The sexual politics of genius

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0. Introduction

The modern West believes in genius, but definitions vary widely when they can be come by at all. I think this is so for an essential reason: no normative definition can meet all the needs that are fulfilled by the genius ideal, a vague bundle of rumors and anecdotes with the force of intuition and the air of certainty.

In the first section of this work, I will inspect popular genius narratives about a selection of nineteenth- and twentieth-century mathematicians and physicists in order to launch a few key claims. To start, I argue that their life stories are significantly skewed and transformed in the storytelling that reaches popular audiences. I want to understand genius in terms of a collection of, often contradictory, narrative social needs for heroes in the life of the mind, tracked partly through the trend of emphases and exaggerations in public legends of consensus geniuses. I hope to locate a genealogy for the genius ideal that guided those narratives in the second section, and I do so by illustrating its roots in the discourse of genius produced in Europe during a fairly specific historical window: the Romantic transformation of Enlightenment principles, circa 1750–1850. The ideal produced then and passed down through changing times is vague and surrounded by a massive confusion of messages, some of whose significant contradictions will emerge in this analysis. For this reason, attempts to study genius through collecting attributes of geniuses are deeply flawed. In fact, an absolutely central role in the cultural selection of geniuses is played by aspects of social recognition having nothing to do with mental quality—in that way, geniuses turn out not to be a meaningful guide to genius. Thirdly and finally, I argue that linguistic and iconic factors conspire to create a genius ideal that is inaccessible to women in an ongoing way, even as the doors of material and mental opportunity open to them. I will look in particular at Julia Kristeva's recent trilogy on "Female Genius" to interrogate one attempt to fit those two loaded terms.

Let me be emphatic about one point: the finding that women are excluded from access to genius is not the goal of this work; instead, I am treating that observation as a first corollary of the main analysis, and a piece of a larger problematizing of genius. That genius has a politics, and in particular a sexual politics, knocks it from its perch as a nonsocial phenomenon.

The program outlined above would be consistent with an overarching argument that genius is "mere" social construction and deserves to be considered illusory. My aim is nothing of the kind, however. I think that genius, like beauty, is a potent concept because of its intuitive appeal and the strong human experience it codifies. In each case, I believe that the underlying intuition is useful and should be preserved. But also, in each case, we can gain a great deal of insight by inspecting the flow of social premises to and from the influential idea.

I. The genius-makers and what they say

Vignettes

The figure of the mathematical genius provides heroes, and sometimes anti-heroes, which recur with startling frequency despite – or because of – the distant or chilly relations of so many people with the mathematical field. In this light, the mathematician might seem to be a likelier subject for slander than for lionization. This may have been Arthur Conan Doyle's idea in selecting "ex-Professor Moriarty, of mathematical celebrity" as an arch-nemesis for his hero Sherlock Holmes. In Holmes' words, "He is the Napoleon of crime, Watson. He is the organizer of half that is evil and of nearly all that is undetected in this great city. He is a genius, a philosopher, an abstract thinker. He has a brain of the first order."[1] The sinister Moriarty is an exception, though, and more often we find mathematical geniuses, real and imagined, figured heroically. For fictional geniuses to be described in hyperbolic terms is unremarkable, so for the moment we will turn to flesh geniuses and their stories.

Perhaps the most often-cited biographies of mathematicians are contained in E.T. Bell's immortal anthology *Men of Mathematics*. It is a vivid and engaging collection of short biographies of thirty-three famed mathematicians plus a few generations of the Bernoulli family, heavily leaning toward human-interest anecdote with a soap opera quality instead of a more sober and straightforward cataloging of milestones. Published evidence and common sense[2] shows that many of his anecdotes are tall tales – romanticized at best, fictionalized at worst – yet the book, written in 1937, endures not as a curiosity but as a beloved introduction to mathematical culture, a frequent source for biographical information, and a widely used reference in curricula. In this new millennium, Bell's book has been included in syllabi of math and history-of-math classes at no fewer than fifteen American colleges and universities as well as reading lists for four high school districts and two youth gifted programs.[3] Numerous well-known mathematicians have identified reading *Men of Mathematics* as a pivotal moment in their career choice, a point I will return to. These biographies, then, can teach us a great deal—perhaps less about the figures they describe, and more about popular ideas on great mathematicians and the cultural climate of mathematics.

In his Introduction, Bell sets forth his project, saying, "Two criteria have been applied in selecting names for inclusion: the importance for modern mathematics of a man's work; the human appeal of the man's life and character" (Bell 3). A critical reading of the book gives new meaning to what Bell means by

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[1] From "The Final Problem," where Moriarty is introduced in Doyle 251-253.

[2] For example, Tony Rothman's "Genius and Biographers: The Fictionalization of Evariste Galois" carefully details errors, purposeful omissions, and misrepresentations in the chapter on Galois. Constance Reid says, "Bell's biographical accounts were often largely anecdotal, and his successors in the history of mathematics have exposed factual errors and exaggerations seemingly without end" (Reid 1993, 290). More basically, throughout the book, Bell's use of direct quotation is impossible to take at face value given the scantiness of his bibliography.

[3] A web search shows *Men of Mathematics* present on syllabi as a text or an optional term paper topic at dozens of educational institutions across the United States, from community colleges to elite research universities. It has recently appeared on high school reading lists in Chatham, NY, Hopkinton and Plymouth, MA, St. Cloud, MN, at the Denver Public Schools, the Honors Reading Program in Byron Center, MI, and the Center for Talented Youth at Johns Hopkins University. It was also used as an introductory English text at Moscow State University.

"human appeal": he has tried to paint portraits of (1930s) supermen—heroic, manly, decent geniuses. He wants to expose the popular conception of a mathematician as a "slovenly dreamer totally devoid of common sense" to be a "ludicrous untruth" (8). Rather, he says, "As a group the great mathematicians have been men of all-round ability, vigorous, alert, keenly interested in many things outside of mathematics and, in a fight, men with their full share of backbone…. For the rest they were geniuses of tremendous accomplishment marked off from the majority of their gifted fellowmen only by an irresistible impulse to do mathematics." After ascertaining their virility, it is key to establish their decency, too; thus he touches on "the sex life of great mathematicians," in particular answering the question he perceives to be on everyone's mind—"how many of the great mathematicians have been perverts"? Bell's categorical answer, "None," is certainly not warranted by the scope of the sources he cites. He continues, "Some lived celibate lives, usually on account of economic disabilities, but the majority were happily married and brought up their children in a civilized, intelligent manner." Any deviants? "A few of the great mathematicians of bygone centuries kept mistresses," he concedes, "when such was the fashionable custom of their times." Yet his conclusion is that his heroes overall led lives, as he puts it, of no interest to a Freudian (9).

He goes on to establish that mathematicians are "decently inconspicuous," good dressers, devoid of exhibitionism, and generally lead "richer, more virile lives" than their ordinary countrymen. In his lexicon, the men of mathematics are described as princes, masters, and gentlemen, but most often as geniuses. His sole female subject, Sonya Kovalevskaia (1850-1891), is described together with Karl Weierstrass (1815-1897) in a chapter called "Master and Pupil" (and just to be perfectly clear, Herr Weierstrass was not the pupil).[4]

Focusing on Weierstrass for a moment, we see that Bell's men are treated in extraordinary terms: Weierstrass' struggle to break free from his father's plans for his life could have been won by "only a shaggy man like himself, huge and rugged of body and mind." In an over-the-top description of the difficulty of balancing teaching and research, Bell offers that, "His work was excessive. Only a man with iron determination and a rugged physique could have done what Weierstrass did" (409,415). The prose has a consistently discernible subtext: these mathematicians were not just pansy intellectuals, but in fact Men, whose manliness is key to their hero status.

By contrast, Kovalevskaia, when she does enter the story, is Weierstrass' "charming young friend" with "marvelous eyes" (425,424). Of her year of hiatus from mathematics, Bell informs us that "Sonja's sex had got the better of her ambitions and she had been living happily with her husband."[5] To explain her motivation to return to mathematics, doing the work that would eventually earn her a *Prix Bordin*, he surmises that Weierstrass "must have given her some pretty straight talk…" (427). Perhaps it can all be summed up in Bell's rebuke of Kovalevskaia for having treated shabbily "the man who formed her mind"

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[4] There is evidence that Bell's personal attitude towards women's mental abilities may have been significantly more positive than this chapter suggests. In a footnote later in this text, for instance, he refers to Emmy Noether as "the most creative abstract algebraist in the world." He seems to have thought of his wife's intellect very highly also. However, none of this changes the impact of the snide diminishment of women in the main flow of his most famous text.

[5] I have used the more common Americanization, Sonya Kovalevskaia, instead of Bell's "Sonja Kowalewski."

(427). So although a woman is featured in the book, she is clearly not meant to be a great mathematician, but rather a famous student of a Master and herself a novelty. Thus the work retains its theme of exalting the Men of Mathematics as paragons of masculinity and genius.[6]

Surely this masculinization of genius warrants further investigation. Bell is not alone in using genius as a powerful theme to impose on the lives and work of great mathematicians and is also by no means alone in leaving the term without definition. By examining the stories told, circulated, and internalized about geniuses, we can gain some insight into the popular meaning of genius and thereby into its complicated relationship with sex and sexuality. For this reason, beyond (and including) Bell's book, I will be looking at popular accounts, not scholarly biographies, of celebrated geniuses. There are several privileged sites for the clustering of recognized geniuses, especially mathematics and art, and I am confining my present analysis to figures in math and physics.[7] I have chosen to present sketches of Richard Feynman, Paul Erdös, Stephen Hawking, and Srinivasa Ramanujan, four modern exemplars of the genius model, before returning to *Men of Mathematics* and the nineteenth century with the case of Evariste Galois.[8] For though Bell gives us luminously clear examples of the principles at hand – that biography is putty, pressed into shapes we may find instructive to study – we can see the same principles at work more widely and more recently. Below, not just fawning biographers but close friends and the subjects themselves will be implicated in a selective legend-making with an interesting character.

With this in mind, there are several questions we can pose to the stories that follow. What are their themes, images, and elements? Why is the mathematician a good vehicle for these themes? How are messages promulgated by these stories and to what effect?

Richard Feynman (1918–1988) is one of the most respected physicists of the modern age—a man who achieved cult status during his lifetime, even outside his field, and whose most well-known biography is in fact entitled *Genius*. In between highlights of his professional career, his best-selling memoirs, *Surely You're Joking, Mr. Feynman!*, and *What Do You Care What Other People Think?*, portray Feynman as a ribald prankster. A running theme of the books is the portrayal of Feynman's manliness, from fraternity antics to prove he's no "sissy" to liquor and bar-room brawls to show he's a "tough guy" and a "real man" (*Surely* 19,84,161). Another major (related) theme is his great sexual appetite, which a good portion of his narrative is devoted to detailing. This insistence sometimes provides dissonant moments, like when he arrives at Los Alamos to work on the bomb and chooses his dormitory room: "You know what I did? I looked to see where the girls' dormitory was, and then I picked a room that looked right across" (95). His red-blooded taste for "girls" evolved while he was a young professor at Cornell, where he prepared his

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[6] Here it is worth noting that the title was forced on Bell by his publisher Simon and Schuster, who wanted the book to fit with its recent other publication, *Men of Art*. Bell preferred the title "Lives of Mathematicians" (Reid 1993, 276).
[7] Certainly the findings would be somewhat different in a survey of literary giants. I will try to make the case below that studying mathematicians is of particular value, and that mathematics has a culture especially suited to the genius ideal, but I recognize that this focus gives access to only one of the main genres of genius.
[8] I have intentionally avoided the case of Albert Einstein, probably the man/icon most strongly associated with genius. Einstein biographies are something of a cottage industry and there do not seem to be one or two most important or popular sources: to incorporate Einstein into this analysis is beyond the scope of the present project, since his story would not lend itself readily to vignette.

courses in the library to "ogle the girls that would go by" (155). The anecdotes are endless: flirting with receptionists, sneaking over to the stewardesses' hotel rooms in Copacabana, "making nice" with the prostitute showgirls in Las Vegas, preparing his lectures in a topless bar. His attitudes towards women are most jarring in the chapter detailing the lessons he learns about how to "get something" from bar girls. "I adopted the attitude," he explains, "that these bar girls are all bitches, that they aren't *worth* anything, and all they're in there for is to get you to buy them a drink, and they're not going to give you a goddamn thing; I'm not going to be a gentleman to such worthless bitches." The anecdote, following his mistreatment of the woman in question, culminates in his "getting the girl" (170-172). Feynman's feelings about his sexual prerogatives and entitlement are an important facet of his self-presentation throughout. To cement his self-presentation as a man's man, he includes a chapter entitled "Feynman Sexist Pig!" in his second collection of memoirs, where he delightedly recounts a tale of stopping picketing feminists in their tracks with a stunning proof of his own feminist credentials: he encouraged his sister to pursue a Ph.D. His delight seems to stem as much from the fact of being picketed as from his punchline of outsmarting the feminists.

