Numberphile Podcast Transcript

Episode: The Legendary John Conway (1937-2020)

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We pay tribute to John Horton Conway - with clips from the man himself, plus contributions from Siobhan Roberts, David Eisenbud, Colm Mulcahy and Tony Padilla.

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[Gentle woodwind music]

John Conway [from clip JC]: The thing is that there can be in mathematics, particularly in number theory, there can be theorems about numbers that are tremendously hard to prove and maybe when you prove them you don't feel you've got any insight as to why they're true. I mean in fact asking why…

although I keep on asking why, I don't understand what it means to ask why, and I don't understand what would count as an answer to that question.

[music continues]

Brady Haran [BH]: That's the voice of John Horton Conway. He died this week at the age of eighty-two. [music continues] He wasn't just one of the great mathematicians of his generation, he was also one of the great characters. I interviewed Conway for a series of Numberphile videos back in 2014, you'll hear a few clips from those videos today. Including a few that weren't used originally. I'm playing them for the first time here. I'll also be speaking to other people about that their thoughts on Conway. First, it's the woman who wrote the book on him, quite literally, Siobhan Roberts was Conway's biographer.

Siobhan Roberts [SR]: So I first met him when I was writing my biography of Coxeter, so that would have been 2003. I tracked him down at a math camp that he was at for a couple of weeks, Conway was at this math camp.

BH: Yep.

SR: So that was 2003, and then… you know, when you first meet Conway and being a writer I kind of knew immediately well… here's a fantastic subject for a book so I think you know, for all intents and purposes that's when I started collecting Conway anecdotes and then when the Coxeter book came out in 2006, then I proposed it to John that I could write his biography and initially he said no, but then when he suffered his first stroke he sort of, you know, felt his own mortality and soon after that he reconsidered. So I guess I started in earnest in maybe in 2007, and then the book came out in 2015. So all and all I've been kind of on his trail for, you know, I was on his trail for more than ten years, which is a long time. So everyday I would walk across town and go and sit with Conway in his alcove at Fine Hall in the Math Department.

BH: Yeah.

SR: And yeah, there were countless, countless visits and he was supremely generous with his time. He was at once a biographer's dream come true and worst nightmare because he just loves talking so much. But he is a great storyteller so, you know, it was this wonderful treasure of information, but, you know, there were pros and cons and you know, he was kind of as I came to discover in the fact checking process when I would, at the end, go back and wanna nail down certain details, you know he seemed almost congenitally incapable of answering a yes or no question.

BH: [laughs]

SR: So I would have some, you know, very specific question, you know, yes or no, and he would be like, well have I ever told you the story of how I came to discover Surreal Numbers?

BH: [laughs]

SR: And I'm like, yes John I've already heard that story a number of times.

BH: I did only meet him once, even from that one meeting I can tell he would be a really hard guy to pin down. I imagine at times he would have treated you like a [sighs] like a… he was a cat with a mouse and would enjoy messing with you.

SR: Yeah! I mean, he did like to sort of string people along and there were a couple times where he told me stories that turned out not to be true.

BH: [laughs]

SR: You know, so there were some counterfactuals and some misdirection

there and…

BH: Yeah?

SR: You know I'd have to triangulate a truth if not the truth.

BH: [laughs]

SR: It was fun, but it could be infuriating.

David Eisenbud [DE]: He was a giant in a lot of different ways. He did very important central mathematics. He did any amount of recreational mathematics. He was also a stunt man in various respects. Quite a remarkable character.

BH: David Eisenbud's Director of the Mathematical Sciences Research Institute in Berkeley, California.

DE: Oh, he attracted plenty of attention. That was, you know, he famously that when he went to Cambridge for university he decided to transfer from being an introvert to an extrovert. But his notion of being extrovert was to do stunts. So you know, he could roll his tongue in more ways that you're supposed to be able to do.

BH: [laughs]

DE: Or he could calculate the day of the week of a given date very, you know, within two seconds. He loved that kind of thing and was extremely good at it too. I mean very talented person in a lot of different ways. But he wanted to stand out and that was how he had figured out to do so, I think.

[gentle violin music]

BH: Why did you become a mathematician? Why didn't you become a runner, or a brick layer?

