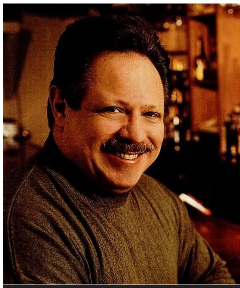
Chapter 7

What's The Difference between Hi-Q & Genius?

Genius does what it must; talent does what it can.
–Edward George Bulwer-Lytton (1803–1873)

What do geniuses look like? Do they resemble Star Trek's Mr. Spock and have an IQ that registers off the charts? Are they highly confident, speaking in measured tones with robotic deliberation, or socially awkward and reclusive? These are the questions that people ask when they think about Hi-Q people. And so it was not surprising that at 8:00 p.m. EST on January 25, 2008, millions of Americans tuned in to watch "the smartest man in America" take on 100 other contestants in a trivia contest.

The cameras panned in on host Bob Saget as he announced, with exploding enthusiasm, "It's the 1 vs. 100!"[1] The guest who challenged the 100 other contestants (called the "mob") was Chris Langan deemed "the smartest man in America." Hyping the status of the special guest, Saget observed, "The average person has an IQ of 100, … Einstein, 150. Chris has an IQ of 195." The audience waited with electric anticipation to watch the performance of an IQ that is more than 6 standard deviations above the mean. As the show unfolded, Langan fulfilled expectation. He answered correctly a succession of questions, eliminating 77 of his 100 opponents. This brought him to the point where he had won $100,000, along with the option of risking it all to win $1,000,000. The host-contestant dialogue moved forward with a sense of urgency:[2]



Ben David [CC BY-SA 2.0]

Chris Langan 1952 –

Bob Saget: You're at $100,000! Knock out another three people and Chris, you're going to jump to a quarter of a million dollars. You can walk right out of here now with $100,000 or you can continue to play on … Do you want the money or do you want the mob?

Chris Langan: I'll take [on] the mob!
… the audience explodes in cheers and applause.

Bob Saget: You're just 3 people away from $250,000 and 23 people away from $1,000,000.

… the next question appears in giant script on a jumbotron.

Bob Saget: In the Abbott and Costello routine "Who's on First," what is the second baseman's name?" Is it "Who," "What," or "I don't know."

[A poll of the audience, reveals that the majority of the remaining opponents have chosen the answer "What,"

Chris Langan: They're smart people; they've been right [up until now] so I'm gonna go with answer B, "What."[3]

The host reviews the question, and the answer, stringing out the process to allow the tension to build, while everyone waits to find out whether Chris has lost his $100,000 or won $250,000. When the correct answer is announced, the audience explodes into resounding cheers and tumultuous applause. As the clamor abates, Saget reminds Langan that he can leave with $250,000 or challenge the remaining 10 members of the mob for the top prize of $1,000,000. Following the rules of the game, the host helps Langan in his decision by providing a sneak peak at the next question: *With receipts of over $20 million, what's the highest grossing NC-17 rated movie?*

Langan pauses, thinks about his chances of winning and responds, "I guess I'm just going to have to take that money." To Chris Langan, $250,000 is a lot of money and, for reasons explained later, not worth risking.

Interpreting IQs of the Gifted

Does Chris Langan really have an IQ of 195, or was this all hype? That was a question asked 8 years earlier by the ABC News program 20/20 when they commissioned neuropsychologist Bob Novelly to administer an IQ test to Langan. Following an intense two-hour engagement with problem solving challenges, Langan emerged with an IQ score of 195–a score that Novelly described as "off the charts," indicating that he had exceeded the measuring range of the test. The incredulous neuropsychologist said he had not seen anything like this in his 25 years of testing.[4]

In chapter 2, we saw that scores on typical IQ tests for adults are normally distributed (i.e., they lie on a bell curve) and are standardized so that the average score is 100 and the standard distribution is 15. By calculating the area under the normal curve (see figure 2.1) up to a given IQ, we obtain the percentage of people (percentile) who score at or below that IQ. Subtracting that percentile from 100% yields the percentage of people above that IQ. Table 7–1 expresses that percentile as a fraction with numerator 1 for various IQs. This shows the rarity in the human population of IQs at the high end of the intelligence spectrum.

