

Interview with Dr Nira Chamberlain CMath CSci FIMA

Nira Chamberlain is the IMA President for 2020–2021. He is a mathematical modeller currently working for SNC Lavalin Atkins. Nira joined the IMA in 1997 and he attended the first Younger (now Early Career) Mathematicians' Group Conference back in 2004. He is now the first ECM/Younger Mathematician to go on to become President of the IMA!



Congratulations on being chosen as IMA President. What are your plans for your term?

Well, every President has a theme and mine is going to be embracing a stronger mathematical identity. Everybody knows what Brexit is and there's a new term I want to put out there and it's 'Mexit'. 'Mexit' is when a mathematician has made up their mind that they're no longer a mathematician. So, what I want to talk about is encouraging mathematicians to embrace a stronger mathematical identity.

One of the challenges after a mathematics degree is that you get called all these different titles. Maybe you're a data scientist, a financier or a project manager. I want mathematicians to go out and say, 'Whatever I do, whatever I become, I am still a mathematician', and they can see that the IMA is their natural home.

We need people to want to be proud of mathematics and see the value of it. We need to get to the stage where we can all stand up and say, 'I know the unique selling point of mathematics, I know what mathematics can do beyond computer science, statistics and engineering. This is the value of mathematics. This is what mathematics can add to the economy. This is why mathematics is compulsory. This is why I'm a mathematician'.

As a community, we have to retain our mathematicians and recognise that when we sell mathematics, it's to non-mathematicians. Non-mathematicians fund mathematical research and mathematical projects in industry. Now, if we are in this 'Mexit' environment and can't defend mathematics or show the value of it then guess what, we're not going to have much of a future. Our territory will get increasingly smaller and smaller.

If we are going to make society and the economy more mathematically driven, it's going to start with the mathematicians themselves.

While at Babcock International, you created a mathematical cost capability trade-off for the aircraft carrier HMS Queen Elizabeth. Can you tell us how your maths impacted this project?

When you're talking about big projects like that, there are, let's say, two major stages. Speaking in layman's terms, there's the scientific stage and the engineering stage. The scientific stage is where they are designing the asset. The engineering stage is when they actually start building it. Now, before you can move from the scientific stage to the engineering stage, you have to submit a business case, but for this asset there was a question about its running costs. It was predicted to be unaffordable to run and there was a question of what we could do in terms of its capability to make it affordable. A Royal Navy captain asked me, 'Is there a mathematical way of doing this?' and so I developed a whole series of non-linear equations that actually linked the capability to the cost. Then I did a Monte Carlo simulation optimisation that showed how changing the capability would impact not only the aircraft carrier itself but also its *through life cost*. It came up with a range of solutions and they went for one of them, and made a decision to start cutting the steel.

What encouraged you to become Chartered?

Well, I became a Chartered Mathematician in 1999. What encouraged me at the time was that I worked with quite a number of Chartered Engineers, so when Chartered Mathematician came along, I thought, 'Yes, that is something that I really want to go for'. I wanted to have that extra thing that shows that I've reached a certain standard, and I was very proud when I became a Chartered Mathematician. Certainly, when I was working for a consultancy, I could see that they could charge me at a higher rate because I was Chartered.

Chartered Mathematician measured my professional achievements up to that date. At first I thought, 'Well, I'm a Chartered Mathematician, why do I need to be a Chartered Scientist?'

But what Chartered Scientist encouraged me to do is to keep on moving forward, mathematically keep myself sharp by applying new techniques, learning and tackling new problems, keep on growing as a mathematician, keep on growing as a scientist. In 2005 I became a Chartered Scientist and when it comes to my CPD, when they ask me, let's say five questions, I make sure that there is a serious essay for each of those questions.

My Chartered Scientist is linked to my mathematical activity and it's good to say that we're taking a scientific approach to real-world problems. We're using mathematics to take a scientific approach to solve the problems so as opposed to looking at something and just guessing, you're saying, 'Here, I'm using a mathematical logical approach to solve this problem', and away we go.