JC: Yeah I became a mathematician in some sense before the age of four. So… doesn't that excuse me from answering the question, why? You know it's more than seventy years ago. I did go through a period when I was at high school in England of possibly being more of a scientist, of a physicist or something, but mathematics always seemed to be it somehow. Here's the answer really. There are some things, I call them parochial, or let's say parochial really means depending on where you live. You know I live in the parish of somewhere, I'm going back to you know the 16th or 17th century, you know. I live in the Parish of So-and-so, and there parochial matters are just relevant to people who live in this particular little district, you know? And I'm not really terribly interested in parochial things. They're just local and if you move to another parish in the same county, they're not… you know, you have a different set of values and so on. In a larger sense, if I'm interested in a sort of British history, well, American history is different, and so British history is parochial and so is American history, you know, and then you can go up to World history and geography, they're still parochial, and when finally we meet some people, I'll call them Martians, but they're not really Martians. They would be educated in a totally different way and maybe discovered fantastically interesting things. Then what they're saying is less parochial, but mathematics I suspect that these people I'm calling Martians, perhaps Aliens would be a better name, would still be interested in mathematics. And so it was the most non-parochial subject, I used to think like that at the age of fourteen maybe? That was my reason for really concentrating on mathematics I suppose. At least that was my rationalization of why I thought about mathematics. And in a way it still is, you know, am I interested in history of the Ottoman Empire? Well, there's possibly a good reason to be interested in it if I'm Turkish, which I'm not, you know, or if I'm Greek because Greek was subjected to Ottoman rule. Now I'm not… well I actually am interested, I like to think, in everything, but I'm less interested than in the things which will be of interest to the Aliens when they come to visit us.

BH: Someone who's dying in the street of starvation doesn't care about the symmetry of objects in twenty-four dimensional space.

JC: True.

BH: Like that… nothing matters less.

JC: I agree. Listen I'm not going to go up that person kneel down and try and interest him in twenty-four dimensional space, you know. I might very well try and produce some food or some warmth or some lodging and so on. I'm not entirely without human feeling. Although I think human feelings are parochial. [laughs]

[violin music]

SR: And I came to be very fond of him. Which is kind of a funny thing as a journalist, you know, you're supposed to keep your distance from your subject but since I did spend so much time with him you know I did find him to be a very endearing fellow, you know?

BH: Yeah.

SR: He was a vulnerable soul in a lot of ways.

BH: Yeah.

SR: But at once, you know, an egomaniac. As he used to say, you know, modesty is my only vice, if I weren't so modest I'd be perfect.

BH: [chuckles]

SR: And yeah he just had this, you know, obviously this massive curiosity, I think. He would write Martin Gardener letters in the sixties and seventies telling him about all his… you know, games and things that he was inventing and what he was thinking about and… one time Martin wrote back and, you know, commented on the kaleidoscopic profusion of ideas that Conway had sent him. So he was just, you know, he had this treasure trove of things going on his brain and it was such a joy to sort of try and tap that and understand it even. In a very superficial way as far as I was concerned I think.

[gentle piano music]

Colm Mulcahy [CM]: Well it was rather different from the average mathematician.

BH: Colm Mulcahy is a mathematician at Spelman College. He's also Vice President of the Gathering for Gardener.

CM: He didn't have airs or graces. He wasn't particularly impressed by credentials. He was interested in ideas.

BH: Hmm.

CM: He would talk to anybody on the street. And in fact he was one of those people whom people sometimes thought was a man on the street. [laughs]

BH: [laughs] Yeah.

CM: He could be mistaken for a hobo in later life because, you know, he didn't wear a suit, or comb his hair very often. But he just was an infectious man with a tremendous passion and effectiveness for communicating and getting people interested in mathematics. So you know, I mean anybody who ever went to talk would never forget it and I had the good fortune to see him probably a

dozen times in the last twenty or thirty years and just amazing, amazing guy.

SR: I think he really valued simplicity. You know, mathematicians talk about elegance and beauty and simplicity and so he really did always want the simplest, clearest, explanation whether it be in words or in a theorem, you know, that was another funny thing about writing the book. He was… he read parts of it towards the end and so he was constantly, you know, questioning my word choice.

BH: Yeah?

SR: So I think he just had, you know, he just had really fine taste in all things intellectual in sort of that quest for knowledge and wanting to know how things work and how the world works and just trying to find these little moments that spark your brain and then get to the bottom of things.

