

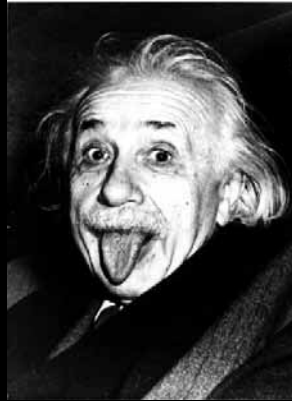
Mathematics and Insanity

Volume 1

Disclaimers

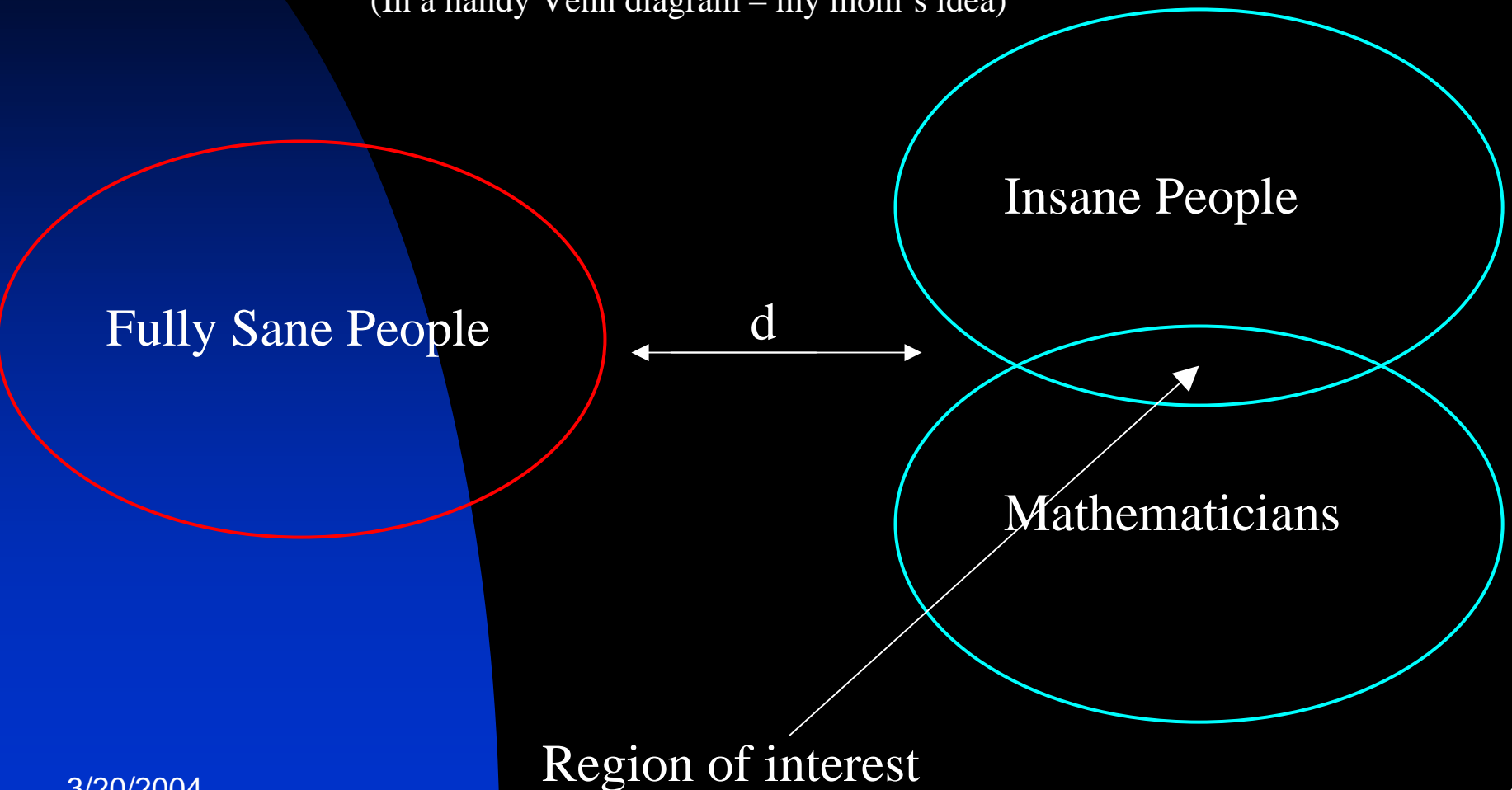
- I am not a psychologist
- This is for entertainment
- Don't be offended if possible – this is meant to be enjoyable
- All images and stories used *without* permission (academic freedom?)
- Please leave weapons at the door

Who will be crazy?