You do a lot of outreach work, including a talk on the Black Heroes of Mathematics – how visible and how important were these role models to you when you were growing up?

How important? Important. How visible? Not very visible.

When I was a teenager, I was very much into mathematics, pressing my calculator's buttons until its screen flashed at me, and I used to watch all these logical detective programmes like Columbo. So when I went to my school careers teacher, they said to me, 'So, Nira, what would you like to be when you grow up?',

and I said, 'Oh, something that involves mathematics and logic', and they turned to me and they said, 'Well, actually somebody of your physique should become a boxer'. So, that was very discouraging.

Now, what I didn't realise at the time was that Katherine Johnson was a black mathematician working for NASA (see the film *Hidden Figures*). She helped to work out the trajectory for the Apollo mission and they would have been doing all of that whilst I was still at school – not trying to give away my age! What they did wasn't well known, it certainly wasn't celebrated and what they did for NASA was very much hidden. So, I didn't realise that there were black mathematicians, I always thought that mathematicians were European and if someone said to me, 'You can't be a mathematician', then I had no evidence to counter that.

What my parents said to me at the time was, 'You don't need anybody's permission to be a great mathematician'. It stuck with me and I went forward to do A-levels, mathematics degree, masters, etc.

I didn't really start thinking about black heroes of mathematics until much later in my career when I met the Congress for African American Researchers in Mathematical Sciences (CAARMS) at an ICIAM conference in Edinburgh, in 1999. They said, 'Nira, somebody of your enthusiasm and your passion, you should really do a PhD', and that helped get the ball rolling – more on that later. From there, I actually researched the contribution that black people had made to mathematics. Before that I always thought that when you look through the books and see great mathematicians, you never see any black people. So, when I actually started doing the history and seeing, wait a minute, they're all modern, that is when I first came across Katherine Johnson. I didn't know that even though I was really into space rockets and watched all those space movies and NASA going to the moon; I never saw those black mathematicians there.

As a mature student, you completed your PhD on the gambler's ruin at Portsmouth in 2014 – what made you decide to go back to university to get your PhD?

I was working for a consultancy and they saw that I was doing some nice serious mathematics on the whiteboard and they were looking and thought, 'Okay, well how can we keep this man here for a while? I know, why don't we sponsor him to do a part-time PhD'. So they said to me as part of my appraisal, 'We would like you to do a part-time PhD, we don't care what it's in as long as it is in mathematics'. The following year, I went to my appraisal again and they said, 'Okay, in your appraisal, we have here that you're supposed to start a part-time PhD in mathematics, why haven't you started?', and I said, 'I thought you were joking'.

There were other reasons why I was then more motivated to do a part-time PhD. If we fast forward to the next generation, when my son was four, his teacher asked, 'So, what do you want to be when you grow up?' He said, 'I want to be like my daddy, so I want to be a mathematician'. The teacher said to my son, 'Oh, you'll never be a mathematician, you might become a singer'. It was almost like a lightbulb moment for me thinking, 'Wait a minute, I didn't have role models when I was 14 and that was still true for my son'. I saw the importance of black role models. That's when I decided actually to go ahead and do my PhD otherwise what type of role model was I to my son. I went ahead and did it and then, once I got the PhD, all the doors started opening up.

You are on Science Council's list of the UK's top 100 scientists and the first black mathematician in Who's Who. You are also on the Powerlist of the most influential people of African and African-Caribbean heritage. How important do you think it is that British society has visible black role models like you?

It's very important. I don't want to sound egotistical, I want to say it in a very humble way. I tend to be mathematics focused and sometimes I don't realise how many people are watching. I remember when I did my PhD and I used to write on Facebook about how I was getting on and I got all these comments and questions from around the world. I didn't really appreciate what challenges other people were going through.

