<https://www.cnn.com/2020/04/14/us/john-conway-death-obit-trnd/index.html>

<https://www.dailyprincetonian.com/article/2020/04/john-conway-dead-covid-19>

those we’ve lost

# John Horton Conway, a ‘Magical Genius’ in Math, Dies at 82

He made profound contributions to number theory, coding theory, probability theory, topology, algebra and more — and created games from it all. He died of the coronavirus.



John Horton Conway in his office at Princeton University in 1993. He “was a magical mathematician,” a colleague said.Credit...Dith Pran/The New York Times

By Siobhan Roberts

This obituary is part of a series about people who have died in the coronavirus pandemic. Read about others [here](https://www.nytimes.com/series/people-who-have-died-of-the-coronavirus).

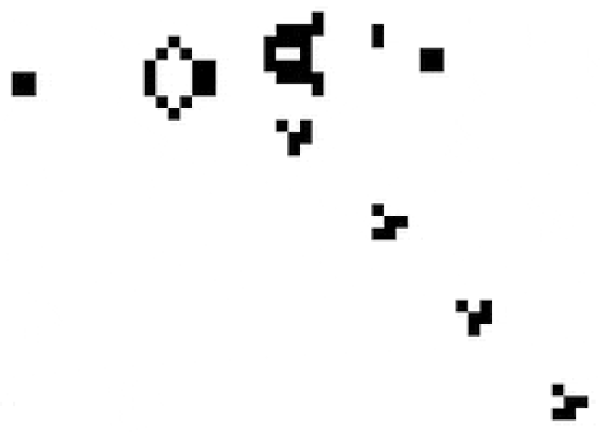
John Horton Conway, the English-born Princeton mathematician whose body of work ranged from the rigorously highbrow to the frivolously fun, earning him prizes and a reputation as a creative, iconoclastic and even magical genius, died on Saturday in New Brunswick, N.J. He was 82.

His wife, Diana Conway, said his death, at a nursing home, was caused by Covid-19.

Dr. Conway’s boundless curiosity produced profound contributions to number theory, game theory, coding theory, group theory, knot theory, topology, probability theory, algebra, analysis, combinatorics and more. Foremost, he considered himself a classical geometer.

“His swath was probably broader than anyone who ever lived,” said the mathematician Neil Sloane, a collaborator with Dr. Conway and the founder of the [On-Line Encyclopedia of Integer Sequences](https://oeis.org/). “I’ve worked with a lot of people, and he was the fastest at solving a problem and would pursue a topic as far as it would go.” (The two were co-authors of 50 papers and published the 706-page book “Sphere Packings, Lattices and Groups.”)

During what Dr. Conway called his “annus mirabilis,” roughly 1969 to 1970, he discovered what’s known as the Conway group, an entity in the realm of mathematical symmetry that inhabits 24-dimensional space. He discovered a new type of number, “surreal numbers.” And he invented the cellular automaton Game of Life, which is among the most beautiful mathematical models of computation. He described it as a “no-player never-ending” game.



A sample of Dr. Conway’s Game of Life.

His friend [Martin Gardner](https://www.nytimes.com/2010/05/24/us/24gardner.html), the longtime mathematical games columnist for Scientific American, called the Game of Life Dr. Conway’s “most famous brainchild.” He reckoned that when it went viral on the internet — with addicts programming it at home and at work — one quarter of the world’s computers were playing it.

“Conway’s LIFE changed mine,” the musician Brian Eno said in an email. “I think Conway himself thought it rather trivial, but for a nonmathematician like me, it was a shock to the intuition, a shattering revelation — to watch glorious complexity emerging from staid simplicity.”

Dr. Conway was proudest of his discovery of surreal numbers. (The Stanford computer scientist Donald Knuth had come up with the name while writing the novelette “Surreal Numbers: How Two Ex-Students Turned on to Pure Mathematics and Found Total Happiness.”)

