas, and an opera.[19]

Not all prodigies become successful in later life, nor do all geniuses demonstrate promise in their early years. Some, like Einstein and Darwin, to take but two examples, were regarded as quite slow as children. And a disproportionate number of prodigies suffer emotional difficulties in later life. John Stuart Mill went into a deep depression in his early twenties. Francis Galton had a nervous breakdown while a student at Cambridge. Both recovered and went on to do great work, though that is not true of all prodigies. Some are unable to salvage a career.

Creativity and Madness

The relationship between creativity and madness is one that has been observed and commented on for centuries. Sometimes a psychosis such as schizophrenia is involved. Vincent Van Gogh is a famous example, John Nash, the mathematician and game theorist whose life was popularized in the book *A Beautiful Mind*, is another. Sometimes the madness arrives in the form of schizoid paranoia, as in the case of Ezra Pound. More often, the problem is manic-depression, or bi-polar disorder, as it is now commonly called.

The list of renowned men and women who suffered from bi-polar disorder is a very long one. Poets and writers are particularly prominent

among those affected. Leon Tolstoy, Robert Lowell, Samuel Taylor Coleridge, Virginia Woolf, August Strindberg, Eugene O'Neill, Graham Greene, Ernest Hemingway, Sylvia Plath and Percy Bysshe Shelley are only a few among the many. Another was Lord Byron, who, in a letter to his fellow poet Thomas Moore, claimed that "I should, many a good day, have blown my brains out, but for the recollection that it would have given pleasure to my mother in law."[20]

The American Psychiatric Association defines the "high" or manic side of bi-polar disorder as including "A distinct period of abnormally and persistently elevated, expansive ... mood'. Among the symptoms described are an "increase in goal-directed activity; a "decreased need for sleep"; and a "flight of ideas or subjective experience that thoughts are racing".[21] Whatever changes in brain-chemistry are involved during these episodes, it is clear that they are able to stimulate great bursts of energy, creativity, and enterprise. And since the bi-polar syndrome tends to run in families, an inherited aspect to creativity can be deduced.

Various medications - tranquilizers, lithium, prozac and so on - are now used to alleviate the symptoms. But one can't help but wonder whether an unintended side effect of these drugs will be to eliminate the explosions of creativity that have served civilization so well over the centuries.

Sleep

The extra energy and lack of sleep that characterize the manic phase of bi-polar disorder portray the normal life of some extraordinary individuals. The amount of sleep required varies enormously, and no one seems to know

exactly why. One sleep researcher, named Ernest Hartman, claims that short sleepers are more likely to be energetic, practical, and efficient, while long sleepers are more likely to be creative. If one needs little sleep more time is obviously available for accomplishment.

The aristocratic French foreign minister Dominique de Villepin is a colorful example. Though hardly a popular figure in this country, De Villepin is remarkably accomplished. While working as Chirac's chief of staff, he wrote a history of Napoleon's dash from Elba to Waterloo. More recently he completed a thousand page book on the art of poetry. The following is taken from the *Washington Post*:

"De Villepin is one of those modern Supermen who can get by on four or five hours of sleep a night, write books several hours a day, maintain an impressive private collection of African and Asian art, and run marathons - *in addition to* directing French foreign policy."[22]

Napoleon, Edison, Churchill, Stalin, and Lyndon Johnson are other examples of famous men who got by on very little sleep. Einstein, on the other hand, was reported to be a very long sleeper. Hartman suggests that hard charging, ambitious men are able to condition themselves to do with less sleep, a sort of self-disciplined insomnia. In his memoir, *Six Crises,* Richard Nixon wrote the following:

"Many times I have found that my best ideas have come when I thought I could not work for another minute and when I literally had to drive myself to finish the task before a deadline. Sleepless nights, to the extent that the body can take them, can stimulate creative mental activity."[23]

Zeitgeist

Finally, there remains the question of why genius flowers at certain historical moments. Why do periods of great intellectual ferment, discovery and artistic innovation alternate with periods of tranquility, decadence and decline? The Egyptians, the Greeks and Romans, the Chinese and Persians in their classical periods, the Ottomans in Turkey and Moghuls in India, the Italian Renaissance, the American colonies of the latter half of the eighteenth century, Napoleonic France, Elizabethan and Victorian England, *fin de siècle* Vienna and Weimar Germany - all were host to far more than their fair share of geniuses. All were the locus of astonishing bursts of creativity.

Thus over the years many historians have become convinced that genius and innovation are inseparable from conditions peculiar to time and place. Simonton believed that peacetime is more favorable than wartime, which is almost certainly wrong. The demands and pressures of war often result in a high degree of inventiveness. The first world war brought forth the tank and the diesel-powered submarine. The second, radar, rocketry, the jet-engine and atomic fission. Economic prosperity and a sympathetic political climate are also sometimes credited with providing a favorable atmosphere. Lord Rutherford, the great New Zealand-born physicist, adopted a contrary view. Rutherford explained his own phenomenal scientific success with this formula: "We have no money, so we have to think".

Some analysts insist that a culture cannot flourish unless it is cosmopolitan, receiving nourishment through intellectual exchange. The French scholar, Jean-François Revel, points out that Athens, an open city,

was "the prolific fount of creation in letters and arts, philosophy and mathematics, political science, and history", while Sparta, a closed city, valued its "exceptionalism". Sparta, Revel writes, "pulled off the *tour de force* of being the *only* Greek city not to have produced a single notable poet, orator, thinker, or architect."[24]

The late Columbia University sociologist Robert K. Merton popularized the rather determinist idea that the *zeitgeist,* or cultural context of a period, forms a kind of historical predestination in which scientific breakthroughs become "historically inevitable". That, he said, is why similar, or even identical, discoveries are often made by individuals working quite independently of each other.

A more limited variation contends only that a specific historical framework creates a hospitable climate for intellectual advances, but does not make them inevitable. Or, in reverse, if a culture is not ready for a new idea, even a brilliant one, the idea will prove unwelcome . Thus, we have the familiar spectacle of a new sort of musical improvisation being hissed and shouted down by audiences only to become a premier feature of the classical repertoire a generation later. Jonathan Swift took note of this phenomenon in the early eighteenth century when he wrote: "When a true genius appears in the world, you may know him by this sign, that the dunces are all in confederacy against him."

The mathematician and astronomer, Archimedes, who lived in Syracuse two hundred years before Christ, formulated mathematical theorems that found little use until the Arabs took them up in the eighth and ninth centuries and the Europeans in the sixteenth and seventeenth.

Archimedes was also the first to reveal that the earth rotated around the sun. Little attention was paid until the Polish astronomer, Copernicus, introduced the same idea seventeen hundred years later.[25]

Genius Inspiring Genius

Harold Bloom takes a more literary approach to the question. Genius, he writes, is invariably "engendered by the stimulus of *prior* genius, to a much greater degree than ... by cultural and political contexts".[26] A similar concept was espoused by Andre Malraux, who argued in *The Voices of Silence* that art is inspired by other art, not by beautiful damsels, love, sunsets or magnificent scenery.

It should be obvious by now that there is a chicken and egg aspect to this entire debate. Clearly, the exigencies of the era, the nature of the culture, and the presence or absence of individual genius are all part of the equation. One factor alone won't do; all must be in place. "Task and man have to be matched" Hans Eysenck insists, "the man alone is not enough".[27] Or, to revert to the metaphor I earlier introduced , a candle snuffer is of little use without a candle, or a flame to extinguish.

Notes

1. Paul Strathern, *A Brief History of Economic Genius*, pages 69-71
2. Hans Eysenck, *Genius: The natural history of creativity*, page 50
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