What is known so far

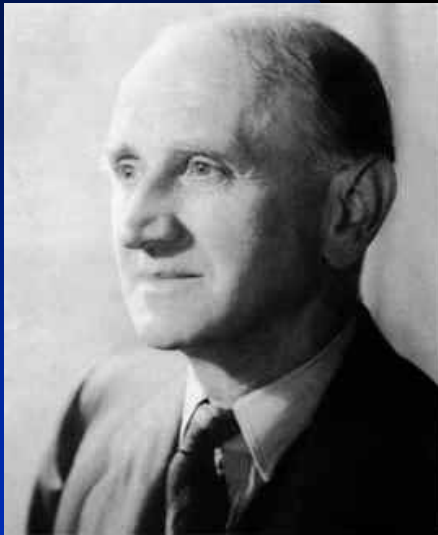
(In a handy Venn diagram – my mom's idea)



Movies and culture

- There have been some recent movies and plays about math and somewhat “different” people
 - ◆ Pi – crazy number hunter...
 - ◆ Good Will Hunting – troubled genius, notes Unabomber better known than other current mathematicians
 - ◆ A Beautiful Mind – the story of John Nash
 - ◆ Soon – A Paul Erdős movie?!
 - ◆ Proof – a play about mental disorder and mathematicians.

Alexander Craig Aitken

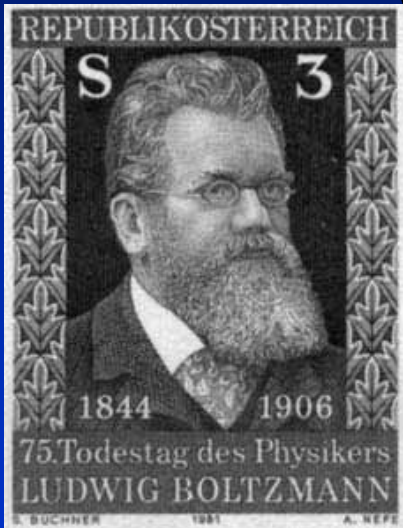


- 1895 - 1967
- Mental prodigy
 - ◆ Knew pi to 200 places
 - ◆ could instantly multiply, divide and take roots of large numbers
- Perfect memory contributed partially to death
 - ◆ horrific memories of the battle of the Somme
 - ◆ His bad memories did not fade



Ludwig Boltzmann

- 1844-1906
- Invented statistical mechanics
 - ◆ Connected properties of atoms with global properties of matter
 - ◆ Could instantly multiply, divide and take roots of large numbers
- Fights with contemporaries depressed him
 - ◆ Attempted suicide around 1895
 - ◆ Committed suicide just prior to experiment verifying his work

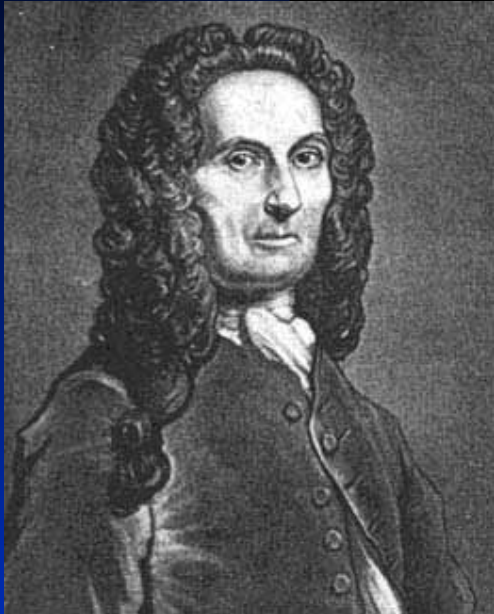


Georg Ferdinand Ludwig Philipp Cantor

- 1845 - 1918
- Studied many types of infinity
 - ◆ Showed there are as many integers as rational numbers
 - ◆ Showed the infinity of real numbers is larger than the infinity of integers
 - ◆ Showed transcendental numbers are uncountable
- Depression starts in 1884
 - ◆ Tried to publish “lacking” papers
 - ◆ Spent later years in sanitariums, died of heart attack