Described by Mr. Gardner as “an astonishing feat of legerdemain,” the surreals are a super-continuum of numbers, including all the old-fashioned reals ones (integers, fractions and irrationals like pi) as well as those that go above, beyond, below and within, embracing both the infinites and the infinitesimals.

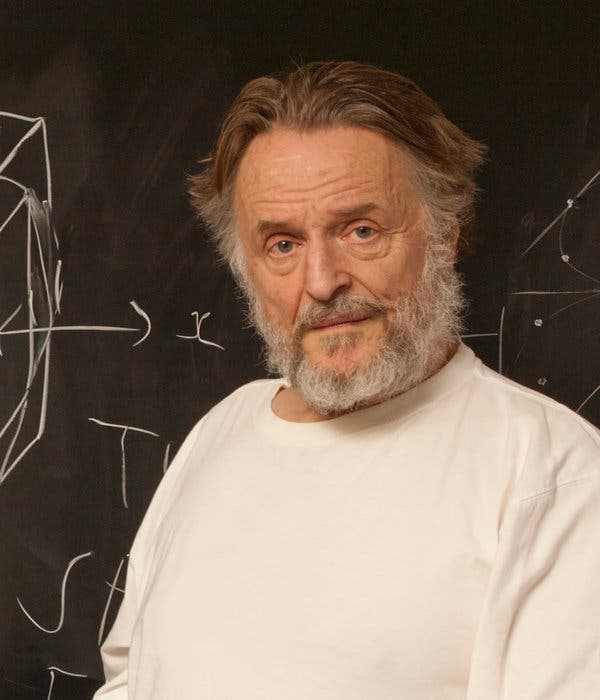
Dr. Conway always hoped that surreal numbers might find practical applications, perhaps in helping to illuminate the universe on the cosmic and quantum scales.

One of Dr. Conway’s favorite accomplishments was the Free Will Theorem, conceptualized casually over the course of a decade with his friend and fellow Princeton mathematician Simon Kochen and first published in 2006 (and later revised).

The theorem, simply put, is this: If physicists have free will while performing experiments, then elementary particles possess free will as well. And this, Dr. Conway and Dr. Kochen reckoned, probably explains why and how humans have free will in the first place.

“In mathematics and physics there are two kinds of geniuses,” Dr. Kochen said by phone from his home in Princeton, echoing something once said about the physicist Richard Feynman. “There are the ordinary geniuses — they are just like you and me but they are better at it; if we’d worked hard enough, maybe we could get some of the same results.

“But then there are the magical geniuses,” he added. “Richard Feynman was a magical genius. And the same always struck me about John — he was a magical mathematician. He was a magical genius rather than an ordinary genius.”



Dr. Conway in 2009. He invented a profusion of games — like Phutball, short for Philosopher’s Football.Credit...Denise Applewhite/Princeton University

John Horton Conway was born on Dec. 26, 1937, in Liverpool, England, the third child and only son of Cyril and Agnes (Boyce) Conway. His father, an autodidact, had left school at age 14 and, with his photographic memory, made a living playing cards. Later he was a technician in the chemistry lab at the Liverpool Institute High School for Boys, setting up experiments for students, among them George Harrison and Paul McCartney.

Dr. Conway’s mother, a great reader, especially of Dickens, had worked from age 11. Family lore has it that she boasted about finding her son at age of 4 reciting the powers of two. At 18, in 1956, John left home for the University of Cambridge, where he earned his Ph.D. His adviser, Harold Davenport, a number theorist, once said that when he would give Dr. Conway a problem to solve, “he would return with a very good solution to another problem.”

As a student, Dr. Conway cultivated his acknowledged lifelong preference for being lazy, playing games and doing no work. He could be easily distracted by what he called “nerdish delights.” He once went on a flexagon binge, courtesy of Mr. Gardner, who described flexagons as “polygons, folded from straight or crooked strips of paper, which have the fascinating property of changing their faces when they are flexed.”