Different in seemingly every respect is the story of Srinivasa Ramanujan (1887–1920); he is the mathematicians' genius, being very possibly the figure most modern mathematicians would associate with the term. The Western narrative of Ramanujan is famous and is every bit the colonialist fairy-tale: born terribly poor in a wretched village in South India, self-taught because the school system could not accommodate his burgeoning genius, he naively sent his work to the great British mathematicians and was subsequently discovered by G.H. Hardy, who whisked him away from the backwardness of India into the intellectual center of the earth, Cambridge, where Hardy's rigor and discipline balanced Ramanujan's mystical genius and they produced mathematics of amazing caliber until Ramanujan abruptly died a few years later.[9] And Hardy is explicit about the relationship between India and Britain: "He had no real teaching at all; there was no one in India from whom he had anything to learn" (Hardy 1999, 10). John Allen Paulos, in *The New York Times Book Review,* lays bare the core of the fable, describing it unskeptically as a "rags-to-mathematical-riches tale."[10] The dominant element in portraits of Ramanujan seems to be the remarkable way that mathematical talent will find its way to the light—even from the dark depths of India. As one biography has it, "His extraordinary powers seem to have been recognized almost immediately" (Newman 366). His poverty is stressed, as are the remoteness of his village in India and the religious superstition that he shared with his mother, as though to say that *despite* all this, he rose to fame. The obstacles in his way and the many times his eventual Western success was almost thwarted—up to and including the fact that he sent out *many* letters to British mathematicians, of which all but Hardy's were discarded—these are read as plot twists which make his "discovery" all the more dramatic.

As to his work, there persists a rich mythology. Ramanujan trafficked in beautiful formulae about numbers which tended to be highly mysterious to his colleagues. He claimed, and it is often repeated, that

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[9] In the words of Robert Kanigel's popular biography *The Man Who Knew Infinity: A Life of the Genius Ramanujan*, the situation was that of a "young, unschooled Indian clerk… begging [a] pre-eminent English mathematician's opinion on several ideas he had about numbers."

[10] From "A Fierce Intuition about Numbers," *New York Times Book Review*, July 21, 1991, p11.

inspiration and sometimes specific theorems were given to him by the goddess Namagiri. In Hardy's words, "All his results, new or old, right or wrong, had been arrived at by a process of mingled argument, intuition, and induction, of which he was entirely unable to give any coherent account."[11] And indeed one of the factors in the building of his mystique was that, though his intuition and his ability to forge inscrutable yet valid theorems were astonishing, he was sometimes entirely wrong. His early death by tuberculosis completed the romantic tragedy for his biographers. "Ramanujan's creative intensity took its toll: he died at the age of thirty-two and left behind a magical and inspired legacy that is still being plumbed for its secrets today."[12]

Paul Erdös (1913–1996) was a Hungarian combinatorialist and arguably the most prolific mathematician in history. He wrote over 1400 papers, co-authored with at least 502 distinct people, and maintained breakneck productivity (thanks in part to the methamphetamines he took regularly) up to the moment of his death, which occurred at a math conference.[13] The magazine *Science* (circulation 150,000)[14] ran an article profiling Erdös in October 1984. He is described as "the world's only itinerant mathematician," by which the author means that Erdös had no salaried position or stable home; he traveled from university to university and from country to country, never in any place for more than a few days or a month at most, lecturing and just solving problems (Tierney 40). While a world traveler many times over, Erdös did not make his travel arrangements for himself, and in fact did very little of his own arrangement for anything, depending on his mother until her death when he was 54, and on colleagues thereafter. He owned no checkbook or credit card (saying "private property is a nuisance") and simply flew around the world from one mathematical environment to the next, not worrying about food or lodging or travel. As he said about one trip to Japan which he made with only $50 in cash and no firm plans, "I had friends everywhere along the way." And indeed there seemed to be a worldwide network of mathematicians willing to take care of him, from booking his plane tickets to putting him up and feeding him—"making his well-being their collective responsibility" (41).

His disengagement from the world, in fact, extended to even an interpersonal level of conduct. As another Hungarian combinatorialist, Vera Sós, said of her friend Erdös, "He's never wanted to accept any sort of force that restricts him—a family, a home, a teaching position. He's so restless that it's hard for him even to sit in one room for very long. He'll go to hear a lecture by another mathematician to be polite, but you can see him suffering if he has to sit there very long" (46).

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[11] Newman 366. Hardy was not prone to mysticize his friend and colleague entirely; he goes on to say, more soberly, that "with his memory, his patience, and his power of calculation, he combined a power of generalisation, a feeling for form, and a capacity for rapid modification of his hypotheses, that… made him, in his own field, without a rival in his day" (Newman 368). Their relationship clearly had deep significance for the odd Hardy, who said, a bit mysteriously, "I owe more to him than to anyone else in the world with one exception, and my association with him is the one romantic incident in my life." (Hardy 1999, 2)

[12] From *The Man Who Knew Infinity*, back matter.

[13] Methamphetamine information is taken from Tierney and public knowledge. Statistical information on papers and collaborations is found in EN ("The Erdös number project") where the collaboration graph for mathematical articles is explored.

[14] All circulation numbers are rounded from the values in Gale Directory of Publications and Broadcast Media for the appropriate years; they are included to underscore the importance being placed on widely heard cultural messages.

Erdös never married and in fact was quite opposed to the idea on several levels. He said, "Basically I have a psychological abnormality. I cannot stand sexual pleasure. It's peculiar."[15] In fact, his attitude toward women was rather bifurcated in that he seemed to regard Women as a species to be entirely different from the women mathematicians he encountered and even often collaborated with. Women in general he treated with contempt and disinterest; he called them "the Bosses" while men were "the Slaves" and he was famous for remarking, in his dry idiosyncratic humor, that such-and-such a mathematician had just been "captured" (read: married). On the subject of wives, he was notoriously sardonic and negative; this attitude seemed to have no relation in his worldview to the women he worked with, like Sós, who besides being a mathematician is also a mathematician's wife.

Taking the image of disembodiment to another level is the cosmological physicist Stephen Hawking (1942–), who was diagnosed in college with the degenerative condition known in the U.S. as Lou Gehrig's disease and in Britain as motor neuron disease. Hawking made his name as a scientist by his affiliation with the discovery that black holes can emit certain kinds of particles, now called "Hawking radiation."[16] He became generally famous by writing the astonishingly bestselling popular physics book *A Brief History of Time*. (In fact, publisher Norton took a chance on the manuscript because of the recent success of Feynman's *Surely You're Joking*. The two books shared space on the *New York Times* top ten Best Seller list for part of Spring 1989.) In *Brief History*, as in general, Hawking did not shy away from self-promotion either in his description of his own role in his field or of the field's importance. Indeed, the book ends with the sentiment that if a so-called grand unified theory should be produced, "then we will truly know the mind of God"—surely a bit of showmanship from a confirmed atheist.

Hawking has been in a wheelchair since the late sixties. He has become paraplegic and has his wheelchair equipped with a computerized speech system which he operated first by hand, more recently with the motion of his eyes. In 1990 he left his long-term marriage to move in with one of his nurses, whom he subsequently married; his friends and biographers take issue with the tabloid furor around this event, explaining it as an expression of his "normal man"-hood. And as to his sexuality, the public obsession with his disabled body coexists with a simultaneous insistence on his virility, his appeal to women, and his interest in them. One eager friend dubs him an "incorrigible flirt" and a "real party animal" and avers that women "were always very interested in Stephen long before his international fame brought him wide attention" (White 126-7). Indeed, Hawking was once introduced at a professional talk in Chicago with the bawdy observation that "as evidenced by the fact that his youngest son Timothy is less than half the age of the disease, clearly not all of Stephen is paralysed!'"; Hawking is said to have loved it (288).

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[15] Tierney 46. Another peculiarity was his relationship with his mother: she was incredibly protective and his constant travel companion for seven years before her death; it was her death that plunged him into the depression that began his amphetamine habit. Taken in combination, these characteristics might cast some doubt on Bell's claim that the lives of mathematicians offer nothing of interest to a Freudian.

[16] Whether he suggested this finding, or on the contrary resisted it when other researchers observed that it followed from his calculations, is a matter of controversy.

Finally, consider the short life of Évariste Galois (1811–1832). It is well-known that he was the originator of the field of math now called Galois theory, which concerns itself with the symmetries of polynomials; that within that investigation he developed the concept of a Galois group, now a cornerstone of modern algebra; and that he died at the age of twenty in a duel. Beyond these intriguing facts, there remains substantial mystery, so it is little wonder that E.T. Bell's authoritatively worded telling of Galois' life remains the dominant source for information. In his chapter on Galois, titled "Genius and Stupidity," Bell does some significant violence to his historical sources in order to advance his thesis that his subject was a criminally misunderstood, unmistakable genius, persecuted by the whole of educated Paris out of ignorance and spite, and finally done in by a "woman of ill repute" who had stolen his virginity. In sum, Bell tells us in the breathless prose he favors throughout, "even his magnificent powers were shattered before the massed stupidity aligned against him, and he beat out his life fighting one unconquerable fool after another" (Bell 362).

As this legend would have it, Galois was jealously ignored or thwarted by the established Academie mathematicians of the day, who went so far as to intentionally mislay his papers. He was failed on his University entrance exams by an incompetent and bureaucratic examiner. Embittered and even unable to make a living tutoring, he turned from mathematics to Republican politics and was sexually initiated by "some worthless girl" (374). Finally, he met his end in a duel to defend the honor of this woman, who is implied to be a prostitute. And, critically, he scribbled a letter to his friends in the small hours of the morning before his fateful death—a letter which Bell calls his "scientific last will and testament" and which supposedly contained all of the work that bears his name, enough to keep "generations of mathematicians busy for hundreds of years" (375). The physicist and science writer Tony Rothman has done an admirable job of showing that in each one of these main points, Bell has played loose with the facts at his disposal. He has omitted information (in fact Galois had the encouragement of Cauchy and Poisson), changed the chronology (Galois' father committed suicide right before the young man's university exams, which helps explain the result), elevated third-hand supposition to fact (as with the loss of innocence to an "infamous coquette"), and simply invented elements as they seem necessary to support his narrative goals. As a small token, consider his ascription to Galois of the quotation, "Genius is condemned by a malicious social organization to an eternal denial of justice in favor of fawning mediocrity," which is to be found nowhere in the young man's writings. Here, we find Bell literally throwing his voice, and the words of his ideas about genius, into Galois' mouth. Finally, as Bell was certainly aware, the celebrated letter of a doomed Galois contained no mathematics that was not already present in the papers he had been submitting since age seventeen.[17]

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[17] It is a subject of some interest and some mystery to consider Bell's motivations for his extremely numerous misrepresentations and exaggerations, beyond the simple desire to create a legend. Constance Reid has written a compelling book touching on the subject, *In Search of E.T. Bell*, where we learn that alongside his extremely prolific career in number theory, Bell maintained a literary career as John Taine, the pioneering science fiction writer with a distinctly hyperbolic style. He also misstated a significant number of facts about his own life at various times, changing names, sites, and circumstances and using unnecessarily elaborate falsehoods. One example: Bell's son, reared in California, was astonished to learn through Reid's research that the senior Bell had spent almost the whole of

Cultural penetration

We stand to learn a great deal more from *Men of Mathematics* given its exaggerations and falsehoods than we might if it were more conventional, or more accurate. Much information can plainly be seen to have been invented by Bell, considering the few and terse sources he cites, like Weierstrass' beer habits and the innumerable snippets of one-on-one dialogue. These inventions offer essential clues in the project of genius manufacture. And while I do not claim that the memoirs and biographical pieces on the other genius candidates are falsified, I have precisely chosen selective, anecdotal popular sources in order to get more clues by probing the question of what narrative elements and what images are emphasized and seized upon in the popular imagination. Einstein's shock of white hair is emblazoned on the vernacular genius much more than his wrangling with four-manifolds, and therefore it has more to tell us about the state of the genius ideal.