BH: So what was John Conway like in person, then? If you would have a coffee with him or when he wasn't like you know, playing the room?

DE: He was never not playing the room. [chuckles]

BH: Right? [chuckles]

DE: He was born performer and it was absolutely charming to be with him, I mean if you like that kind of thing and I do, he, you know, was a laugh a minute. It was kind of a new trick, a new thing that he did or told you or could do, all the time. Let's see, when we invited him to come and give a talk, you know, we have these Museion dinners, rather formal dinners, fancy catering. This particular one was at Will Hearst's offices in a high rise building in San Francisco, and, we had nice cocktails and there was music and then we went down to hear Conway talk. And Conway had come wearing a tie, which was extremely unusual for Conway, and but he saw that Will Hearst was not wearing a tie. I of course I was wearing

a tie, but Will Hearst was not wearing a tie and so as he began his talk he commented on this and said since Will was not wearing a tie, he wasn't going to either and but that wasn't... you know that's not enough for Conway. So, he took off his tie, while he was standing at the podium, and threw it on the floor and jumped up and down on it. So...

BH: Yeah?

DE: That was the sort of way Conway would do things.

CM: He had a card trick which was his own extension of a classic principal and he did it with a rigged deck. So he would set up the entire deck but the deck could be shuffled once. Could be given one so-called Gilbreath shuffle where you deal off some into a pile thereby reversing their order. So he had a set up where he could set up the deck, take it out, and do a few false shuffles and then do this genuine shuffle and convince people the deck was very randomized and then he would do trick after trick. He had a little sequence with his own kind of, you know, his own slant on it. And it was very entertaining. So having seen him do it a few times I begged him to tell me what was going on, 'cause I was starting to get interested in card tricks myself. This would have been the late nineties, I guess, and he did actually give me the inside secret and like all inside secrets once you hear it you go, oh is that all there is to it? But of course when you don't know that it's quite an impressive trick. But the fun part was I would then... when I would meet him at conferences I'd always have a deck ready, in the Conway order.

BH: Yeah.

CM: And I would give it to, you know, he would spot me and once he understood he would say to somebody, oh does anybody have a deck of cards by any chance?

BH: [laughs]

CM: And I say, oh I have one here John, I think.

BH: Yeah.

CM: Oh Thank you very much! and he'd take him from [laughs] and off he'd go 'cause he knew I had set it up in the right order.

BH: Physicist Tony Padilla's a regular on Numberphile and like John Conway was born in Liverpool and went on to study at Cambridge.

Tony Padilla [TP]: He's a bit of inspiration really because, of course, you know he's a mathematician, one of the world's greatest mathematicians, and he just happens to come from the same city as me. You know, so he's the boy from Liverpool who went onto be one of the world's greatest mathematicians and it's natural that for me that makes him an inspiration. It also made… always made me feel a little bit inadequate to be honest.

BH: [chuckles]

TP: You know, you think you come from the same place, you think maybe you got the same similar starts in life, even though he was obviously quite older than me. And he just gone on to do sort of things that I could only dream of. He's kind of like lived the, you know, like come from Liverpool, come to Cambridge, and then he's just done everything that I've tried to do with my career but he's just done it so much better. [laughs]

BH: [laughs] Do Scousers know who he is? Like is he identified as a famous Scouser?

TP: No, I don't think so. So were talkin' about, you know, one of the world's

greatest mathematicians here and he comes from our city, we're not just talking about some ordinary mathematician, we're talking about an absolute great here.

BH: Yeah.

TP: And I think, you know, we should be super proud of him, the way that were proud of our musicians and our footballers.

BH: Have you ever dipped into his actual mathematics, or is not really something that has crossed your path?

TP: So obviously the whole Monstrous Moonshine thing is of course related to string theory, so that's something where you know you hear the name crop up, but I'll tell you where I've really started to, you know, come across it more and more. And obviously we make a lot of videos, Brady, on big numbers and I think Conway, his name crops up again and again, and when I'm sort of doing a bit of digging on these sorts of things, you know, the Arrow Notation, Conway Arrow Notation, for example, that's something we haven't really discussed but I keep seeing and thinking oh maybe that's something that we should do a bit more on. I don't know if you've actually discussed it with him. But, you know, it's just seeing his name keeps cropping up in that area. And I was also, you know, reading some stuff up about symmetries and what not and then about his magic theorems so you just… I think a lot in the recreational side of maths is where I would sort of perhaps see more of him, and you know it's doing the things that we do together.

