

+ Profile

Star of the west

A former “Westie” who grew up reading comics and hot-wiring cars, Gaven Martin is one of the finest mathematicians New Zealand has produced. **Donna Chisholm reports.**

DONNA CHISHOLM IS NORTH & SOUTH'S EDITOR-AT-LARGE. PHOTOGRAPHY BY CHRIS SKELTON



Gaven Martin's front yard, in the tasselled and Ugg-booted heartland of 1970s West Auckland, used to be littered with the rusting remains of car parts from his father's panel-beating business.

Today, the kick-ass silver Mercedes convertible (licence plate PROF) parked outside his Massey University office in Albany, less than 20km from where he was raised, tells you just how far he's come.

So too does the title Distinguished Professor, the international bidding war for his services, the breakthrough discoveries he has already made and the hundreds of pages of papers published in the world's leading mathematics journals.

In 1992, aged 32, he became the youngest professor in our universities; 15 years on he became founding director of Massey's New Zealand Institute for Advanced Study, a think tank of the university's intellectual scientific elite. He could probably walk into many universities in the world and double his salary.

In August, he will be an invited speaker at the International Congress of Mathematicians in Hyderabad, India, which is, says Berkeley-based Sir Vaughan Jones – probably New Zealand's greatest-ever mathematician – “really a big deal” and a “signal honour”.

Martin, then, is a mathematics superstar – but so arcane is the world in which he works and competes that I cannot begin to describe to you what his discoveries actually are. Lay terms for this sort of stuff don't exist. Martin speaks a kind of mathematical mumbo-jumbo that only he and others of his species understand.

Here is one example, from an abstract of his talk to a 2007 meeting of like minds in Wellington: “Most of us have seen a bit of the Fatou/Julia theory of iteration of rational mappings of the Riemann sphere and pictures of associated parameter spaces such as the Mandelbrot set. A natural question is: ‘Are there such rational (conformal) dynamical systems on manifolds in higher dimensions?’ Classical rigidity theorems (e.g. the Liouville theorem from 1860) suggest strongly that there are not. Surprisingly there are, but we must give up smooth Riemannian structures to allow singular structures where branching of mappings may occur and quite fascinating examples can be found.”

Okaaaaay. As Goethe said, “Mathematicians are like Frenchmen: whatever you say to them they translate into their own language and forthwith it is something entirely different.”

“A few of my mathematical friends read a lot of comics when they were kids too. Maybe the comics were a different world, a different place... Isn't Batman science fiction in some sense?”

Martin agrees that this is so. “Mathematics as a discipline goes back thousands of years so we've built up a level of technology and jargon that's impenetrable if you come at it face on. It's almost like another language and if I was to explain the content of some novel in Swahili, the fact that you didn't understand it is hardly your fault.”

So let us leave Riemann, Mandelbrot et al for now, right there in the cognitive stratosphere of paragraph seven where they belong, and return to a galaxy far, far away – West Auckland circa 1970.

Three or four dead cars used to sit in the front yard of the Henderson house where Gaven Martin, his parents and two younger brothers lived. Father Bob was a panel beater and sometime stock-truck driver; mum Gloria cleaned cars for the Todd Group.

Martin attended Henderson Intermediate and later Henderson High, working after school and in the holidays at Collards Winery across the road from his home.

Despite being the dogsbody, washing bottles and carrying crates, Martin worked alongside winery boss Lionel Collard. “He would tell you you have to do this shit job but he'd help – and he was running the goddamn business. So that taught me a great lesson about working hard and leading by example.”

At high school, though, Martin was in the top classes, devouring the *Scientific American* journals in the school library and eventually winning a scholarship: “I don't think any of the teachers would have thought I was particularly brilliant – I'd just found what I was good at.”

He raced slot cars in his spare time, and built the chassis himself. “People would buy them and I remember a discussion early on, when I was about 13 or 15, when someone asked me what I was going to be when I grew up and I said, ‘I want to be a professor at university.’ From then on, I was called ‘the professor’.”

He had, of course, spent his childhood tinkering with car parts and wonders if being left to his own devices to do “incredibly dangerous things like getting shocks from the mains a few times a week from wiring stuff up” helped expand his horizons more than today's cotton-wool kids.

Martin's parents came from big families of 11 and 12, so the clan had more than 100 cousins. And yet, by the time Martin left Henderson High at 17, he would become the first in the extended family to attend university.

He was 11 when the family left Rotorua where he was born. They'd lived in what's now known as Fordlands, the city's poorest suburb and the one Alan Duff depicted in *Once Were Warriors*. In an area with three times the national unemployment rate, at least Bob had a job. And the kids were never hit.

The Martins cashed in the family benefit to buy their state house. It had no books and no bookshelves. “I read comic books non-stop all the time. I think I must have read 40-50 a week,” Martin recalls. “In the middle of Rotorua there was a comic-book exchange at the end of the street so every Friday – payday was Thursday – we'd get fish and chips for tea and take in all the comics we had, pay three or five cents, and exchange them. I loved them, Superman, Batman, all the Marvel stuff, Green Lantern...”