He built a water-powered computer, which he called Winnie (Water Initiated Nonchalantly Numerical Integrating Engine). He read and annotated H.S.M. Coxeter’s edition of W.W. Rouse Ball’s classic work, “Mathematical Recreations and Essays” and wrote Coxeter a lengthy letter that started a lifelong friendship between these two classical geometers.

Hired at Cambridge as an assistant lecturer, Dr. Conway gained a reputation for his high jinks (not to mention his disheveled appearance). Lecturing on symmetry and the Platonic solids, he might bring in a turnip as a prop, carving it one slice at a time into, say, an [icosahedron](https://mathworld.wolfram.com/Icosahedron.html), with its 20 triangular faces, eating the scraps as he went. “He was by far the most charismatic lecturer in the faculty,” his Cambridge colleague [Peter Swinnerton-Dyer](https://www.theguardian.com/science/2019/jan/09/sir-peter-swinnerton-dyer-obituary) once said.

Dr. Conway invented a profusion of games — like Phutball (short for Philosopher’s Football, which is a little like checkers on a Go board) and collected them in the book “Winning Ways for Your Mathematical Plays,” in collaboration with Elywn Berlekamp and Richard Guy.

All the gaming was supported by a loyal following of graduate students, among them Simon Norton, with whom Dr. Conway published the Monstrous Moonshine conjecture, investigating an elusive symmetry group that lives in 196,883 dimensions. (His Ph.D. student Richard Borcherds received the prestigious Fields Medal in 1998 for his proof of the conjecture.)

At the University of Cambridge Dr. Conway rose to become a professor in mathematics as well as a supernumerary fellow at Gonville and Caius College, his alma mater there. He was named a fellow of the Royal Society in 1981.

In 1985, with four co-authors, he published “The ATLAS of Finite Groups,” one of the most important books in group theory.

That same year, he was invited to give a talk at Princeton, and a job offer followed: In 1987, he took up the position of the John von Neumann professor of applied and computational mathematics. In announcing the hire, Princeton’s president called Dr. Conway “one of the most eminent mathematicians of the century.”

At Princeton Dr. Conway, with his mischievous and seductive aura, drew news media attention. Asked by a reporter for The New York Times about his life of the mind, he replied: “What happens most of the time is nothing. You just can’t have ideas often.”

He became a fellow of the American Academy of Arts and Sciences in 1992. A fellow inductee, the mathematician Robert MacPherson, recalled that at the ceremony Dr. Conway accepted his honor in what appeared to be green running shorts.

His first two marriages, to Eileen Howe and Larissa Queen, ended in divorce.

In addition to his wife, he is survived by four daughters from his first marriage, Annie, Ellie and Susie Conway and Rosie Wayman; two sons from his second marriage, Oliver and Alex; a son with Ms. Conway, Gareth; three grandchildren; and six great-grandchildren.

At Princeton he was almost invariably recruited to give the first-year course intended to persuade students to become math majors. And he offered extracurricular content, like a campus tour titled “How to Stare at a Brick Wall.”

He gave over his summers — prime research time — to teaching at math camps. He was a star attraction, despite the fact that his talks were advertised vaguely as “John Conway Hour, NTBA” (Not to Be Announced). He would take topic requests from students and deliver an extemporaneous lecture.

Math, Dr. Conway believed, should be fun. “He often thought that the math we were teaching was too serious,” said Mira Bernstein, a mathematician and a former executive director of Canada/USA Mathcamp, an international summer program for high-school students. “And he didn’t mean that we should be teaching them silly math — to him, fun was deep. But he wanted to make sure that the playfulness was always, always there.”

Dr. Conway persevered in finding the fun through triple bypass surgery, a suicide attempt and a number of strokes. Sometimes he would regale anyone willing to listen on the science of rainbows or on his Doomsday rule for calculating the day of the week for any given date.