Abraham de Moivre



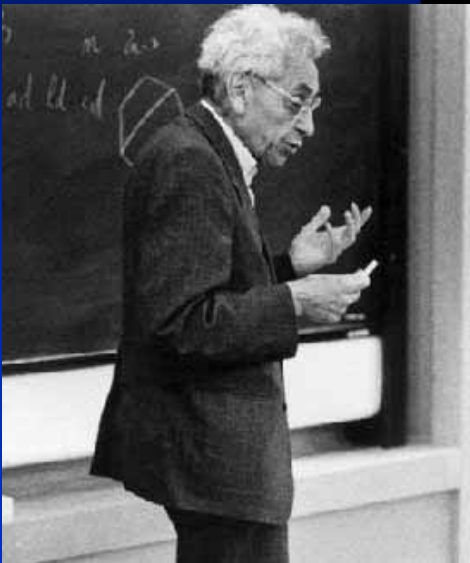
- 1667-1754
- Studied
 - ◆ $(\cos x + i \sin x)^n$
 - ◆ Created Stirling's Formula 1730 which was wrongly attributed to Stirling
 - ◆ Pioneered the development of analytic geometry and the theory of probability
- An odd death...
 - ◆ Famed, like Cardan, for predicting the day of his own death
 - ◆ He was sleeping 15 minutes longer each night and calculated that he would die on the day that he slept for 24 hours. He was right!



Paul Erdős



- 1913 - 1996
- Prolific mathematician!
 - ◆ Second only to Euler
 - ◆ Gave elementary proof of Bertrand conjecture when only 18 (prime between n and $2n$)
 - ◆ Posed and solved problems that were beautiful, simple to understand, but notoriously difficult to solve.
 - ◆ In 1943 Erdős worked at Purdue University.
- There are many stories....
 - ◆ Had funny names for things.
 - ◆ Odd way to get cereal.
 - ◆ Spent his life wandering the globe, taking pills, doing math.





Evariste Galois

- 1811 - 1832
- A brilliant, short life
 - ◆ A teacher writes: *“It is the passion for mathematics which dominates him, I think it would be best for him if his parents would allow him to study nothing but this, he is wasting his time here and does nothing but torment his teachers and overwhelm himself with punishments.”* School reports describe him as *singular, bizarre, original and closed.*
 - ◆ Failed the École Polytechnique entrance examination in 1828 (and again in 1829)!
 - ◆ Founded Galois theory ☺.
 - ◆ Died from a duel with Perscheux d'Herbinville, seemingly over a woman.
 - ◆ It is this which has led to the legend that he spent his last night writing out all he knew about group theory





Kurt Gödel



- 1906-1978
- A landmark in 20th century mathematics
 - ◆ 1931 - Gödel's Incompleteness Theorems
 - ★ Propositions that cannot be proved or disproved within the axioms of a given system.
 - ◆ Implies a computer cannot be programmed to answer *all* mathematical questions.
 - ◆ Friends with Einstein, contributes to relativity.
 - ◆ Story about citizenship....
- Self starvation
 - ◆ Had nervous breakdown, spent several months in institutions.
 - ◆ Became convinced he was being poisoned and, refusing to eat to avoid being poisoned,¹² essentially starved himself to death





Alexander Grothendieck

- 1928 -
- The best mathematician of 20th century?
 - ◆ 1966 Fields medal
 - ◆ Invented or popularized sheaf cohomology, K-theory, schemes, stacks, derived categories, much more....
- Hated military, led to withdrawal
 - ◆ NATO conference....
 - ◆ “Satan changed the speed of light...”
 - ◆ Perhaps writes papers through others sometimes
 - ◆ Has 10,000 pages he vows never to publish