A dreadful start? Not so, says Martin. “A few of my mathematical friends, people I consider to be really smart, often read a lot of comics when they were kids too. Maybe the comics were a different world, a different place... a lot of science and technology. Isn't Batman science fiction in some sense?”

As young as seven, Martin was showing glimpses of the mathematician within. When his teacher at Malfroy Primary mentioned how fast the Earth orbited the sun, he didn't believe her. “I went home for lunch and Dad happened to be home and he said, ‘Well, we could figure that out.’ So we sat down with a pad and multiplied and divided these incredibly big numbers – it's not very hard if you have an idea about how far the Earth is from the sun and every kid in those days knew it was about 93 million miles.” It transpired the teacher had rounded the numbers wrongly



Gaven Martin says mathematics is “almost like another language”.

and was out by half a mile a second.

“But here’s the power of mathematics. You’re sitting in a classroom in Rotorua and it’s not the wealthiest part of the world and here’s a calculation you can make that tells you how fast the Earth is hurtling through space. You don’t have to be at some fancy-pancy school to figure this out. Mathematics has explained it and that’s a really beautiful thing.”

And, he says, that day gave him “my first and best memory of Dad”.

By the time Bob Martin died of an aortic aneurysm in 1990 at the age of 52, he’d been pumping gas on a petrol-station forecourt for five years, was broke and left only debts, says Gaven, “despite working like a bastard all his life”. Twenty years later, he still chokes up at the memory that he was studying in Sweden when his dad died and couldn’t afford to return for the funeral. And that his father never got to see all he achieved. “I think he would have been proud.”

Did Bob want his son to be anything in particular? “Yeah,” he says slowly. “Not him.”

His father died in the year that Martin made one of his most significant mathematical breakthroughs when he spent six months at the prestigious Mittag-Leffler maths research institute in Stockholm, working on the “problem of Liouville” (back to the incomprehensible paragraph seven) with Polish collaborator Tadeusz Iwaniec, working from 9.30am to 3am every day.

“We knocked the bastard off!” he says. Sadly, it is the only sentence of his explanation of what they did that I can understand.

“Here’s some Swahili,” he continues gaily. “We had to identify the p norms of some singular integral operators so they’re operators that move functions about. They’re used in the solution of linear partial differential equations and we were using them in a non-linear setting. But there’d been some earlier work showing these p norms were bounded and what we needed to do to get the result was to find the answer, the actual number. This is a common situation

of mathematics; you have this object you’re trying to control and you know it gives you a number. Well, the first thing you’d like to know is that number’s finite number...”

Martin burbles enthusiastically in this vein for several minutes as I, like Douglas Adams and his deadlines, hear only the whoosh as the words fly by. I jolt back to awareness as he relates how he and Iwaniec searched for the missing link amid some rare and dusty volumes from the 1880s in the Mittag-Leffler library at 3am on a frigid winter morning.

“And lo and behold, we opened this bloody book, thumbed through it and found our formula!

“We just looked at this book and then we looked at each other and this incredible feeling of elation goes through your body as you realise you’ve solved this problem. It’s just amazing.”

How does one celebrate such an achievement? “You go to bed and hope it’s right in the morning.”

So how do we shed even a fragment of light on what it is that Martin actually does



The Martin File

Gaven Martin's CV runs to 16 pages. Here are a few highlights:

- 1980:** BSc (first-class honours), Auckland
- 1981:** MSc (distinction), Fulbright Scholarship
- 1985:** Myers Prize, University of Michigan, best PhD thesis
- 1986-88:** Yale University associate professorship
- 1989-91:** Auckland University lecturer and senior lecturer
- 1991:** Associate professor Auckland University
- 1992-2004:** Professor (personal chair) Auckland University (head of department 1999-2001)
- 1992-1996:** Commutes to Canberra as reader/senior fellow Australian National University
- 1993:** Elected fellow of Royal Society
- 2005-present:** Distinguished professor, Massey University
- 2009:** First New Zealander invited to deliver Taft lectures at University of Cincinnati
- 2010:** Invited speaker at International Congress of Mathematicians, Hyderabad

Visiting professorships and distinguished visiting positions include:

University of Michigan; Technische Universität Berlin; University of Helsinki; Institut des Hautes Études Scientifiques, Bures-Sur-Yvette, France; Mathematical Sciences Research Institute, Berkeley, California; Wesleyan University Connecticut; Université de Lille, France; University of California, Berkeley.

and why he's so good at it? Even his colleagues find it difficult to explain to non-mathematicians.

Auckland University maths professor David Gauld, who taught Martin when he was a masters student 30 years ago, recalls him quickly grasping concepts and asking intelligent questions in lectures which could otherwise be very quiet as students struggled with challenging material. "And once he came back as a lecturer in the late eighties, he was just powering ahead."

But mathematicians make their mark by their research and publications, and the quality of the journals in which they publish. "He tends to publish in top-quality journals – and that's difficult to do."

