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The professor's days are numbered

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By Keith O'Brien, Globe Correspondent | July 18, 2005

Most people don't want to become a number. Dan Rockmore is OK with it.

That's not just because he's a professor of mathematics at Dartmouth College with a recently published book devoted to the subject. Numbers, Rockmore likes to say, are all around us: in our genes, in the way we move, in the music we like, and the things we buy.

Examined closely, they tell a story. And Rockmore, 43, is all about finding stories in numbers.

"Everybody has this fear: 'I don't want to be reduced to a number.' That's a standard phrase," he said recently from his office on campus in Hanover, N.H. "But you shouldn't think of it as being reduced to a number. You should think of it as being transformed to a number."

Rockmore is the sort of guy who wears jeans and sneakers to class, who doesn't like to be called professor by his peers, and wants, more than anything else, to make his students understand the practical applications of math. By that, he doesn't mean balancing a checkbook. He means using math to bring the world into sharper focus or, at the very least, not being afraid of math.

"I think it's a tragedy," he said, "when people get turned off by mathematics or quantitative kinds of approaches very early in life."

To head that off, Rockmore tries to keep math interesting. For years, he and a fellow professor have taught a course about mathematics in music. This fall, he and another colleague will teach a course focusing on the mathematics of computer animation. He has made one documentary, "The Math Life," and he is working on more.

But it's his recently published book, "Stalking the Riemann Hypothesis: The Quest to Find the Hidden Law of Prime Numbers," that is his most public effort yet at turning numbers into narrative.

It is, quite literally, a million-dollar story. Five years ago, the Clay Mathematics Institute in Cambridge offered \$1 million to anyone who could prove the Riemann Hypothesis, a theory presented by Bernhard Riemann in 1859 that baffles the best analytical minds to this day.

"I want the million dollars. Who wouldn't want it?" Rockmore said. But he isn't trying to prove the hypothesis. Rockmore said he can't. "I just have to say this problem is truly out of my league." In Riemann, Rockmore simply found another story.

A quick math lesson: Prime numbers are numbers like two, three, five, and seven, numbers divisible only by one and itself. They are infinite in number. But Riemann suggested that they are not random. They could be predicted, he said. And there are few things a mathematician likes more than a nice, solid prediction.

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The thing is, Riemann never proved it. He fell ill shortly after his "brief moment of glory," Rockmore writes, and died eight years later without settling the issue. Others tried. Just a few years ago, Rockmore said, "You couldn't swing a dead cat without hitting the Riemann Hypothesis." It was everywhere. Some even thought they were close to solving it, Rockmore said, but the solution slipped away.

And so today, Riemann's idea remains just that. All Rockmore can say with certainty is that prime numbers, like all numbers, play a role in our lives. They are used to encrypt personal financial information on the Internet, making it possible to buy books, music, and most everything else online.

That's yet another practical application of math, Rockmore said, and one most people would enjoy thinking about, if they could get over the fact that it was math.

"Out in the world, you're a huge collection of numbers now. It's a long list, and it's going to get longer," he said. "We are all a bunch of numbers."

FACT SHEET

Home: Grew up in New Jersey, now splitting his time between Hanover, N.H., and New York City.

Education: Bachelor's degree in mathematics from Princeton University in 1984, followed by a master's in mathematics in 1986 and PhD from Harvard University in 1989.

Family: Wife, Ellen, and son, Alex, 15 months old.

The sidekick: For years, it was his trusty golden retriever, Digger, a dog that was known to accompany Rockmore around campus and pretty much everywhere else he went. His death last August from cancer devastated Rockmore, who still keeps Digger's photos on his website and food bowls in his office. "He was always next to me," Rockmore said.

As a child: Rockmore watched his father, a physicist, working out problems on a board and found himself infatuated with the equations. "It was total magic, total mystery," he said. "But still sort of beautiful. It was like this secret world of symbols."

His research interest: Prime numbers are numbers -- like 2, 3, 5, and 7 -- that are divisible only by one and itself. Bernhard Riemann came up with a formula to suggest that these numbers occur in a certain pattern. While the formula, known as the Riemann Hypothesis, has attracted much attention since that first mention in 1859, it remains unproven, leaving \$1 million in prize money unclaimed and a story of mathematics unfinished. ■

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