

Rota's Conjecture: Researcher solves 40-year-old math problem

August 15 2013

(Phys.org) —A Victoria University mathematician has experienced his own eureka moment, solving a 40 year-old mathematical problem.

Professor Geoff Whittle, from Victoria's School of Mathematics, Statistics and Operations Research, has been working with colleagues Professor Jim Geelen (Canada) and Professor Bert Gerards (Netherlands) to solve a problem posed by the famous mathematician and philosopher Gian-Carlo Rota in 1970.

Earlier this year the trio realised that, after more than 15 years of work, they had achieved all the essential ingredients to prove Rota's Conjecture.

Geoff visited the United Kingdom last month to break news of the discovery to mathematics colleagues at a conference where he was a guest speaker.

Rota's Conjecture relates to a specialised area of mathematics known as matroid theory, a modern form of geometry, which Geoff specialises in.

Rather than focusing on distance and angles, matroid theory investigates properties of structures which don't change under projection—for example, whether or not three points are always on a line, or four points are on a plane.

The theory investigates [geometric structures](#) that can be completely

different from those in our world, and Rota's Conjecture is a way of using mathematics to recognise these alternative structures.

"I like to compare it to Kafka's Metamorphosis story, where a man wakes up and realises he has transformed into an insect—the way he views the world changes entirely," says Geoff.

"Matroid theory is all about visualising a world of new geometrical structures and developing ways of describing the big, overarching structures which would emerge."

Although he has been working on proving Rota's Conjecture for a long period of time, Geoff says the hard work will really begin now, as the team starts writing up the results of its work.

"Resolving Rota's Conjecture is really special, and the product of many, many years of collaborative work.

"Now, we have a lot of writing to do, which I expect to take several more years—as well as many hundreds of pages of journal articles."

"It's a little bit like discovering a new mountain—we've crossed many hurdles to reach a new destination and we have returned scratched, bloodied and bruised from the arduous journey—we now need to create a pathway so others can reach it."

Head of School Dr Peter Donelan is also excited about the news, which he believes will attract international recognition.

"This will be regarded as one of the outstanding mathematical achievements in recent years," he says.

Geoff has been based at Victoria University since 1992, when he joined

the School of Mathematics, Statistics and Operations Research as a lecturer. He was promoted to Reader in 1997 and to Professor in 2001.

Geoff is recognised as a world leader in the field of discrete [mathematics](#). He has spent time as a visiting research fellow at Merton College, Oxford and is a Fellow of the Royal Society of New Zealand. In 1996, his achievements were recognised with the New Zealand Mathematical Society's Research Award.

Provided by Victoria University

Citation: Rota's Conjecture: Researcher solves 40-year-old math problem (2013, August 15)
retrieved 28 April 2024 from

<https://phys.org/news/2013-08-rota-conjecture-year-old-math-problem.html>

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