Letters to the Editor

On Traditionalists and Reformers

At a time when our profession is faced with a number of serious problems that require unified action, it unfortunately is embroiled in an internecine war over mathematics reform. Comments from reformers and traditionalists fill the pages of these *Notices* and other journals, e-mail lists and Web sites, and even the *Chronicle of Higher Education*. Sarcasm and ridicule seem to be the rule rather than the exception as each side tries to one-up the other in what has become a take-no-prisoners conflict.

Reformers tend to view their opponents as Luddites who cannot stand to see changes in the way things are done. Traditionalists are accused of promoting MSM (Mindless Symbolic Manipulation) with little regard for student understanding. Change is the order of the day and any change in the name of reform must be good. Traditionalists on the other hand view reformers in the same way that the ancient Romans viewed Attila and his Huns. Reformers are accused of preaching KISS (Keep It Simple, Stupid) and practicing hucksterism. As keepers of the true light, traditionalists categorize reformers' attempts at change as encouraging mediocrity and being destructive of the nature of mathematics.

The real question seems to involve the roles of "rigor", "proof", and "basic skills", whatever those terms might mean, in the beginning curriculum. Traditionalists feel that rigor and proof are the essence of mathematics and as such belong in the first year calculus sequence. They also feel that algebraic and symbolic manipulations are critical to the nature of the course and must be stressed and practiced. Reformers tend to favor a more conceptual approach during the first year, with "justifications" frequently replacing proofs. Calculators, *Mathematica*, *Maple*, et al. are used to reduce reliance on hand calculation and to allow the introduction of data intense problems. Of course, both sides claim that their approach helps develop the mathematical reasoning and logical skills necessary for further study.

All of this quibbling might be amusing if it were not so pathetic. After all, the quibbling does revolve around a few calculus texts. And as far as these new books go, they do have something in common with traditional texts; a couple of them are OK and the rest are not all that good. Their success suggests that they are seen as meeting needs that previously have gone unmet. It would be useful to isolate what these needs really are. In any event, the points of disagreement certainly should be amenable to orderly discussion; there doesn't seem to be any movement toward making abstract algebra and real analysis into Handwaving 101 and 102. Unfortunately, lines have been drawn and sides have been taken. Egos and self interests have become involved. The net result is a situation that does not do our profession any credit.

So what is the solution to this problem? The answer to this question might test the wisdom of Solomon. But we somehow must get an answer; our profession faces too many other problems to get bogged down on this one. Topics such as temporary positions, the production of new Ph.D.s without the corresponding generation of jobs, the staffing of mathematics courses by nonmathematicians, the changes in research funding by the NSF, the inadequate preparation of our Ph.D.s for classroom teaching, and the generally miserable public perception of mathematics and mathematicians have all been described quite well in these *Notices* and elsewhere. These are problems that must be addressed, and addressed in a unified fashion, if our profession is to have a future. We will not be able to do so until our divisions over reform are healed; if we do not respect ourselves, how can we expect others to respect us? Furthermore, they must be healed in a way that is beneficial to our students since, after all, we do claim to be teachers. If these divisions are not healed, there are people on both sides

About the Cover

The cover collage was created by Alain Connes to represent ideas or formulas which play an important role in his book "Noncommutative Geometry" (Academic Press, 1994, 661 pages, $59.95 hardcover). See related articles on pages 792 and 800.

who will know who is to blame. They need only look in a mirror.

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On Pure and Applied Mathematics

V. Arnold's "Interview" in the *Notices* of April 1997 is very disappointing: There are profound differences in the broad American, French, and Russian cultures which are the background—and "explanation"—for the incidents about which he complains so much. Can the American mathematical culture which produced a Milnor and a Smale be all bad?

I am particularly concerned about his closing "Comments on the Relation Between Pure and Applied Mathematics". I have been involved in my own career with two major applied topics: control and physics. In both, I realized that ideas developed in the "pure" cultures—particularly those of differential geometry and Lie group theory—were essential to the understanding of what the engineers and physicists were trying to do. I certainly was not "paid for the solution of given problems"! However, I did find that the ground rules were different; success and effectivness required greater exposure to what was going on in "real time" in the "real world" than I was used to in my own "pure" experiences.