Table 7–1

The Rarity of Various IQs in the Human Population	
IQ	**Meaning of this IQ Score**
100	1 out of every 2 people score at or above 100.
115	about 1 out of every 6 people score at or above 115.
130	about 1 out of every 44 people score at or above 130.
145	about 1 out of every 740 people score at or above 145.
160	about 1 out of every 32,000 people score at or above 160.
175	about 1 out of every 3,500,000 people score at or above 175.
195	about 1 out of every 8,300,000,000 people score at or above 195.
200	about 1 out of every 76,000,000,000 people score at or above 200.

From the table, we see that Chris Langan's score of 195 is attained by only about 1 out of every 8 billion people. Since the world population is about 8 billion, either Chris Langan is all by himself in intelligence, or IQ as a measure of intelligence has its greatest validity within a limited range, but less validity at the upper extreme. As British psychologist, Liam Hudson observes:[5]

It is amply proved that someone with an IQ of 170 is more likely to think well than someone whose IQ is 70, and this holds true where the comparison is much closer–between IQs of, say, 100 and 130. But the relation seems to break down when one is making comparisons between two people both of whom have IQs which are relatively high…A mature scientist with an adult IQ of 130 is as likely to win a Nobel Prize as is one whose IQ is 180.

If Not IQ, then How do we Compare the Intelligence of Gifted People?

If IQ tests are not appropriate for ranking those in the highly gifted category (known as "Hi-Q" people) then what measure might we use to compare such people? When asked how he would determine whether someone was smarter than he, Chris Langan responded:[6]

I wouldn't give him necessarily an IQ test. I'd look at his production. Am I capable of understanding his production? Is he capable of understanding mine? If the answer to that were in his favor, then I'd have to say he's more intelligent than I.

In this statement, Langan is suggesting that rather than using an IQ test to determine which of two gifted people is smarter, he would present his *Cognitive-Theoretic Model of the Universe* (CTMU) to a challenger to see if the challenger could understand it. Then the challenger would share his most intellectual "production" with Langan to see whether Langan could grasp it. If one person understood both productions and the other understood only one, the person who understood both would be deemed the "smarter." Langan recognizes that problem solving at the highest levels draws upon deeper cognitive skills than can be measured in any test administered over a period of an hour or less. A real test of intelligence at the highest level would require a profound achievement, perhaps developed over an extended period of time, such as Isaac Newton's *Principia*.

The Intellectual Duel: A Measure for Comparing the Hi-Q?

Contests to determine which of two highly intelligent people is "smarter," surfaced during the early Italian Renaissance, almost 4 centuries before formal measures of intelligence had been invented. The emerging universities were competing for status by hiring the most gifted scholars they could find. But how, in the absence of widely circulated journals, could the best and brightest be identified? One method was to stage an intellectual duel in the form of a public debate–a sophisticated version of the popular cockfights.[7] People would gather in a public forum and bet money on their favored combatant. The winner might be awarded a university position as lecturer, while the vanquished contestant would return to obscurity. Though the duel itself might not last much longer than an IQ test, the preparation in building the intellectual tools for the duel would span months or years.

In the mathematical arena, the competitions took the form of problem-solving contests. Each contestant would present a series of problems for the other to solve. The contestant who could solve more of the other person's problems was the winner.

Immortalized in the history of mathematics is the famous contest between Fior and Tartaglia that occurred around 1541. As symbolic algebra was evolving, the quest to find a formula for the roots of the general cubic equation became a prime goal of mathematicians. When word spread that a man named "Tartiglia" had discovered a formula for the roots of certain types of cubic equations, interest in a public showdown grew. Seizing the opportunity, a student at the University of Bologna, Antonio Maria Fior, emboldened by a secret formula for the solution to cubic equations of the form $x^3 + bx = c$, challenged Tartiglia to a showdown. The formula was secret because Fior's professor Scipione del Ferro had died before publishing his discovery, and the young Fior sought to capitalize on his mentor's discovery.[8]