Theodore Kaczynski

aka The Unabomber



- 1942 - ?
- The mathematical years...
 - ◆ Extremely gifted, went to Harvard College at age 16, Ph.D. in mathematics University of Michigan at Ann Arbor, assistant professor at Berkeley from 1967 to 1969.
- The Unabomber years...
 - ◆ First bomb 1978, many more through 1994
 - ◆ 1995 – The Unabomber manifesto,
 - ★ argues that technological progress is undesirable, can and should be stopped, in order to free people from the unnatural demands of technology, so that they can return to a happier, simpler life close to nature





Marius Sophus Lie

- 1842 - 1899
- Many results in mathematics.
 - ◆ Worked in geometry with Klein
 - ◆ Partial differential equations.
 - ◆ Lie groups and algebras.
- Isolation
 - ◆ Work was hard to follow due to poor writing, so many dismissed him, making Lie upset.
 - ◆ Attacked friends, became ostracized.
 - ◆ Suffered “mental difficulties” in 1889.
 - ◆ Klein referred to him using “the close relationship between genius and madness”.

André Bloch

- 1893 - 1948
- Many results in mathematics.
 - ◆ On 17 Nov 1917, at a family meal, he murdered one of his brothers, his uncle and his aunt. He was confined to a psychiatric hospital (Saint-Maurice Hospital) where he worked on a large range of topics, function theory, geometry, number theory, algebraic equations and kinematics.
 - ◆ A model patient, refused to go out saying *Mathematics is enough for me.*
 - ◆ Explained the murders: *It's a matter of mathematical logic. There had been mental illness in my family.*
 - ◆ Corresponded with: Hadamard, Mittag-Leffler, Polya, Henri Cartan.



John Forbes Nash



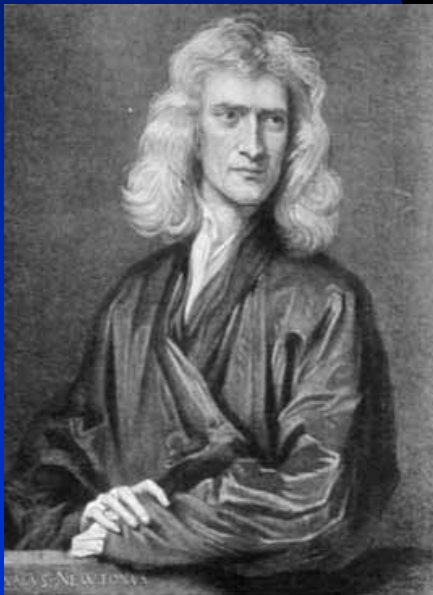
- 1928 -
- Many results in mathematics.
 - ◆ Topology, algebraic geometry, game theory.
 - ◆ Won 1994 economics Nobel Prize
- See the movie “A Beautiful Mind”
 - ◆ Didn't fit in well with others as a youth.
 - ◆ Fellow students tormented him.
 - ◆ In and out of institutions from 1960-1990
 - ◆ Son didn't finish HS or college, got PhD
 - ◆ Read the book for more....



Sir Isaac Newton



- 1643 - 1727
- Perhaps greatest scientist of all time.
 - ◆ Invented calculus, scariest class of all time
 - ◆ Gravity, optics, math, theology, spectrum
 - ◆ First scientist to be knighted for his work
- Odd habits
 - ◆ Shunned others
 - ◆ Poked self in the eye as a light experiment
 - ◆ Upon death, all items owned were maroon
 - ◆ Left no will
 - ◆ Created most of his ideas while feverish with the plague
 - ◆ Flew into irrational tantrums





Sir Isaac Newton II



- Not only stamps, but coins and statues!





