

Lives of the Mathematicians

A review of

(cover image)



Loving and Hating Mathematics: Challenging the Myths of Mathematical Life

by Reuben Hersh and Vera John-Steiner

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Reviewed by

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In *Loving and Hating Mathematics: Challenging the Myths of Mathematical Life*, Reuben Hersh and Vera John-Steiner describe the extremes of joy and frustration experienced by mathematicians and explore reasons why some people dislike the subject so intensely. Their major objective is to address what they see as distorted stereotypes. They review the lives of numerous mathematicians, most well known but some familiar only to practitioners of the field; in this way they hope to change the popular view of mathematicians as being somehow different from the rest of us.

The book is organized around four common beliefs that the authors consider to be myths. They address the belief that mathematicians exclude emotions from their thinking. They consider whether mathematics is a solitary pursuit. They address assumptions about age and gender. Finally, they consider the role of mathematics in the lives of nonmathematicians and challenge the belief that mathematics is an effective filter for higher education.

No doubt mathematics is seen as a peculiar enterprise by many people. The nonexpert's understanding of what expert mathematicians do probably amounts to less than

that for any other field. Considering the strange behavior of some noted mathematicians, as portrayed in popular books and movies, it is no surprise that stereotyped views of mathematicians should be widespread.

It is worth bearing in mind, though, that stereotypes exist for a reason. They are a form of schema that makes possible the efficient processing of social information, and as a rule they are accurate reflections of experience. They can be harmful, of course, in several respects. If based on experience that is vicarious (portrayals in the media, for example) rather than direct, they can be very inaccurate representations of reality. Once formed, they distort our perception of subsequent experiences, and their very efficiency discourages us from seeing people as individuals. It is useful to evaluate stereotypes about mathematicians, therefore, and to encourage nonmathematicians to look past the group to the individuals.

The method used by Hersh and John-Steiner is to examine the lives of numerous mathematicians, taking stories and anecdotes from their autobiographies or from other sources. This approach has an obvious appeal, especially if one seeks to emphasize the individuality of these mathematicians. It is interesting and engaging, but it does have its limitations. The reader cannot know how representative these individuals are of the group as a whole. Furthermore, since the authors say little about nonmathematicians, it is impossible to know what, if anything, might make mathematicians special.

Because the book is organized around the four myths, the authors' success must depend on the effectiveness of their attempt to shatter these myths. I'll summarize their treatment of each in turn.

Mathematics and Emotion

Myth Number One is that mathematicians are unemotional. It is not clear why the authors assume that this is part of the stereotype of mathematicians. They may have in mind the related but rather different assumption that successful analytical thinking necessarily excludes the emotions. This assumption may well be widespread among the public, although it has been known to be invalid since the work of Damasio (1994), and probably before.

In their exploration of the role of emotion, the authors review the early experiences of many famous mathematicians. They describe the challenges mathematicians face and how they overcome them. Similar incidents can probably be found in the lives of experts in many areas. Indeed, the authors acknowledge, "these issues are . . . found in other aspects of academic and scientific life," but they add, "[the issues] have a special and definite flavor in the life of mathematicians" (p. 85). Unfortunately, they do not say what that special flavor might be.

In one respect the authors arrive at a different conclusion. They show that mathematical work can be absorbing, even addictive. This is not uncommon, but they then

review cases of psychological disorders in mathematicians. Here they may themselves be guilty of overgeneralizing. They assert, “Total immersion in mathematical life, with the expectation of perfection, can contribute to madness” (p. 127). They make a great deal of the case of Ted Kaczynski, the Unabomber, and suggest that his committing murder was somehow connected to his mathematical background. The suggestion does not help their cause of modifying the popular view.

Mathematics as a Solitary Endeavor

Is mathematics a solitary exercise, or does it involve others? There are numerous examples of mathematicians sharing their ideas. The examples suggest, though, that although they may share their work during the final stages of development, especially when verification of results is needed, evidence is not impressive for collaboration at earlier stages.

There are certainly many instances of mathematicians depending on mentors and teachers in their professional development, but this is a rather different issue. It is also clear that mathematical communities have been important in providing moral and intellectual support. The chapter on communities is an interesting and informative case study in how academic communities operate.