Tartaglia 1499–1557

The man challenged by Fior was Niccolo Fontana, nicknamed "Tartaglia", meaning "stutterer," from a wound to his palate inflicted upon him as a child when the French invaded Brescia, Italy around 1512. The formula that Tartaglia had discovered applied to the solution of cubic equations of the form $x^3 + ax^2 = c$, i.e., cubic equations with an x^2 term but no x term. Each combatant submitted 30 questions as a challenge to his adversary. Shortly before the duel, Tartaglia had independently discovered Scipione del Ferro's formula enabling him to solve cubics with both x^2 and x terms. In the public contest, Tartaglia solved all of Fior's equations, while Fior was unable to solve any of Tartaglia's–catapulting Tartaglia's formula into the annals of mathematics–not as *Tartaglia's* formula, but as *Cardan's formula*–an anomaly explained in the notes.[9]

Through his victory in this intellectual duel, Tartaglia had established, in the eyes of the onlookers that he was "smarter" than Fior, bringing to the fore an interesting distinction between IQ and genius. Tartaglia had not demonstrated a higher IQ, but rather a superiority in solving polynomial equations–an advantage that may not transfer into other domains. While IQ is a measure of fluid intelligence, including the talent for learning and comprehending, genius is measured by achievement–what Langan calls a "production."

To clarify the distinction between IQ and genius, we can draw from the profile of Leonardo da Vinci presented in chapter 1. The fact that Leonardo was able to learn geometry with minimal instruction and understand complex ideas spanning several disparate disciplines, is evidence that he had a high IQ. However, it was this high IQ together with an insatiable curiosity, high creativity, and relentless striving for perfection that enabled him to create the masterpieces that qualified him as a genius in visual arts. His high IQ was merely a factor contributing to his genius. Similarly, Michael Jordan's "genius" to which Phil Jackson referred was his accumulated achievements made possible by his athleticism (talent), and his indefatigable practice driven by a fiercely competitive zeal.

The Meaning of "Genius" in Mathematics

In the field of mathematical research, genius is measured by the difficulty of problems solved and the depth of theorems proved. The intensity that people in this top intellectual echelon bring to the quest for "top-dog" status was captured in the 1997 movie *Good Will Hunting.* When Fields Medalist, Professor Gerald Lambeau, acknowledges that the young janitor at the University, named Will Hunting [played by Matt Damon] has superior mathematical talent, he says:

I can't do this proof. But you can, and when it comes to that it's only *about..it's just a handful of people in the world who can tell the difference between you and me. But I'm one of them… Most days I wish I never met you…Because then I could sleep at night, and I wouldn't have to walk around with the knowledge that there's someone like you out there…And I didn't have to watch you throw it all away.*

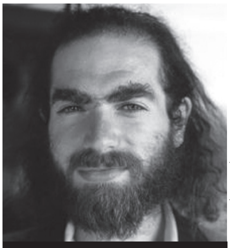
Acknowledging that he is less gifted in mathematical talent than Will Hunting, Professor Lambeau accepts his upper limit with bitter regret, yet in spite of this personal acceptance he so reveres the gift of mathematical genius that he laments even more the prospect that Will Hunting's greater talent may be squandered.

Modern intellectual duels in mathematics are not carried out in head-to-head combat as in the Fior-Tartaglia contest, but are typically conducted as quests to solve specific problems that the mathematics community has identified as important. Often this involves proving or disproving a famous conjecture and in other cases it involves establishing a theorem that reveals previously unknown relationships connecting mathematical entities.

The preparation for this conquest often begins as early as high school when mathematically-gifted young people enter mathematics competitions where performance is measured as the number of problems solved. Many of those who win medals in these contests focus on mathematics during their university careers, entering competitions such as the Putnam that can win them access to the top graduate schools. Among those who earn a Ph.D. in mathematics, some seek post-doctoral fellowships while others apply to the universities for a tenure-track position. For those who gain a tenure-track position in a mathematics department, the long road from Assistant Professor to Associate Professor to Full Professor is paved with published papers. Only those who are mathematically gifted, intensely motivated, and endowed with high creativity have a shot at reaching the top-dog status to which Lambeau aspired. One such thrice-gifted human, came into prominence at the beginning of this century.