Robert McLachlan, immediate past president of the NZ Mathematical Society, says there are at most only one or two other mathematicians in Martin's league here, and no one can approach him in his area of geometry and analysis.

"It's pure maths and I hardly know how to begin explaining it. If I was doing a popular article about his work, I'd bring in the geometry of complex numbers, because people study those in high school, and then there's a famous thing called the Mandelbrot set which is very familiar."

Ahh, back to paragraph seven again!

If you're interested, McLachlan advises, go to Google images and see the beautiful pictures of hyperbolic geometry, "the kind of weird geometry he studies. It's about sets of functions and trying to understand the weird things they do. Beyond that, all you can really do is show pictures."

Martin's wife, Dianne Brunton, has found work at every university where Martin has been posted. In a striking coincidence, Brunton's father was also a panel beater – born on the same day in the same year as Martin's dad.

A couple of prefabs away on Massey's Albany campus, Gaven Martin's wife, associate professor of ecology and conservation biology Dianne Brunton, is preparing to head to the kakapo recovery programme on Codfish Island off Stewart Island.

Theirs has been an extraordinarily close partnership for nearly 40 years. They attended Henderson High and Auckland University together, and Brunton has found work at every university where Martin has been posted. In a striking coincidence, Brunton's father was also a panel beater – born on the same day in the same year as Martin's dad.

They both learned how to hot-wire cars, though they stress they never stole them. Brunton was better and faster at it, says Martin. "She once left her father's car burning on the side of the motorway when the wires got too hot, so she could get to a Gary Glitter concert."

At Yale in the late 1980s, where Martin was associate professor and Brunton worked in the biology department, the couple lived in New Haven – then the seventh-poorest city in the US, a place which made Henderson seem salubrious. "It was like your worst nightmares," says Martin, "with crack dealing on the streets, drugs, prostitution and the almost constant sound of gunfire."

Brunton arrived at her field site in Long Island Sound one morning to find it cordoned off by police – a fridge with two bodies emerging from it had washed up on the shore. "She was studying terns," Martin says with a gust of laughter.

The couple started dating at 18, though Brunton cheerfully agrees the seventh former she fell for was a bit of a nerd. "He always wore a white cardy with blue trim on the sleeves."

"It was adidas!" Martin protests.

These days, though, he buys most of the clothes for her and their two daughters (Jennifer, 22, a Toi Whakaari drama student in Wellington, and 16-year-old Kristin School student Amy, whom Martin describes as "a whiz at everything").

"He buys good-quality stuff like Armani. The girls just love it when he comes back from overseas trips."

The family lives in what one colleague describes as a "fabulous, completely over-the-top" mock-Tudor mansion in Albany featuring architectural relics from historic buildings demolished in Auckland in the 1970s. Martin likes getting guests to look



Gaven Martin with his wife, associate professor of ecology and conservation biology Dianne Brunton. As teen "Westies" they both learned how to hot-wire cars, though they emphasise they never stole them.

"It's important we do try to understand," he says, "because maths underpins so much around us."

up at the ceiling; he'll say, "Gauguin slept under this" because it was the former ceiling of an old Auckland hotel.

An art lover and avid collector, Martin has filled the house with artefacts, from glassware to dinosaur eggs: "Shopping was something we never did as kids so I enjoy it. But I love getting a bargain.

"People expect academics to be dry, boring people, uninterested in the finer things of life but I don't think that's true at all."

The boy who drove to Auckland University listening to Radio Hauraki now has a regular slot on Kim Hill's Radio New Zealand National show on Saturdays and says, though most of the audience won't "get it" right away, the level of intelligence is surprising.

It's important we do try to understand, he says, because maths underpins so much

around us, from the way the laser in our CD player works, to the technology that spins the drum in our washing machine.

"A little mathematical knowledge goes a very, very long way. If you look at the leading scientists in virtually any discipline, they all have significant maths skills. And in the business world, who are the people making the real money? Accountants, mathematical biologists, computer scientists, software engineers."

He points out the most revolutionary developments of last century – computers and the internet – evolved from the computer "toys" in the basements of mathematics departments.

While Martin rails against the shortage of skilled maths teachers – who are so underpaid they're either promoted into administration or attracted into other jobs – he says New Zealand's scientific future is not bleak "because there are lots of smart

kids who do well despite the system".

When he travels, he says he always tries to encourage New Zealanders to return home but believes most who go overseas at the crucial ages between 21 and 31 will be lost for good.

"I hope New Zealand absolutely rejects this notion that this is a great place to be breeding the next generation of successful Australians."

Education is the key, he says, as well as our ability to think smarter. "The total venture-capital market in New Zealand is \$100 million, give or take. That's just chicken feed to almost any other nation and if we spend our \$100 million trying to get pieces of technology that can be seen on the horizon you can be damned sure other countries have seen it on the horizon and are spending 10 times as much to get there first.

"We have to look beyond the horizon, to those things not yet seen." +