The details of genius offered by the profiles of the previous section are widely variable. Elements which are common to these and other genius tales include flashy results at a young age, eccentricity, and of course maleness, with the trappings of the day. One discernible narrative feature is detachment from the world and from the body, but that archetype comes with the risk of seeming insufficiently manly. I will argue that the state of the idea of genius is a jumble of striking contradictions, including this one (between maleness and bodylessness). The various accounts of genius necessarily compete in particulars, then, but there are nonetheless strongly distinguishable themes in the broad strokes.

Another major theme is an anxiety around suggestions of effeminacy and dependency. An element central to Bell's portrayals and Feynman's memoirs is the assertive rejection of the sissified academic image. Of course, Bell and Feynman, coming as they do in different eras, assert manliness in different fashions: for Bell, the ideal is attained by strong, volatile, and sexually mainstream gentlemen, while Feynman employs more of a trickster model for himself, actually boasting of sexual conquests and potency. And although Hawking has a policy of not talking about the press-sensationalized story of leaving his wife of for his doting nurse, it seems clear from the comments of his friends that the desired interpretation is as both proof and consequence of the principle that "Stephen Hawking is a normal man." And after all, it must be rare to have one's erectile capacity lauded in the introduction to a scientific presentation.

Generally, the geniuses presented here exhibit great unearthliness in their mental work, but the extent to which this carries over to their personal lives varies. Feynman is made the more compelling by his raunchiness, while we see in Erdös an unworldliness bordering on helplessness. In this, Erdös represents an extreme—he never learned to drive and it is said that he never buttered a piece of toast until after the death of his mother. Erdös, to a great and public degree, was exempt his whole life from having to be bothered by the practical exigencies of the world.

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his own childhood not in Great Britain near his father's shipping business, but in nearby San Jose on his father's orchard.

We might suspect that mathematics is uniquely well-suited to tales about unearthly minds. Indeed, reporter Tierney commented that, "The way Paul Erdös conducts his personal life is exactly the way a pure mathematician conducts his work: with utter disregard for the real world."[18] Here we have a first inkling as to why mathematics may be especially fertile ground for geniuses. Also, significantly, the genius is to be an icon of the intellectual elite and mathematics is unabashed about the domination of the field by the cherished few—there is no analog in math to the lab-worker support role in other fields of science. Professional mathematician Alfred Adler rendered this prevalent view of the mathematical community, as though in caricature, in his article for the *New Yorker* in 1972 (circulation over 800,000) entitled "Mathematics and Creativity," saying

> Each generation has its few great mathematicians, and mathematics would not even notice the absence of the others. They are useful as teachers, and their research harms no one, but it is of no importance at all. A mathematician is great or he is nothing.[19]

Adler's characterization requires mathematics to have the feature that it recognizes its own luminaries unfailingly. Where else but in the most exact of sciences can we venture with as much certainty that a thinker is worthy of praise? This impression of ultimate meritocracy in mathematics – with no room for taste – is useful if the tale hinges on the unmistakable superiority of its hero.

It is still important to make an argument that these messages detectable in popular genius tales – manliness, exoticism, eccentricity, unworldliness, otherworldliness – are actually culturally significant. I contend that stories like these, and in fact these precise stories, form public ideas about what genius is and more: they condition notions of intellectual life and the identity of a mathematician or physicist, and they actually impact the makeup as well as the atmosphere of those fields. To begin this case, consider the public reception of Feynman's racy memoirs. His uncoated chauvinism and the jarring "worthless bitches" episode are effaced in the book's reception. Quite the opposite effect may be observed, as for instance when Raymond Todd's review for *Library Journal* speaks of Feynman's "social mischief that is delightful in its purity"— these attitudes are subsumed in his boyishness and as such are tolerated by, and even endearing to, many readers. *Newsweek* comments on his "brilliance and eccentricity," saying "It's hard not to smile all the way through." Commentators from the popular press seized on Feynman as busting that stodgy professor image once and for all: "If a single book can shatter the stereotype of the stuffy scientist, this may be the one," proclaimed the *Detroit Free Press*. Of course, in shattering the old image, a new ideal is constructed; one of the most startling realizations about the effect of this account of Feynman is that in some ways it acts as a selection pressure on future physicists. As *Science Digest* puts it, "It almost makes you want to become a physicist"—though of course this must depend on the relationship of your self-image to the exploits that Feynman put up for offer.[20]

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[18] Tierney 43. This is echoed in Hardy's famous sentiment, "Very little of mathematics is useful practically, and that little is comparatively dull." (*A Mathematician's Apology*)

[19] Adler—cited in Davis and Hersh.

[20] Book Review Digest and the International Bibliography of Book Reviews were consulted to find references.

All commentators agree that Stephen Hawking has been avidly seeking out celebrity, and he has achieved it in ways that seem outlandish for a scientist: pop culture penetration includes mentions on Murphy Brown and Seinfeld, voicebox samples in songs by Radiohead and Pink Floyd, and guest appearances on the Simpsons and on Star Trek: The Next Generation, where he is pictured playing poker on the Holodeck with Einstein, Newton, and Star Trek's own android Data.[21] Hawking's wheelchair is very much his emblem according to these pop culture appearances. His physical appearance and helplessness are almost compulsively referenced by commentators, often in counterpoint to his mental prowess, for instance in the introduction of his most popular biography:

> For this man, weighing no more than ninety pounds and completely paralysed, speechless and unable to lift his head should it fall forward, has been proclaimed "Einstein's heir", "the greatest genius of the late twentieth century", "the finest mind alive" and even, by one journalist, "Master of the Universe." (White 3-4)

Stephen Hawking's rather bitter ex-wife Jane, in her recent memoir, makes this reference herself, saying "he was all mind and no body, an all-too-powerful rational mind and an enormous fund of restless energy trapped in a pathetic paralytic shell of a body, as emaciated and enfeebled as any victim of Belsen" (Hawking 566).

It may take time before the historical magnitude of storytelling about the twentieth-century figures can be assessed, but by now it is easy to trace the cultural impact of Bell's biographies of characters from earlier centuries. Respected psychologist Hans Eysenck, in a 1995 book called *Genius*, bases all his conclusions about mathematicians on an inventory of the table of contents of *Men of Mathematics*, including the conclusion that geniuses must be men. (Eysenck's work will be discussed below.) A recent study by Satoshi Kanazawa in the *Journal of Research in Personality* was picked up and covered by dozens of media outlets in Summer 2003, including *Nature*, the *New York Times*, ABC, and many others. The study was called "Why Productivity Fades with Age: The Crime-Genius Connection."[22] Kanazawa's conclusion is interesting enough that I quote it at some length.

> Perhaps the tragic life of the French mathematician Evariste Galois (1811–1832) best illustrates my argument. Despite the fact that he died at age 20, Galois made a large number of significant contributions to mathematics. (His work was integral to Andrew Wiles' celebrated proof of Fermat's Last Theorem in 1994.) Galois was involved in an affair, and the woman's fiancé challenged him to a duel. The night before the duel, Galois stayed up all night and wrote down all of his mathematical ideas on paper. (It is due to these notes, written on the last night of his life, that many of Galois' ideas survived to the posterity.) From other comments written on the paper, next to a series of mathematical notations, however, it is clear that Galois spent the night, intensely thinking about the woman over whom he was to have a duel the next morning. Something compelled this young man of 20 to produce so many brilliant mathematical ideas in one night and then go to a duel the next morning, ready to kill or be killed over a woman. It is my contention that the same psychological mechanism was responsible for both.[23]

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[21] Episode #252. Hawking won a hand before the game was disrupted by a distress call from the Ohniaka III outpost.

[22] As an example of why the study was considered sensational enough to merit all the press coverage, one news story bore the title "Scientists, like criminals, peak at 30: Study hints that men strive to win women and then sit back."

[23] Kanazawa, S. "Why productivity fades with age: The crime-genius connection." The wording and grammar are preserved from the original.

Kanazawa is wrong (or uncorroborated by the historical record) in nearly every fact he cites about Galois in this widely cited and very recent scientific article; this shows clearly that the fairy-tale version is actually implicated in creating new science, and then, relayed by the news media to huge audiences, new fairy tales. Kanazawa's information comes from a popular book on Fermat's Last Theorem that cites Bell among its references.[24]

But perhaps the most direct feeling of the sway of Bell's book may be perceived in the comments of professional mathematicians indicating that *Men of Mathematics* was a force that brought them into the field: published mentions include British-American physicist Freeman Dyson ("In those days, my head was full of the romantic prose of *Men of Mathematics*"[25]), Indian topologist Som Naimpally ("Bell's *Men of Mathematics* had a deep influence on me and I decided to become a mathematician rather than an engineer."[26]), and New Zealand's J.C. Turner ("I remember devouring E.T. Bell's *Men of Mathematics* in my first year; that had an inspirational impact on me, which has lasted to the present."[27]). Intriguingly, Julia Robinson, the celebrated American logician and the first woman mathematician elected to the National Academy of Sciences, reports Bell's book as introducing her to the idea that she could become a mathematician.[28] And finally, John Nash, the recent object of so much attention since the careful biography *A Beautiful Mind* was made into a romanticized genius biopic, also spoke of the early excitement and inspiration of Bell's book—in fact, he saw fit to mention it in his Nobel Laureate autobiography. It goes without saying that people discouraged from pursuing mathematics by Bell's forceful images are much harder to find on the record.

II. The lineage of an idea

Genealogy and social functions of the solitary romantic hero

The social role fulfilled by the belief in genius exerts a number of contradictory pressures on the narratives of geniuses: transcendent of the body, yet masculine and even manly; effortlessly visionary, yet perseverant and hard-working; born that way, yet distinctly self-made men; off the scales of achievement,

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[24] Kanazawa cites Singh's book *Fermat's Enigma* for his information about Galois. Singh tries to be careful about using Bell's version as a source for Galois (he even references Rothman's exposé) but he recapitulates much of the sensationalism, and Kanazawa restores most of the rest of the misinformation.

[25] From Dyson's *Disturbing the Universe*, quoted in Rothman. Dyson continues, "This is a splendid book for a young boy to read (unfortunately, there is not much in it to inspire a girl, with Sonya Kovalevsky allotted only half a chapter), and it awakened many people of my generation to the beauties of mathematics." Dyson seems to suggest that sex only figures into the picture by the lack of space devoted to women; several of the modern syllabi and reading lists mentioned above work on this same premise, trying to counteract the blatant sexism of the book by adding a second book on women mathematicians.

