Archimedes and the Internet

Gedanken sind zollfrei, Martin Luther is supposed to have said—thoughts are toll-free. What about knowledge, in its modern electronic form? Should there be tolls on the information superhighway? Two recent experiences got me thinking about this question in the context of mathematical publication.

A colleague wandered into my office the other day, scratching his head in puzzlement. "I just got an e-mail from someone in Romania who wants a reprint of my paper in [well-known journal]. But the paper isn't published yet! How in the world did someone find out about it?" I clicked the left mouse button in my Web browser exactly six times. "Eureka!" I cried, echoing Archimedes, "I have found it. Although the text of that journal is not online, the table of contents of the next issue is, and it lists your forthcoming article."

The next day I received from Australia an e-mail request for an English translation that I published in 1983 of an article in the Russian mathematical literature. No electronic copy of that paper exists: the back issues of the journal have never been digitized, and in 1983 I was still using a typewriter. I had to write back asking for a postal address to which I could send a photocopy of the article.

These stories illustrate the state of electronic publication today. To *locate* scientific information by electronic means is typically straightforward, but to *obtain* the information electronically is often impossible. Sitting at the computer in my office, I can learn that my university holds a copy of Ver Eecke's French translation of the works of Archimedes, but to read the text I must walk to the library and pull the physical book off the shelf. Will this situation soon change?

Tantalizing hints of an affirmative answer are already visible in MathSciNet (`http://www.ams.org/mathscinet/`), the electronic version of *Mathematical Reviews*, and in its European counterpart, the Zentralblatt MATH database (`http://www.emis.de/ZMATH/`). These compendia of reviews exploit the interconnectivity of the World Wide Web to provide links to the full text of many online articles at various publishers' websites. Most publishers, however, restrict access to the articles to subscribers or to subscribing institutions.

Another vision of the future of electronic availability of scientific publications is the arXiv (`http://arXiv.org/`). Many physics preprints of the past decade are available there, and the mathematics collection is growing rapidly. Several journals, notably including the *Annals of Mathematics*, now contribute their articles to the arXiv after publication, thus guaranteeing that their contents will remain permanently and freely available in electronic form. If a large number of journals were to follow this lead, the arXiv could metamorphose from a preprint archive into a comprehensive digital library of the periodical mathematical literature.

Is such a development a realistic possibility? Some believe that it is not only achievable but inevitable, not only in mathematics but in other sciences also. To increase the momentum, thousands of researchers have signed an open letter at `http://www.publiclibraryofscience.org/` calling on publishers of scientific periodicals to allow the full text of articles that appear in their journals to be included in free online public libraries within six months of publication. The plea is backed by a threat that uncooperative publishers will lose not only the subscriptions of signatories but also their free services as authors, reviewers, and editors. Scientific researchers dedicate their lives to building up the edifice of human knowledge. Surely it is reasonable—so goes the argument—that once publishers recoup the expenses they incur in helping to paint the structure, they should then relinquish any claim to ownership of the building.

The value of a public database of journal articles goes far beyond easy access to the literature. The "killer application" of such a database will be electronic searching of the full text of articles. For example, I recently became curious about the history of an old chestnut of integral calculus: Find the volume of the intersection of two right circular cylinders of equal radius whose axes meet at right angles. An electronic search at JSTOR (a subscription service at `http://www.jstor.org/`) located numerous variations of this problem in the *American Mathematical Monthly*, the earliest in 1895. But too little of the scientific literature is currently available in searchable electronic form to yield definitive answers to such historical questions. Indeed, the problem about the intersecting cylinders actually dates back over two millennia to the *Method* of Archimedes, the only extant source for which is a palimpsest auctioned at Christie's in 1998 for $2 million.

I prefer to think of scientific knowledge as a shared public resource rather than as a commodity to be sold to the highest bidder. The success of TEX, the freely available, high-quality software that we mathematicians use to write our papers, provides a model for the triumph of generous collegiality over greedy commercialism. "Give me a place to stand," Archimedes is supposed to have said, describing the principle of the lever, "and I will move the world." How much leverage will we apply to move the world toward online public repositories of our common scientific knowledge?

—Harold P. Boas, Editor

Letters to the Editor

Foundations of Mathematics

My colleagues and I working in foundations of mathematics and in mathematical logic were pleased to see that Saharon Shelah has been recognized by the Wolf Prize. His prolific achievements in model theory and set theory are truly remarkable.

I would only add that the prize jury's citation, as reported in the *Notices* (May 2001, pages 502–3), contains a somewhat inaccurate characterization of Shelah's impressive work as "foundations of mathematics and mathematical logic." The distinction between these two fields is crucially important to a large number of logicians and philosophers and needs to be better understood in the mathematical and wider intellectual communities. "Foundations of mathematics" is the study of the most basic concepts and logical structure of mathematics as a whole. "Mathematical logic" is a set of related technical tools and research directions, many of which have taken on a life of their own, independent of the original foundational aims.

Harvey Friedman and I in 1997 jointly founded an e-mail list for discussing foundations of mathematics. It can be accessed at `http://www.math.psu.edu/simpson/fom/`.