I enjoy doing mathematics talks and engaging the audience. I find the greatest thing is when the pupils come to me afterwards and say, 'This is what I'm going through and you've inspired me'. They're going through these challenges of being marginalised, ignored or pushed aside and you're just saying, 'Keep on moving forward, you don't need anyone's permission to be a great mathematician'. I may say that to black students but I say that to everybody and on one occasion somebody come up to me and they said, 'I have autism and I know you're talking about black mathematicians but what you said actually spoke to me and I just feel really encouraged and inspired'. So, I didn't realise at that time that I had an important story to tell about my journey and how I became a mathematician and this idea of how to get over being marginalised, how to get over being ignored, how to get over being pushed aside, and how to keep on moving forward and that you don't need anybody's permission to be a great mathematician.

I know there's been quite a number of pupils who weren't thinking about doing A-level mathematics and are now doing it because of what I've said or they're saying, 'Wait a minute, I didn't realise that mathematicians could do that', or recognise that, 'We all have these challenges but you keep on moving forward'. If you have a dream then you have to protect that dream, you have to keep on moving forward to achieve that dream.

As a mathematician, I've managed to break that glass ceiling or this glass ceiling and I didn't realise there was a glass ceiling and then all of a sudden, I have a crazy life where one day, I'm sitting down having breakfast with the Jamaican Prime Minister ...

Do you have any advice for IMA members who want to give talks in schools?

What I found is the pupils are your most challenging audience. If you can stand up in front of 100–200 pupils for an hour and sell mathematics, then guess what, you can do that in front of anybody.

My first time, the results weren't brilliant but from that, I actually learned and then my talks steadily got better. After a few talks, I realised that what I had to do was look at the students and target them. When the pupils know that you've made this unique presentation for them, they're much more appreciative rather than saying, 'Oh, you did that to a school down the road'.

I deal with the elephant in the room by saying, 'sin, cos, tan, algebra, why am I doing this because I'll never ever do this for the rest of my life ever again', I deal with that there and then. I went to one school and I did an entire workshop called 'saving Aston Villa' and they developed their own mathematical model to save their football team. They're seeing 'wait a minute, this is mathematics in action, this is real-world mathematics'.

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One of the things that I see which is common in pupils is that lack of confidence thinking, ‘I would really like to be a mathematician but I don’t know how, and am I good enough?’ When I actually just stand up in front of them and I just tell them my story, tell them this is what I do, these are the adventures that I’ve been on, and you see them at the end and you receive the feedback from the teachers saying, ‘My students are still buzzing. They just wanted to talk about mathematics, mathematics, mathematics’, then my job is done. The thing is, that’s just me, that’s just my story. I think everybody who is in the IMA, they’ve got their own story to tell. I really do believe that we all have a responsibility to put something back and invest in the next generation. We all have stories, adventures, challenges, defeats and victories, and our school children have to hear that because if we don’t tell our story, who is going to tell them?

You were also recently given an honorary doctorate from the University of Greenwich. How did this come about and what does it mean to you?

The University of Greenwich invited me to do a talk at the festival of mathematics in 2017 and I said, ‘Okay, well how about me doing a talk on saving Aston Villa?’ and they came back saying, ‘That’s very interesting but no, we don’t want you to do a talk on saving Aston Villa’. They said, ‘To fit in the festival theme, we would like you to do a talk on the black heroes of mathematics’. Now, I had done it a couple of times but when I did it there, the feedback from the delegates was great. They said it was one of the most inspirational talks they had ever been to and subsequently, I’ve been in contact with undergraduates and I have been interviewed for their magazine. Lo and behold, earlier this year, I received a letter saying, ‘We want to award you an honorary doctorate for your unique and inspirational contribution to the field of mathematics’.

The day was amazing, it really was. I’m trying to find the words, I’m getting all emotional here. You see all the undergraduates and the masters and the PhDs getting their certificates and people making their speeches. The chancellor was making a speech and I’m thinking, ‘She’s just said all the things that I wanted to say’, so I had to stand up and speak from my heart. They said, ‘We want you to inspire them’. I’m rarely lost for words but it was just a fantastic day and I feel really touched and honoured that the University of Greenwich actually awarded me and recognised me in such a way.