Grigory Perelman and the "Perelman Stick"

In the fall of 1976, a strange, pudgy, and socially awkward 10-year-old was enrolled by his mother in a Soviet school math club. Like thousands of talented young people across the Soviet Union, Grigory Perelman was entering an apprenticeship in the service of the Soviet Union as a future mathematician. The after-school math club met twice a week for two hours of immersion in mathematical problem solving. In each session, the coach Sergei Rukshin, who would later attain recognition for his prolific output of mathematical superstars, assigned students the types of problems they would encounter in competitions. When a student found a solution to a problem he or she would go to Rukshin's desk and explain their solution. At the end of the session, students would be given a problem set that was to be completed at home. Three days later, the students would return to the math club and explain their solutions to a teaching assistant in the first hour. In the second hour, the solutions would be presented on the blackboard by Rukshin. As the students moved into the senior grades, the after-school sessions often extended into the evening hours. By the time Grigory Perelman entered the All-Soviet Olympiad in 1980, he had four years of Rukshin's math club training behind him, and he came to the competition expecting nothing less than first place. When the Olympiad results were announced, Perelman came second. This was, for him, a devastating blow that prompted him to double down on his efforts. His biographer, Masha Gessen observed:[10]



Grigory Perelman born 1966

By George Bergman - Mathematisches Institut Oberwolfach (MFO), GFDL

From then on he practiced ceaselessly. While for other kids, life was divided into school and leisure, for Perelman it was split into time devoted to solving problems without disruption and the rest of the time.

On July 9 and 10, 1982, the International Mathematical Olympiad (IMO) was held in Budapest, Hungary. Grigory Perelman, was just 16 years old and had logged 6 years of intense problem solving under the tutelage of coach Rukshin. He came ready for the challenge. In two 4½-hour sessions spread over those two days, he grappled with the full set of 6 challenging problems. When the marking of the solutions was completed 3 days later, the name Grigory Perelman stood at the top of the list as the winner of the gold medal at the IMO. This gold medal earned him admission to Math-mech–Leningrad University's Mathematics and Mechanics department.

Five years later in the fall of 1987, Grisha (as Grigory was known to his small circle of friends) Perelman had finished his undergraduate work and was embarking on his graduate studies at the Leningrad site of the prestigious Steklov Mathematics Institute. His assigned dissertation advisor was the famous Russian topologist Alexander Alexandrov. It was a time of historic change in the USSR. Mikhail Gorbachev was preparing to introduce reforms known as *perestroika* that would lighten travel restrictions on Soviet citizens, allowing them to connect with the outside world. In the next four years, Grisha was able to immerse himself in the study of topology, defend his dissertation, and travel to France and the US to share ideas with the international mathematics community.

In 1994, he published a short, concise proof of the Soul Conjecture, a conjecture in topology that had been proposed 22 years earlier, but unproven until yielding to what his colleagues called "Perelman's stick." This moniker referred to the imagined weapon that Perelman was believed to wield in dealing the death blow to a hard problem. Colleagues reported that Grisha would become absorbed in a problem until he could reduce it to its essence and then deliver the killer blow. The Perelman stick was respected, but it had not yet been wielded with its full power.

Following his conquest of the Soul Conjecture, Grisha's reputation spread and several of the top universities in the United States attempted to recruit him. When Princeton offered him an assistant professorship, Grisha held out for immediate tenure. With only a few publications and almost no teaching experience, the 29-year-old was making a demand that Princeton felt was unjustified, so they let him walk. Perelman felt his proof of the Soul conjecture had established him as the best in the world and that he should be exempt from jumping through the conventional hoops of the tenure-track process. He had the strong sense of self efficacy (that some interpreted as arrogance) that is critically important to anyone who dares to climb to the rarefied heights where others have perished.

The Poincaré Conjecture and a $1,000,000 Prize

In the year 2000, the Clay Foundation of Cambridge, Massachusetts launched the new millennium by posting a one-million-dollar prize for the solution of any one of seven so-called *millennium problems* in mathematics. Each of these problems is considered a "Mount Everest" of mathematics problems because each has eluded proof by the greatest mathematicians and may remain beyond the reach of the human mind for centuries to come.