Florence Nightingale

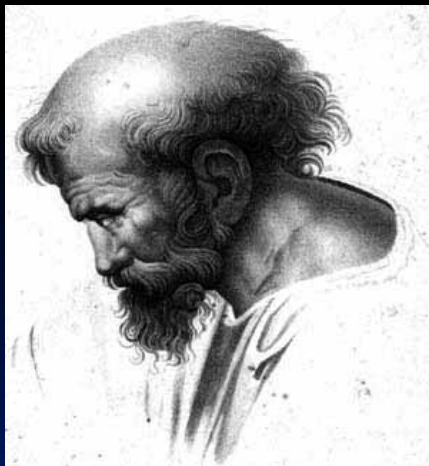
- 1820-1910
- Worked in statistics
 - ◆ Demanded to be taught mathematics, despite parents objections.
 - ◆ Showed soldiers 7 times more likely to die in hospital than on battlefield, led to reform, for which she is most remembered
 - ◆ Published 200 books, reports and pamphlets, even though bedridden much of her life.
- Bipolar?
 - ◆ Likely suffered from bipolar disorder, showing alternating highs and lows
 - ◆ Heard voices, had severe depressive episodes in her teens and early 20's – symptoms consistent with the onset of bipolar disorder.





Emil Leon Post

- 1897 - 1954
- Worked in logic
 - ◆ Seems to have proved Godel's theorems in 1921, unpublished due to fear of reaction.
 - ◆ Showed the word problem for semigroups was recursively insoluble in 1947
- Suffered mental problems entire adult life
 - ◆ Suffered all his adult life from crippling manic-depressive disease, no drug therapy then available.
 - ◆ Died from heart attack after undergoing electric shock treatment at age 57.



Pythagoras of Samos



- 569 BC – 475 BC
- First pure mathematician?
 - ◆ Pythagorean theorem!
 - ◆ Likely students came up with some results attributed to him.
 - ◆ Constructed 3 of the 5 Platonic solids
- Stories...
 - ◆ Drowned student who had proof that the square root of 2 is irrational.
 - ◆ Refusal to eat beans, extreme secrecy, striving for purity
 - ◆ Founded a religious school



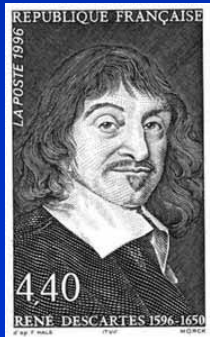
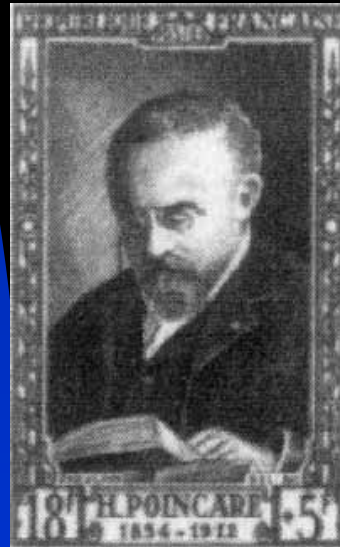
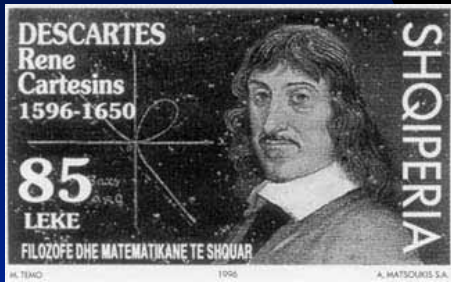


Srinivasa Aiyangar Ramanujan

- 1887 - 1920
- One of India's greatest math geniuses
 - ◆ Found own solution to quartic, failed at quintic, age 16.
 - ◆ Mostly self taught, "discovered" by Hardy in England, brought there
 - ◆ Had only a vague idea of what constitutes proof
 - ◆ Hypergeometric series, many series results.
 - ◆ Partition formula correctly derived.
- Did not take good care of himself...
 - ◆ Died from malnutrition
 - ◆ $1729 = 12^3 + 1^3 = 10^3 + 9^3$ story...

Fame measured in stamps...

- Descartes
- Pascal
- Poincare
- Russell



Conclusion

- “I see crazy people. They are every where. They do not even know they are crazy....” (to paraphrase The Sixth Sense).
- Be tolerant of your math inclined friend, employee, spouse.... They may really be unable to stop those weird habits.....