An Interview with Professor Sean Dineen

GARY MCGUIRE

1. Introduction

On 10 November 2009 I conducted an informal interview with Sean, who officially retired in 2009.

2. Background and Education

GMG: As a child were you interested in mathematics?

SD: I wasn't top of my class, but I had some good teachers. We had to do a lot of mental arithmetic in school. Now, it wasn't mental arithmetic like you have it. We had pounds, shillings and pence, we had hundredweights, tonnes, stones and pounds of weight, and so on. We had to work out these things in our head, and the teacher used to give sixpence to whoever got the right answer first. And I can tell you, the competitive element really pushed us on because we had no pocket money in those days.

I was always good at maths in school, and I never had a problem, but I wasn't exceptional. In my class in primary school was Donal Hurley, who went on to get his PhD from Cornell in mathematics. So two PhDs in mathematics came from that small class in Clonakilty, Co. Cork.

Sixth and seventh class were together in the school. Sixth class used to do algebra, working with polynomials in x. Seventh class, for those who would not go on to secondary school, did geometry and proved theorems. There was one student in that class who got full marks in all subjects in the primary cert. It was quite competitive there. Clonakility was good in sport too and that was also competitive.

My parents were teachers, and they started the boys secondary school in Clonakilty, in 1938. There was no boys secondary school before that. My father died in 1953 and my mother continued to run the school. At the time Clonakilty was part of the diocese of Ross, which is now part of Cork and Ross, and that apparently had something to do with the fact that there were very few boys secondary schools in the area.

GMG: You went to University College Cork for your undergraduate studies.

SD: By the time I got to my Leaving Certificate year, I was certain that I wanted to study mathematics in university. I entered UCC in 1961. There were about 14 in the class doing honours mathematics. In those days you had to qualify for honours at the end of first year in order to proceed at honours level. I remember I was afraid that I would qualify for doing honours in physics or chemistry, and that I would not qualify in maths. But I did qualify in maths. I really liked chemistry, and I qualified in chemistry also.

GMG: Was attendance taken?

SD: Yes. We all had an assigned seat, which was done alphabetically. The porter came in to every lecture and took a note of which seats were empty. There was a strict rule that if you didn't attend a certain percentage of lectures, you weren't allowed sit the exam.

GMG: Were there good students in your class?

SD: Oh yes, I think about half the class of 14 went on to do a PhD. Tony Hollingsworth, who was scientific director of the European Meteorological Centre in Reading, and Brendan MacWilliams, another meteorologist, who used to write a column in the Irish Times, were in my class. Niall Horgan, who did very well in applied mathematics, was also there. It was very competitive.

The dean would announce the exam results orally, in the quadrangle, and then post them on a noticeboard. The next day they would be published in the Cork Examiner, in order of merit. There were lots of McCarthy's, of course, so if you were McCarthy you were never sure of your results when they were read out. You had to wait until the official posting.

There was a great atmosphere in the class. During the year, we used to cover the ceramic tables in the restaurant with mathematics, and we could wipe it off afterwards. We drank coffee and smoked, everyone smoked in those days. In third year the exams were in September, so we had the summer to study. We had no email of course, and phone calls were expensive. So we used to write a lot of letters to each other about solving the problems that were set.

We set up the student Mathematical Society in our second year. We visited the other student societies to see how things were operated. In my first year we had Finbarr Holland for tutorials, he was a masters student. And Mick Mortell, later president of UCC, was a tutor in mathematical physics. Paddy Barry came back when I was in third year. For statistics we had Tagdh Carey, who also went on to be president of UCC. You either did maths and statistics, or maths and maths physics. I took the statistics option.

During my first year the professor of mathematics, Paddy Kennedy, was away, so we had Siobhan O'Shea teaching us. Kennedy came back in Easter of my first year, and he lectured us then. He was a brilliant lecturer. He insisted on each student wearing the gown, you were thrown out if you didn't have your gown.

GMG: Students had to wear gowns?

SD: Oh yes, each student had their own gown. When you registered at the start of first year you had to buy a gown. There were no applications through the CAO in those days. You just queued up in the arts line, or the science line, or the pre-med line, or whatever, and you registered. And you had to buy a gown, and show your receipt. Then you went to the bursar and paid your fees. And then the dean of the faculty shook hands with you. The fees were 65 pounds for the year.

GMG: Did you do a masters degree in UCC?