BH: You obviously spend loads of time with lots of mathematicians, do you have any idea what it was about him that made him different to the others?

SR: Well, I think he wasn't interested in what was fashionable. So he really did go his own way, he wasn't governed by, you know, kind of ordinary propriety and so that gave him a certain freedom maybe in his… I call it his promiscuity of

curiosity. He really at some point, you know, he had this period in his life where he was quite down and wasn't happy with how he was progressing as a mathematician and he had his annus mirabalis when he invented the Game of Life and discovered surreal numbers and his Conway Constellation of Groups and then after that he really decided not to worry what anybody else thought, and would just pursue whatever interested him and go his own way. And I think that's somewhat unique.

[gentle piano music]

JC: I have never really been worried about whether something was trivial or not. Well, no, that's not true, I was worried. You know, in my early twenties let's say, people always thought I would, you know, be a great mathematician and be good at various things and so on. And in my late twenties I hadn't achieved any of the things that people were predicting. And so I call it my Black Period, I started to wonder, you know, whether it was all nonsense. Whether I was not a good mathematician after all and so on. And then I made a certain discovery, and was shot into international prominence as a mathematician. When you become a prominent mathematician in that sense it doesn't mean that many people know your name, it means that many mathematicians know your name. And there aren't many mathematicians in the world anyway, you know, so, it doesn't count very much, but it suddenly released me from feeling that I had to live up to my promise. I had lived up to my promise. I remember I was lecturing on in various mathematical capitals. I lectured in Paris, in Goetheanum, and then flew to New York, gave a twenty minute talk and flew back again, that's all in the space of about two weeks. And I was in the mathematical jet-set for a time. And that stopped me from worrying as to whether I was good enough. I sort of made a vow to myself, it was so nice not worrying anymore, that I thought, I'm not going to worry anymore, ever again. I was going to study whatever I thought was interesting, and not worry whether this was serious enough. Most of the time I've kept to that vow.

BH: And what has that resulted in for you? What has that made you better or more successful or just happier? What's the result of taking that attitude?

JC: Well, it made me happier. Yes, it made me happier is the only one of those different things. You know I sit in a corridor in the mathematics department in Princeton and I think about things. I imagine that the young graduate students there think oh this guy's a looney, he did something good once, and I don't care. I really don't care. I've been released from worrying about what other people think about me and in a way he did do something interesting once. [chuckles] You know, if I may say that. As far as I'm concerned I'm doing something interesting right now. I don't mean talking to you, I'm sorry, that's really boring, [laughs] forgive me for saying that, but no I find some problem, I try and solve, and I don't care whether it's a problem that will advance my reputation or not. I mean I really don't.

BH: Do you care about…

JC: I've been freed.

BH: …advancing knowledge, advancing mathematics?

JC: Yes, I suppose I do, but less than I did before, because you know I'm pretty old now, and I so if I advance mathematics and I'm not around to see the result of that advancement… then what do I care? I dunno… I don't like thinking of my impending death. You know… I haven't got all that many years left, I don't quite know how many. But I do still like doing mathematical things, so I do.

[gentle violin music[

DE: He was phenomenally fast. He could make calculations in his head very accurately and very quickly. You know, he had this system for telling the day of the week on which a given date had fallen. So you would say the 9th of March

1564. And he would tell instantly the day of the week. And he was right, I mean he had a whole system for doing this. He practiced incessantly, his computer wouldn't let him log on until he had solved one of these puzzles.

CM: Well I asked him about checking his email, and this was in the mid nineties, he was already up to speed on email, but he said to me, you know, I can't get in it takes me so long and I said what do you mean? And he said well I make myself identify the day of the week for ten random days of the week. I've programmed the computer to throw at me ten random days of the year, in history. So it might say the 4th of July 1827, and I have to type in a three if it's Tuesday or whatever.

BH: Yeah.

CM: Instantly. And I have to ten of these. And I said how long does it take you, and he said oh I'm very slow these days, it's very embarrassing, it takes me about eight or nine seconds. [laughs]

BH: [chuckles] Right.

CM: To do ten of them in a row and the computer would lock him out if he didn't do it with in ten seconds flat.