In 1904, Henri Poincaré was studying a special topological property of the *n*-dimensional sphere, that we'll call the "shrink-to-a-point" property. Poincaré conjectured that any *n*-dimensional surface with the "shrink-to-a-point" property is an *n*-dimensional sphere, or can be transformed into such a sphere by bending or stretching. However, Poincaré was unable to prove his conjecture and it remained unproved for a century in spite of a multitude of failed attempts by some of the world's greatest mathematicians. Consequently, it became one of the seven millennium problems and was called the *Poincaré Conjecture.*[11]

By the time the Millennium prize was posted, Grisha Perelman had returned to Russia and disappeared from the world mathematics community. He stopped answering emails from friends and colleagues and became a recluse. In the words of his biographer Masha Gessen:[12]

> *Even Gromov [his mentor] heard nothing from him and assumed he was still stuck on Alexandrov spaces–in other words, that he had joined the sizable ranks of talented mathematicians who did brilliant early work and then disappeared into the black hole of some impossible problem.*

Then, on November 12, 2002 at 5:09 EST an e-mail sent to a dozen US mathematicians read: **May I bring to your attention my paper in arXiv math.DG 0211159.** The message was followed by an abstract of the paper he posted the day before on the arXiv.org website hosted by Cornell University Library in Ithaca, NY. The e-mail was signed, "Best regards, Grisha." In this e-mail, Grisha Perelman didn't indicate that he had solved the Poincaré Conjecture; he merely let the mathematics speak for itself.

The e-mail launched a tsunami of cyberspace communication that swept through the mathematics community in a giant wave of speculation. A dumbfounded gaggle of the world's greatest intellects were engaged in frantic efforts to make sense of it all. Ensuring that it was, indeed, a proof with no fundamental flaws would take months or possibly years. Mathematicians who were working on the Poincaré Conjecture had mixed feelings about this epic event. If, in fact, Grisha Perelman had beaten them to the finish line, their life's work would evaporate instantly. This was the high-stakes risk that haunted all mathematicians who dedicated substantial chunks of their lives to the search for the proof of a difficult conjecture. As a minor consolation, these mathematicians could play a supportive role in checking the proof and in helping people understand the implications of this new theorem.

Deep Problems and the Perelman "Shtick"

Following the e-mail in November 2002, Perelman was flooded with invitations to speak in the US at conferences, in colloquia, and at informal meetings of his colleagues. He agreed to come for only a month to speak on the Poincaré Conjecture, and he followed through on his promise, arriving in the United States in early April 2003, and returning to Russia at the end of that month. Grisha was described as cordial and friendly with his colleagues but contemptuous of the press and the American focus on extrinsic rewards. He perceived the process of submitting publications to journals supported by paid subscriptions and the posting of monetary rewards as incentives to mathematical scholarship to be vulgar. As a purist, he seemed to believe that the mathematics community in America had prostituted itself by promoting its ambitions in the media.

By the middle of 2005, the mathematics community had reached consensus that Perelman's proof was, indeed, valid. To celebrate his triumph, the organizers of the International Congress of Mathematicians (ICM) selected him to receive a Fields Medal–the highest honor that a mathematician can receive–to be announced and presented at the ICM in Madrid on August 22, 2006. Traditionally, the winners of the Fields Medal (presented every four years) are not informed of their award until the Conference. However, the governing board of the International Mathematical Union wanted to ensure that Perelman would attend the Congress and accept his medal, so they sent their President, Sir John Ball to St. Petersburg to inform Grisha of his award and to persuade him to attend. The unyielding Perelman refused to attend or even accept delivery of the Fields Medal. It was the first time anyone had ever refused this prestigious award.

In March 2010, the Millennium Prize of $1,000,000 was awarded to Perelman in absentia. As expected, he refused the money and the invitation to attend any ceremony in his honor stating, "the main reason is my disagreement with the organized mathematical community. I don't like their decisions, I consider them unjust."[13] Grigory Perelman not only turned his back on his fellow mathematicians, but walked away from virtually all former friends and associates, declaring that he was abandoning mathematics forever. However, there is some speculation that he may be working on another Millennium problem–a solution to the Navier-Stokes fluid flow equations. For the brilliant mind, the lure of deep problems is addictive.

Speed vs. Depth in Problem-Solving

There is considerable debate about the link between performance in mathematics competitions and performance in mathematics research. Some argue that contests put excessive emphasis on speed while research allows for deeper, more methodical problem solving over an extended time. The analogy has been drawn between speed chess, which requires quick intuitive assessments and a fast-and-frugal response, compared with standard chess that allows more time for rumination and rational analysis. Vadim Krutetskii, whom you met in the previous chapter as the research psychologist who conducted a comprehensive 12-year study of mathematically gifted students in the former Soviet Union, stated:[14]

Among the most promising pupils in mathematics classes are children who fail regularly in olympiads, where hard problems must be solved in a short time. And at the same time, they can solve much harder problems when they are not limited to any strict deadline.