SD: Yes I did an MSc. During that year I lectured to commerce, 250 students, and to third year honours. I was very involved with student politics that year and I organized all the student dances. I had to deal with a new MSc course, where you took two majors, instead of one major and two minors. I took real analysis, I was the only one. I think Maurice Kennedy from UCD was the one who designed the course. He took all the best books, like Kelly, Taylor, Halmos, Loomis, and called them the real analysis course. They were great books, and still are, but I had no preparation for that level and I struggled with those books all year. The department in UCC specialized in complex analysis.

One curious thing is that Boole was never mentioned in UCC. I remember that it was in my final year as a PhD student in America when I found out that Boole had been a professor in Cork. No-one mentioned it. And we didn't even know about Hamilton, we did the Cayley–Hamilton theorem but no-one mentioned that Hamilton was from Dublin.

GMG: What books had a big impression on you?

SD: I remember Cantor's little book on transfinite numbers as a great book. It was in the library and Paddy Kennedy mentioned that if you want to know more about infinite sets, go and look at this book. So I went to the library and read it. I'm not sure if students nowadays look up books that are outside the prescribed texts.

There was a book on Taylor series by Dienes, and also Bromwich's book on infinite series, that I remember studying for a long time on my own. I thought they were fantastic, and were useful later to me in my research. Bromwich actually lectured in Galway for a year, and later I got to know his grandson who was an engineer in Dublin during the 70's.

I also subscribed to the Oxford journal in my final year and tried to read the articles. But nobody told us to do that, we just explored by ourselves.

3. Early Mathematical Career

GMG: You then went to the USA for your PhD?

SD: Yes, I was the first student in pure mathematics from UCC to go to the USA for my PhD. There were a few in applied mathematics before me, like Paddy Quinlan, Mick Mortell. I didn't want to go to England because the financial support was uncertain. I applied to 4 universities in the USA, Maryland, Syracuse, Princeton, and Stanford. Stanford said I was too late. Princeton said I could enroll but that I would not receive financial support. It came down to Maryland or Syracuse, both of whom offered me a teaching assistantship, and I chose Maryland. I remember there was no-one to tell me which to pick. I had nothing to go on. So I chose Maryland because it was larger, it had 40,000 students, and Syracuse had 7,000 students. I reckoned you could get on better with a larger choice. Also it was nearer the equator and nearer the sea!

GMG: Were there a lot of students at Maryland?

SD: There were about 250 graduate students in mathematics! About 100 were doing the PhD, and the rest were doing a masters. This was the 1960s and there was a big expansion in Washington DC due to the space programme. There were lots of people from NASA, the Goddard space centre and other government institutes, who were sitting in on maths courses. There must have been another 250 people taking advanced mathematics courses! I remember in functional analysis, the capacity was 40 but there were 80 people who wanted to take it, so there was another class of 40 going on simultaneously.

There were lots of jobs in various colleges in the area teaching maths, which were well paid. So people with masters degrees got good jobs afterwards.

There was a lot of grant money too. I remember one professor asked me at the end of first year if I wanted a summer job, paid from his grant. I said no, I am going back to Ireland for the summer. He said that's no problem, just sign here.

I remember the preliminary PhD exams, because they were on my birthday. You had to take four exams in one day, in algebra, analysis, topology, and probability. We were trained in Ireland to do well in comprehensive exams like that, and I had no problems. Americans found them more difficult. I had more trouble with the language exam, because we had to do two languages. I already knew some German, but I had trouble with French. I eventually passed it.

Also in Maryland I was a fellow student of a grandson of George Salmon.

GMG: You established a Brazilian connection while in Maryland.

SD: My first day in America I met a Brazilian guy named Thomas Aloysius Walsh Dwyer. That might sound like an Irish name to you, but he was Brazilian. He became a great friend of mine, and we had the same initial advisor. I had the travelling studentship, so that gave me a bit of freedom. Tom told me about Leopoldo Nachbin, who was at IMPA (Instituto Matematica Pura e Aplicada) in Rio de Janeiro, and had written a book on approximation theory, and another one on the Haar Integral. I thought his books were great, so simple and clear. So I looked at his research, and I liked it too. I wondered if I could transfer to Rochester, where he had a joint position, the other half of his position being at IMPA. He said that I should do all my course requirements in Maryland, and he arranged that John Horvath would be my official supervisor in Maryland, and that I would go to Rio for my research. So Nachbin was my unofficial supervisor. He had other students in Brazil, like Soo-Bong Chae who was from Korea, Richard Aron and Phil Boland.