And there were ever more games of Phutball, which Dr. Conway was not very good at. Sometimes, when all seemed lost — when he was almost certainly beaten at his own game, though he might yet magically prevail — he’d delight in borrowing from Mark Twain, admonishing his opponents, “Reports of my death have been greatly exaggerated!”

Siobhan Roberts is the author of “Genius at Play: The Curious Mind of John Horton Conway” (2015).

Simon Norton, who has died of a heart attack aged 66, was a world-class mathematician sometimes mistaken for a homeless man.

In the late 1960s he represented Britain at the International Mathematical Olympiads three times, scoring the top grade each time, once with 100%, another time with 99%, and winning a special prize for the elegance of his solutions. What made his work beautiful was not its complexity but its simplicity. Without drafts or false starts, he laid down his pellucid solutions to questions involving imaginary numbers, infinity and the distribution of primes with the grace of a ballerina unfolding her hands.

Simon took his first mathematics degree at Imperial College, London, while still a schoolboy. But then came Cambridge University. Rather than allowing Simon to continue his ebullient race into mathematics and start on a PhD straight away, the Cambridge mathematics department insisted he retake the final year of his degree. For the first time, Simon faltered. Mathematics legend has it that he scored a historic 52 alphas in his finals (12 is all it takes to get a first); in fact, it was 13. Simon was not even the best in his class. Bored at having to repeat material he already knew, the next year he almost failed Part III Mathematics, necessary for anyone wanting to start research.

Simon’s fortunes revived when he started to work with the charismatic John Conway, a brilliant and playful mathematician at the university. Together they worked on the Atlas of Finite Groups. Group theory concerns the study of symmetries. Turn a triangle on its side and it will still look like a triangle: that is a group theory result. At its most complex – in the rarefied landscapes where Simon gambolled – group theory underpins our understanding of the universe.

The job of the atlas was to catalogue all the fundamental types of symmetry: the atoms of the subject. Simon’s attention was caught by one of these “atoms”, known as “the Monster”. You can turn a triangle three times, and it looks the same each time. For the Monster, the equivalent number is 808,017,424,794,512,875,886,459,904,961,710,757,005,754,368,000,000,000.

Simon became the world expert on an unearthly mathematical aspect of this group called Monstrous Moonshine. “I can explain what Monstrous Moonshine is in one sentence,” said Simon. “It is the voice of God.”

Simon was playful in daily life as well as abstract thought. Backgammon and making up anagrams were regular, often riotous pastimes in the faculty common room at Cambridge. Simon was the best at both. His instant solution to “phoneboxes” (shouted out before you can reach the end of this sentence) was remembered for decades: xenophobes. He was known not only for his good looks but for his modesty (a rare trait among mathematicians): what delighted Simon was the clever defeat of a puzzle, never of a person.

One day, during the 15 years it took to write the atlas (which was published in 1985), Conway asked Simon a question. Simon gave the solution immediately, as usual, and Conway began writing the answer down … then stopped. “No,” said Conway, “you’ve got that wrong.” Simon saw that he had, and blushed. “That,” said Conway, “is the beginning of the end.”

It was. Simon continued to publish excellent work and give outstanding talks at mathematics conferences around the world, but his days of eerie brilliance were over. It is impossible to say whether this was because his genius had diminished, or his focus. Never a tidy man, he became increasingly dishevelled. He wore battered clothing and mutton-chop whiskers, and always carried a greasy holdall that Conway suspected contained the solution to Monstrous Moonshine; in fact, it was filled with bus timetables.

The youngest of three brothers, Simon was born in London. His father, Richard Norton, was a remote figure, eager for Victorian respectability, who ran SJ Phillips, the family jewellery business, and dreamed of eating supper with a tail-coated footman behind every chair.

It was Simon’s mother, Elaine (nee Manasseh), who spotted Simon’s mathematical brilliance, when he was one and a half. Instead of flinging toy bricks around the room as his elder brothers had done, Simon sorted them into patterns. When he was three, Elaine arranged for an IQ test: Simon scored 178. He could count to 100 in 2s, 3s, 5s and 10s, read books and spell “fire extinguisher”.

