Loving and Hating Mathematics
by Reuben Hersh and Vera John-Steiner

Loving and Hating Mathematics (hereafter referred to as Loving and Hating) is the child of two passionate scholars, a mathematician and a social scientist. Reuben Hersh is known to some readers for his many articles in the Intelligencer and earlier books, such as The Mathematical Experience coauthored with Davis and Marchisotto, and What is Mathematics Really? The latter had a substantial effect upon the older of us; it was, at the time of publication, a welcome blast of mathematical humanism.

Loving and Hating is written in the same clear, gentle style, and it aims to vanquish four myths:

1. Mathematicians are different from other people, lacking emotional complexity.
2. Mathematics is a solitary pursuit.
3. Mathematics is a young man’s game.
4. Mathematics is an effective filter for higher education.

Outline of Loving and Hating
Loving and Hating addresses mathematical beginnings, culture, solace, addictive potential, communities, gender and age related-issues, philosophies of teaching of mathematics in universities, and the teaching of mathematics in schools. At 416 pages, it is as compact as it could be, given the ambitious breadth of its scope.

Only the last and first chapters of the book deal directly with school mathematics. This makes the cover design (credited to Lorraine Betz Doneker) particularly worthy of mention. The image is emblematic of a key message, which the authors state as they conclude their last chapter: Because we love mathematics, we want to minimize the number of those who hate it. Two adorable little boys in short-trousered school uniforms sit in front of a blackboard, with a silver trophy between them. One is forward facing and looks quite content, the other is notably unhappy and gazes to the side. They personify the Loving and Hating of the title, as we realized when a young person who glanced at the book instantly associated himself with the sad-looking child.

Loving and Hating is not a recipe-book for addressing problems with school experiences of mathematics, however. Rather, it is a tour of mathematical life in the large, carrying with it a recommendation that issues relating to the school-level experience of mathematics should be addressed in terms of mathematics in its entirety, and in particular the joy that its practitioners take in the endeavor.

The chapters are:

Chapter 1: Mathematical Beginnings
Here the authors address how a child becomes engaged in mathematics. The trophy on the front cover points to the section on mathematics competitions. We learn of the childhood mathematical experiences of famous mathematicians, such as Terence Tao, Carl Friedrich Gauss, Sonia Kovalevskaya, and many others, and observations of personality and psychological traits recurrent in children’s enjoyment of mathematics.

Chapter 2: Mathematical Culture
Mathematics has a culture reaching back over a long, long time. The authors’ description encompasses thoughtful forays into four main ideas: abstraction, aesthetics, belongingness, and the tension between collaboration and competition.

Chapter 3: Mathematics as Solace
The authors ask: “Is mathematics a safe hiding place from the miseries of the world?” and answer that it can be. For instance, absorption in mathematics can temporarily keep the worries of the world at arm’s length. It can even be a means of coping with situations as extreme as imprisonment.

Chapter 4: Mathematics as an Addiction:
Following Logic to the End
What does “mathematics as addiction” mean? The authors give us a sample of some extremes: after a mention of John Nash, whose life and schizophrenia were the subject of the book and movie A Beautiful Mind, they paint a detailed picture of the extraordinarily creative and intense life of Alexander Grothendieck. Then follow “five cases of actual criminal or suicidal insanity in other mathematicians,” including famous cases such as the tragic later life and death of the renowned logician Kurt Gödel.

Chapter 5: Friendships and Partnerships
This chapter describes some famous friendships between mathematicians, including: Karl Weierstrass and Sonia Kovalevskaya, the trio of Hardy, Littlewood, and Ramanujan, and the friendship between Gödel and the physicist Albert Einstein. Mathematical marriages such as the Robinsons (Julia and Raphael) are also described – see also the book Julia and film Julia Robinson and Hilbert’s Tenth Problem. The importance of friendships and partnerships in sustaining the individuals involved is described both in particular and in general.

Chapter 6: Mathematical Communities
Communities of mathematicians have formed spontaneously or in organized ways to meet the needs of the groups that comprise them. Examples given here range from the faculty at the University at Göttingen in Germany (1890s-1930s), the famous French group Bourbaki, which began in the 1930s, and the short-lived Jewish People’s University (1978-1983) in Moscow, to contemporary examples such as the Association for Women in Mathematics (AWM) and the web-supported...
Polymath Project. The authors describe ways in which communities support their members, how communities themselves die or flourish, and how they relate to larger mathematical communities.