Nachbin had spent time in Paris, and he knew Henri Cartan and many other famous mathematicians. One time on sabbatical in Paris, Cartan arranged that Nachbin rent an apartment in the same block as Cartan. Nachbin's maid was from Rio and Cartan's maid was from Portugal, so of course the maids talked in Portuguese. Nachbin overheard them one time. Nachbin's maid asked Cartan's maid: what does your boss do? Cartan's maid answered, I don't know but he can't be very good at it, because he's always inside in his room tearing up paper!

Lots of well known mathematicians visited Rio, so there was a great mathematical atmoshere there. I took a course from I.N. Herstein, the algebraist. Laurent Schwartz and Francois Treves were there also. There was an excellent social atmosphere.

GMG: Did they pay you well in Brazil?

SD: Yes, they were interested in making IMPA a world class institute, so they paid quite good salaries to all staff, including the PhD students. I was never as well off, in fact, as I was down there. Because I was receiving the studentship from the NUI, I wrote to let them know that I was getting extra money for teaching, and I asked them if that was allowed. I believe it was discussed at a meeting of the senate of the NUI, because technically it was not allowed, but in the end they let me go ahead.

We had a great time there, we lived in Ipanema, near the beach. Every Saturday the PhD students went to the beach and we had a party afterwards.

GMG: What did you do after your PhD?

SD: I spent one year in Johns Hopkins, as an instructor. There were no positions in Ireland. Then I applied for a scholarship at the Dublin Institute for Advanced Study, which I got. So I was there for two years, 1970-1972. In the middle of my first year a job came up in UCD, which I applied for. The problem was that DIAS wanted a decision for my second year sooner than UCD could confirm the position, so I said to UCD that I had to take the DIAS post for another year. UCD agreed to take my application as if it were for the following year, so I spent another year (my second) at DIAS and then I got the UCD position which I took. I have been there ever since.

GMG: How was research in the 1970s?

SD: During the early 1970s, Maurice Kennedy (associate professor at UCD, and afterwards registrar) decided that he wanted research done, but that teaching was the top priority. Dick Timoney ran the department. Maurice felt that we should do research at night, in our spare time. He also wanted everyone to be included. So Maurice got us all to buy a book which was on operator theory with an algebraic slant, Bonsall and Duncan on numerical range. He organized for everyone to come to a seminar at 8pm in F209 (in the UCD Arts Block) on a weeknight. Afterwards we retired to McCluskey's pub in Donnybrook. That's how it was done. That started the year I was in DIAS, as far as I remember.

That year another job came up in UCD, and Phil Boland applied and got it. He was another student of Nachbin. Then Richard Aron got a job in TCD, so there were three of us here in the one area. Then Nachbin started sending us his PhD students from Rochester. We ran seminars on various things. People like Lelong and Stein had students, in Europe, and they started to come here. So in 1973-74 we had an international year in infinite-dimensional complex analysis, where we ran our seminar and had many visitors.

We had no funding whatsoever at that time. We had a travel grant from the university, which was very helpful to us.

4. Later Mathematical Career

GMG: Have you stayed with infinite-dimensional complex analysis for your whole career?

SD: Yes, but there have been many different strands to it. In the 1970s it was very topological, locally convex spaces, pseudoconvexity, holomorphic convexity, analytic continuation and things like that. At the end of the 1970s Phil Boland moved into statistics, Richard Aron went permanently to Kent State, so that stream had sort of finished. But if you want to stay active as a research mathematician, you have to reinvent yourself regularly. In 1978 I went back to Rio for six months and met Wilhelm Kaup, who is one of three brothers who all worked in complex analysis, believe it or not. I was there to write my first book. Kaup gave some lectures on bounded symmetric domains, Lie groups, Lie algebras, complex differential geometry, vector fields, all in infinite dimensional spaces. This was quite new to me and I found it very interesting. The next month I visited Kent State and I gave a talk on this topic, to help myself learn it. There was no-one else in UCD working on this topic. Richard Timoney had come back to TCD after completing his PhD with Lee Rubel in Urbana-Champaign, and we decided that the two of us would study this area. During the 1980s then, Richard and I concentrated on bounded symmetric domains.

In the 1990s I got interested in spectral theory, and I started working with Robin Harte. But all the areas relate to each other, so some extent, and you start to pull them together a bit.

