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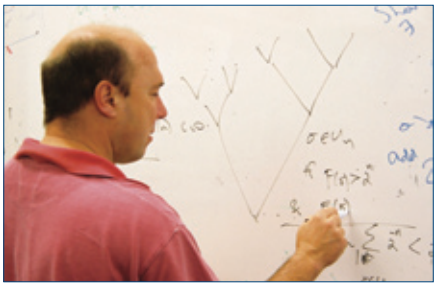
The dance of mathematics

At first glance, a connection between Scottish Country Dancing and complex mathematics is not immediately obvious. Anna Meyer investigates.

Developed in the 18th century, Scottish Country Dancing is believed to be derived from English country dancing, brought to Scotland by the gentry who had enjoyed it while on holiday. In this social form of dance that predates modern ballroom dancing, groups of couples follow precise, progressive footwork patterns, accompanied by different types of music.

In a classic example of the subtle relationship between maths and art, Rod Downey, a Professor of Mathematics at Victoria University and the first Maclaurin Fellow of the NZIMA, uses his mathematical work as inspiration for the dances he writes and performs as part of his favourite hobby.

Professor Downey's research involves understanding algorithmic processes, a discipline that has applications in many areas, particularly computer science. "An algorithm is a recipe for doing something," he explains. "There are a lot of theorems you can prove, but if you want to implement them in some form, say on a computer, you need an algorithm, so the computer can execute them in little steps. For example, when you turn your computer on, sitting behind there are algorithms. I guess you could call it on the borderline between mathematics and computer science."



Robert Downey Photo: Myles Herschell, drawn from Revisioning Science, a photo-essay project developed by Massey University and funded by the Government's Science and Technology Promotion Fund.

Look closer, and it becomes clear that Scottish country dances bear a striking resemblance to algorithms – indeed, to mathematics as a whole. Dances are written as a series of logical steps that participants must follow sequentially, and numbers are everywhere – in the number of couples, the precise formations they dance, and how the dance steps relate to the timing of the music.

"When you devise dances, you have to think about things moving in space, visualise what's going on," Professor Downey explains. "With a lot of the mathematics I do, you have to do the same kind of thing. I do phrasing and patterns in dances rather similarly to doing proofs – it's just that it's a little bit easier."

Mathematicians, he believes, actually make some of the best choreographers. "It's noticeable that a lot of the best dance devisors down through the years have actually been mathematicians. For example, Hugh Foss was one of the original devisors of modern dances, and he was a well-known mathematician who worked at Bletchley Park, decoding."

Professor Downey began dancing on the suggestion of his wife, Kristin, who had learned the hobby while living in Singapore. "I played a lot of sport when I was young, and I kept on getting injured, so my wife said "why don't you come along and see what it's like?" I went along and I liked it."

Now a qualified teacher, he has written a book of new dances, The Cane Toad Collection, and is working on a second one. Dance titles that include They Stole My Wife From Me Last Night, Jill's Dental Jig, and Buttermilk Falls, reflect the fact that the dances are full of personality and interest.

When not at work or involved in dancing, Professor Downey can often be found indulging in his other favourite hobby – surfing at Makara Point or in the Wairarapa. This, however, does not have a maths basis. "That's purely just for pleasure," he says.