[26] *Topological Commentary* volume 6 #2, International Conference Function spaces, proximities and quasi-uniformities, on the occasion of Som Naimpally's 70 birthday. Caserta, Italy 14-18 September 2001.

[27] *New Zealand Mathematical Society Newsletter* #64, August 1995.

[28] Reid, Robinson's sister, points out that Robinson read *Men of Mathematics* in her sophomore year of college, the year it came out (Reid 4).

yet rankable; and young and vital, even while a white-haired Einstein is their patron saint.[29] Unlike a prophet or a medicine man, the genius has a firm claim on reality status in the modern West. To understand the social roles played by the genius ideal, it is important to contend with the public commitment to its reality. That geniuses exist is at once reassuring and demeaning, perhaps, but either way it is a major mode people use to think about acts of startling creativity, and by extension the foundations of the creative process: thinking generally, and, underlying that, consciousness.

Intelligence provides a means to probe the nature of human consciousness and thinking, but unfortunately it proves quite as elusive to study as those phenomena it might illuminate. The intuition that a discerning and creative faculty is present to varying degrees in the people around us is indeed ancient, and attempts to corroborate that intuition with measurement also have a very old pedigree. The problem has been approached in vastly different ways at different historical moments, from high-stakes riddling to measuring skull capacity with gunpowder-packing to the enduring practice of counting intelligence quotient with scores on abstract tests of mental agility. In any event, intelligence alone, distributed somewhat evenly among the people of the world, does not easily suffice to explain some of the great mental achievements in the scope of human history.

In the old debates on evolutionary theory, the appeal to complex design was a favorite argument of creationists. Consider the eye, they entreated—an unimaginably complicated organ whose intricate design is appropriate for a seemingly irreducible purpose: vision. How could the eye possibly have evolved bit by bit, gradually improving towards its ultimate function? This implausibility becomes a persuasive argument for the role of divine creation of living organisms.[30] Similarly, some works are of such profound originality and power that they emerge like an eyeball fully formed; an explanation no less holy seems to be demanded. How could the theory of gravitation be developed piecemeal, or the notion that infinities come in different rigorously definable sizes, or the idea that time runs slow from the perspective of a speeding body? The simplest explanation is that it is the insight, the 'Eureka!', of one agent with a direct tie to God.

Christine Battersby, a feminist philosopher and historian, took on the sexing of historical and modern genius notions in her work *Gender and Genius*. Etymologically, she says, "genius" derives from the Latin *genius* via the Italian *genio*, both of which terms refer to divine forces associated with male fertility (Battersby 26). Only in the eighteenth century did the term take on shades of its modern meaning; the Age of Reason brought an obsession with describing the mental faculties that set "man" apart, and thus

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[29] This is only a taste of the soup of contradictions. In the *Hannah Arendt* volume of her Female Genius trilogy, Julia Kristeva comically juxtaposes Buffon's wisdom, "genius is endless patience," with the mot of Valéry, "Genius! O endless impatience!" (Kristeva xii)

[30] For instance, in William Jennings Bryan's forceful prose: "But how does the evolutionist explain the eye when he leaves God out? Here is the only guess that I have seen – if you find any others I shall be glad to know of them, as I am collecting the guesses of the evolutionists. The evolutionist guesses that there was a time when eyes were unknown – that is a necessary part of the hypothesis. And since the eye is a universal possession among living things the evolutionist guesses that it came into being – not by design or by an act of God – but just happened, and how did it happen? I will give you the guess – a piece of pigment, or, as some say, a freckle appeared upon the skin of an animal that had no eyes. This piece of pigment or freckle converged the rays of the sun upon that spot and when the little animal felt the heat on that spot it turned the spot to the sun to get more heat. The increased heat irritated the skin or so the evolutionists guess, and a nerve came there and out of this nerve came the eye! Can you beat it?" (97-98)

genius became an immensely popular idea for philosophical debate. Genius became construed as being greater than reason alone as Romanticism gained sway—as encompassing feelings, imagination, and intellectual transcendence. Women, always caught in the corporeality of bodies and worldly duties, have never been figured as transcendent in Western thought. In fact, transcendence aside, the canonical voices of Western philosophy have not always allowed that women have even the capacity to think well. At least as early as Aristotle, we can easily identify among canonized philosophers the explicit intellectual devaluation of women, a tradition which extended uninterrupted to the Enlightenment preoccupation with genius and fueled some central ideas of its transmutation in the writings of Romantic philosophers. This romantic genius, emerging as a forceful popular concept, is holy but very real and is certainly, centrally, male.

Voltaire made the complex design argument indicated above: "this invention in particular appeared to be a gift from the gods; this *ingenium quasi ingenitum* was a sort of divine inspiration." Rousseau, here as elsewhere, bridges from Enlightenment to Romantic views, promoting genius to an individual, a generally remarkable figure, rather than an idea or work. He brings an obsessive focus on human singularity – consider, from his *Confessions*, "I am made unlike anyone I have ever met… I may be no better, but at least I am different" – to bear on the pre-Romantic genius. His genius is firmly sexed: arguing in *Émile* (1762) that women should be trained as companions to educated men, Rousseau was upfront in describing their creative inertness, famously writing that woman loves no art and is skilled in none. "Women, in general, possess no artistic sensibility… nor genius. They can acquire a knowledge… of anything through hard work. But the celestial fire that emblazens and ignites the soul… [is] lacking."[31] For Rousseau, genius is housed in the soul, rather than in particular works or ideas.

In that key period when the ages of Reason and Romanticism interfaced, which I have bracketed as 1750-1850, genius took shape in the writings of Rousseau, Kant, Coleridge, Edward Young, William Duff, Carlyle, and many others as a divine mental gift – unmistakable, innate, effortless, and transcendent – that is seeded in an individual, necessarily male. Rousseau, Edward Young, and Hamann were influences on the late eighteenth century "Sturm und Drang" writers including Goethe, who maintained a stormy focus on passion and individuality and brought it to bear on themes of genius, as in his enormously influential *Faust*. Genius as an identity, with mystique and maleness at the fore, is everywhere in these writings. The period was kicked off with William Sharpe's *Dissertation on Genius* (1755), called by some the first book on the subject, where he focused on the "natural untrained powers" of genius. For Edward Young, writing in 1759, "A genius differs from a good understanding, as a magician from a good architect…" Hamann wrote to Herder in 1760, "My coarse imagination has never been able to imagine a creative genius without genitals." Colman wrote in 1761-2 that "The Genius… needs neither diligence nor assiduity." Duff's *Essay on Original Genius* (1767) made genius "a matter of strong imagination and lively passions" while his *Letters on the Intellectual and Moral Character of Women* explicitly bar women from membership. In Kant's *Critique of Judgment* (1790), genius is an "innate mental disposition."   In his other writings, we

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[31] Voltaire cited in Kristeva. Rousseau cited in Battersby. Trans. Citron, cited Battersby 36.

learn that a woman who knows mechanics "might as well have a beard." Coleridge in 1817 wrote of a genius as an androgynous mind in a male body. Carlyle's genius (1840) is endowed at birth with originality and inspiration; he calls genius "the heroic quality we have no good name for" and posits that it is "the Soul of a Man actually sent down from the skies."[32]

In the contemporary moment, most of the elements of this complex romantic genius ideal have descended untouched (though not uncontradicted), one telling shift notwithstanding: no longer is the maleness of genius a self-evident or definitional premise. Now, the idea that geniuses must be men has been reduced to an empirical observation, a stance made possible by the convenient oversight of a clear fact—the necessary maleness of genius is built into the worldview that produced the defining notions.

In the same period that romantic individualism forged a new genius, science was solidifying and measurement of minds was readying for a new era. Many of the authors and philosophers cited above were concerned with art and literature and would not have had room for science in their ideas of genius; in fact, the word "scientist" is an invention of the 1830s, before which time "natural philosophy" combined the study of nature with theology and alchemy and many other interests not today considered the domain of science.[33] The genius in their writings nonetheless massively influenced the language used to exalt the great scientists in the years to follow.

The celebration of individualism, clearly visible in these writings, persists in the genius ideal. The genius is a hero of the mental life, and a hero should be solitary, independent, and triumph over circumstances. The need for intellectual heroes is an important force behind the lasting trend of seeking a single person to receive credit for a complicated discovery or invention. For a recent instance, several centuries of progress and development with dozens of major participants produced the ideas behind the proof of Fermat's Last Theorem, but Andrew Wiles announced the completion of the final step only in 1993. Because he came chronologically last, and despite the fact of his having had important collaborators in the process, the popular image of the solution, likely to endure, is the one offered in coverage from the *New York Times* to NOVA: a lone Wiles holed up in his attic for seven years, driven to slay a childhood demon in the famous unsolved problem.[34]

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[32] Quotations in this paragraph cited in Battersby, Fara, and Wittkower. Battersby has convincingly argued that the maleness of genius is a prior conviction rather than a conclusion in these writings; though the authors' recipes for genius differ, they all agree that women lack the key ingredient. Rousseau's genius is passionate, but women, though they can reason at the highest levels, lack passion; Kant's women are passionate, but lack the necessary reason for genius; and Duff's genius is made of imagination, precisely the locus of women's deficiency.

[33] Fara puts the origin of the word "scientist" in 1833. The Oxford English Dictionary offers the following quote from 1834: "Science…loses all traces of unity. A curious illustration of this result may be observed in the want of any name by which we can designate the students of the knowledge of the material world collectively. We are informed that this difficulty was felt very oppressively by the members of the British Association for the Advancement of Science, at their meetings…in the last three summers... *Philosophers* was felt to be too wide and too lofty a term,..; *savans* was rather assuming,..; some ingenious gentleman proposed that, by analogy with *artist*, they might form *scientist*, and added that there could be no scruple in making free with this termination when we have such words as *sciolist*, *economist*, and *atheist*—but this was not generally palatable."

[34] The *New York Times* (circulation over one million) had a great deal of coverage including "At Last, Shout of 'Eureka!' In Age-Old Math Mystery," June 24, 1993, and "Math Whiz Who Battled 350-Year-Old Problem," June 29, 1993. A third headline proclaims that "it took Andrew Wiles seven years to solve a 350-year-old equation" (October 3,

Consider too the French secret society Bourbaki, founded in 1935, which comprised many of the finest mathematicians of its era and came to possess immeasurable clout, setting style and influencing content in world mathematics for decades. Instead of publishing as a collective, the group chose to publish under the solitary pseudonym Nicolas Bourbaki. The founders tried to keep their secret for years, even seeking membership in professional societies for their fictional gentleman scholar. As late as 1960, the game was still on: a "Notice on the life and work of Nicolas Bourbaki" was published tracing the famed mathematician's biography. In it, we hear of family background dating back to 1089; Nicolas' birth in Moldavia in 1886; his studies with Hilbert and Poincaré; his thesis at the University of Kharkov; his marriage in 1915 which produced a daughter who later married a noted lion-hunter; his flight to Iran to escape civil war in the Caucasus region; and a great number of subsequent details. The narrative culminates in Bourbaki's growing misanthropy as an old man, probably intended by the authors to explain why the celebrated Bourbaki was never to be seen at conferences.[35]

This mythical solitary hero figure is very arguably, as Julia Kristeva would have it, "a therapeutic invention that prevents us from dying from equality in a world without a hereafter" (Kristeva x). If genius is indeed "the ancient deification of personality," as she contends, then the genius is also the romantic personification of deity— and its modern secular surrogate as well. The genius serves a need to provide some continuity from humanity to the godly, or to the infinite, the totally abstract, and the unguessable. We have seen in the preceding material that some life stories become exceedingly plastic in the hands of tellers and re-tellers; I argue that this is the necessary consequence of the drive to find heroes among us. Genius produces an imperative for biographical narrative and, concordantly, an extraordinary malleability of biography.