Of course, there are those, like Perelman, who do well on competitions and on deep long-term problem solving, registering very high intelligence on both measures, but these are two distinct manifestations of intelligence.

Scientific Genius: Is it IQ or Is It Something More?

The estimated IQs of famous geniuses are most likely to have a large margin of error because they are inferred from achievements. Estimating how a brilliant person might perform on an IQ test based on his or her achievements, is little more than an educated guess. Such is the case with Albert Einstein, who qualifies for "top-dog" status in physics. His remarkable insights have changed the way we perceive space and time. His Field Equations, that describe how space is warped in the presence of mass and how the warp defines the paths that objects will take as they move through space, were described by Nobel laureate Paul Dirac as "probably the greatest scientific discovery ever made."[15] Such dramatic advances in a subject characterized by abstract thinking, involving sophisticated mathematics, justify attributing to Einstein a very high IQ. But was his IQ 150, as announced on the 1 vs. 100 quiz show or was it 190? Many estimates within this range can be found on the internet, but they serve little purpose, because Einstein's brilliance resided in a variety of factors, including in his ability to ruminate on a problem over a long period of time, allowing ideas to incubate and percolate into his conscious mind. IQ and deep problem-solving ability, while strongly correlated, are distinct.

The brilliant Nobel laureate, Richard Feynman, best known for his work in quantum electrodynamics and his diagnosis of the cause of the Space Shuttle Challenger disaster, was measured to have an IQ of 125 when he was about 12 years old. If he had taken an IQ test as an adult, he probably would have scored much higher, since he won Putnam Fellow status in the prestigious Putnam Examinations–a much greater challenge than an IQ test. Indeed, his path integral formulation of quantum physics outshines the accomplishments of many scientists of higher recorded IQ.

Darwin, whose genius was celebrated in chapter 1, changed our understanding of who we are and where we come from–insights he gained from the long-term contemplation of his observations. Yet, he had an unspectacular academic career, and graduated from Cambridge with an "ordinary degree." His performance on IQ tests, had they existed at that time, would probably have been high, but not commensurate with the genius he displayed in drawing inferences from large collections of information.

Comparing the Genius of Scholars outside the Natural Sciences

Comparing the intelligence of scholars in the social sciences and humanities is much more difficult than in the natural sciences, because the evidence is less objective. When we attempt to judge the "genius" of a philosopher or historian, our perceptions are subjective and the assessment is seldom universal. Publishing articles in refereed research journals is the prevailing method for establishing a reputation, but in academic disciplines where opinion plays a role, "top-dog" status is usually obtained by consensus, and the consensus is seldom unanimous while the scholar is living. One measure that provides a kind of holistic metric for ranking those in the humanities is achieved by counting citations. That is, a count is made of the number of times a scholar's name or articles are cited in the publications of other scholars. This was the approach that Charles Murray used in his book *Human Accomplishment* to rank those of highest eminence in fields where objective measures are rare. He presents data to identify the sources of human achievement in the arts and sciences from the beginning of recorded history to 1950. While Murray accepts that human intelligence is distributed according to the normal distribution, he provides data to support the claim that *achievement* throughout the human population is represented by the Lotka distribution (described below) rather than the normal distribution.[16] In fact, he asserts that the overwhelming number of world-changing discoveries, inventions, and creative works come from a remarkable few whom he designates as the "giants" in those domains:[17]

> *When you assemble the human résumé, only a few thousand people stand apart from the rest. Among them, the people who are indispensable to the story of human accomplishment number in the hundreds. Among those hundreds, a handful stand conspicuously above everyone else.*