At five, he changed his name to 5, and sent sums to his mother, addressed “My darling 45, I cried when you went out …” All his life, he maintained that his mother embodied “loveliness”, even though he found her criticisms of his messy clothes and bumbling manners difficult. At 10, he sat the Eton entrance test. “What’s that noise?” asked a teacher during the examination. “That is Norton, doing his mathematics paper, singing for joy.” Simon’s answers were beyond words: the examiner wrote simply “!!”

In later years, he owned a house in Cambridge and was famous for his generosity. He was the only landlord in the city to reduce his rent when [Margaret Thatcher](https://www.theguardian.com/politics/2013/apr/08/margaret-thatcher-political-phenomenon-dies) brought in the poll tax. Sometimes he would set potential tenants a mathematics puzzle. One was to replace the letters with the right numbers in the following multiplication: SIMON x P = NORTON. (There are two possible solutions.) I first met him in 1995, when I became one of his tenants, and in 2011 I published a biography of him: [Simon, The Genius in My Basement](https://www.theguardian.com/books/2011/aug/24/genius-in-my-basement-review).

The other love of Simon’s life was public transport. Even as a boy he would rush away to ride around the country on buses and trains. As an adult, he became a vehement campaigner against cars, wrote a regular, remarkably funny newsletter for the Campaign for Better Transport, and donated £10,000 annually to fund a prize for transport activism (he was especially pleased when one of his winners [superglued himself](https://www.theguardian.com/commentisfree/2008/jul/25/gordonbrown.activists) to Gordon Brown). Despite Simon’s collapse into mathematical obscurity, he was a triumphant and inspiring figure: a person unburdened by rancour, jealousy or sense of loss.

He is survived by his brothers, Michael and Francis.

CHECKLIST FOR OBIT ESSENTIALS  
  
A good way to start is by saying – from the very first sentence – what X did, demonstrated or thought in preference to who X was. Rather than telling general readers that X was eminent or distinguished, it will hold their interest better if you relate the main episode in their story – what they actually did that made a useful difference. For writers and academics, for example, bring out the ideas, arguments and insights; for scientists, point to the problems, breakthroughs and applications. General readers should be able to get at least something out of even the most specialist figures.   
  
Readability without slowing up is essential: we're telling a story rather than putting up a monument. There needs to be a simple, clear, direct narrative, based on a succession of concrete facts, with years wherever possible for events, books, films and recordings. By conveying what was distinctive about the core activity and the useful difference that it made for other people, you can leave readers to draw their own conclusions about the worth of the whole, so that it shines through effortlessly and more tellingly.   
  
Reinforcing words intended to make things important often just get in the way: if X won a prize, then nothing's gained by calling it a “prestigious” or “coveted” prize. The piece will be in the paper, and the story makes an impression by just being there.  
  
"who has died aged XX" at some point near the start  
cause of death  
  
Do give the main story or a significant episode of it a good run before the “born in” biography starts. Leave it till a third or even half the way down before you get into that.  
  
born in [where?]  
line on family background (parents' names, including mother's maiden name, and occupations); for female subjects, give the maiden name if it's not already clear from the parents' names  
  
school(s), college/university, what studied, and year of any graduation/professional breakthrough  
  
name of spouse/partner (with year of marriage if readily available)  
surviving family, with numbers of sons/daughters, plus names if possible, not mentioning the fact of any adoption (grandchildren and divorced spouses aren't absolutely necessary, though do include them if you know them; the fact of any previous marriages should be mentioned)  
  
writer's name – your byline  
  
in the tag at the end:  
full name including middle names, occupation,  
date of birth, date of death  
  
Please include any relevant links to online resources at the end of the article.  
  
The piece must be exclusive to the Guardian, and we wouldn't wish to read any substantially similar text elsewhere.  
  