SR: You know at Cambridge there was the John Horton Conway Appreciation Society? I think his students were always agog with him, you know, he would come in seeming to not know what he was doing and totally confused and disorganized and then either by the end of the lecture he would have pulled some rabbit out of a hat or by the end of the term they would come to see that he, you know, had this sort of brilliant thread going all the way through.

BH: Yeah.

SR: So he was, and he was a sort of showman, on various levels in that way. Like he really did sort of seem to be pulling at the strings and he had a grander idea in mind so…

CM: Well the first thing is… it was nice when he actually showed up. [laughs]

BH: [laughs]

CM: And there were times that a couple of rather important national talks in the US where he forgot to show up…

BH: [laughs]

CM: …in his later years and that was embarrassing, you know, if you have four hundred people in a room to see the great John Conway and he's not there and nobody even remembers having seen him at the meeting…

BH: [laughs]

CM: …and it turns out that he'd forgotten to show up or had forgotten his plane ticket or whatever, that was not good. But on the occasions when he showed up, which was most of the time in fairness…

BH: Yeah.

CM: He was very unconventional. For instance he came and talked to my students about twenty-five years ago and I couldn't get him pinned down on what the topic was going to be, which had me a little worried, but he said don't worry, I've got various things I can speak about. So he walked into the room and he wrote up on the board about eight or nine topics and he described them briefly and said to the students, which of these would you like to hear a talk on? And they were just flabbergasted because that's not the way most of us, you

know, you have to lecture, prepare very carefully and get your slides or your thoughts organized, and they voted.

BH: Yeah?

CM: And… democracy won and he launched forth with great passion on one of them. And in fact one of the talks he, he gave a few talks, one was on, can you hear the shape of a drum, which he gave to an applied mathematics class, which was supposed to last for fifty minutes and he went on for I think a little over two hours.

BH: Yeah?

CM: And it happened that there was another class afterwards so he didn't leave the room and the students didn't want to leave, they were just fascinated because he brought them into this deep result that people had proven a few years earlier and he had simplified the proof. That was one of his geniuses was for simplifying things. Streamlining, making it seem obvious in hindsight. So he did it in such a way that these undergraduate students were with him all the way, and I just kept looking at my watch thinking, they're gonna bolt any minute but they didn't, and they talked about him til they graduated. They still remember that visit.

SR: He had an office, I think, at one point he had two offices, which just got overrun with stuff, like models and papers and books and so forth, at one point his son Gareth strung hazard tape around his office.

BH: [chuckles]

SR: Because it was just such a tip.

BH: Yeah.

SR: And so I think partly it was, it just became slightly uninhabitable so he would park himself in the common room. So there were windows lining the hallway and there were these nooks sort of, one nook per window and there were two armchairs and chalkboard. So along one wall there was two armchairs facing a chalkboard on the other wall. So he'd sort of would always be in one of these alcoves and you know even in Cambridge he would spend a lot of time in the common rooms so I think it must have been his just preferred modus operandi to sort of be out there and have people coming by him and talking.

BH: I didn't get the impression he was a super tidy man.

SR: No. No. I mean in the alcove there was his… under his, I think probably under a couple of different armchairs in various alcoves he would stuff papers under the seat cushion. [laughs]

BH: [laughs]

SR: So that's where he kept all his notes.

BH: Yeah?

SR: And then he would stash chalk in the radiators beside the windows so he always knew where some chalk was. So you know he…

BH: [laughs]

SR: …he created a little ecosystem [chuckles] for himself.

CM: His work was extremely deep and broad and extended over many decades but was marked by this free spirited fun loving and playful approach to everything, which distinguished him from, you know, some other big shots, who

also did various serious mathematics. He had a flare and a passion which is unique, but he did contribute to group theory, coding theory, knot theory, geometry, quadratic forms and two fields that he largely founded or played significant roles in founding, that'll be cellular automata, think the Game of Life, his most famous creation, and combinatorial game theory, and sadly within a year and a few days we lost the three creator of combinatorial game theory. Elwyn Berlekamp, a year ago, Richard Guy, about a month ago, and now John a few days ago, so you know it's very much the passing of an era.

DE: He and Elwin were not friends at the end I'm afraid. But their disagreement which was passionate, was the kind that only mathematicians could possibly have.

BH: Yeah?