Below, I hope to substantiate the claim of this lineage for the modern genius by showing the descent of the central features of that genius ideal to later time periods, and from there to the present. I hope also to illuminate some of the contradictions in genius and to highlight its constituent paradoxes and tensions.

Unmistakable genius

Consensus is essential for the reality and stability of the genius as an identity category. It is equally important that geniuses be unmistakable and that they be few if they are to be the heroes of intellectual life. These properties are practically axioms of the culture of modern mathematics, as we hear from authors ranging from Hadamard to Hardy to our *New Yorker* journalist Adler; in the phrase of the latter, "There is never any doubt as to who is and who is not a creative mathematician."

1993). NOVA's coverage, emphasizing Wiles' path "to achieve his life's ambition," is called "The Proof" (original broadcast: October 28, 1997).

[35] The patronym "Bourbaki" was chosen from an obscure Napoleonic general memorialized in the folklore of École normale supérieure, the elite university attended by all of the founders. The first name "Nicolas" was chosen by Éveline Weil, the wife of co-founder André Weil, in perhaps the most active involvement by a woman in Bourbaki's long history. This information comes from *Bourbaki: Une sociéte secrète de mathematicians*, a special issue of the magazine series *Pour la science: les génies de la science* published by the French edition of Scientific American.

In this regard, Ramanujan's story is the most useful, seeming to show that people of sufficient talent will emerge from the depths of obscurity. He becomes a means to bolster the myth of meritocracy, which of course is intimately related to the idea that genius will inevitably find exposure and recognition. Let me note briefly that an entirely different reading of Ramanujan's trajectory is possible, and perhaps more persuasive: that in fact it *is* only by chance that he came to be in England, and that the great majority of would-be Ramanujans in stations like his (or those even more "improbable") *do* live out their lives as clerks, or sweepers, or even housewives. After all, though biographical accounts do not dwell on this fact, Ramanujan was a Brahman in India, that is, a member of the highest social caste, and as such he was in the small portion of India's vast population with as much access to education, and as many avenues to pursue it, as he had.

The core principle that genius can be stably and objectively designated is necessary for the quantitative practice of studying genius through studying geniuses, which began with Francis Galton's *Hereditary Genius* of 1869 and continues to the present day in the writings of psychometricians (quantitative psychologists) like Arthur Jensen, Charles Murray, Hans Eysenck, and Satoshi Kanazawa. This psychometric approach will be discussed below.

Putting the stamp of evident genius on the profiles above changes the way their lives are told: failures must be re-understood as slights and jealousies; advancement and recognition as inevitable. The subjects are often treated like the hero-architects in Ayn Rand novels—visionaries whose superiority is written on their entire lives, so that any who stand in their way are bitterly disappointed and self-loathing rivals or the committed enemies of truth and beauty. *The Fountainhead* (1943) offers a vivid protagonist/antagonist pair in its genius, Howard Roark, and its villain, Ellsworth Toohey. Roark's original genius is always in evidence, and in college it causes his small-minded teachers to militate against him, with one exception. "The dean wondered why he had promised the professor of mathematics to do all he could for the boy. Merely because the professor had said: 'This,' and pointed to Roark's project, 'is a great man.' A great man, thought the Dean, or a criminal. The Dean winced. He did not approve of either" (Rand 25). Mediocrity triumphs and Roark is expelled from college. Here, mathematics is useful because of its image as objective, difficult, and unyielding to plodding minds. The respect of the math professor is unwaveringly won by Roark's genius; the mathematician cannot be duped. In counterpoint we have Toohey, the scheming, seething promoter of mediocrity, full of contempt and envy for genius, which he tries to thwart at every turn. We learn that "At school he was a model pupil. He always knew his lessons, had the neatest copybooks, the cleanest fingernails, loved Sunday school and preferred reading to athletic games, in which he had no chance. He was not too good at mathematics—which he disliked—but excellent at history, English, civics and penmanship; later, at psychology and sociology" (296). Further, Toohey "had all the earmarks of a sissy," save his overweening self-confidence, while Roark is decidedly manly and virile.

Rand seems to be engaging in quite the same kind of project that Bell was six years earlier when he painted the established mathematicians of Galois' time as spiteful and malicious, rather than

countenance the possibility that the young man's brilliance was not writ large on his earliest essays. This same project provides the motivation to posit foul play or ineptitude on the part of the examiner when considering Galois' failure on his University entrance exams. Hawking biographers White and Gribbin adopt much the same tactic when discussing Stephen's undistinguished performance on his honors undergraduate exams at Oxford: "if the examiners had any intelligence they would soon see that he was cleverer than they were" (White 54). The goal, much like Rand's, is dramatic—a hero whose excellence is obvious to all, resented by many, temporarily thwarted by some, but fated for legend. Only Rand calls her impassioned exaltation of genius, in the form of male ego and individualism, a novel.

Innate genius

G.H. Hardy, Ramanujan's "discoverer," famously called mathematics "a young man's game."[36] Galois, of course, is relentlessly cited as proof that genius is native to impetuous youth. Even "Uncle Paul" Erdös is fitted to this mold by those who are so inclined; although his mathematical productivity was astounding into his eighties, some insist that his most important achievement was his elementary proof of the Prime Number Theorem in 1949, achieved when he was thirty-six.[37]

We have already seen that Kanazawa's study, on astonishingly flimsy evidence, asserts empirical support for the hypothesis that scientific productivity fades with age.[38] There, the author, never shy to bolster his marginal science with anecdote, avers that "physicists and mathematicians tend to think they are over the hill at age 25" (258). Adler, writing in the *New Yorker*, reiterates the primacy of youth: "The mathematical life of a mathematician is short. Work rarely improves after the age of 25 or 30. If little has been accomplished by then, little will ever be accomplished. If greatness has been attained, good work may continue to appear, but the level of accomplishment will fall with each decade."

This youth fetish is concretely inscribed in mathematics by the means of its greatest prestige, the Fields Medal, often described as the mathematician's Nobel Prize. The prize is awarded at each International Congress and it is explicit in the guidelines for selection that the recipient must be no more than forty years of age, allegedly to reward both past achievement and future promise. This is of course strongly grounded in the assumption that productivity tapers off with age. The elite Bourbaki, too, had a formal enactment of the narrative preference for youth: one was compelled to leave the society on the occasion of turning fifty.[39]

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[36] *A Mathematician's Apology*. Even more forcefully, he said "I do not know of a single instance of a major mathematical advance initiated by a man past fifty" (Singh 3).

[37] The Erdös/Selberg proof of the Prime Number Theorem was "elementary" in that it did not make use of complex numbers to demonstrate the statement about real numbers, making it in some sense simpler and preferable to the original proofs of fifty years before.

[38] Please note that Kanazawa's methodology for finding the "peak" age for a scientist uses the date of the first entry in the scientific biography; therefore, Erdös would be a data point for age thirty-six, ignoring his incredible productivity for the ensuing five decades.

[39] Fang places the exit age at forty-five (Fang 81).

In fact, when it comes to youthful genius, the younger the better. Mathematics is a field which is extraordinarily fond of prodigy. A 1994 headline in the *New York Times* proclaimed, "At 15, Westinghouse Finalist Grasps Holy Grail of Math," by the logic that a high-school boy who could pass graduate school qualifying exams must surely be the stuff of religious legend. This conferral of holiness took place simply because he could do in his teens what would be entirely un-newsworthy six or seven years later.

The youth imperative does not stop at puberty, though; in fact, the envelope is pushed all the way back to the womb, or to the spiritual endowment of the self. "To be a scholar of mathematics," writes Paul Halmos, "you must be born with talent, insight, concentration, taste, luck, drive and the ability to visualize and guess."[40] This statement seems nonsensical; how can one be born with concentration? Halmos' statement is the natural extension, though, of the extremely broadly accepted idea that genius is not teachable. The removal of genius from the scope of learnable traits maintains the mythology of its otherworldliness. Significantly, too, in combination with the premise that genius is unmistakable, its unteachability becomes a powerful justification for the insularity of intellectual society, since outreach and training become irrelevant.

That a trait of mysterious origin should be innate, and therefore beyond the control of its carrier, is a claim that provides some comfort in quite an array of scenarios. This may be particularly true of traits that carry stigmas, where the stakes of the "born-that-way" sweepstakes are obvious for those concerned with the ascription of blame. A powerful example is that of criminality. The idea of "criminal anthropology" dates from the late nineteenth century and the work of Cesare Lombroso (1835–1909), whose insistence on the prevalence of born criminals had great and lasting impact on public ideas about crime, and concurrently on policy in law and justice. Before Lombroso's important *Criminal Man* (1876), though, came his *The Man of Genius* (1863), and his unity of thought on the inborn origins of genius and criminality is striking. Arthur Conan Doyle (1859–1930), surely influenced by Lombroso's school, treated Moriarty's mathematical bent and his criminality in similar terms. Professor Moriarty, we are told, was "endowed by nature with a phenomenal mathematical faculty," but his promising mathematical career was derailed because "the man had hereditary tendencies of the most diabolical kind. A criminal strain ran in his blood, which, instead of being modified, was increased and rendered infinitely more dangerous by his extraordinary mental powers." Psychologist Kanazawa was merely tapping into this legacy in linking genius and criminality in his study.

Though nature/nurture debates rage loudly in various corners recurrently throughout modern history, genius seems to be above the fray, its natural status assured. Consider the thoughts of Jacques Hadamard, the famous French complex analyst, on the coincidence of Galois and Hermite, two mathematicians celebrated enough to be profiled in Bell's anthology. In *The Mathematician's Mind*, his self-aggrandizing study of what makes mathematical geniuses tick, Hadamard says, "A curious thing is that Galois' teacher in mathematics in the high school, Mr. Richard… was also, fifteen years later, the teacher

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[40] Paul R. Halmos, "I Want to be a Mathematician." Washington: *MAA Spectrum*, 1985.

of Hermite; this, however, cannot be regarded otherwise than as a mere coincidence, since the genius of such men is evidently a gift of nature, independent of any teaching" (Hadamard 120). So even in the face of facts that suggest another possibility – two of the men considered to belong to the loftiest ranks of the mathematical elite had the same early mathematical schooling – the strength of the innateness-of-genius idea prevails.

Effortless genius

A genius should display inexplicable mental virtuosity; it is distinctly less romantic if the candidate for genius works very hard and leaves a paper trail. In this respect, Ramanujan is king, as he was known for presenting his colleagues with an incredibly complicated but very elegant formula as a *fait accompli*, often with neither an account of how he had arrived at the result nor any kind of proof.

Marc Kac, in his 1995 book *Enigmas of Chance*, expounded on the value of mystery to genius, saying:

> An ordinary genius is a fellow that you or 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. They are, to use mathematical jargon, in the orthogonal complement of where we are and the working of their minds is for all intents and purposes incomprehensible. Even after we understand what they have done, the process by which 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.

Kac's much-cited dichotomy was paraphrased by Hans Bethe in Feynman's *New York Times* obituary. In Bethe's version, though, "The ordinary kind does great things but lets other scientists feel that they could do the same if only they worked hard enough." While he is not so bold as to deny genius status upfront to scientists who work hard, Bethe clues us in that slaving over your craft, or even making its status as craft too readily apparent, will downgrade you in the genius hierarchy.

Recall Rousseau's allowance that women "can acquire a knowledge… of anything through hard work" but can never ascend to genius. Clearly, for Rousseau, arbitrarily advanced erudition does not a genius make—not if it comes by labor.

This priority on effortlessly producing whole ideas without revealing the secrets of their manufacture explains several elements often linked to genius: "doing it in your head" becomes exalted – even more so if the computation is fast enough to give the appearance of great ease – and powers of visualization come to the fore. Indeed, Paul Halmos explicitly included visualization on the list of qualities that any scholar of mathematics must be born with. Perhaps this purchase that visualization powers have on genius explains the motivation for the rash of studies in the 1990s devoted to showing that male brains were hardwired for spatio-visual manipulations more than females.

