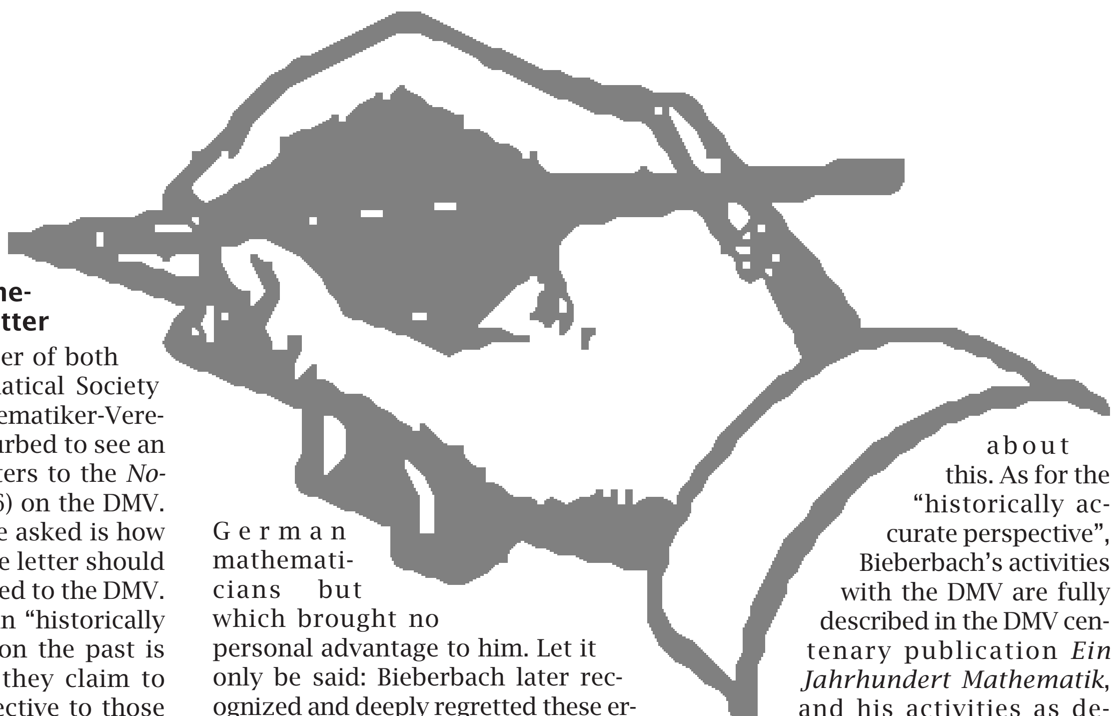
Letters to the Editor



Comments on Kahane-Krickeberg-Lorch Letter

As a reciprocity member of both the American Mathematical Society and the Deutsche Mathematiker-Vereinigung, I am very disturbed to see an attack made in the letters to the *Notices* (vol. 41, number 6) on the DMV. The first question to be asked is how the AMS is involved: the letter should surely have been directed to the DMV. The authors say that an "historically accurate perspective" on the past is being "withheld". Do they claim to have a superior perspective to those who are genuinely trying to understand what happened under Hitler? The attacks which they proceed to make on their mathematical colleagues do not suggest that they have.

Their first complaint concerns the obituary notice published about Bieberbach in the *Jahresbericht*, written by the late H. Grunsky. This notice says the following: "This is not the place to look closely into these events, which susceptibly harmed mathematics in Germany and many individual German mathematicians but which brought no personal advantage to him. Let it only be said: Bieberbach later recognized and deeply regretted these errors, as is confirmed by well-warranted assertions." This is a perfectly fair statement, in accordance with the usual perception of an obituary notice. It is surely at least plausible that Bieberbach did regret his activities: it would be amazing if he had not regretted making such a fool of himself. But no, this is not enough for our writers, who want evidence of it. But Grunsky's article says "as is confirmed by well-warranted assertions". There is no reason to question his integrity about this. As for the "historically accurate perspective", Bieberbach's activities with the DMV are fully described in the DMV centenary publication *Ein Jahrhundert Mathematik*, and his activities as department head in Berlin are described in highly critical terms. No mathematician admires what Bieberbach did in these matters, but to doubt "current willingness to face the past" in his case is absurd.

Then comes Strubecker. Apparently the offence of his obituary writer, H. Leichtweiss, is to say that he enjoyed the war years in Strasbourg. The obituary notice says that one of these enjoyments was his marriage, but this is not mentioned in the letter. Was it a crime, then, to do creative mathematics in Strasbourg during the Nazi occupation? And our righteous letter writers are incensed because Leichtweiss speaks of the "occupation" of Strasbourg by the Allied forces. But that is what they did! To demand the use of a word with emotive significance instead of "occupation" is pure political correctness and has nothing to do with historical understanding.