DE: Namely, Conway thought that infinite games were important too, and Elwyn only thought that finite games were important. And this they locked horns over this. And I think in some way it stopped progress for a while on their big book, and at one point Elwyn threatened to sue Conway, for non-delivery of the manuscript so to speak. It never came to that.

SR: Well I guess I, you know, simply came to see him as just being human. I can remember one of the first times I visited him, I was staying with John and his wife Diana at their house and I remember being horrified that he was eating Jell-O Pops…

BH: [laughs]

SR: Of some kind, I'm like, oh my god he's a genius and he's eating Jell-O Pops, like this can't be right, he must have, you know, some more sophisticated snack, which was you know, silly but…

BH: Yeah.

SR: You know, just realizing that yeah he's just a guy and he likes Jell-O Pops.

BH: [laughs]

SR: And in the end you know he has his foibles, he's definitely not perfect, in the book I say, you know, he's a sweetheart and an asshole and he was fine with me saying that. So yeah I just, you know, I just got to know him on a more granular level if you will and, you know, cameo like him all the more really.

BH: When you say he was a bit of an asshole…

SR: I think it probably ran the spectrum. You know he had his moods, he could be a little, you know, there was maybe although he was often insecure and self deprecating he could also be kind of hoity-toity and, you know, maybe he didn't give everybody the attention they deserved whether it's, you know, an interested student here and there or his family in his life, you know he was just…

BH: Yeah.

SR: He could be an asshole like anybody else can be an asshole.

CM: He was once asked, possibly in an interview in a student magazine, in recent years, how he made progress on stuff and how he attacked difficult problems and one of the things he said which actually resonated with me and I've kind of tried to take it on board, is he said he never worked on a single problem at a time, he always had you know five or six different pots simmering away.

BH: Hmm.

CM: And if he got stuck on one he would switch gears and try another and then he might be on the fourth one and he'd suddenly realize something from the second problem might help him or be relevant. So he said don't be too narrow in your focus, you know, have broad interests even within your discipline and be pursuing different theorems or lines of engagement or whatever.

BH: Yeah.

CM: And they might… there might be some synergy between them and he's a classic example of that. A lot of people have very narrow focuses, I think, in research and you know it works for some people and it may be the only thing that works for most of us, but when your mind is as original and effective as his was, and I can't begin to fathom how he functioned.

BH: Yeah?

CM: He made good use of, you know, multi-tasking and working on five different theorems at the same time.

BH: What was his crowning achievement in his mind, do you think?

SR: He was definitely proudest of the Surreal Numbers.

BH: Yeah?

SR: Yeah. He really thought that was his greatest achievement and I think he had hoped to sort of see them take on another life, or find their way and anybody I spoke to said they will eventually, you know, whether its in physics or in another field. Yeah he was definitely proudest of the Surreal Numbers. I think he also was still really curious about the Monster Group and he wished that he understood why the Monster Group existed, and that he was something he was

after. He wanted to understand why before he died and he would say you know I fear I'm not gonna understand.

BH: Do you feel like he was happy with where he was towards the end, like, was he satisfied?

SR: I think he was reasonably satisfied. I mean I think just the nature of who he was always wanting to understand things and be curious he was still wanting to do that and I think at the end it was increasingly difficult and that frustrated him definitely.

BH: Yeah.

SR: You know, his brain was not working the way it used to and the way he wanted it to. I think that pained him, but all in all, you know, I visited him in January and he still had his sense of humor and he was still, you know… making plays on words and… talking about, you know, the Game of Life, and he came to love Life again, which was nice to see that he came around to love the Game of Life after hating it for so long. [chuckles]

BH: He made his peace with it did he? [chuckles]

SR: I think he did, yes, finally.

[gentle violin music]

JC: I felt like whenever, you know, my name was mentioned in respect of some mathematics, it was always the Game of Life. And I don't think the Game of Life was very very interesting. Don't think it was worth all that, I've done lots of other mathematical things. So I found the Game of Life was sort of overshadowing much more important things and I did not like it. Now… well, I'm getting old. My capacity for hatred is getting less, I suppose, [chuckles] and it

was an achievement and I'm quite proud of it. I just want… don't want to talk about it all the time. [laughs]

BH: [laughs] I'm sorry! [laughs]

JC: That's alright.

BH: Do you ever feel frustration that you won't see where things are going to be in fifty years or the next breakthrough. Do you worry about the things you'll miss?