A favorite story of Gauss' youth, told for instance by Bell, has one of his childhood teachers impatient with the boy's fast answers and obviously superior mind. In the story, the teacher banishes Gauss

to a corner and tells him not to return until he has added the numbers from 1 to 10,000. Gauss returns within a minute with only the answer written on his slate.

Obviously working towards the same narrative goal, Hawking's biographers tell us that "…it was around [age 14] that his scientific aptitude began to show. He would spend very little time on maths homework and still obtain full marks. As a contemporary recalled, 'he had incredible, instinctive insight. While I would be worrying away at a complicated mathematical solution to a problem, *he just knew the answer* – he didn't have to think about it.' " (White 18). Later in the story, this is one of the main reasons that adult Hawking's physical disability heightens his genius mystique—he certainly is not writing anything down.

Transcendent genius

We have seen that the genius was classically figured as godly, and thereby somewhat inhuman. L'Hôpital wondered about Isaac Newton, "Does he eat, drink and sleep like other men? I cannot believe otherwise than that he is a *genius*, or a *celestial intelligence* entirely disengaged from matter."[41] The otherworldliness of modern genius is a clear vestige of these originating ideas.

Schopenhauer wrote often on notions of genius, for instance in his essay "On Genius" (1851), a chapter in *The World as Will and Representation*, where he gives a clear glimpse of this newer secular otherwordliness.[42] Schopenhauer draws a distinction between intellect and will, where in his lexicon the will is a sort of ego which is intimately connected with the body, while the intellect is the faculty of the mind.[43] In the genius, intellect triumphs over will: "the intellect of the genius is detached from the will and so from the person" (Schopenhauer 382). In fact, "the ever wider separation between the will and the intellect… reaches its highest degree precisely in genius, where it attains to the complete detachment of the intellect from its root, the will, so that here the intellect becomes wholly free" (383). License for eccentricity, too, is part of Schopenhauer's model; he says, "[the normal man] will certainly not run into those eccentricities, personal slips, and even follies, to which the genius is exposed. The genius does this because his intellect… is engrossed more or less in what is purely objective" (387). Schopenhauer's genius was not to be expected to be a "useful and capable citizen of this world"; actually, "the happiest lot which can befall the genius is to be released from action, which is not his element, and to have leisure for production" (395,390). He also presents the allowance if not the requirement for puerility: "every child is to a certain extent a genius, and every genius is to a certain extent a child" (395). Part of the necessary childishness is a great distance from reproductive exigencies; a genius should be primarily concerned with leaving ideas behind—"the production of immortal children" (386). In terms of actual offspring, though, they may benefit from a father's genius: his intellect, but not that of the mother, can be heritably

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[41] Fara 2, citing Universal Magazine 3 (1748), 295. Emphasis original.

[42] Schopenhauer, interestingly, explicitly excluded mathematics from the creative arts, saying in fact that the man without imagination "will never achieve anything great, unless it be in arithmetic or mathematics" (Schopenhauer 379). The influence of his ideas for the genius model in mathematics, though, is unmistakable.

[43] Consider: "The act of the will and the action of the body are not two different states objectively known…, but are one and the same thing" (cited Weiner 53).

transmitted to a child. It seems that his profile, in sum, would likely describe a man, for being "released from action" and allowed to develop the mental faculties and to suspend the relationship with the body is not a course which is traditionally available to women. Schopenhauer settles the matter without equivocation, however, asserting that genius "must occur in a male body" (392).

This element of transcendence in the genius ideal, highlighted here by Schopenhauer, produces both the unworldliness and the otherworldliness that we may observe in modern genius stories. His description echoes in the genius tales of the men above in Erdös' practical helplessness and in Hawking's disembodiment: both are exercises in "complete detachment." The exemption from worldly duties called for by Schopenhauer has a sexed meaning. On this point, it is so obvious as to hardly need mention that women are expected to be caretakers – for spouses, children, and homes – in a way that men often are not. We even see this difference in the small sample of twentieth-century genius narratives treated above. Jane Hawking and Richard Feynman each married a youthful love who was given by doctors only a short time to live (Stephen Hawking lives on, as we know, but Arlene Feynman did indeed die after a few years of marriage). However, the terms were highly different: Richard Feynman was thought to have admirably acquitted himself of his loving duties by visiting her in the hospital every weekend while he worked on the bomb in Los Alamos; Jane Hawking was expected to, and did, give up her own academic aspirations and devote herself to her husband's nursing and their children's rearing.

In the work of a much more minor figure, Otto Weininger, the conflation of genius with transcendent masculinity finds an extremely explicit venue at the dawn of the twentieth century. Though not a celebrated philosopher himself, Weininger must be seen as playing an important role in the transmission of ideas in the Western tradition: his own work inherited from the Romantics and adapted Schopenhauer, and he was read and respected by many, including the subsequent generation of philosophers, most notably Wittgenstein.[44] Weininger's most famous treatise, *Sex and Character* (1903), deals with the question of the character of Woman and her unsuitability for the life of the mind. It holds that she is, in fact, without mind or soul, and that her lack of suitability for thought is therefore obvious. In his ideas, the incorporation of the key romantic updates of genius is clear, but he has amplified the misogynistic strains with viciousness and insistence. He begins, "[T]he ego of the genius… is itself universal comprehension, the centre of infinite space; … For the genius the ego is the all; the genius sees nature and all existences as a whole; the relations of things flash on him intuitively; he has not to build bridges of stones between them" (Weininger). And he is explicitly interpreting Carlyle when he observes that "the idea is definitely insisted on that genius is linked with manhood, that it represents an ideal masculinity in the highest form." In this way, "genius declares itself to be a kind of higher masculinity, and thus the female cannot be possessed of genius… a female genius is a contradiction in terms, for genius is simply intensified, perfectly developed, universally conscious maleness." His exaltation of masculinity is so complete that he proclaims that "There are no men in whom there is no trace of the transcendent…" while manifestly the opposite is true for women, and furthermore that, quite literally, any women who defy

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[44] Wittgenstein explicitly wrote of his admiration for Weininger in his diaries (Weiner 19).

his prescription of mindlessness are not truly women, but of intermediate sex. "[A]ll women who are truly famous and are of conspicuous mental ability, to the first glance of an expert reveal some of the anatomical characters of the male, some external bodily resemblance to a man." This physical loss of femaleness is the necessary condition of female transcendence: "A woman who had really given up her sexual self, who wished to be at peace, would be no longer 'woman.' " The circuit of misogyny is complete, proclaiming exceptional women to be defiant of their sex rather than of his characterization.

III. Female Genius?

Cognitive Dissonance

Psychology gives us the principle of cognitive dissonance: one idea or worldview can be so entrenched that future evidence seeming to contradict the prevailing idea poses resolution problems to the mind.[45] Generally, having sizable discrepancies in cognitions produces an unpleasant psychological tension and an accompanying drive to reduce the tension. Sometimes, the counterexamples to a standing principle are themselves rejected because the mental misfit is so strong. As Leon Festinger put it in his extremely influential 1957 manuscript introducing the term, "Two elements are dissonant if, for some reason or another, they do not fit together. They may be inconsistent or contradictory, culture or group standards may dictate that they do not fit, and so on. … The dissonance might exist because of what the person has learned or come to expect, because of what is considered appropriate or usual, or for any of a number of other reasons" (13). The mental tension can be diminished by a change in behavior, but another frequent outcome is that the "person involved… might change his 'knowledge' " (Festinger 6). I want to use this framework to analyze the case of people with a strong and silent belief in the maleness of genius who encounter an extraordinary woman thinker.

The now-unspoken founding feature of genius is its maleness, and we have seen manhood reflected and refracted in a number of different ways in the narratives (and narrative adjustments) of genius. Justice Potter Stewart famously could not define pornography, but averred that "I know it when I see it"[46]—and of course, the main mechanism for identifying what you cannot define is generalizing from a supply of examples. If all available examples of ineffable genius are men, then that in itself provides resistance against the future designation of female geniuses.

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[45] Festinger 1957. One scenario for dissonance is when an action and a belief are at odds (for instance, smoking while believing it is unhealthy). The scenario I am focusing on is when two beliefs are at odds, such as in Festinger's example of a white person who believes in the equality of white and black but does not want a black neighbor.

[46] "I have reached the conclusion, which I think is confirmed at least by negative implication in the Court's decisions since Roth and Alberts, that under the First and Fourteenth Amendments criminal laws in this area are constitutionally limited to hard-core pornography. I shall not today attempt further to define the kinds of material I understand to be embraced within that shorthand description; and perhaps I could never succeed in intelligibly doing so. But I know it when I see it, and the motion picture involved in this case is not that." From concurring opinion in Jacobellis v. Ohio.

One anecdotal example of this logic comes from a University of Chicago literature course from the late 1960s. The professor made a very understated case for his feeling that Jane Austen should not be considered a literary great. He simply intoned,

"Homer. Milton. Tolstoy. Dostoyevsky. *Jane Austen??*"

This should be regarded as a direct appeal to dissonance to make an argument about literary stature: Jane Austen does not belong because she stands out when juxtaposed with the consensus masters. It is not necessary to make an intricate analysis of the merit of her writing; her inclusion in the canon would create an untenable discord with the prior ideas about greatness. The canon of geniuses itself thus assumes the place of a definition, and this definition can exclude women wordlessly.

Psychometrics and the fetishization of lists

We might learn something about genius from studying the list of the club members if – and only if – a genius can be stably and objectively designated, as the premise of unmistakable genius supposes but no authors credibly explain. This is the frequent approach to genius in the field called psychometrics, which is essentially the quantitative branch of psychology, to which American academic psychology is almost wholly devoted.[47] Through statistical analysis of empirical data, practitioners of psychometrics endeavor to throw light on mind and behavior. It is the tradition that grew out of Francis Galton's interest in intelligence measurement (and, relatedly, in eugenics) in the nineteenth century, that produced the notion of a measurable IQ at the turn of the century, and that recently garnered an enormous boom of attention with Charles Murray and Richard Herrnstein's 1994 publication of *The Bell Curve*, reiterating the argument of almost two centuries' pedigree claiming heritability of IQ and linkage to racial identity. We have already encountered a list-based take on genius in the work of Satoshi Kanazawa.

The same Murray of *Bell Curve* notoriety has more than dabbled in genius-measurement, publishing in 2003 a book of grand scope, called *Human Accomplishment: The Pursuit of Excellence in the Arts and Sciences, 800 B.C. to 1950*. In it, he gleans names of eminent individuals from obituaries and a biographical dictionary, then ranks them from 1 to 4002 "according to how many column inches the editors [of 167 chosen encyclopedias] have chosen to devote to each of them."[48]

The circularity of the psychometric approach to understanding genius in particular (as distinct from intelligence, eminence, etc.) is easily apprehended in Arthur Jensen's survey article, "Giftedness and Genius." Jensen informally considers the properties that emerge from the statistical study of consensus geniuses. When he runs out of just-so stories to explain the findings, he abdicates spectacularly: "A number of the remaining personality correlates of genius may best be captured by the idea that genius represents an acting-out of its very essence" (405). Besides foreclosing on the possibility of recognizing his correlates as unmeaningful, this revealing statement reflects a clear prior conviction that genius has an essence at all, a tenet that he has a pressing responsibility to argue.

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[47] See Susan Groppi, "Primary sites of influence in American psychology" (preprint), for a history.

[48] Judith Shulevitz, "The Best and the Brightest," in the *New York Times Book Review*, November 30, 2003, p12.

The high priest of twentieth-century psychometrics might well be Hans Eysenck, whose publishing career spans five decades of work on personality, behavior, and intelligence. In his 1995 book *Genius: A natural history of creativity*, the quantitative approach is brought to bear on the elusive concept of his title.

