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Book Review: Encyclopedia of Mathematics and Society

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BOOK REVIEW

Encyclopedia of Mathematics and Society, Sarah J. Greenwald and Jill E. Thomley eds., Salem Press, 2011, 1191 pp., ISBN 9781587658440. \$395.

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Relics of the past

When I was a child, we had shelves full of encyclopedias—encyclopedias on the history of humanity, encyclopedias on the human body, encyclopedias of world geography. I vividly remember the day we landed everyone’s favorite, the industry standard *Encyclopaedia Britannica* (EB)! My sister and I read these encyclopedias voraciously. My sister would occasionally pick a volume off the shelf and disappear. You would not see her for hours until finally she surfaced, having read, page-by-page, all of the letter L.

I was an obsessive reader of a different kind. I had my favorite entries (**rabies** and **hypnosis** come to mind) and I would read those over and over. It was not until I left for graduate school and did not have the chance to refresh my memory regularly that I finally forgot the specifics of each entry.

That was then. Today, my four-year-old promptly tells me to “check it on Wikipedia” or “ask Google” if I do not immediately know the answer to a question. She lives in a world that did not exist a mere ten years ago, a world where shelves and shelves of encyclopedias do not represent the whole of knowledge, even to a four-year-old.

Where does the *Encyclopedia of Mathematics and Society* fit in? Although a dedicated reader of encyclopedias, I have not yet purchased one for my children. When Wikipedia, Google, and so much more is at our fingertips, why bother? So where do these volumes belong? It seems like the intended audience might be school libraries, but as they are defunded and slowly scraped off the face of the earth, at least in this country, I do not know who will find these books and read them.

That is not to say that I was not thrilled to get a copy of the *Encyclopedia of Mathematics and Society* (EMS) to read and review. And read I did. The EMS boasts approximately 500 entries, split into fifteen categories:

Architecture and Engineering,
Arts, Music, and Entertainment,
Business, Economics, and Marketing,
Communications and Computers,
Friendship, Romance, and Religion,
Games, Sports, and Recreation,
Government, Politics, and History,
History and Development of Curricular Concepts,
Mathematics Around the World,
Mathematics Culture and Identity,
Medicine and Health,
School and Society,

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Space, Time, and Distance,
Travel and Transportation,
Weather, Nature, and the Environment.

Unlike A. J. Jacobs [1] who read the whole of EB and lived to tell about it, I have read only about half the entries in the EMS. However, I must admit that they are not distributed evenly across the categories, as I was much more fascinated by *Friendship, Romance, and Religion* than by *Travel and Transportation*. Nonetheless, I conjecture that besides the two diligent editors (Sarah J. Greenwald and Jill E. Thomley, both of Appalachian State University), I am the only person who has read so much of the text. “How about the copyeditor?”, you ask? I doubt there was one, given the numerous typos and minor—but annoying—grammatical errors.

So far you will have gathered that I find it difficult to identify the appropriate audience for these books, and that the many superficial errors are irritating. But don’t stop reading this review. The rest is all love and roses. For the most part.

A song of praise

The expanse and breadth of these volumes is amazing! Every student who asks, “Where will I ever use this?” and every guy who smirks or shrinks when you tell him you do math for a living will find something of interest here. The entries cover standard mathematical ideas like **Infinity**, **Function Rate of Change**, and **Sequences and Series**, but also mathematically-rich scientific and technical concepts like the **Geometry of the Universe**, **Carbon Footprint**, and **Stock Market Indices**, and even topics where the mathematics is more deeply hidden, like **Pregnancy**, **Deforestation**, and **Religious Symbolism**. The range and power of mathematics is here in all its glory, and the reader, especially one saddened by society’s lack of respect for mathematics, cannot help but feel uplifted, even after skimming the table of contents or the index. This is without a doubt a momentous enterprise, a huge task that the two editors have undertaken and successfully accomplished. And the end product looks good. The volumes are sturdy and sharp, the images are clear and detailed, the entries are rich and often unexpected.

The EMS deserves comparison with another recently-produced, large-scale enterprise: *The Princeton Companion to Mathematics*. Having perused both carefully, here is my impression. The *Princeton Companion* requires more mathematical maturity of its readers, and mathematical readers will be more satisfied with its content. However, the EMS covers a much broader spectrum of topics relating to society. In other words, these two complement each other, and together provide an almost exhaustive overview of today’s mathematics. Just what my childhood encyclopedias promised: the whole world in your hands.