GMG: How was the funding situation through your career?

SD: There was none in the 1970s, 1980s or 1990s even. In UCD in the 1980s, when I was head of department, we wrote a book of problems and we sold it to all the undergraduates. All homeworks were assigned from this book. The money from this paid for visitors, and visits, and conferences here, and it really kept the research going.

There never was any funding really for mathematics in Ireland until the late 1990s. As a profession we don't actually need much funding, that's one of our problems. Our students and postdocs need funding, but we don't need much. And we are considered to be one of the sciences, so the higher-ups think that if you are not bringing in funding, then you must be no good! We are not treated as an arts subject in that sense. We are like an arts subject in many ways, we don't need equipment. You can't verify a mathematical result by experiment, so in that sense we are not a science. Also, we build on previous work, we don't discard theories based on experiment. In mathematics, what the Greeks did is still there, and we build on it. By its nature, mathematics has to be a unit and has to integrate itself together. It's very important that different areas be related to each other. The basic theorems are still there, the concept of a prime number is still the same as it ever was. We don't invent a new kind of prime number that is better than the old one, although we may expand the concept. In some sciences, you have theories which get replaced by different theories after a while. That doesn't happen in mathematics.

GMG: Has mathematics, and doing mathematics, changed over the last forty years or so?

SD: Back in the 1960s, there were many people who were intrinsically interested in the subject. I spoke earlier of 80 people doing functional analysis at Maryland, and things like that. People were studying mathematics because they were interested in it. What I think is happening now is that, with all the grants and so on, it's turning into a bit of a business. What's still good is that there are original mathematicians leading the field. Mathematics will always be an individual effort. The subject is becoming a business, and people have to get grants and they have to publish. For thirty years, I didn't have to publish, and what kept me publishing was that I was part of a team, and I wanted to do good for my team.

There is a certain amount of sharpening pencils these days. There is a lot of technical mathematics being produced now, because people have to publish. On the other hand, there is fantastic mathematics being produced as well, like Fermat's Last Theorem, and the Poincaré Conjecture. And there are people like Terry Tao, Gilles Pisier, Tim Gowers, who are doing great things. So you have a very high standard of mathematics appearing, no doubt about that.

Compared to 30 and 40 years ago, written articles don't give as much of a lead in. In the old days, people used to give an introduction for people not in the precise area. I think that has changed. Another change is that in the 1970s there were a lot of conference proceedings, and some very good articles were put in conference proceedings. But nowadays such proceedings don't count for citations and they are being sidelined and people don't want to publish there. People respond to the environment they find themselves in. So if the citation index becomes important, people will respond to that. I think that a time will come when we will realize that all this is rubbish. The stuff that is of value will be kept going.

GMG: How important is teaching to you?

SD: Teaching is very important. I remember my advisor Nachbin saying to me once, you could prove Fermat's Last Theorem in your bathroom, but if you didn't tell anyone, nobody would know. You have to communicate it. You communicate with teaching, and if you are challenged with a question, you should be able to answer it.

I think the teaching of first year students is very important. We should be quite tough, but we should also spend a lot of time with first year students, trying to have as many small classes as we can. We have students who become enthused by maths, when they are pushed. One economics and finance student recently was very enthused by maths in first year, and now he is doing the higher diploma in maths. There is skill in teaching first year students. In first year, you can challenge them, and set the standard for later years, and this applies to students who are not studying a maths degree but are doing a degree with a large maths component, like engineering or economics and finance. You change them from thinking immediately that they can or can't do this problem, to thinking that it will take 15 minutes, and perhaps longer, before they know whether they can or can't do it.

5. General Questions

GMG: What is your feeling about Irish undergraduates doing a PhD in Ireland versus doing it abroad?

SD: I'm not dogmatic about this, I think the mixture we have now with about half our PhD students from Ireland and half from abroad is a good mix. I do believe that spending some time in another university is a good thing. Going abroad for a PhD, in a new atmosphere, is of course a good experience. Staying in Ireland has the advantage of keeping you in touch with what is going on in Ireland.

If people go abroad for years, they can get into new areas and come back to Ireland to find that there is nobody in Ireland they can talk to. It can be difficult to come home to work in an area that nobody locally is interested in.

GMG: Do you think the Erasmus programme is good ?