[pause]

JC: No I don't think I do. I mean… you see how serious has things have happened. You know, when I was a kid, I mean a sort of late teenager and learnt about all these unsolved problems, it really did seem there were about four of them, there was the Four Color Map Theorem, there's Fermat's Last Theorem, the Riemann Hypothesis, the Continuum Hypothesis, okay, and they had all lasted at least a hundred years, and it looked as though they were going to last another few hundred years. [chuckles] you know, then they've mostly been solved in some sense. Continuum Hypothesis, solved in a way. Four Color Map Theorem, definitely solved. The Riemann Hypothesis, still unsolved. I've forgotten what the fourth one was…

BH: Fermat's Theorem.

JC: Fermat's solved, yes of course. So three out of the four were solved or shall we say two and a half out of the four because the solution of Continuum Hypothesis is a bit different from the others. But there're very definite sense in which it is solved. And that may be the only sense in which one can live with it so to speak. But they had all lasted at least a hundred years. Now when something lasts a hundred years you're unlikely to be in it at the beginning and

at the end of it [laughs] that demands that you're at least a hundred and say seventeen years old provided you're pretty bright at the age of seventeen, so essentially nobody is in at the beginning and the end, and so we're accustomed really in mathematics to have these problems that you don't expect to see solved in your lifetime. There's nothing you can do about that, I mean, you can wail and moan and say, you know, something, I've heard people say that if they are granted the thing to come back in a few hundred years, you know, what's the first question you'd ask? Some of them say has the so and so problem been solved, you know. But really… there's nothing you can do. You can try desperately to solve it but if it hasn't been solved for a hundred years you probably aren't going to. You know, it's only given to one person so to speak to solve a particular one of these problems. So we're used to it. And here's an atmosphere of resignation, you know, there's also a thing that we don't really know quite often, whether a problem can be solved, okay? That's that. I mean…

BH: I have to ask you then if you were to… if you come back in a few hundred years and get one question, what's your question then?

[pause]

JC: Yeah interesting. [pause] I… this is not original, I mean, I'd like to know whether the Reiman Hypothesis has been solved and so on and perhaps a few more technical details about it.

BH: Do you have unfinished business, or are you…?

JC: I don't know that I have… I mean I have unfinished business in a way, things I'd like to do. But I'm not gonna do 'em. I'm not gonna solve 'em. There's one thing I would really like to know. Yes, there is perhaps if I hark back to the question you asked a little bit ago, there's a thing called the Monster Group, which is a beautiful very large symmetrical thing [laughs] and I would just like to know what it's all about. You know, why it's there. I've often said, I've said for

twenty or thirty years, that the one thing I'd really like to know before I'd die is why the Monster Group exists? I'm resigned now to not learning it before. I might just… every now and then I've taken it out, so to speak, thought about it for a time, it's about every five years but usually when I've taken it out, dusted it and thought about it for a time, I've made some progress, but I don't think I will learn what it's all about before I die.

[gentle piano music]

CM: Well he did leave us a great body of work, I mean, the Big Group Atlas and you know, Game of Life, which people are still playing, and many other things. Sphere packing and so on, but he… I think, you know, his originality, his original approach and spirit, I mean there's very few people in the last fifty years, I can only think of one or two who developed a following, if you like, like almost a rock star like following, the way he did. I mean the other obvious one would be the Hungarian inerrant mathematician Paul Erdös who was about twenty years ahead of him. Erdös travelled the world and met people, and Conway did that too, in a different sense, but he did, you know, what twenty-five years in Britain, his home country, another twenty-five or thirty in the States, he covered a lot of ground and met a lot of people and made a lot of friends and had a heck of an influence.

DE: Erdös was a real character, a special special person. Conway was a real character. I don't think I know anybody in that category who's alive today. [pensive music fades in] He certainly added color to the scene anywhere he was, in his shaggy way.

[pensive music continues]

BH: That's all from us today, I'll be putting plenty of links into today's show notes, including Siobhan's excellent biography of Conway, it's called Genius at Play, and also there among the links I'll put all the videos we did with John

Conway, including of course a couple about the Game of Life. There's also a lot of stuff there about the Monster Group and our Look and Say sequence that was a lot of fun too. [music continues] I'm Brady Haran, and you've been listening to the Numberphile podcast. You can find out more about all our podcasts and videos at Numberphile.com.

[music slowly fades out]