—Stephen G. Simpson
Pennsylvania State University

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Refereeing and Reviewing

In an October 1998 commentary (*Notices* **45**, p. 1117), Steven G. Krantz noted that mathematicians in general see no evil and speak no evil on certain important subjects. I am willing to take the risk of expressing a criticism of the present state of the processes of refereeing and reviewing. As Mary Beth Ruskai was bold enough to review "Featured Reviews" (*Notices*, May 1999, p. 517), most of my comments will be directed at journal editing.

In an August 2000 article (*Notices* **47**, pp. 770–4), Joan S. Birman states that "In mathematics, papers are refereed in a careful and serious way.... Consultations will be made to locate a referee who has the skill and time to do the job.... The refereeing process adds value to the paper.... " This is how ideally the system should work. We all read mathematical papers and

submit ones, most of us referee at least occasionally, many of us served as editors or members of editorial boards. Does the picture portrayed by Birman conform to our firsthand experiences?

How often did you read a trivial paper and question the expertise of the referee who accepted it? On the other hand, how often did you encounter (as an author) malicious, arrogant, or outright ignorant referees? How frequently did the refereeing process "add value" to your paper? (My own estimate, based upon my own papers, lies between 5 and 10 percent—and this does not at all mean that my other papers could not benefit significantly from serious refereeing.) As a result, a typical author feels relieved rather than exhilarated when the paper is finally accepted (sometimes after a struggle which has lasted several years).

Now a person waits apprehensively for the review in *Mathematical Reviews* (MR). Most likely, the review is not something to look forward to. Worst are those where MR decided that the author's summary is enough. The interpretation lies somewhere between "The author has done such a super job, it will be difficult for a reviewer to surpass it" and "We do not feel that this lousy paper in a tenth-rate miserable subject deserves spending the precious time and efforts of our hard-pressed referees." I leave it as an exercise to determine which interpretation is closer to the truth (or at least to the perception generated by MR).

Of course we all know that editors in chief are, generally speaking, honest, dedicated, and hard-working individuals. We are also aware of the difficulty in finding competent referees who are willing to invest the required effort. At the end compromises are made and errors of all types (accepting papers which should not be accepted, rejecting good papers) are abundant. The same applies to the agonizing decisions which have to be made by the editors of *Mathematical Reviews*. However, since promotions, tenure, and scientific careers are often at stake, it would be far better if the system would operate more equitably than it does. (The horror story told by Abraham A. Ungar in a letter (*Notices*, December 2000, p. 1358) shows that problems exist in peer reviews of grant proposals as well.)

A simple solution is not at hand. Perhaps editors, referees, and reviewers should be both better compensated and more accountable than at present. One feels that, far from being satisfied with our system, our profession should think hard of ways and means to correct its most obvious deficiencies.

—Yakar Kannai
The Weizmann Institute of Science
Rehovot, Israel

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The *Notices* invites readers to submit letters and opinion pieces on topics related to mathematics. Electronic submissions are preferred; see the masthead for addresses. Opinion pieces are usually one printed page in length (about 800 words). Letters are normally less than one page long, and shorter letters are preferred.

Council Inaction: Eugene Gutkin and the University of Southern California

The purpose of this letter is to bring the following sequence of related events to the attention of the membership of the Society.

1. On March 16, 2000, University of Southern California (USC) president Steven Sample dismissed Eugene Gutkin, a *tenured* professor of mathematics.

2. The Society's Committee on Academic Freedom, Tenure and Employment Security (CAFTES) was asked to intervene in the dispute between USC and Gutkin and submitted a report to the Council for its January 2001 meeting calling for specific action.

3. During the first portion of an executive session of the Council's January 2001 meeting, CAFTES and USC were represented, but Gutkin was not. USC counsel also sent a letter to the secretary of the Society that, to the best of our knowledge, has not been seen by CAFTES members.

4. In the second portion of the same executive session of the Council's January 2001 meeting, it decided to neither accept nor reject the CAFTES report. President Browder asked CAFTES members to keep its report and a memorandum it prepared on "The Findings of Fact" strictly confidential.

5. On March 22, 2001, CAFTES requested that the Council reopen the USC/Gutkin matter and that the published Council minutes show that the CAFTES report dealt with the dismissal of a tenured faculty member by USC. A "stronger" minority report by the undersigned was also submitted to the Council.

6. At the April 2001 meeting of the Council, the CAFTES proposal was defeated. The minority report never made it to the floor.

7. In early March the undersigned were informed that their tenure on CAFTES had ended on January 31. Two new members were appointed. The undersigned were *not* asked if they wished to be reappointed, as is the practice for many AMS committees. In late April, James Heitsch resigned his position as chairman of CAFTES.

—Irwin Kra
SUNY at Stony Brook
—Seymour Schuster
Carleton College

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Response to Kra-Schuster Letter

The sensitive personnel issues treated by CAFTES are examined in closed executive session of the Council and do not appear in the Society's open records. Respecting that tradition, I cannot comment about particulars of the matter addressed by Kra and Schuster except to mention that, while recognizing CAFTES acted diligently and in good faith, after lengthy presentations and careful study the Council decided not to adopt the committee's recommendations but instead to refer the matter to the AAUP [American Association of University Professors].

—Robert J. Daverman
AMS Secretary

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