Please file all copy, messages and indeed, if you have them, any pictures – preferably colour, high-resolution and free of any cost or rights considerations – to [obituaries@theguardian.com](mailto:obituaries@theguardian.com)  
  
Unless there are a lot of accents, please just paste and copy your text into the ordinary message section of the email. We don't need them to come as attachments.   
  
Tributes and expressions of sentiment should be minimal – no more than one sentence of either. A couple of honours or awards are quite enough. There is no place for euphemisms or mention of “battling” serious illness.  
  
If you knew the person and think it appropriate, use just their first name after the first mention of the name and surname at the start, and include a first-person reference to indicate your relationship to them. We wouldn't have a writer who was a family member.  
  
For freelance terms and conditions, see our website: [https://www.theguardian.com/info/guardian-news-media-freelance-charter](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.theguardian.com_info_guardian-2Dnews-2Dmedia-2Dfreelance-2Dcharter&d=DwMFaQ&c=YCc5C-dvZ907UAiUS4hsGXc_DmdN2HkjS4jaoLGwtak&r=s8gKF-jUqvLSNJ2jhtLLsg&m=BclhmsdhnvW6jg6o9kCVgJFnvay9qlMIdVWkqvFmIms&s=_LDTigo_7MigdkH90Q6USE8VH9ijv_c-DEP9-zhuMi4&e=)

JHC was one of the most unique mathematicians and human beings who ever lived.

He made extensive contributions to mathematics for half a century, to group theory, coding theory, knot theory, geometry and quadratic forms, as well as two fields he played huge roles in founding: cellular automata (think: The Game of Life) and combinatorial game theory. His proudest contribution was his creation of Surreal Numbers in 1970.

What separated him from other mathematicians whose work was also deep and broad and which extended over many decades was his free-spirited fun-loving and playful approach to everything. He did very serious mathematics, but with a flair and passion that was quite unique. While he was shy as a younger man, for the second half of his life he perfected a disarming casual charm and eccentric persona while delivering one brilliant lecture after another.

Like eccentric itinerant Hungarian mathematician Paul Erdos, who was 20 years his senior, he inspired adoration in undergraduates and post-graduates alike, and his infectious enthusiasm turned on so many generations of young people to the joy of research mathematics.

He had a genius for simplicity and memorable and self-explanatory notation, and also for giving things their right names: think kites and darts (for Penrose tiles) and hop, step, jump, sidle and so on (for Frieze patterns), or orbifolds (for symmetries).

He wrote original and engaging books, he was kind and helpful to anyone who sought his council. Like another sublime communicator, Martin Gardner, with whom John corresponded going back to his undergraduate days in the 1950s in Cambridge, he always shared his toys. Not only did he have a lot of original and fascinating

toys, most of them were of his own invention.

When he visited my campus 25 years ago this month, he spent the first few minutes describing half a dozen talks he could give, then had the students vote on which one they wanted to hear. They were mightily impressed!

After he moved to the USA in the 1980s, he had a great parlour trick involving 100 pennies, which he would perform only once for any given person, and in private, also swearing you to secrecy. I could never figure out how it was done. Somebody told me later what the secret was, and like with the best illusions I wish I've never found out, it broke the magic spell.

In the 1990s he set up his unix email account so that before he could log on, he had to correctly identify the day of the week for 10 randomly chosen dates in history, using his own famous Doomsday Algorithm, and all within 10 seconds. His methods were much streamlined from Lewis Carroll’s 1887. ttps://www.nature.com/articles/035517a0

implified from

At a 1998 talk at the AAAS meeting in Philadelphia, he said something that has always stuck with me: "Geometry is the user interface of mathematics". As somebody whose own education at university was devoid of pictures, and was just starting to rediscover geometry myself, it was very influential for my own teaching and writing.

He had a great sequence of card tricks, based on a rigged deck which he would genuinely shuffle before performing miracle after miracle to the amazement of onlookers. He taught me the set up and for years I'd carry a rigged deck with me to meetings, and when we'd spot each other he'd casually say "Does anybody have a deck of cards? I'd like to show you something interesting" before dazzling everyone with the deck I "just happened to have on me". The sequence was based on a mnemonic of his that went "The Five Tenactious Boys, Nicely Joke To Hated Servant Girls Sick For Absent Kings."

