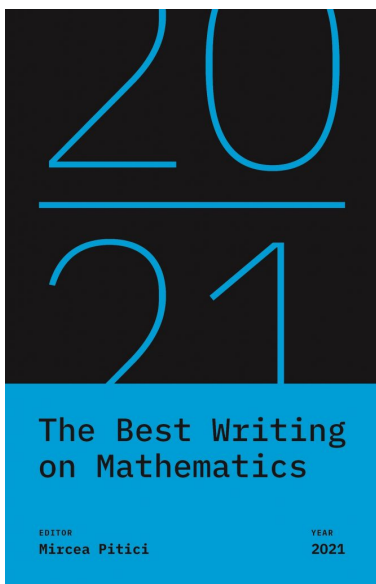


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Book Reviews bring interesting mathematical sciences and education publications drawn from across the entire spectrum of mathematics to the attention of the CMS readership. Comments, suggestions, and submissions are welcome.

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The Best Writing on Mathematics, 2021

Edited by Mircea Pitici
 Princeton University Press, 2022
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Reviewed by Karl Dilcher

Reviews of past issues of *The Best Writing on Mathematics* can be found in the 2019, 2020, and 2022 volumes of CMS Notes.

“So much to read, so little time!” is a common complaint that is known in several variations. Different solutions have been suggested, including speed reading. I tried learning a technique once when I was younger; but in the end, I had to agree with Woody Allen who reportedly said in one of his early comedy routines, “I read War and Peace in 20 minutes—It’s about Russia.”

A much better solution is to get advice from a trusted friend or colleague on what to read, and then read it slowly and in depth. When it comes to the large number of shorter pieces of writing in any given field, including mathematics, such a friend or colleague can also be a trusted and knowledgeable editor and/or anthologist.

This is the solution I have now happily relied on for several years, with the help of the series *The Best Writing on Mathematics*, edited by Mircea Pitici and published by Princeton University Press since 2010. The book under review is the twelfth volume in this remarkable series of annual anthologies. In the brief review of *The Best Writing on Mathematics, 2018*, I addressed some general features shared by all volumes. I will not repeat these remarks here; the interested reader will find them in the September 2019, issue. Instead, I quote from the Introduction to the current volume, where the Editor recalls that the series brings together “diverse perspectives on mathematics, its application, and their interpretation—as well as on their social, historical, philosophical, educational, and interdisciplinary contexts. The volume should be seen as a continuation of the previous volumes.”

A bit later in the Introduction, Pitici writes, “The pieces offered this time originally appeared during 2020 in professional publications and/or in online sources. The content of the volume is the result of a subjective selection process that started with many more candidate articles. [...] Once again, this anthology contains an eclectic mix of writings on mathematics, with a few even alluding to the events that just changed our lives in major ways.”

I will now quote from the overview of this current volume and add the titles of the 26 individual pieces of writing, as I did in the two previous years. The average length of the pieces is almost exactly 10 pages.

“To start, Viktor Blåsjö takes a cue from our present circumstances and reviews historical episodes of remarkable mathematical work done in confinement, mostly during wars and imprisonment. [*Lockdown Mathematics: A Historical Perspective*].

“Andrew Lewis-Pye explains the basic algorithmic rules and computational procedures underlying cryptocurrencies and other blockchain applications, then discusses possible future developments that can make these instruments widely accepted. [*Cryptocurrencies: Protocols for Consensus*].

“Michael Duddy points out that the ascendancy of computational design in architecture leads to an inevitable clash between logic, intellect, and truth on one side—and intuition, feeling, and beauty on the other side. He explains that this trend pushes the decisions traditionally made by the human architect out of the resolutions demanded by the inherent geometry of architecture. [*Logical Accidents and the Problem of the Inside Corner*].

“Steve Pomerantz combines elements of basic complex function mapping to reproduce marble mosaic patterns built during the Roman Renaissance of the twelfth and thirteenth centuries. [*Cosmatesque Design and Complex Analysis*].

“Ben Logsdon, Anya Michaelsen, and Ralph Morrison construct equations in two variables that represent, in algebraic form, geometric renderings of alphabet letters—thus making it possible to generate word-like figures, successions of words, and even full sentences through algebraic equations. [*Nullstellenfont*].

“Maria Trnkova elaborates on crocheting as a medium for building models in hyperbolic geometry and uses it to find results of mathematical interest. [*Hyperbolic Flowers*].

“Yelda Nasifoglu decodes the political substrates of an anonymous seventeenth century play allegorically performed by geometric shapes. [*Embodied Geometry in Early Modern Theatre*].

“In the next piece, Stephen K. Lucas, Evelyn Sander, and Laura Taalman present two methods for generating three-dimensional objects, show how these methods can be used to print models useful in teaching multivariable calculus, and sketch new directions pointing toward applications to dynamical systems. [*Modeling Dynamical Systems for 3D Printing*].

“Joshua Sokol tells the story of a quest to classify geological shapes mathematically—and how the long-lasting collaboration of a mathematician with a geologist led to the persuasive argument that, statistically, the most common shape encountered in the structure of the (under)ground is cube-like. [*Scientists Uncover the Universal Geometry of Geology*].