The next attack is on the writers of a review of Teichmüller's life and work. Here our defenders of the truth have a little difficulty, since everybody knows that Teichmüller was a genius. They fall back on the old method for getting around this: "Yes, but his results were anticipated by someone else." The writers of the review are then taken to task for not saying this, in particular for "hardly mentioning" Grötzsch. I am in no position to judge the importance of Grötzsch's work to Teichmüller, but the letter writers apparently think themselves better judges of this than the distinguished mathematicians who wrote the article on Teichmüller. Of course, Grötzsch's work is also discussed in detail in *Ein Jahrhundert Mathematik*, the proper place for it. Again there is no question of unwillingness to face the past here; no one defends Teichmüller. But there is mention in the letter of the fact that Grötzsch was an "anti-Nazi dismissed on that account"; the inclusion of this information can only be interpreted as a suggestion that the authors of the Teichmüller article ignored Grötzsch for that reason. Such a slur is unacceptable. The fact is that the authors of the letter are unable to come to terms with the fact that it was possible for someone to be both a great mathematician and a fanatical Nazi.

So the letter ends with an attack on the DMV itself. This is because a "discussion article"—whatever that may be—was rejected by the *Jahresbericht* with no invitation to reply. But you, sir, rejected a letter of mine about eleven years ago, with no explanation. Is this not what journals do with mathematical articles all the time? It is impossible not to see in such a trivial accusation an example of the anti-German xenophobia which is so common in the daily press (in England at least!) but which has up to now not reared its ugly head in the mathematical literature. I sincerely hope that the AMS is not going to change this.

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Balancing Deductive and Descriptive Mathematics in the Schools

I am writing this to research mathematicians to interest as many as I can in a course for prospective elementary and middle school teachers. A recurring theme in the letters and forum sections of the *Notices* is that very few people (educators, politicians, funding sources) have any idea of what mathematics is or what mathematicians do. This theme is a symptom of a problem I address in my course. For the purpose of explaining the course, I break mathematics into two aspects (1) discovery/deduction and (2) description computation. Discovery/deductive mathematics asks the questions, What is true about this thing studied? and How do we know it's true? Descriptive mathematics, on the other hand, asks us to describe some physical or business situation mathematically and to compute associated values. To most people who are otherwise well educated the techniques associated with solving equations, finding antiderivatives, dividing whole numbers, and so on *are* mathematics.

The reason for people's misunderstanding of mathematics is clear. Their entire experience in twelve years of school and most college courses will have been with descriptive mathematics. There are now high school geometry texts that boast that not one proof is to be found in the text.

The solution that I propose to this problem is to give deductive mathematics and descriptive mathematics equal attention from the middle school on. The (two-semester) course that I teach to prospective elementary and middle school teachers prepares them to do deductive mathematics. On the final exam (among other things), I give definitions that they have not yet seen and new theorems that depend on the definitions. The better students are able to provide original proofs for the new theorems. Some of these better students started out with math anxiety.

The students in my present course are much more excited than were the students in a traditional section of the course I first taught. In sections of the present course, almost half the class rated the course as excellent. In the traditional course, almost none rated it excellent. The course leads up to certain student investigations. In the first investigation, students conjecture general set relationships from exploring diagrams. The students, on their own, discover DeMorgan's laws, the distributivity between set intersections and union, and some interesting relationships that have been new to me. By the time they get to the investigation sections, they are able to provide original proofs of their conjectures. A second investigation has them extend certain order and ring-theoretic properties of the integers to the rational numbers by making new definitions that are appropriately analogous to the definitions for the integers.

Students are taught to write proofs first in terms of a formal system with many inference rules. The rules model what mathematicians do naturally. The explicit use of the rules gives way to implicit use, in somewhat abbreviated proofs, which look like traditional mathematical proofs at a beginning level. It is the explicit rules, however, which make possible the description of a heuristic system for discovering one's own proof steps. The entire program of learning proof is linguistically guided and has nothing to do with students' quantitative abilities or familiarity with descriptive mathematics.

Instructors that teach the same course here at the University of Maine, and to whom I have described my system, are universally put off by the formality of the system at its initial stages. I have been told that the *trend* these days is toward increased informality. Students, however, are of exactly the opposite opinion. When we get to the point where we can use rules either implicitly or explicitly, students say that they *need* the experience with the explicit use.

