

THE JOY OF X: A GUIDED TOUR OF MATHEMATICS FROM ONE TO INFINITY by Steven Strogatz, Atlantic Books, 2013, 336 pp, £20 hardback, ISBN: 9781848878433.

Steven Strogatz is Jacob Gould Schurman Professor of Applied Mathematics at Cornell University. He is widely known in maths and physics, notably for a 1998 Nature paper with his graduate student Duncan Watts, entitled 'The collective dynamics of small world networks'. This classic has accumulated almost 20,000 citations, clocking up an extra mention once every six hours. The small world effect is a cultural icon, providing the theory of Kevin Bacon and Erdős numbers. Whether in movies or mathematics, we are all mutually connected by a frighteningly small number of links.

Strogatz also has an impressive reputation as a mathematical populariser. A tour of the mathematical section of YouTube shows why his engaging sense of humour and sharp mind have penetrated depths unplumbed by ordinary mathematics teachers. Here he shows that his mastery extends also to the printed word. The book contains a series of snappily-titled short essays, most of which first appeared as columns in the *New York Times*, divided logically according to broad mathematical themes. Each essay addresses, in a self-contained manner, a key mathematical concept, bread-and-butter to most present readers, but less so to *New York Times* readers. The result is a narrative which succeeds in communicating the essence of mathematical ideas (and the joy we receive from them!) across that cultural divide which most of us find so difficult to penetrate.

As an example 'From fish to infinity' addresses counting: why isolate a 'sixness' apart from the six of something being counted? 'Location location location' discusses advantages of the Arabic number system, compared to the previous Latin numerals. 'Take

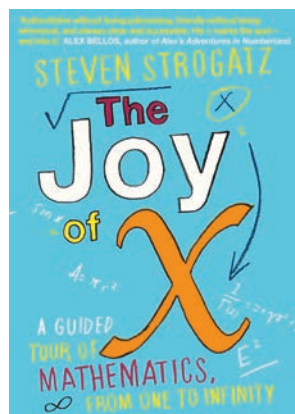
it to the limit' discusses Archimedes's argument for the circle area formula $A = \pi r^2$, anticipating the invention of calculus by two thousand years, and breathing life into an otherwise formal exercise. 'Square dancing' dramatically reminded me of a long-forgotten geometrical proof of Pythagoras's theorem. 'Hilbert Hotel' explains countability, while 'The loneliest numbers' discusses prime number theorems.

Most readers will be horrified by the innumeracy of our ruling classes, and their apparent inability to understand data analysis. A separate section is devoted to this subject. 'Untangling the web' discusses Google's page-rank algorithm, and 'Chances are' the Prosecutor's Fallacy. As examples of poor mathematical reasoning by m' learned friends, Strogatz exposes naive statistical arguments adduced by both prosecution and defence in the celebrated O.J. Simpson murder case.

Readers of this review will want this book more to use in their outreach work, or as gifts for family members, than to buy for their own use. The style is 'North-American-folksy', and recalls that of Feynman. Some may find it irritating, but others will find it an essential aid to overcome their dyscalculia. The more technical notes at the back of the book are well-written and illuminating. £20 (advertised price) is a bit steep, although Amazon offers it at £12 (but use your local bookseller!). A paperback edition is also projected at a more reasonable price. A Kindle edition is also on sale at £8.15. Recommend!

Tim Sluckin
Professor of Applied Mathematics
University of Southampton

Tim Sluckin is co-author (with David Dunmur) of *Soap, science and flat screen TVs, a history of liquid crystals* (OUP 2011).



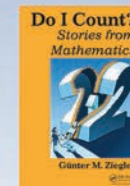
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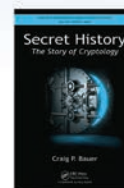
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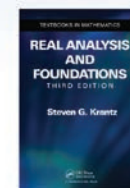
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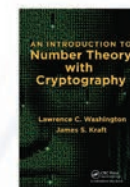
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