The social mechanisms for people trained in "pure" mathematics moving over to "applied" have not been adequately developed in the American mathematical culture, but do seem to fit in much better with Russian traditions. Arnold's experiences in three mathematical cultures seems almost unique: It is then a pity that he did not take the occasion of recounting in the *Notices* some of his experiences to give us a more coherent account!

Robert Hermann
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Agreed: Mathematicians *ARE* Skillful

The *Notices* article "Requiem for the Skillful" (February 1997, pp. 207–208) by Professor Saunders Mac Lane takes exception to a sentence in the 1992 National Research Council report *Educating Mathematical Scientists: Doctoral Study and the Postdoctoral Experience in the United States*. That statement, concerning mathematicians at the time of World War II, said

> However, very few mathematicians—American or foreign born—had the applied skills needed for the tasks at hand.

After reviewing archived files for the Board on Mathematical Sciences project which produced that report, I am confident that the main intention of the report's paragraph in which this sentence is found was to make the same point as did Professor Mac Lane in his article: that many pure mathematicians (who, presumably, had minimal involvement or concern with applications prior to the war) quickly broadened their palettes with a mastery of applied areas of great importance to the war effort. In fact, the next sentence in the report states:

> Mathematics was forced to broaden its perspectives to meet war needs, and many pure mathematicians learned to do applied work.

I regret the poor wording of that first sentence; if it had become clear during the report's prepublication internal NRC review that its wording was troublesome, I feel certain it would have been changed. Nevertheless, I wish to encourage readers of the *Notices* to consider (or reconsider) that still highly relevant sixty-four page report. This is because it presents the results of a BMS study that identified what makes certain doctoral and postdoctoral programs successful in producing large numbers of American mathematical sciences Ph.D.s with sufficient professional experience and versatility to meet the research, teaching, and industrial needs of our technology-based society. Fortunately, it (and many other recent BMS publications) is now browseable in its entirety on the World Wide Web at the BMS Website `http://www2.nas.edu/bms/` (via the subpage "BMS Current Publications and Reports"). It can also still be ordered (ISBN 0-309-04690-4) from National Academy Press (telephone either 800-624-6242, or 202-334-3313).

John R. Tucker
BMS Director

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Information from Web Pages

In the course of my work I have frequently found it necessary to find the fax number or e-mail, home page, or regular mail address of individuals, knowing only their names and universities (often, not knowing the department). I am surprised by how difficult this task can be. Web pages that look fabulous are sometimes uninformative! Test it yourself: Select ten individuals, perhaps from bibliographies of your papers, and try to find their mail and e-mail addresses and fax numbers. It will probably be a frustrating experience.

This is a request for mathematicians to critically examine their own departmental and university Web pages, and to suggest improvements to the Webmasters.

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Funny and Not-So Funny Stuff About Publications, Talks, and Reviews

I enjoyed Gian-Carlo Rota's whimsical advice (*Notices*, January 1997, pp. 22–25) and Paul Nevai's semi-serious answers (*Notices*, March 1997, pp. 309–310).

I comment (not "I would like to comment") only on one aspect: "Publish the Same Result Several Times" (Rota)—"Don't" (Nevai). Most mathematicians and, in particular editors, referees, and reviewers would agree with Nevai, though there are situations which make you think. If, for

example, you and the referee(s) are rather sure that you closed a subject, or at least did your best, and publish it—but two (or more or less) years later you find you can essentially improve the result and the referees agree, should you refrain from publication in order to "spare others from being bombarded by epsilon (how large is 'epsilon'?) improvements and generalizations…from the information junkyard"? Maybe not.