Chapter 7: Gender and Age in Mathematics
In this chapter the authors examine mathematical life through the lenses of gender and aging. The experiences of many famous women mathematicians are described, including historical examples in which being female was a considerable impediment to mathematical life, such as experienced by Sonia Kovalevskaya and Emmy Noether. Notably absent is Lady Ada Lovelace, famous for her early work on algorithms and information in relation to Babbage’s analytical machine. The varied experiences of contemporary women mathematicians, such as Karen Uhlenbeck, Joan Birman, and Fan Chung, are described. Again, this is just a selection—pleasingly, there are now too many accomplished women in the profession to be comprehensive; the selection does not include other equally notable women such as Cathleen Morawetz, nor any non-Americans.

The experience of being a mathematician and growing older is also described in some of its varied detail, reprising results from an earlier published survey conducted by Hersh as well as comments from other surveys.

Chapter 8: The Teaching of Mathematics: Fierce or Friendly?
The focus here is on two University-level methods: those of Robert Lee Moore (Moore Method) and Clarence Francis Stephens (Potdasm Model), both from the USA. They are extreme points rather than the sort of barycentric averages that may be common practices today in the USA and other countries. These models, the authors explain, “embody two different, opposed strains in American Education: the egalitarian versus the elitist; the cooperative versus the competitive; the heritage of the Declaration of Independence versus the heritage of the Confederate States of America.”

Chapter 9: Loving and Hating School Mathematics
The final chapter begins with observations on how school mathematics affects the feelings of adults toward mathematics, including the “hating” of the book’s title. The authors provide very little description of mathematics in the classroom as experienced by school students; they refer to mathematical learning in a variety of contexts, such as the shopping contexts investigated by anthropologist Jean Lave. The chapter includes many suggestions for reform in the teaching of mathematics, with reference to various trial programs. That people have multiple different kinds of intelligences, and that teaching generally should not privilege mathematical thinking or even specific kinds of mathematical thinking, is a thread underlying many of these suggestions.

End Matter
The book ends with five pages of conclusions, nine pages of “literature review” listing other popular books on mathematics, and thirty-four pages of paragraph-long biographies of mathematicians. This last compendium was of particular interest to the (mathematician) husband of one of us, who picked up the book upon its arrival in the household and, on discovering the biographies, sequestered it until he had read them (and the rest of the book) through. This biographical “digestif,” with its overview of the lives of well known and less known mathematicians, may be one of the highlights for readers in the mathematical community.

To summarize, Loving and Hating is a sweeping survey of mathematical life, into which the four myths and the antidotes the authors provide are woven. We find ourselves largely in agreement on its strengths and weaknesses; the remainder of this review is a snapshot of our discussions. We write in explicit dialogue (JB for Jon Borwein and JO for Judy-anne Osborn), to clarify our different perspectives and occasional disagreements. Where we write in one voice, we agree with each other.

We structure our remarks around the following two sets of questions, which arose for us in the reading.

About the Myths
1a. Are the four claims actually myths?
1b. Who believes them?
1c. Are these myths about mathematicians, or about broader groups?

About the Audience
2a. To whom is the book addressed by the authors?
2b. To whom would the book be useful?
2c. Will the book Loving and Hating find its audience?

1. The Myths One by One

Myth 1
Mathematicians are different from other people, lacking emotional complexity

Is this a widely held belief? Does it have a basis in fact? Hersh and John-Steiner have run two claims together here. Is obfuscation the result?

JB: If Myth 1 is meant to say that mathematicians are “a bit odd,” then it is widely believed. It is sometimes, but not always, true. I grew up around many mathematicians, who ranged from the urbane and articulate to the seemingly mute.

JO: Quite a few anecdotes in Loving and Hating reinforce a perspective of eccentricity. For instance the one where R. H. Bing drives colleagues to a conference, and when the windscreen fogs up, uses it to draw mathematical diagrams on, instead of wiping it clean.

JB: Films such as A Beautiful Mind pick up on and emphasize the idea of the eccentric or insane mathematician. It is a myth that being crazy helps a person do good mathematics (or much of anything else): it doesn’t. As Michael Crichton had said, however, “All professions look bad in the movies - why should scientists expect to be treated differently?”

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