Throughout the book, Eysenck splits hairs in distinguishing a cluster of factors in his prose: we are told that genius, eminence, creativity, success, productivity, influence, and intelligence are all importantly distinct. He then utterly conflates these same factors when crunching numbers and compiling charts and figures. That the genius exists at all is mainly a principle to be taken on intuition, though he does argue that "there is a good deal of agreement among experts" on who qualifies as a genius. This is mainly supported by data that show that the members of four famous orchestras have a significant degree of between-group consensus on how to rank-order nineteen eminent composers—this is interesting, and quantifiable as far as it goes, but hardly provides sufficient support for an assertion that is absolutely essential to the meaningfulness of his project.

In the fine print, Eysenck equivocates greatly in all the appropriate places. He writes of the immense difficulties of inferring causality from correlation. He recognizes the many "irrelevant criteria" of the personal profile which unfortunately contribute to the identification of a genius figure, singling out Hawking for skepticism by asking whether the wheelchair did not make the popular genius in that case. He does not seem to heed his own caveats, though, and he simply culls names of geniuses from lists made by other people.[49] The bulk of the book is then devoted to empirical data from the biographies of these geniuses and subsequently to the advancement of conjectural causal explanations for observed correlations. Crafting causal stories is quite a task, as Eysenck uses hundreds of studies' worth of data, ranging from the stuff of common stereotypes to the incredibly obscure.

Genius, success, creativity, intelligence, and/or eminence are reported to be strongly correlated with factors including middle-class origin, high parental status, productivity, tendency to psychoticism, large brain size, early death of parents, theoretical as opposed to social orientation, commitment to work, Jewish ancestry, youth, birthdate in February, undersocialization, egocentrism, the appearance of sunspots during one's career, and a case of gout.[50] He proceeds to try to explain why each of these factors might favor the emergence of genius, and the result is a crazyquilt of nature, nurture, and the unclassifiable: we hear of high "P-genes," overcompensation for feelings of guilt and unworthiness, innate potential, alienation, conditioned inhibition, family educational tradition, and season-dependent virus infections.

In the midst of the chaos of his argumentation, Eysenck stops to clarify an obvious point: "Creativity, particularly at the highest level, is closely related to gender; almost without exception, genius

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[49] This despite the fact that he explicitly discusses two examples of widely held "errors" about genius status concerning men about whom he is knowledgeable: Sigmund Freud (an outrageously overrated charlatan) and George Washington Carver (outstanding and undervalued; proof that genius triumphs over "the worst imaginable environment"). Given these strong opinions, it is even more curious that other people's lists merit uncritical acceptance and extended study.

[50] It is worth mentioning that parental status is measured by father's job, productivity by mean number of publications and citations, and "commitment to work" by stated plan to work full-time until retirement. The imperfection of each of these measures is apparent.

is only found in males (for whatever reason!)" (127). In particular, Eysenck confidently states that mathematics has known no women of genius; ludicrously, his evidence, as I mentioned above, is no more than a list of the profiles in our familiar *Men of Mathematics*. He has decided on his own initiative to exclude the anomalous Kovalevskaia from the tally.

A major flaw of the logic in this book, amplified and clarified from its form in casual conversation about genius, is the continual confusion of two things: on one hand, describing the features of some concrete, existent property; on the other hand, reifying an informal descriptor into a measurable. I argue that the investigation of possible reasons that genius would be *produced* by his correlated factors is completely vacuous, since he is studiously ignoring the fundamentally social selection-and-canonization component of the process—which, by the way, is precisely the feature that his method might provide the most hope to illuminate.[51] Often, he has merely succeeded in observing strong correlations between the people recognized as geniuses and the factors that caused that recognition to take place, factors which may have no relation to mental worth. By studying consensus geniuses through crunching numbers on their attributes, he seems to find no more than some personal and narrative features by which we recognize and attribute genius, overlain with the noise of arbitrary information. To observe that the agreed geniuses have all been male cannot indicate that genius "must occur in a male body," except by corroborating the suspicion that this "must" is a tautology because maleness is part of what genius means. The observation in itself only tells us that maleness is a likely precondition for being identified as a genius.

In this connection, consider an example from the history of race. Johann Friedrich Blumenbach was a student of the great taxonomizer Linnaeus and is in fact credited with the innovation of the word "race" for divisions of human diversity as well as the use of the term "Caucasian" to designate white people. Blumenbach added a fifth race to Linnaeus' simple white-black-yellow-red scheme and introduced a notion of racial superiority into the scientific record with his own taxonomy published in 1795. He wrote that there were two lines of racial degeneration from the Caucasian ideal, one running to Malay, then Ethiopian; the other to (Native) American, then Mongolian. His claim was that the white race was closest to the original state of the human species, and that the others had deviated progressively further from that created perfection.[52] Fascinatingly, though, Blumenbach was something of a racial egalitarian and was very committed to monogeny, the notion that all races come from a common stock of the same species. On these grounds, he refused to believe, as most of the scientific racists argued, that whites had superior innate intelligence or moral virtue. Needing other grounds to explain his hierarchies, he made an interesting choice of criterion for measuring the degree of perfection: he selected beauty. He considered it self-evident that white faces were the most beautiful, and in fact thought that this distinction carried over to naked crania, of which he had a large collection. One, from the Caucasus region, was described by him as

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[51] Eysenck himself speaks of "plausible biological factors in *producing* creative achievement" (169, emphasis added), making it clear that he is making a causal and not just a correlative account. This caps a passage in which, for example, he goes so far as to speculate that gout, being associated to high levels of uric acid, might benefit creativity because of the structural similarity of uric acid to caffeine.

[52] This is ironic considering that the inverse racial logic was often alleged, post-Darwin: that blacks were closer to the prior state of development, and therefore less evolved and inferior.

"really the most beautiful form of skull which… always of itself attracts every eye, however little observant" (Gould 411). Through this reasoning, he named the white race for the Caucasus, from which region he had concluded that the most beautiful people derived. He was by no means alone in making this kind of judgment—a great many of the eminent scientists of the day were on the record about the aesthetic inferiority of nonwhites.[53] Today the phrase "Western beauty standards" has entered the general lexicon, packaged with the recognition that culturally specific beauty ideals can be and are promulgated, internalized, and digested. At the turn of the century from the 18th to the 19th, however – in the same period that "genius" was reborn – it would have been a very simple matter to achieve remarkable consensus among educated Westerners that the most beautiful people in the world could with complete objectivity, down to the last specimen, be identified as members of the white race. Physical beauty is a very strong intuition, and hardly worth denying as an aesthetic concept—but would we then be learning something about a timeless essence of beauty if we dispassionately tabulated the features of widely celebrated beauties in the dawn of the Romantic era and observed that none were black?

Not (A and B) implies (not A) or (not B)

To see the "change of knowledge" at work, let us turn to the few available examples to see the narrative resolution of the dissonant elements of femaleness and widely recognized mathematical talent.

Many say the greatest mathematical achievement by a woman is that of Emmy Noether (1882–1935). Amalie Noether, better known as Emmy, was a German Jew, the daughter of Max and Ida Noether of Erlangen. Noether did not come to mathematics until fairly late in her short life, very possibly because only at that stage had the social conditions in Germany modernized enough to (barely) allow it. She studied with her father, himself a mathematician of note, and sat in on classes; when the institutional policy preventing doctorates from being conferred on women was lifted, she received her doctorate, though continued to meet with resistance to obtaining the higher degree (Habilitation) which would enable her to teach. The Habilitation was denied by the Prussian government in 1915 for "unmet legal requirements," a euphemism indicating that she was banned because of her sex (Dick 32). She was invited to the University of Göttingen, a hub of modern algebra, by the extremely prominent mathematicians Felix Klein and David Hilbert. Even while her fame was growing, her status remained marginal. Hilbert found himself having to argue for her against those who thought it evident that women should be excluded from the Göttingen's faculty, famously exclaiming that "the University senate is not a bathhouse!" (Reid 143)[54] He failed, though, and Noether lectured under Hilbert's name until 1919. Ultimately she was given an ad hoc position

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[53] Consider the "Hottentot Venus," a tribal woman shipped from South Africa to Europe in 1810 and put on circus display for five years to be gaped at. The celebrated scientist Cuvier commented extensively on her monstrous and apish features, in fact dissecting her labia after her death and keeping them on display in his museum long thereafter. Harvard's adulated naturalist Louis Agassiz was so shocked by the physical appearance of blacks upon first contact in Philadelphia – writing of them as bent, grimacing, woolly, and hideous in an 1846 letter to his mother – that he became convinced that they were of a different species.

[54] Hilbert and others wanted Noether to be granted Privatdozent status (low-level faculty) which would allow her to lecture. There were vigorous objections, notably, "What will our soldiers think when they return to the university and find that they are expected to learn at the feet of a woman?". From Reid's *Hilbert*.

with no salary of its own. Students traveled from all over the world to work with her—in particular, the entourage of eager young men who would follow her around on her lunch-time walks came to be known as "Noether's boys." Renowned mathematician Hermann Weyl reports that "In my Göttingen years, 1930-1933, she was without doubt the strongest center of mathematical activity there, considering both the fertility of her scientific research program and her influence upon a large circle of pupils."[55] In 1933 she was removed from her position by the Nazis along with colleague Richard Courant and most other Jews. She relocated to Bryn Mawr College in Pennsylvania, having failed to secure a position at a research university despite efforts from various colleagues.[56] Within two years of relocating to the United States, Noether unexpectedly died. Despite her constant marginalization during her lifetime, Emmy Noether nonetheless had a great impact on mathematics, in particular contributing significantly to the mathematics behind Einstein's theories and pioneering the axiomatic and extremely abstract style of modern algebra that would survive in the text of her student B.L. van der Waerden and serve as a primary influence on Bourbaki.

Noether was often described as being obese and manly. In fact, her heft is referenced in both of her major professional eulogies, which must surely be unusual: Weyl calls her "heavy of build and loud of voice… a rough and simple soul" and the topologist Alexandrov speaks of "her well-known heavy build." Biographer Dick chides her as untalented for housework, not pretty, an ungraceful dancer, an untidy lecturer, and a wearer of "shoes so sturdy that one could not avoid the impression that they were men's." Persistent anecdotes dwelled on her dress, her table manners, and her personal style. She never married, and is not known to have had any love interests or close friends. In Germany, one of her colleagues had started a tradition of addressing her with the masculine pronoun – *der* Noether – a fact which was noted on her placard in the "Men of Modern Mathematics" exhibit in the 1964 World's Fair in New York, which also joins the chorus in calling her "fat, rough, and loud."[57] All of this might well call to mind Weininger's edict that a great woman thinker would inexorably become partly male. For those around her, this seemed to ease the tension of her femaleness with her undeniable mathematical skill; she was most often removed from the category of woman to resolve the conflict. Her close colleague Edmund Landau, for instance,

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[55] Weyl says further: "When I was called permanently to Göttingen in 1930, I earnestly tried to obtain from the Ministerium a better position for her, because I was ashamed to occupy such a preferred position [Hilbert's old chair] beside her whom I knew to be my superior in many respects. I did not succeed, nor did an attempt to push through her election as a member of the [Göttingen Academy of Sciences]. Tradition, prejudice, external considerations, weighted the balance against her scientific merits and scientific greatness, by that time denied by no one." From his eulogy for Noether delivered at Bryn Mawr, reprinted in Dick.

[56] Dick's book indicates failed efforts to place her at Oxford, at Princeton, and at Moscow University. While at Bryn Mawr, she gave weekly lectures at a new institute for mathematics in Princeton, New Jersey, though not, in her words, at the "men's university where nothing female is admitted" (Dick 81). It is worth noting that Noether always indicated contentment with Bryn Mawr, and in fact never complained about her uprooting or her other shoddy treatment in the profession.