What I learned

A ton! Test yourself. Did you know that:

- Bram Stoker was a math major? (**Castles**)
- “The geometry of modern toilets has been analyzed by engineers using a variety of mathematical and statistical methods”? (**Toilets**)
- “Because of their intelligence and interesting personalities, mathematicians appear as characters in many works of fiction”? (**Literature**)

- As of 2010, the average US household has just fewer than three televisions? (**Nielsen Ratings**)
- “The broad variety of optical illusions cannot be explained by a single cause; therefore, a unitary theory of optical illusions is rather unlikely”? (**Optical Illusions**)
- Origami can be used for document certification? (**Origami**)
- “Words from the French language may be common in ballet terminology, but concepts from mathematics abound as well”? (**Ballet**)
- There is a new trend in food called *molecular gastronomy*? (**Cooking**)
- The hobby of crocheting stuffed animals has a name, *Amigurumi*? (**Crochet and Knitting**)
- The first three digits of a social security number are related to location? (**Pensions, IRAs, and Social Security**)
- “Preparing a tax return is an activity too difficult for a mathematician and is better suited for a philosopher”? (Alfred Einstein, as quoted in **Sales Tax and Shipping Fees** and paraphrased in **Income Tax**)
- “The connection between religion and mathematics is intricate, spanning cultures and centuries, with mathematics itself sometimes manifesting religion-like features”? (**Mathematics and Religion**)
- Every TI calculator when reset produces 0.94359740249213 as its first random number? (**Video Games**)
- “The emphasis on fast motion, tricks, and personal expression in extreme sports makes geometry especially relevant to athletes”? (**Extreme Sports**)
- “The name ‘gerrymander’ was first used by the Boston Gazette in 1812 to describe the shape of Massachusetts Governor Elbridge Gerry’s redistricting plan, in which one district was said to have resembled a salamander”? (**Gerrymandering**)
- In the Middle Ages, accountants used VIII for 9 while stonemasons used IX? (**Addition and Subtraction**)
- We have about 16,000 pacemaker cells in our hypothalamus? (**Pacemakers**)
- Surgeons managed to do a face transplant in 2010? (**Transplantation**)
- The poliovirus capsid has icosahedral symmetry? (**Viruses**)
- “NASA declared the universe to be flat within a 2 percent margin of error”? (**Geometry of the Universe**)
- “Only mathematics can prevent forest fires”? (**Forest Fires**)
- “In children younger than 6, problem solving abilities strongly correlate with foot size”? (**Green Mathematics**)

What is mathematics, really?

One quibble about the name. It is not completely accurate to call this an encyclopedia of mathematics and society. Many entries are quantitative or algorithmic, but not quite mathematics *per se*. Several entries, furthermore, describe engineering or physics applications exclusively. A typical mathematician might not take these to be genuine examples of mathematics. If you consider that the eventual audience is mostly non-mathematicians, however, then this might be all right. Your typical nonmathematician will probably not be so discriminating.

EMS entries as essays

Individual entries of the EMS were meticulously crafted by experts and enthusiasts (approximately two hundred of them!). Most pieces are charming, insightful essays on the topic at hand and easily stand alone. There is no comparison to the entries you would find in my childhood industry standard EB. For instance, the entry on **National Debt** begins:

Mathematician Richard Feynman once said, “There are 10^{11} stars in the galaxy. That used to be a huge number. But it’s only a hundred billion. It’s less than the national deficit! We used to call them astronomical numbers. Now we should call them economical numbers.”

Or consider the first sentence on **Skydiving**:

Skydiving is the act of leaping out of an airplane at a sufficient altitude and placing your life in the hands of a piece of cloth— although a fairly large piece of cloth.

What about this description of the National Security Agency (from **Intelligence and Counterintelligence**):

The National Security Agency (NSA) is a riddle wrapped in a mystery inside a code—a black palace of glass located in Fort Meade, Maryland.

These are not Wikipedia writers! These essays won’t make it into the *Encyclopaedia Britannica*, either. They have too much character; they are too playful; they are all around too much fun to read.

Verdict

The *Encyclopedia of Mathematics and Society* is an impressive achievement of collective effort and serious thought, an amazing collection of delightful, unexpected essays, a sourcebook for students and teachers alike. The experience of reading the EMS was, for this encyclopedia enthusiast, enlightening and enjoyable.

If any librarians out there are still wondering, let me be clear: I strongly recommend this encyclopedia. For individuals, the expense might well be an initial turn-off; keeping in mind that the hard copy books come with online access to the same content might alleviate some of the pain.

As for me? I expect to enjoy these three volumes for years to come.

Reference

1. A. J. Jacobs, *The Know-It-All: One Man’s Humble Quest to Become the Smartest Person in the World*, Simon & Schuster, New York, 2004.