Commentary

In My Opinion

Ask and You Shall Receive …

The job market continues to be dreadful. But, like reformed evangelists, we are all whistling in the dark—hoping that the bogie man will go away.

There are some points of light. At the San Antonio meetings, 400 jobs were offered (up from 250 last year), and the number of applicants was down. A recent issue of the *Chronicle of Higher Education* reports "An Upturn in the Job Market". The article cautions against reckless optimism. Tenure-track positions to replace recent attrition will not recur every year. Some universities are benefiting from the current strong economy. The long-term prospects are unclear. My view is that the American attitude toward universities and their denizens has changed. The academic profession seems to be downsizing, and young people are feeling the ill effects.

In the 1980s we all believed optimistic predictions for the 1990s: (i) those hired in the Sputnik era would retire, (ii) the children of baby boomers would go to college, (iii) the growing technological sector would demand mathematically trained people.

What happened? The flow of fresh Ph.D.'s into the job market has been affected by an influx of expatriates from Eastern Europe and elsewhere. That influx has subsided, but its effects remain. Many decided not to retire. Many children of baby boomers are not going to college, at least not right away. The technological sector needs people with new skills, such as programming in Java and C++. These demands create good jobs for which mathematicians can qualify. They are not what those predicting prosperity had in mind. Indications are that the technological sector needs more people who can read and write proper English than people who can program.

In 1996 the AMS reported that there were 1,154 new Ph.D.'s. Of these, 122 found jobs in the Group I (top 50) institutions, 47 landed jobs in Group II, 28 in Group III, and 15 in Group IV. The total of jobs at Ph.D.-granting institutions was less than 20 percent of applicants. That figure includes all instructorships at all institutions.

And so we face a brave new world. By anecdotal evidence, Ph.D.'s from even the top math departments have had difficulty landing jobs: late in the season, less than 50 percent typically have found a position. One might ask: if people do not want to hire the top Ph.D.'s, then whom *do* they want to hire?

What can senior mathematicians do? We could tell our graduate students at the outset that there are not many jobs. Or we can just continue to grind out new Ph.D.'s and ignore the problem. Or we can try to effect some change. Good mathematics is not the sole province of the Group I math departments. Good, vibrant mathematics is going on in virtually every math department, both Ph.D.-granting and not. As we saw twenty years ago, a hard time for the top departments can be a time of growth for others. There lies opportunity for job seekers.

We can steer students toward curricula that will train them for other choices. Courses in statistics, operating systems, applied linear algebra, operations research, and applied PDE can often lead to gainful and rewarding employment.

Non-Ph.D.-granting institutions have the majority of teaching jobs. This year some such colleges have five tenure-track openings. There are worthwhile jobs at the National Security Agency, at Boeing and Texas Instruments, at consulting companies like Daniel Wagner, at software firms, at genetics labs, in medical schools, and at actuarial firms.

If students think that the only future is at a Group I university, then most will be disappointed. If students instead see that mathematics is a smorgasbord of activities, only some of them academic, then they will be better equipped. If graduate programs provide internships during training, then students will be part of the job market before they leave school.

Senior faculty *could* rethink the curriculum. We should not supplant the current, time-tested course of study; rather, we should enhance it. We should emphasize the importance of good teaching. I do not have the skills to train my students in Java or in operations research. I can, however, make myself aware of the market and teach students what opportunities are available.

Senior faculty have tenure so that they can plan the future of math departments. As they set the curriculum, hire new faculty, and mentor young people, they can also teach the tools to deal with the future: (i) they can show that there are many rewarding roads to being a successful mathematician, (ii) they can maintain a network with former students and have them counsel current students, (iii) they can foster in the profession and among students awareness of the opportunities that are available.

We have arguably been living in a fool's paradise. Each year we have returned from a lambent summer of travel and introspection with the words "I wonder how much hiring we will do this year?" on our lips. In ten years we may instead be saying, "I wonder what our teaching load will be this year?" If indeed the profession of academic mathematics is restructuring, then it will not only be young job seekers who are affected. Even tenured, senior people will feel the pain. If we want to control our future, then we had better learn to understand it.