As the years went by, he became a little more self-indulgent and overplayed the absent-minded professor card. On several occasions he forget to show up for his own talks, even major invited ones at national meetings, causing embarrassment for organisers and disappointment for attendees.

Meeting him was always an unpredictable delight, you never knew what you were about to learn. It might be the fact that Fermat pronounced the final "t" in his name, based on where and when he lived.

He was a lovable character with a little rogue element, and he could talk the hind legs off a donkey. Those lucky enough to have spent time in his company are going to miss him greatly.

His first wife went to university at Trinity College Dublin, and he visited

there numerous time in the early 1960s. As we say there,

Ní bheidh a leithéid arís ann (IRISH SAYING)

(roughly: "his like will not be seen again")

As his former PhD student Derek Smith has observed, may be Rest in Play.

“What separated him from other mathematicians whose work was also deep and broad  
  
and which extended over many decades was his free-spirited fun-loving and playful  
  
approach to everything,” Colm Mulcahy, professor of mathematics at Spelman College, said in an e-mail. “He did very serious mathematics, but with a flair and passion that was quite unique.”

In the late 1960s he represented Britain at the International Mathematical Olympiads three times, scoring the top grade each time, once with 100%, another time with 99%, and winning a special prize for the elegance of his solutions. What made his work beautiful was not its complexity but its simplicity. Without drafts or false starts, he laid down his pellucid solutions to questions involving imaginary numbers, infinity and the distribution of primes with the grace of a ballerina unfolding her hands.

Simon took his first mathematics degree at Imperial College, London, while still a schoolboy. But then came Cambridge University. Rather than allowing Simon to continue his ebullient race into mathematics and start on a PhD straight away, the Cambridge mathematics department insisted he retake the final year of his degree. For the first time, Simon faltered. Mathematics legend has it that he scored a historic 52 alphas in his finals (12 is all it takes to get a first); in fact, it was 13. Simon was not even the best in his class. Bored at having to repeat material he already knew, the next year he almost failed Part III Mathematics, necessary for anyone wanting to start research.

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Simon’s fortunes revived when he started to work with the charismatic John Conway, a brilliant and playful mathematician at the university. Together they worked on the Atlas of Finite Groups. Group theory concerns the study of symmetries.

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November 1968, Conway returned to the department and got the standard question: “Had the baby?”

*Yes.*

“Boy or girl?”

*Yes.*

His middle initial or name is used several times here as there is another distinguished mathematician John B Conway.

John Horton Conway, who has died at age 82 in New Brunswick, New Jersey, from COVID-19 complications, was one of the most prolific and charismatic British mathematicians of the 20th century.

John was an iconoclastic academic who held court for over half a century at coffee lounges in mathematics departments worldwide, especially at Trinity College, Cambridge, and, following his 1987 move to the USA, at Princeton University. Trying to name Conway’s most important contributions to mathematics is as pointless as identifying the best three or four songs by fellow Liverpudlians the Beatles: there’s just too much great material to pick from, and no two people will agree on their selections.

John Conway was very active and productive in many branches of mathematics, including group theory, coding theory, knot theory, geometry, number theory, and quadratic forms, as well as in recreational mathematics. His 1970 invention of The Game of Life is seen as a watershed moment in the development of cellular automata, and is still the subject to much study today. John came up with a wealth of whimsical games such as phutball, hackenbush, and sprouts, as well as innovative ways to analise other games. Together with Elwyn Berlekamp and Richard Guy, who predeceased him by a year and a month respectively, he is credited with co-founding the field of combinatorial game theory.