“Don Monroe describes the perfect similarity between foundational algorithms in quantum computing and an experimental method for approximating the constant p , then asks whether it is indicative of a deeper connection between phenomena in physics and mathematics or it is a mere (yet striking) coincidence. [*Bouncing Balls and Quantum Computing*].

“Kevin Hartnett relates recent developments in computer science and their unforeseen consequences for physics and mathematics. He explains that the equivalence of two classes of problems that arise in computation, recently proved, answers in the negative two long-standing conjectures: one in physics, on the causality of distant-particle entanglement, the other in mathematics, on the limit approximation of matrices of infinite dimension with finite-dimension matrices. [*Landmark Computer Science Proof Cascades through Physics and Math*].

“David Hand reviews the risks, distortions, and misinterpretations caused by missing data, by ignoring existing accurate information, or by falling for deliberately altered information and/or data. [*Dark Data*].

“In the same vein, Michael Wallace discusses the insidious perils introduced in experimental and statistical analyses by measurement errors and argues that the assumption of accuracy of data collected from observations must be recognized and questioned. [*Analysis in an Imperfect World*].

“In the midst of our book—like a big jolt on a slightly bumpy road—John Conway, Mike Paterson, and their fictive co-author Moscow, bring inimitable playfulness, multiple puns, and nonexistent self-references to bear on an easy game of numbers that (dis)proves to be trickier than it seems! [*A Headache-Causing Problem*].

“Next, Sanjoy Mahajan explains (and illustrates with examples) why some mathematical formulas and some physical phenomena change expression at certain singular points. [*A Zeroth Power is Often a Logarithm Yearning to Be Free*].

“Stan Wagon describes the counterintuitive movement of a bicycle pedal relatively to the ground, also known as the “bicycle paradox”, and uses basic trigonometry to elucidate the mathematics underlying the puzzle. [*The Bicycle Paradox*].

“Jacob Siehler combines modular arithmetic and the theory of linear systems to solve a pyramid-coloring challenge. [*Tricolor Pyramids*].

“Natalie Wolchover untangles threads that connect foundational aspects of numbers with logic, information, and physical laws. [*Does Time Really Flow? New Clues Come from a Century-Old Approach to Math*].

“The late Harold Edwards pleads for a reading of the classics of mathematics on their own terms, not in the altered “Whig” interpretation given to them by the historians of mathematics. [*The Role of History in the Study of Mathematics*].

“Michael Barany uncovers archival materials surrounding the birth circumstances, the growing pains, and the political dilemmas of the Notices of the American Mathematical Society—a publication initially meant to facilitate internal communication among the members of the world’s foremost mathematical society. [*“All of These Political Questions”: Anticommunism, Racism, and the Origin of the Notices of the American Mathematical Society*].

“Mike Askew pleads for raising reasoning in mathematics education at least to the same importance give to procedural competence—and describes the various kinds of reasoning involve in the teaching and learning of mathematics. [*Reasoning as a Mathematical Habit of Mind*].

“Roger Howe compares the professional opportunities for improvement and the career structure of mathematics teachers in China and in the United States—and finds that in many respects the Chinese ways are superior to the American practices. [*Knowing and Teaching Elementary Mathematics—How are We Doing?*].

“Stephen Ramon Garcia draws on his work experience with senior undergraduate students engaged in year-end projects to distill two dozen points of advice for instructors who supervise mathematics research done by undergraduates. [*Tips for Undergraduate Research Supervisors*].

“Adam Glesser, Bogdan Suceavă, and Mihaela B. Vâjjiac read (and copiously quote) Sophie Germain’s French *Essays* (not yet translated into English) to unveil a mind not only brilliant in original mathematical contributions that stand through time, but also insightful in humanistic vision. [*“The Infinite Is the Chasm in Which Our Thoughts Are Lost”: Reflections on Sophie Germain’s Essays*].

“Melvyn Nathanson raises the puzzling issues of authorship, copyright, and secrecy in mathematics research, together with many related ethical and practical questions; he comes down uncompromisingly on the side of maximum openness in sharing ideas. [*Who Owns the Theorem?*]

“In the end piece of the volume, Terence Tao candidly recalls selected adventures and misadventures of growing into one of the world’s foremost mathematicians.” [*A Close Call: How a Near Failure Propelled Me to Succeed*].

Returning to the Introduction, the Editor mentions the difficulties of compiling this volume, the main work of which was done during the height of the COVID crisis. This meant that many print-only resources were not available to him. Still, in addition to the fascinating 26 pieces of writing published here, the volume ends with a chapter on *Notable Writings*, containing a sizeable list of *Notable Journal Articles* and a list of close to 30 *Notable Journal Issues* which are “fully or partly dedicated to the specified topics—or contain symposia on the respective theme”.

The tone of the Introduction to this volume is more subdued than that of earlier volumes, and the Editor also mentions that it is shorter than in the past, and that, due to the COVID crisis, some additional material (e.g., a book list) is lacking. More concerning, the Editor indicates that the series faces an uncertain future. I sincerely hope that any difficulties facing further publication have been, or will be, overcome, and that Princeton University Press will make it possible for Mircea Pitici to continue providing this wonderful service to the community.

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