—Steven G. Krantz
Associate Editor

Letters to the Editor

Buying the Bois-Marie Estate

In the article "The IHÉS at Forty" (*Notices,* March 1999), it is stated that in 1962 the IHÉS bought the Bois-Marie estate, where the Institute's scientific buildings have been located ever since, from the French state. This is erroneous. The domain was the property of the Comar family, and it was purchased from them for the sum of 1,500,000 FF, paid partly directly from the Institute's budget and partly thanks to a seventeen-year loan from the Caisse des Dépôts et Consignations, a major state bank in France specializing in real estate. The portion of the domain which the Institute had to give up in 1967 for the construction of a roundabout at one end of the park represents a little less than 10% of the whole area. The IHÉS was paid 70,000 FF by the state, i.e., approximately 1/20 of the total price paid five years earlier. This is said to rectify the false allegation that through this operation the state paid a compensation to the Institute that exceeded the purchase price.

—Jean-Pierre Bourguignon
Director
Institut des Hautes Études Scientifiques

(Received March 9, 1999)

Browder's Comments on Graduate Education

Felix Browder's comments on graduate education in mathematics in the March 1999 issue bring me back to my own experiences of forty years ago. After a Ph.D. in differential geometry at Princeton, a postdoc year at Chicago, and three years as an instructor at Harvard, I joined a group of electrical engineers at Lincoln Laboratory of MIT and spent the next years in their world. The mathematics of mechanics and control theory was of most immediate relevance to the problems studied by that group; needless to say, I had received no explicit training in those areas, which were considered in the mathematical circles from which I came as dead, nineteenth-century stuff. However, I did find the geometric mathematics I had learned—or studied on my own—to be of extreme usefulness, which contributed much to the future evolution of those fields. This taste of freedom from the dogmas of the avante-garde research mathematics of that day has determined my own idiosyncratic career.

I am now a research affiliate in the Artificial Intelligence Lab of MIT, where I can see many interesting and important problems whose solution could use the attention of mathematicians trained to the level I was forty years ago. Again, needless to say, I don't see them appear! Part of the problem is that the funding agencies in Washington have no understanding or appreciation of what well-trained mathematicians might contribute. Another part is that, as Browder admits, the AMS (among others) has done very little to build up a constituency.

—Robert Hermann
Brookline, MA

(Received February 18, 1999)

Comments on "Science Wars" Citations

In the science wars it appears from the letter of Theo Theocharis [*Notices*, February 1999] that we have yet to attain an *All Quiet on the Western Front*. The book *Impostures Intellectuelles* by Alan Sokal and Jean Bricmont, to which the letter refers, consolidates the territory swept by physicist Sokal in his (now famous) breathtaking one-man foray into enemy lines ["Transgressing the boundaries: Toward a transformative hermeneutics of quantum gravity", *Social Text* **46/47** (1996), 217–252]. (Sokal, apparently, was provoked beyond restraint by the dark forces of postmodernism—antiscientism/pseudoscientism/subscientism—and embarked on a sort of academic *Saving Private Ryan*.)

The current counterattack by Theocharis is a reprise of an earlier but recent salient by Mara Beller ["The Sokal hoax: at whom are we laughing?", *Physics Today* (September 1998), 29–34]. Beller offered quotations by some eminent physicists (Bohn, Pauli, Heisenberg, …) from the early days of quantum theory. Some of these quotations are indeed peculiar and show that their authors apparently were so bedazzled by the successes of the weird theory which they were creating that they wanted to apply it beyond physics—to social and psychological constructs. Beller asks, What is so different about such wild ideas and the quack pronouncements of the postmodernists?

Now Theocharis takes up the refrain, offers quotations and the devil-made-me-do-it argument: the postmodernists derived their silly ideas under the influence of "philosophical utterances of earlier mathematicians and scientists (mostly quantum physicists)." And finally there is a rebuke to the proscientists for being silliness-critical—"Before any mathematicians and scientists (and especially quantum physicists) dare to accuse any others…of intellectual imposture, they ought first to put their own houses in order."

Beller targeted only physicists, but, curiously, Theocharis has added two mathematicians to the mix—G. H. Hardy and Bertrand Russell. His particular quotations from physicists don't have the apply-quantum-theory-to-social-science focus that Beller's selection has. Instead, most of them sound more like tongue-in-cheek aphorisms meant for an in-house audience and are anything but postmodernist impostures—they are candid declarations in varying degrees of irony and discouragement.