His proudest contribution was another 1970 creation, the Surreal Numbers, a unifying number system that encompassed ordinary numbers as well as those that are infinitely small or large. He was particularly pleased with the Free Will theorem in quantum mechanics from early in the current century, which he formulated with Simon Kochen. In his own words, it says that "if experimenters have free will, then so do elementary particles.”

Occasionally a mathematician will make deep and broad contributions for many decades, but what distinguished John’s work was that he did this with a fun-loving and playful approach to everything. The serious mathematics he did was done with an unorthodox flair, irreverence, and passion that was quite unique.

Like the American writer Martin Gardner (1914-2010, with whom John corresponded extensively going back to his undergraduate days in the 1950s, he always shared his toys, both figuratively and metaphorically. Not only did he have a lot of fascinating toys, most of them were of his own divising.

John Horton Conway was born in Liverpool, to Agnes Boyce and Cyril Horton Conway. His father was chemistry lab technician at the Liverpool Institute High School for Boys, which Paul McCartney and George Harrison attended. John went to Gonville and Caius College, Cambridge, getting his BA (1959) and PhD (1964, under Harold Davenport).

While he was reportedly quite shy as a young man, over time he perfected a disarming, casual charm, and an eccentric Pied Piper persona. He soon earned a reputation for delivering one brilliant lecture after another, and his classes at both Cambridge and Princeton were popular and oversubscribed. Like itinerant Hungarian mathematician PaulErdős (1913-1996)*,* https://www.theguardian.com/commentisfree/2008/may/19/geekplusnerdequals he inspired adoration in undergraduates and post-graduates alike, and his infectious enthusiasm turned on generations of young people to the joy of research mathematics.

John H Conway was elected a Fellow of the Royal Society (1981), was the first recipient of the Pólya Prize (1987) from the London Mathematical Society, was awarded the Nemmers Prize in Mathematics (1998), and received the Leroy P. Steele Prize for Mathematical Exposition (2000). His 21 doctoral students include Fields Medalist Richard Borcherds. https://www.theguardian.com/lifeandstyle/2000/dec/12/healthandwellbeing.health1

In the 1990s his email account was set up so that before he could log on, he had to correctly identify the day of the week for 10 randomly chosen dates in history, using his own so-called Doomsday Algorithm, and all within 10 seconds. His methods were much streamlined from Lewis Carroll’s 1887. ttps://www.nature.com/articles/035517a0

While many of John’s creations were the products of his fertile mind, he also thrived on collaboration. He wrote numerous books with co-authors including Simon Norton <https://www.theguardian.com/education/2019/feb/22/simon-norton-obituary> , Elwyn Berlekamp and Richard Guy (all three of whom have died since 2018), as well as Neil Sloane, Francis Fung, Derek Smith, Chaim Goodman-Strauss and Heili Burgiel.

John had a genius for communication, and was a master of simplicity and stripping things down to their basics. He knew the power of memorable and self-explanatory notation, as well as the value of giving things their right names. It was he who came up with the catchy “kites and darts” ?? for Penrose tiles in the 1970s, and the right-on-the-nail “hop, step, jump, sidle” and related terms for the seven different ways one was walk in one-dimension (*aka* Frieze patterns). He was a regular contributor to Martin Gardner’s Scientific American column going back to his days as an undergraduate. In 1958, he (and ) used algebra to figure out that there were 240 ways to solve the 3 dimensional Soma cube 7-piece puzzle of Piet Hien.

Like his PhD student, friend and collaborator Simon Norton, one of the co-authors of his landmark *Atlas of Finite Groups* (1985), John was occasionally mistaken for a homeless man. This was due to his disdain for the niceties of neatness and formal attire.

He is survived by his wife Diana (nee Cutsogeorge), their son Gareth; four daughters (Annie, Ellie and Susie Conway and Rosie Wayman) from his first marriage to Eileen Howe; and two sons (Oliver and Alex) from his second marriage to Larissa Queen; as well as three grandchildren and six great-grandchildren.

• John Horton Conway, mathematician, born 26 December 1937; died 11 April 2010.