SD: The Erasmus exchange programme has been good for UCD, and for Ireland. It's something I was very involved in. We had 20 or 25 of the brightest students in Europe here, going through UCD. They were very good for our students, they lifted the level. I used to get something like 30 quid for each student. When it was all put together, we had enough for an orientation week at the beginning and this created a great bond between the students. Then UCD said that we had to have the same number of students going in and out, which was bad for us because we have few students doing mathematics and only a small number of those were willing to go abroad. Quotas like that just don't work. But I think it was good for Irish mathematics, and for UCD, to have Erasmus students going through.

GMG: How have universities changed over your career?

SD: Mathematically we have got a lot more professional. Almost everyone is publishing papers regularly, and we have regular seminars. We have PhD students and postdocs. In UCD we have been combined with Mathematical Physics and Statistics into one school. In the 1990s we were practically the last subject to change from having pass and honours degrees, to only honours degrees. We had to change. We came up with the Mathematical Studies degree in arts, and honours mathematics basically moved to science. Although, until recently you could still do it through arts, which I thought was very important and I regret that being taken out. Mathematical studies became an important degree for teacher training, and the best students in that group can go on and do the diploma and masters.

In the past an academic who had an idea for a project, say something that would be good for students, could get others on board and discuss it at a faculty meeting. Nowadays, a lot of initiatives are coming from the top, like getting more overseas students. These are based on financial considerations, or political considerations, or spin, rather than on their intrinsic merit. At faculties, if you had an idea you had to propose it and defend it in front of your colleagues, and if there was something wrong with it, that would come out at the meeting. You went to the faculty for academic reasons. Then, for the financial implementation you went to the bursar.

I think getting rid of faculties was a mistake. This was where academic decisions were made. Every year some changes were made, they were on the table and debated and voted on. One other advantage was that you met people from other departments and faculties. Nowadays it is difficult to meet colleagues from other schools. This is sad, because then the beaurocrats control the full flow of information. They are interested in perception and spin. I think it will come around again, they will see that it isn't working. It's important that young lecturers coming in know that there is an alternative way.

Previously it was very straightforward, you were a researcher and a teacher. As head of department, you were supposed to lead as a professional mathematician, as a researcher and teacher. The amount of time spent on administration was quite small. This has now changed, and being head of school requires most of your time on administration.

GMG: What are your thoughts on the Mathematical Olympiad?

SD: I think it's great, although I haven't been involved in it. There isn't time to do everything. I think Fergus Gaines and Tom Laffey did great work. As I said earlier, anything that is competitive, as long as it doesn't go overboard, is good. A little bit of competition is good. For example, when I was head, I said to the commerce faculty that we would allow three students to do honours mathematics. Admission would be by interview. So I then had twenty commerce students lined up outside my office trying to be one of the three. If I had said twenty could do it, I bet there would not have been the same level of interest!

GMG: Have you any thoughts about the numbers of school leavers going into mathematics?

SD: There are a number of factors. The points system has really distorted everything. There is a whole dynamic about the Leaving Cert in this country. For instance, the media play a big role. If there is a question on the Leaving Cert that is any way unexpected, there will be an outcry in the media, and they almost expect a commission to be set up to find out what went "wrong". That's not good.

Secondary school teachers come under pressure from the parents to produce points for their children, so teachers are recommending subjects that bring in high points. If it's needlework that will get them into medicine, then they will recommend needlework.

Another thing is that school leavers who are good at maths are being channelled into other courses, usually courses that require high points. The number of courses that demand honours maths in the Leaving Cert is increasing, so those courses are taking some of the honours maths students, whereas the number of students taking honours maths in the Leaving Cert has remained relatively constant at about 15%.

GMG: Should mathematicians be better at public relations?

SD: Mathematics is not very clever at selling itself as a profession. We should have a more visible presence. Not every maths student can have an academic career, but someone with a degree in mathematics is well trained scientifically. However, they still have to convince an employer that they are worth hiring. There are a lot of career options available after a degree in maths or statistics, and to help mathematics become more visible as a profession we should tell people about these options while they are thinking about their third level options.

I also think that mathematicians and statisticians have a new and important role to play in society, because a lot of mathematics is now being used irresponsibly in society. People are devising measures and using figures for their own purposes. Mathematicians have a political and social role in society that they never had before, and need to show students how to challenge these over-simplifications and trivializations. In a very hidden and subtle way, mathematics is being used to shape society.

GMG: Sean, thank you very much.

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