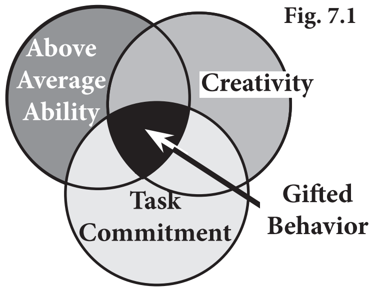
This "handful" of giants in each field have contributed more than all the rest. This idea has been expressed quantitatively in a variety of forms. Lotka's law asserts that the number of scholars who publish *exactly n* papers is approximately C/n^a where C is a constant specific to a given discipline and a is a constant close to 2. Heuristically speaking, this is like an inverse square law: the number of authors who have published n papers drops off as $1/n^2$. Related to this is Price's law, which asserts that half of all contributions to a given field are produced by the square root of the number of contributors.[18] For example, of 100 researchers in any field, the 10 most prolific would account for half of the total output. If the output is measured in terms of the number of papers published, each of the 10 most prolific people would contribute, on average, 9 times as many papers as each member of the other group. Even in athletics, where performance has a large component of crystallized intelligence gained from deliberate practice, achievements follow a Lotka distribution. For example, during his career, Jack Nicklaus won 18 Major tournaments in golf, more than double the number achieved by any player currently active on the PGA, except for Tiger Woods who has won 15. These are the "giants" in golf whose achievements place them head and shoulders above the rest. Why is it that only a fraction of talented people qualify as the "giants" or geniuses in their domain?

The Three-Ring Definition of Giftedness

Francis Galton, who conceptualized the idea of intelligence, asserted that genius could not be attributed to intelligence alone. He attributed genius to "the concrete triple event, of ability combined with zeal and with capacity for hard labour."[19] In 1978, Joseph Renzulli, building on this idea, introduced what is known as his "three-ring" definition of giftedness.[20] He argued that gifted behavior is manifest when 3 components: above average ability, extraordinary task commitment, and exceptional creativity are in play. Gifted behavior, as the intersection of the three components, is displayed in figure 7.1. If we assume that these three behaviors are independent and normally distributed throughout the population, then we can make a crude estimate of the percentage of people in the general population who will display gifted behavior as follows.

Renzulli Model of Gifted Behavior

Fig. 7.1



If we define "above average ability" as "at least one standard deviation above the mean", then the graph of the normal distribution in figure 2.1 indicates that about 16% of the population (i.e., 13.6% + 2.4%) satisfies this criterion. Similarly, if creativity and task commitment are normally distributed, then about 16% of the population are above average in each of these attributes. Our admittedly contestable assumption that these three components are independent enables us to estimate the proportion of people who may exhibit gifted behavior to be about $0.16 \times 0.16 \times 0.16 \approx 0.004$ or 0.4% of the population. This is substantially smaller than even the 2.4% who are at least 2 standard deviations above the mean in intelligence, or in any normally distributed characteristic. If there are more than 3 components (as suggested by Nobel laureate William Shockley[21]) required for gifted behavior, this would skew even more, the distribution of creative achievements throughout the human population.

The Renzulli model of giftedness enables us to distinguish between high IQ and genius in academic pursuits. The former is a measure of fluid intelligence and resides in the circle labeled "above average ability." It pervades all areas of learning. The latter is measurable only through achievement and is domain-specific. That is why we cannot compare the genius of Albert Einstein with the genius of Thomas Edison.

In *Empowerment*, psychologist Gene Landrum notes that the greatest athletes have exceptional physical skills, but argues that it's their emotional and mental dispositions that catapult them from exceptional to eminent status:[22]

> *The truly eminent have physical skills that locate them on the right tail of the normal curve, but emotional and mental dispositions are the factors that combine to move the eminent to the extreme right tail of a Lotka curve, way ahead of the pack.*

Indeed, while exceptional physicality is a necessary condition for an athlete to participate at the Olympic level, additional qualities of zeal and task commitment are required to win the gold. Vital to the development of those qualities is an environment in which world-class performance is valued and nurtured.

What Accomplishment Tells Us about the Existence of Talent

In the previous chapter, we investigated whether the genius of people like Michael Jordan, Judit Polgár or Albert Einstein is merely the manifestation of a prolonged period of deliberate practice or whether some element that we call *talent* plays a role. Those who deny the existence of talent are dispensing with two of the rings in the Renzulli model of giftedness, reducing giftedness to little more than hard work dedicated to a defined goal over a prolonged time. If indeed, this were the case, the achievements of the eminent would differ very little from the "also-rans," because in almost every endeavor, those at the top differ very little in the length of their prolonged deliberate practice. Results such as those presented by Charles Murray in his analysis of accomplishment as well as the empirical principles such as the "laws" of Lotka and Price indicate that the top person in any academic field or sport significantly outperforms the rest. The Renzulli model accounts for the rarity of the "genius," since the rings labeled "creativity" and "task commitment," amplify individual differences in potential contribution.