[57] These references are scattered around Dick's biography: pp149,179,11,48,2. Dick also notes that, as regards her choice of footwear, "she was open to friendly reproach" (48).

when asked to testify to the effect that Emmy Noether was a great woman mathematician, is very revealing in his response: "I can testify that she is a great mathematician, but that she is a woman, I cannot swear."[58]

We saw the comments of Kant, Hamann, and others inaugurate the period of genius-as-identity by insisting on its maleness. For Kant, women who attain certain kinds of knowledge "might as well have a beard"—and he was impugning the femininity of a particular woman in the quotation: Emilie du Châtelet, a contemporary with notable mathematical achievements.[59] The idea certainly exhibits continuity from Kant to Weininger to modernity. For Nietzsche, writing in 1886, "when a woman has scholarly inclinations there is usually something wrong with her sexually." And in the famous words of Goncourt (1822-1896), "there are no women of genius; the women of genius are men."[60]

The desexing phenomenon, which amounts to masculinization, is almost complete in Noether's case but is attempted on other women mathematicians as well.[61] In a puff-piece biography of Kovalevskaia called *Little Sparrow*, for instance, author Don Kennedy seems intent on promoting a desexed image of Sonya for increased palatability of her mathematical success: she was a tomboy when small, always "compact of build" and "uncomfortable in a fashionable dress" and "very good looking" but of "no beauty" (Kennedy 9,26-27,55). In order to make sense of her lack of evident romantic interest in men, he makes the outrageous claim that "very possibly… Sophia had simply never been sexually aroused" (148). It seems that Kennedy cannot give an account of Kovalevskaia in which she is fully mathematical and a feminine, sexual woman, so he concludes that her lot was to have "too much love of science and too little science of love" (149). Ironically, most biographies of Kovalevskaia, faced with the same problem of the mutually exclusive categories of woman and mathematician, have simply chosen the other way – describing her as exquisitely feminine but insufficiently mathematical – as Bell did above. This provides the counterpart strategy to desexing; importantly, though, both strategies preserve the masculinity of genius.

Adjusting genius

In a May 1, 1935 letter to the *New York Times* on the occasion of Emmy Noether's death, Einstein wrote that "Fraeulein Noether was the most significant creative mathematical genius thus far produced since the higher education of women began." Much earlier, Sophie Germain, another mathematician of

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[58] J.E. Littlewood, *A Mathematician's Miscellany*. This striking quote is omitted from the polite biographies on Noether, including Dick's authoritative edition.

[59] "A woman who has a head full of Greek, like Mme Dacier, or carries on fundamental controversies about mechanics, like the Marquise de Châtelet, might as well have a beard" (*Observations on the Feeling of the Beautiful and Sublime* II, 230). The Marquise was a significant Enlightenment figure and was Voltaire's lover and collaborator. He said of her, "She was a great man whose only fault was in being a woman. A woman who translated and explained Newton. . . in one word, a very great man."

[60] Many women thinkers, notably George Sand, were subjected to the public sport of reverse emasculation. The treatment of Noether dovetails extraordinarily well with the assessment of George Sand by many of her contemporaries. (See for instance Battersby 20-22.)

[61] The major exception to Noether's defeminization is the frequent observation of her motherly attitude towards her students.

some eminence, revealed herself to be a woman after having corresponded under a male pseudonym for several years with the eminent Carl Gauss. Gauss gushed in a subsequent letter (1807),

> But when a person of the sex, which according to our systems and prejudices, must encounter infinitely more difficulties than men to familiarize herself with these thorny researches, succeeds nevertheless in penetrating the most obscure parts of them, then no doubt she must have the noblest courage, quite extraordinary talents and a superior genius.[62]

Thus (and clearly), to call a woman a genius is not unheard of. But on a closer look, these ascriptions of genius are qualified by their authors; the praise is clearly circumscribed by the scope of women's achievements as a class. Noether, Kovalevskaia, and Germain are quite unknown outside of mathematics, and not consistently celebrated within.

How might we then find the elusive female genius? We could speak of potential genius – the "Shakespeare's sister" approach implied by Woolf's musings on the talented but thwarted Judith Shakespeare of her imagination[63] – and wonder about the great achievements of, say, a Mary Somerville (1780–1872), who was barred as a woman from the scientific libraries in the Britain of her day but nonetheless able to write insightful books on mathematical physics and astronomy. Or, impatient with hypothetical and potential geniuses, we might simply re-form the trope altogether.

Julia Kristeva has tried to reclaim genius, writing a three-volume work on Female Genius which focuses on three thinkers whom she somewhat possessively calls "my geniuses": Hannah Arendt, Melanie Klein, and Colette.[64] To do this, though, she has had to refigure genius itself, casting it in a populist way so that it encompasses people who have great influence, and finally can be seen in all "unique experiences." This might seem to be unreasonably far from the vernacular notion of genius, and indeed Kristeva has had to selectively scrutinize the Western history of genius to locate a suitable thread. The tradition she isolates comes down through St. Augustine and finds its clearest exponent in the thirteenth- to fourteenth-century writings of the Franciscan philosopher John Duns Scotus.[65] The core notions of this brand of genius are humility and meekness; it is connected with the invisible and the feminine and represents an inverse of the heroic. This genius is a kind of singularity, a "somebody" or a "who" which calls attention to "*this* particular man" (sic), but is accessible to all (Kristeva 175). Commenting on this momentous abandonment of the centrally important elitism of genius, Kristeva says, "Our recent claims of discovering

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[62] This quote can be found in any reference that discusses Germain, for instance Osen or Bell.

[63] "Yet genius of a sort must have existed among women as it must have existed among the working classes. Now and again an Emily Brontë or a Robert Burns blazes out and proves its presence. But certainly it never got itself on to paper. When, however, one reads of a witch being ducked, of a woman possessed by devils, of a wise woman selling herbs, or even of a very remarkable man who had a mother, then I think we are on the track of a lost novelist, a suppressed poet, of some mute and inglorious Jane Austen, some Emily Brontë who dashed her brains out on the moor or mopped and mowed about the highways crazed with the torture that her gift had put her to" (Woolf 84-85).

[64] French does not have the word "female" for humans—the French title of the trilogy is *Le génie feminin*, which would directly translate as "Feminine genius." Kristeva herself, who as a psychoanalyst substantially focuses on the feminine, was not involved in the choice of "Female genius" over "Feminine genius" for the English translation (personal communication).

[65] Duns Scotus was greatly admired and often cited by Hannah Arendt, and, in turn, Kristeva.

'genius' within ourselves—whether in the form of a talent, a natural gift, or a prolonged search for truth—have put an end to the ancient deification of personality" (ix).

Rather than argue that this corresponds with wider notions of genius, she demurs: "Let us agree here to use the term 'genius' to describe those who force us to discuss their story because it is so closely bound up with their creations, in the innovations that support the development of thought and beings, and in the onslaught of questions, discoveries, and pleasures that their creations have inspired" (xi).[66] While this is a fascinating idea, discussed further below, it is questionable as a founding definition because it flouts both the bulk of the term's history and its usage. One would be hard-pressed to argue that Duns Scotus' model provides a lode as rich as the Romantic model for the prevailing modern notion of genius.

A person becomes a genius, for Kristeva, by capitalizing on the historical disturbances brought about by their influence. Upon locating a genius, "We endow him with a biography" that tries, but always fails, to explain an extraordinary life. Here she is hinting at the created rather than reported nature of biography. Perhaps this is more damning for Kristeva's project than it might at first appear. Indeed, who makes the genius— the scholar writing a careful biography and arguing for the influence and subtle originality of a thinker's work, or the journalist proclaiming a wheelchair-bound cosmologist to be "Master of the Universe"?

Conclusion

The goal of this inquiry has been to articulate as clearly as possible the state of an idea. To meet this aim, the analysis needs to transcend a recounting of history and provide some insight into the workings of genius going forward.

Language and other forms of naming profoundly condition social realities. Language and names can mark the place of cultural apparatus after it has been removed, but while the actions that it set in motion are still everywhere in effect. Patronymic last names and the practice of a father "giving away" the bride, for instance, are vestigial markings of the transfer of ownership of women from father to husband. In the same way, perhaps the language around genius goes a long way to understanding the cognitive dissonance of a woman genius: if a great male artist is a master, would a woman be a mistress? Almost every citation that I have read for prominent mathematical awards speaks to the "seminal" papers, ideas, and contributions to the field—the American Mathematical Society even awards the prestigious Leroy P. Steele Prize for Seminal Contribution to Research. This is more than a reminder; it is a reflection of the etymological connection of genius to male fertility. Recalling Schopenhauer's reference to great ideas as the "immortal children" of intellectual creation, notice that scholarly fields have "fathers" but never mothers. Indeed, the father of a field does not have an easy counterpart in a mother. We may say Pythagoras is the "father of geometry" or Newton is the "father of modern physics," but to say, for

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[66] Kristeva's is a stipulative definition ("Let us agree…"); she might be said to make the case that her genius *ought* to be the prevailing one, but she seems to make no descriptive claims about how genius is broadly understood.

instance, that Emmy Noether is the "mother of modern algebra" would carry an entirely different social meaning. Maleness is as stamped on the language of intellectual creation as femaleness is on procreation.

If we remain ill-prepared to talk about a hypothetical woman genius, that might very plausibly reflect that we are culturally ill-prepared to receive one.

Over time, there has been a metonymic shift from the ancient notions (a spirit of genius and works of genius) to the modern model (people who embody the spirit)—acted out by *The Fountainhead*'s professor who waves the math project and decrees "This is a great man." Kristeva has articulated the exciting insight that this metonymic move necessarily elevates biographical narrative to a position of key importance. For if genius is not housed in an intellectual product but in fact constitutes a full-fledged identity, then it must pervade the life of the person so designated, and the story of that life must provide some relief from numbing mundanity; it must offer us a model of singularity—with the balming consequence that distictiveness is possible. What I hope to have demonstrated is that biography becomes so malleable in service of the genius ideal that the often-repeated stories tell us far more about our anxieties, uncertainties, and cultural needs than they do about their putative subjects.

This point is illustrated dramatically in Patricia Fara's 2002 book *Newton: The making of genius*— the subtitle refers not to Isaac's childhood nor to any event in his life, but to the processes of retelling and reformulating narratives of Newton in the centuries since his life and death. Fara traces accounts of Newton in biography, portrait, and sculpture, demonstrating that not only the intangible narrative elements but even his physical features shape-shift to conform to the genius ideal contemporary to the description. Newton's now-lofty scientific status owes a great deal to a series of concerted promotional campaigns waged in his name. These took forms from poems to laboratory demonstrations to widely sold medals, and were undertaken for reasons ranging from religious rivalries to British chauvinism to the building of personal fortunes tied in one way or another to aspects of the Newtonian legacy. The body of work that is now understood as Newton's physics bears only a remote resemblance to what he and his contemporaries touted as his main contributions. It seems to me not difficult but essentially impossible to cleanse or extricate his—or anyone's—intellectual contributions from their culture-rich context.

Exposing genius as falling far short of its rumored objectivity and clarity does not compel us to jettison the core intuition. The problem is not being able to extricate instances of genius from the social factors of designation and judgment, and from its legacy of celebrating a solitary masculine heroic ideal.[67]

This analysis has much broader applicability than in noting that the genius ideal is silently sexed, which in itself may be neither surprising nor especially productive. If the argument is successful, it is a lesson in the continuity of cultural effects and a knock on a bulwark of meritocratic pretension. Finally, it is a toehold for a better understanding of access to power, since mathematics is dominated as a contemporary culture by the genius ideal in a thoroughgoing way and its hallmarks of proof, rigor, and quantitative authority are major keys to broader cultural and rhetorical clout.

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[67] Maybe a partial remedy is restoring genius to its adjectival form from its now-dominant identity status. Perhaps this does indeed put Francophones at an advantage relative to Anglophones, since they have and use the word *géniale*.

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