As for the mathematicians who are quoted by Theocharis, Hardy's blameless idealism (that beautiful mathematics is desirable and ugly mathematics is undesirable) is puzzlingly irrelevant. Russell's remark (that in mathematics we never know what we are talking about, nor whether what we are saying is true) deserves context. This was no mere Wildean quip: Russell himself had contributed a notable addition (the set of all sets which do not contain themselves) to the collection of self-referential paradoxes which beset the early foundations theory and, moreover, by pointing out that this paradox was derivable from the text, had undermined Frege's book on foundations. And, as if these were not enough to show that there can be an unsettling psychological insecurity in the pursuit of understanding, Russell himself [*The Autobiography of Bertrand Russell 1914–1944*, Little, Brown & Co., 1951] had been exposed to a withering critique from Wittgenstein: "Do you remember…I wrote about Theory of Knowledge, which Wittgenstein criticized with the greatest severity? His criticism…was an event of first-rate importance in my life, and affected everything I have done since. I saw he was right, and I saw that I could not hope ever again to do fundamental work in philosophy." No imposture here. Just simple candor.

—Robert M. Baer
Mill Valley, CA

(Received February 22, 1999)

Why the Sky Is Falling

This letter is inspired by the article "The Sky Is Falling" by Solomon Garfunkel and Gail Young (*Notices*, February 1998). Their piece was a siren call to the mathematics community that we are losing students in our discipline at an alarming rate; what follows is my opinion as to why in large measure this has occurred. Hopefully this will elicit responses from the *Notices* readership, who may be in possession of even more recent data that support this apparent emerging trend.

I teach at Washburn University in Topeka, Kansas, and our enrollment in mathematics courses has dropped off especially in upper-division courses in recent years. Some brief background on Washburn: We support B.A. and B.S. programs in pure mathematics, actuarial science, and mathematics for secondary teaching. Total enrollment at Washburn exceeds 6,000 students, including those in a few master's programs supported here along with the law school. Our "normal" number of majors is about 35 to 40. That has fallen off to the point where many of our upper-division courses have only been managing to attract 3 to 6 students. Of those majoring in pure mathematics, most are majoring in computer science with mathematics as their secondary major.

Let's focus on the period beginning in the mid-1980s to now. The biggest reason I can see for the drop-off in students in math courses, particularly at the upper-division level, is the boom in the computing industry. Just take a look at catalogs of course offerings in the area of computer science today—majors in CIS, MIS, Network Management, and so forth simply did not exist in 1985. Many of these degrees are business-oriented, so they require some course work in business and finance. Some of these computer information graduates need to take no more than college algebra or perhaps a business calculus course to fulfill their mathematics requirements.

It is quite possible for today's students to enroll in these major programs and compete successfully in their classes even if their problem-solving skills are less than stellar. These tracks are very attractive, since internship opportunities are seemingly boundless and employment prospects are all but guaranteed. And of course I do not need to point out that starting salaries for these graduates are most impressive indeed! Last spring, the "average" good computer science student graduating from Washburn landed a position starting at $40,000 to $42,000 in the Topeka and Kansas City areas. By "average" I mean a student with an overall GPA between 3.0 and 3.5 on a 4.0 scale (higher in their major courses) and relevant work experience. Not bad to be twenty-two years old and starting out $5,000 to $10,000 higher than what many of your former professors currently make! (For more about current salaries in the computing industry, see the February 1, 1999, issue of *Newsweek*, page 44.)

So the reason for the drop-off in enrollment in upper-division mathematics courses is not so surprising in light of this. Why should someone struggle mightily learning to prove theorems when future employment prospects in mathematics pale in comparison with those in computing? Why not go into some aspect of computer work, where the jobs exist in abundance and the pay is unbeatable? The most recent information we have at Washburn suggests that our actuarial science graduates start at $35,000 if they have passed two exams of the Society of Actuaries (SOA). While they do get positions readily, their starting pay is several thousand dollars per year less than many CIS graduates, plus they must endure the rigors of the SOA examination series.

Let us also address the issue of why precalculus enrollment has been on the upswing while enrollments in remedial courses are down. At Washburn (and at the two institutions where I previously taught full time), students have the option of "waiving" their way out of the recommended mathematics course to take the course they choose. I know this is only anecdotal evidence, but an ever-increasing number of students are waiving out of a noncredit developmental course in favor of a for-credit course such as college algebra to fulfill their college or university mathematics requirement. Further exacerbating this situation is advisors in other departments who encourage their advisees to enroll in for-credit mathematics courses to "get them out of the way."

It appears that the drop-off in calculus enrollment stems from two sources. First, in the mid-1980s the average "good" student came in to college prepared to take calculus. Arguably the average "good" student today is at best ready for a precalculus course in college algebra or trigonometry; the norm has become the exception, unfortunately. Second, I have noted that fewer students seem to want to challenge themselves by taking calculus courses these days. Many who have the talent and background to successfully complete at least one course in the calculus sequence will indicate that they do not require it for their majors and opt to take a precalculus course instead.