You are the World’s Most Interesting Mathematician, according to voters in Aperiodical’s 2018 Big Internet Math Off. Your enthusiasm for your maths was clearly contagious. What was your favourite talk from the competition and why?

When they sent an invitation I asked, ‘Well, what would you like me to speak about?’, and they said, ‘Anything’, ‘How long for?’, ‘You choose’. I’m thinking, ‘There’s no way that I can stand up in front of a video or write a whole essay on mathematics and hold that audience’, because I don’t do recreational mathematics – I do mathematical modelling, I do real world mathematics. I started thinking maybe I should focus on that. One of the things I realised is that for this competition, even though it was me, it wasn’t just me, there was a team. This was my wife and my two boys. They would make suggestions such as, ‘Oh, we believe you should pitch this presentation or you should pitch that presentation’. One of the things that I do when I do an outreach presentation, I tend to combine maths and music to help explain a mathematical idea,

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you have underlying music that actually changes the mood.

When Aperiodical said provide four talks, I thought, ‘Alright, here are my talks’, and one of the things that my wife and my boys said was, ‘Nira, we think that your mathematical model of the Black Panther suit should be in the final’. I was thinking, ‘I’ve only presented Black Panther in a five-minute presentation and

on a blog’, and they said, ‘No, we think that’s your best one, that’s your strongest presentation, that should be in the final’. When I did make the final I only had two days to put a presentation together and it was too light and consequently I bulked it out a bit and did more of a mathematical

modelling presentation with the main emphasis being about the Black Panther (see tinyurl.com/Aperiodical-final2018).

The Black Panther is my style of presentation, my style of communication. You see a video of me at the beginning, that is it, that’s all you need to see and then the rest, you actually see the words and the music were gathered together. I just thought for that presentation, let’s do something experimental and for this competition, it really did work.

To answer your original question, the Black Panther was definitely my favourite because that was a fresh one and it had to be done in two days. It was all cool.

Has anyone said they’ve used your slides in their lessons?

Yes, for instance, because everything is on social media, even when there’s a tweet saying, ‘Oh, we’re coming up to black history month, have we got any resources on black mathematicians?’ and then someone will say, ‘Get in contact with @ch_nira’, and I said, ‘Go to my blog, look at this blog, look at this link, look at this video’, and away we go, ‘Go ahead and use it’ (see www.nirachamberlain.com).

At maths events, you often wear mathematical attire that goes well beyond the usual tie. What’s your favourite?

My favourite is a black jumper with the Fermat spiral around it and it was quite expensive. I won’t say how expensive it was. I was looking at it and call me crazy, it was just calling me saying, ‘Buy me’. I bought it and I think I got criticised by my family saying, ‘How did you find that?’. What I didn’t realise at the time was it is actually one of these unique, New York designer tops and when I search for other tops like that, I can’t find it. I try not to wear it too often. I wear it for doing less formal mathematical talks.

How closely do you check the maths?

Oh, gosh! Oh, yes, I do check the maths because it’s reputation. I mean, I remember one time I bought a T-shirt and I was looking at it and checking the mathematics and saying, ‘That is wrong’. I remember another time I was at an IMA meeting and there were some Oxford PhD students going, ‘Nice tie’, and I said, ‘Yes, have a look, can you spot me the mistake? Here you go, find the mistake’. The best one was an IMA Strategy Weekend at Birmingham University and I was wearing this white hoody and it had the Reimann zeta function on it and it said, ‘What part of this don’t you understand?’, and I remember I had Chris Linton and David Abrahams looking at my jumper and I felt like I was like a living whiteboard. All they needed was a pen

Rebecca Waters
Editorial Officer

These are the personal opinions of Dr Nira Chamberlain and do not necessarily reflect those of SNC-Lavalin.