Epilog

In an article titled, *The Smartest Man in America*, and published in 1999 by *Esquire Magazine*, author Mike Sager discussed his interviews with four individuals of extremely high IQ.[23] The man to whom he assigned the moniker "the smartest man in America" was Chris Langan, 8 years before he won $250,000 on the 1 vs. 100 quiz show. At the time of the interview, Chris was 47 years of age, earning about $6000 a year and living in a cramped and cluttered one-room cabin in Eastport, Long Island. Langan who had begun talking at age 6 months, was extremely precocious and started school in grade 3 at the age of 3.

Though richly endowed with cognitive gifts, Chris was not gifted with a nurturing home environment. His mother had four sons by four different husbands. The first husband, Chris's father, disappeared before Chris was born. The second husband was murdered, the third committed suicide, and the fourth, Jack Langan was an alcoholic who beat his sons on a regular basis. To defend himself and his two brothers, Chris took up weight lifting and by age 14, defended himself in a physical altercation that sent his abusive stepfather packing for good. The family lived below the poverty line, moving across the country to support their hand-to-mouth existence. Troubled experiences during his formative years, combined with the social detachment that often accompanies cognitive giftedness, made it difficult for Chris to navigate the challenges of human interaction. This social ineptness would later alter significantly the trajectory of his life.

On graduating from high school, Chris was offered full scholarships to the University of Chicago and to Reed College in Oregon. He chose Reed, but upon discovering that he did not fit in with his urbane, pot-smoking dormmates, he spent most of his time in the library. At the end of the first semester, he scored straight A's, but early in the second semester he discovered that he had lost his scholarship–his mother had not filled out the parental financial statement of need necessary for its renewal. It is not clear whether Reed College dropped the ball in retaining this brilliant student, or whether Langan's lack of social awareness prevented him from appealing his deregistration. In any case, his attendance at Reed College was terminated and a string of F's were registered on his final transcript. After working for a little over a year in construction and as a forest services fire-fighter around Bozeman, Montana, he entered the University of Montana, specializing in mathematics and philosophy. However, the logistics of getting to class at 7:30 a.m. during the cold Montana winter without a car, combined with his inability to negotiate appropriate changes in his timetable led him to drop out of school permanently. The rest of his life would be spent working on his theory of the universe (CTMU) and surviving on income from his work as a bouncer, physical trainer, and eventually as a horse breeder. Today, Chris Langan lives on his horse ranch in northern Missouri with his wife Gina, a clinical neuropsychologist.

Reports from those who have taken the time to study Langan's CTMU describe it as closer to metaphysics than physics and not likely to be incorporated into mainstream physics, nor regarded as a groundbreaking discovery. Consequently, Christopher Langan would not be regarded as a genius in physics, though he is definitely a Hi-Q person. He certainly has the ability component in the Renzulli model of giftedness, but perhaps lacked the commitment that might have unlocked a special creativity. While a high IQ is a necessary component of intellectual eminence, it is not sufficient. In *Outliers*, Gladwell suggests that Langan's inability to harness his exceptional IQ in the creation of a "production" that would be heralded as a breakthrough could be attributed to his social ineptness–a deficiency in his emotional intelligence (EQ). Gladwell asserts,[24]:

> *He needed to do a better job of navigating the world, but he didn't know how. He couldn't even talk to his calculus teacher, for goodness sake. These were things that others, with lesser minds, could master easily.*

When Barron Lytton issued his now-famous assertion, "Genius does what it must; talent does what it can," he was acknowledging that talent alone is not enough to produce a masterpiece in any field. It must be coupled with the fierce, unrelenting zeal that pushes through all obstacles to achieve its vision.

Myth: IQ is a scale for measuring intelligence that, at its highest level, registers as genius.

Truth: IQ is a measure of fluid intelligence that is reasonably valid for IQs between 70 and 140. For IQs outside this range, the meaning of IQ becomes less clearly defined.

Genius as a measure of a person's ability is based on accomplishment in *a particular domain*. The importance of IQ as a factor contributing to that genius varies with the domain. In sports or music, IQ is less important than in mathematics, but in all domains, bringing genius to fruition requires, in addition to talent and creativity, an all-consuming intensity of purpose.