I believe, however that the example of Frederick Riesz (how did Marcel Riesz get into this? other than being Frederick's sibling?), which both Rota and Nevai use, is quite inappropriate. As is clear to both debaters, Frigyes Riesz was Hungarian. It used to be general consensus (and there are still strong feelings in this respect) that if new results are not published in Hungarian (Polish, Czech, Serbo-Croatian, Russian, Chinese,…) then the terminology for new mathematical notions will be missing from Hungarian (etc.), so publication in Hungarian was strongly encouraged. (Long after Riesz's time it was even obligatory in Hungary for a time, as Pali Nevai may know, to publish everything also in Hungarian; dissertations could not even be accepted if they first appeared in a foreign language). Of course, most Hungarian mathematicians think that it would be simplest if every mathematician who does not understand Hungarian would learn the language but, unfortunately, this does not seem to happen. So publication in an "international" language seems necessary in order not to reduce drastically the number of potential readers. (By the way, Riesz's favorite foreign language was French, not included in Nevai's enumeration even though, when noticing that Riesz's collected papers consisted of two volumes, its title *Oeuvres completes* might also have grabbed his attention; moreover, the first three editions of his famous *Lecons d'Analyse Fonctionnelle*—joint with Bela Szokefalvi-Nagy—appeared in French, as did most of his non-Hungarian works). As to *Comptes Rendus Paris*, its purpose is, as that of many other European and not only European journals of academies of sciences, normally not publication of full length papers but fast announcement of results (the Notes in *Comptes Rendus Paris* are limited to four pages). Similar purpose is served by the Research Announcements, previously in the *Bulletin* of the AMS, now as an electronic flagship of the Society. So I do not think that publication in Hungarian, in the *Comptes Rendus Paris* and in an international journal for full length papers by Frigyes Riesz is a good example for Gian-Carlo Rota's point or Paul Nevai's counterpoint.

I will now not follow advice I was given to "never write in a letter about more than one thing" and give an unsolicited advice to the AMS Committee on Meetings and Conferences about the point II.4 (same March 1997 *Notices* issue, p. 358) "Some concern has been communicated to COMC that national meetings no longer appeal to those mathematicians primarily interested in doing research". I believe that somewhat more care by organizers may help, for instance in coordinating the schedules of different sessions so that one can leave at the end of a talk in one session and arrive to the beginning of a talk in another session (I think the belief is mistaken that every research mathematician is interested in just one session in a half- or quarter-day). The uneven length of talks at Special Sessions does not help (see for instance the schedule of the Special Sessions on Stochastic Modelling). Maybe a "quantum method", say (with discussion) 15 minutes for contributed talks, 30 or 45 minutes for talks at Special Sessions, 60 or 75 minutes for plenary talks or something similar would be easier to manage. I believe also care in matters which seem even more trivial (except to the presenters) would help. For example, without any discernible fault of ours, for the talk no. 508 (January 1997 *Notices*, p. 151) in my place Anthony A. J. Marley was given as presenter with, for good measure, the University of Waterloo given as affiliation to him (he is at McGill) and also to Gyula Maksa (from the University of Debrecen). We believe that there would have been time for rectification before the Joint Meetings started but this was done to lesser effect in the daily bulletins during the Meetings. There were of course more than 1,250 talks but a word of apology to the authors would have helped. None came.

To conclude (with a third or fourth "thing") on a merrier note, I enjoyed the "MR Folklore" boxes on pp. 332 and 335 of the March *Notices* very much and was only astonished that (just as at the 50-year celebration of *Mathematical Reviews*), the immortal words in Truesdell's review were missing (MR 12 (1951), p. 561) "This paper…gives wrong solutions to trivial problems. The basic ERROR, HOWEVER, IS NOT NEW…" (my emphasis; to this too, Paul Halmos called our attention; the rest of the review is also worth reading).

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New Links to Education Articles

A great deal of material on mathematics education has been appearing recently in the *Notices*. I consider this an important contribution to the literature, as I believe that the community of mathematicians is underrepresented. In an effort to make this material more widely available and easier to use, I've created an annotated collection of World Wide Web links to this material (organized both chronologically and alphabetically by author). This index can be found at the URL `http://people.delphi.com/vlorbik/notices.html`.

I hope this will prove useful to readers of the *Notices*.

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