So what can we do, individually and collectively, to stem the tide of our students disappearing from our mathematics classes? At Washburn we have undertaken a recruiting effort to attract not just those we hope will go on to major in mathematics, but also those who could do well in calculus and beyond and obtain a minor in math. Eventually we expect to work closely with faculty in computer science to coax them into encouraging more of their students to take more math. We could easily abdicate this responsibility to our offices of admissions and say that recruiting is their job, not ours. To some extent I agree with this, but as Garfunkel and Young point out, the stakes are now far too high to ignore this situation any longer.

—Kevin Charlwood
Washburn University

(Received March 31, 1999)

Editorial Efficiency Is an Ethical Issue

I am writing to express my concern at recent problems I and others have experienced with the timely refereeing and publishing of mathematical articles.

It appears that the publish-or-perish syndrome is more intense than ever throughout the Western world, and probably elsewhere, and there is ever-increasing pressure from our administrators to publish. That being the case, it is more damaging than ever to have the refereeing and publishing of one's articles held up, for whatever reason.

I believe that the following two examples are symptomatic of a widespread malaise:

1) Two articles I submitted to a journal in September 1996 were not evaluated until May 1998. A colleague who submitted to another journal in January 1997 was notified in February 1999 that his article was rejected. I have recently heard tell of other examples where several years were required to evaluate articles.

2) One of my papers accepted for publication in 1995 has still to be published. When the article was accepted, another author of the paper was told by the editor that it would appear in late 1996.

The first examples concern journals run by the American Mathematical Society, while the second involves a commercially-published journal. Thus, unlike the cost problem, this concerns all sorts of mathematics journals.

I recognise that such things happen sometimes and that sometimes they are hard to avoid. A famous paper in Banach space theory took many years to referee because of its difficulty. But the papers submitted to the AMS journal above are not impossible to understand. These delays appear to be in contrast with the Society's stated policy of promoting "quick refereeing and timely publication". Similarly, the commercially-published journal above is not alone in the length of its backlog.

There are a number of problems involved here. First of all, the same "quality" managers who push for greater output give no credit whatsoever for the refereeing of papers or for the administrative work involved in editing. Publishing constraints, such as the number of pages in an issue, often militate against the publication of longer papers. But surely there are some ways in which we could do better. In particular, there appear to be several journals where the whim of the managing editor is more important than time-since-submission when the decisions about what to put in the next issue are being made. I have seen a letter from an editor of a well-known journal which indicates clearly that his whim is also extremely important in the refereeing process.

I believe that the Society, as the preeminent international professional society of mathematicians, should take the lead and tackle this problem. I would like to propose a number of issues for discussion, and I hope that some of these lead to concrete action.

1) The Society's statement of ethical principles contains guidelines about editorial practice. These are vague: is a three-year period "timely refereeing" or not? I believe not, but am willing to be convinced otherwise by a cogent argument. In any case, more precise indicators are surely appropriate. Similarly, "timely publication" is too vague.

2) The Society might bring pressure to bear on its own editors to apply these principles. Equally, via a questionnaire, it might apply a little pressure on other editors; even requesting a clear statement of editorial policy might be helpful in some cases.

3) The Society might consider whether its members or its authors have any responsibilities. If one submits five papers for publication each year, should one be prepared to referee a similar number of papers in a similar period of time?

Finally, let me point out an alternative for other frustrated authors. The *Bulletin of the Australian Mathematical Society*, of which I am editor, offers rapid publication. It is extremely unusual for the time between submission and refereeing to exceed six months, or for the time between submission and publication to exceed one year. Since we work fast, we sometimes get it wrong—but we never damage our aspiring authors by holding their manuscripts for two years and then rejecting them. Nor do we publish a large number of false proofs. At least some of the delays we authors experience are due to arguably excessive care being taken by editors who are told to seek several reports and only accept very high-quality work. I would argue that most other journals should aim to beat the *Bulletin*'s ethical standards as well as our *Science Citation Index* Impact Factor.

—Michael Cowling
University of New South Wales

(Received April 1, 1999)

Editor's Note: The *Notices* annually publishes a list "Backlog of Mathematics Research Journals". The 1998 edition of this list appeared in September 1998, and the 1999 edition is planned for the September 1999 issue.