However, if we use coauthorship of published papers as hard evidence, it appears that mathematics is indeed a more solitary enterprise, relative to other sciences. Glanzel (2002) compared coauthorship rates in mathematics with those of biomedical research and chemistry. In 1980, about two thirds of all mathematics papers had single authors. In the next 18 years there was a significant increase in coauthorship, but the rate still lagged behind that of other disciplines.

Age, Gender, and Mathematics

G. H. Hardy was a renowned English mathematician who, toward the end of his professional career, notoriously stated, “Mathematics is a young man’s game.” He surely intended the word *man* as a gender-neutral term, but he clearly believed that analytic abilities declined with age. Couple this belief with the common assumption that men are somehow superior to women in quantitative skills, and we have an important topic for discussion.

For the most part, the authors try to persuade the reader that age and gender are unrelated to ability by describing examples of very successful women and of successful men who have continued to produce valuable work as they aged. Again, unfortunately, no list of stories can adequately address the issue.

An example of the limitations to anecdotal evidence is seen in the description of common characteristics in women who are successful. They point out that successful women possess self-confidence and seek the help of mentors. But unless we know something about unsuccessful women, we can draw no conclusions from this information.

There have been other, methodologically sounder attempts to explain the underrepresentation of women in mathematics. In one review of the literature, Ceci and Williams (2010) concluded that the most significant cause is women's preferences and choices. This possibility is not addressed by Hersh and John-Steiner.

There has certainly been a large increase in the number of women in mathematics in recent years. However, Valla and Ceci (2011) claimed that the increased participation is less than what it has been in other sciences. The issue is far from being resolved; Valla and Ceci's data have not gone unchallenged. My point is simply that this remains a contentious issue, complex enough that a series of individual stories does little to advance our understanding.

Similar concerns arise with the issue of aging. The authors describe a survey of mathematicians, which they admit does not lend itself to statistical analysis and thus will not settle the issue one way or the other. As one might expect, a wide range of opinions was found. Interestingly, it seems that women were more inclined to dispute Hardy's conclusion. No evidence has been provided, though, to support the authors' statement that Hardy's slogan "is misleading, even harmful" (p. 268). Whatever comes of the issue, there is a need to connect studies of aging in mathematicians with the broader literature on the psychology of aging.

Teaching Mathematics

The final section of the book addresses educational topics. One chapter provides extensive descriptions of two contrasting approaches to college teaching. Robert Lee Moore was a demanding, abusive tyrant, with a strong aversion to women, Blacks, and Jews. In spite of his abrasive personality, some of his students, even those from groups he despised, claim that his methods provided valuable training. Clarence Stephens, an African American, has championed an approach based on respect and support for every student. His success as a teacher has been extraordinary, and the most intriguing part of his story is why his methods have so far not been adopted by other teachers. The two case histories are replete with delightful anecdotes, although what we can conclude from them is not clear.

In the last chapter the authors turn to the question of why mathematics so often inspires hatred in students. They discuss causes for the failure of mathematics education in this country and prescriptions for its improvement. They describe their own and others' experiences, but their analysis is not carefully argued, and their prescriptions are not

substantiated with good evidence. The problem is that many of the prescriptions that seem self-evident—learning through discovery, for example—often fail to hold up under careful evaluation (see, e.g., Klahr & Nigam, 2004).

Discussion of the fourth supposed myth, that mathematics is a useful filter for other areas of education, is addressed only briefly in a discussion of teaching at the college level. The authors report claims by many people that it serves no value; even many engineers will assert that they never use the mathematics that they learned. However, if there is a value to college courses in mathematics, it is likely to be implicit, not explicit. Self-report is not the best indicator of how effective procedural learning might be.

Conclusions

A reader's reaction to *Loving and Hating Mathematics: Challenging the Myths of Mathematical Life* will depend on what he or she is seeking. For someone who enjoys mathematics or is contemplating a career in mathematics, the stories will be enjoyable. Someone concerned that mathematics might not be for the old or for women will find inspiring examples to disabuse them of the idea. Educators will find plenty of anecdotes and opinions to mull over.

Anyone interested in mathematical thinking may be disappointed, however. A recent book by Nickerson (2010) will be more fruitful (see my review, Pitz, 2010). Finally, by relying almost entirely on anecdotes and self-report, I fear that the authors have not succeeded in demolishing the myths that inspired their book.

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