Mathematicians here that are involved with their own research work, and to whom I have described my course, have been very encouraging but universally (after questions about the involvement necessary) unwilling to teach the course themselves. The course doesn't take any more time than a section of calculus. Since teaching the course involves leading students into ground that is totally unfamiliar to them, there is some need for emotional involvement. In my twenty-five years at Maine, I have taught graduate and undergraduate courses in my general area and two graduate courses in my own research specialty. Yet, I have never been as excited about a course as I am about this course for teachers. I have hopes that some day my students will have students that are learning how to do deductive mathematics. I have hopes that some day students will *enter* high school geometry courses with an understanding of what a proof is and how to go about finding one's own proof. Perhaps politicians will have some idea of what mathematicians do, because they themselves have done the same sort of thing as part of their education.

While entertaining all these grand hopes, I am faced with the reality that I haven't interested a single soul here in teaching the course with my material. I have a hunch that if I do interest people in this, it will be people that don't normally teach a course for elementary school teachers. The material is written on a level appropriate for such students, but it could be helpful for anyone that doesn't know what a proof is or how to begin finding one.

I turned my attention toward elementary teachers because of discouragement with math majors. We are getting fewer of them, and the ones we do get seem to have the wrong idea of mathematics. Our beginning majors have seen nothing but descriptive mathematics in their previous education. They have learned to solve certain typical "problems" by computation and copying "solutions" presented to them. Moreover, this has been what has attracted them to mathematics.

The descriptive orientation of thirteen years of mathematics through calculus and the deductive orientation of advanced undergraduate courses have led to student difficulties in the latter and to the introduction of courses intended to "bridge" the gap between the elementary and the advanced courses. A "bridge" is a poor metaphor. It implies that descriptive mathematics has at least been taking students in the right direction and now they need a little extra to proceed to mathematics from an "advanced" viewpoint. A better metaphor would be to consider descriptive and deductive mathematics as orthogonal. Mathematics with this metaphor is two-dimensional, and proceeding ever so far in the descriptive direction gets you nowhere in the deductive direction. This is not my armchair philosophy. It is what students in my introduction to abstract mathematics course have told me of their previous work.

The identification of deductive mathematics with advanced mathematics has done damage to mathematics education. Deductive mathematics deserves a place in the school curriculum. It is not harder than descriptive mathematics. It's just different. The habits of minds that go with deductive mathematics—the ability to articulate things precisely and to construct and evaluate logical arguments—are more needed in a general education than the ability to use mathematics as a language for science and business. We have rushed off in the descriptive direction. We get to calculus as soon as possible. We are making high school geometry increasingly descriptive. The result of all this is that people don't know what mathematics is. We get mathematics majors that are discouraged and disappointed when they find out.

In the 1960s the "new math" was introduced as a curriculum change. It was widely misunderstood. Teachers had never seen it in their own education, and parents didn't understand their children's homework. I take it that if deductive mathematics is to be made a part of school mathematics, the place to start is with courses for prospective elementary and middle school teachers. I have some material that has worked well for me. I'd like to get others interested.

Andrew Wohlgemuth
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(Received November 28, 1994)

Allocation of Resources at U.S. Universities

I have been reading with great interest reports and comments which have appeared in the *Notices* on the job market difficulties for Ph.D. mathematicians in the U.S. Many people have complained that rosy predictions made just a few years ago did not come true. Others have suggested remedies or have voiced their distress. Current explanations for the unpredicted decrease of university jobs leave me unconvinced. "Rising costs" and "budget cuts" are explanations which raise more questions than they answer. Of course education is a labor-intensive activity and as such its costs tend to go up faster than the costs of industrial production. But this is true of most service activities in modern society, most of which are expanding. What is the difference, in particular, for education in science and mathematics? Are we sure that available resources are rationally allocated? And who decides how to allocate these resources? I looked for answers in the *Digest of Educational Statistics* (1993 edition), a publication of the U.S. Government, which dedicates an entire chapter (Chapter III) to "Postsecondary Education". My attention was caught by a statement appearing in the introduction to this chapter.

"Administrative expenditures (institutional support and academic support, less libraries) have been rising more rapidly than most other types of college expenditures. At public universities, between 1980–1981 and 1990–1991, inflation adjusted administration expenditures per full-time-equivalent student rose 26 percent compared with 12 percent for instruction expenditures per student. At private universities during the same period, the per-student administrative costs rose 45 percent, and the instruction costs rose by 38 percent…College faculty generally suffered losses in the purchasing power of their salaries from 1972–1973 to 1980–1981, when average salaries fell 17 percent after adjustment for inflation. During the 1980s, average salaries were on the rise and have recouped most of their losses."

The increase of "administrative expenses" seems difficult to explain. A clue however may be found in another statement contained in the introductory note to Chapter III of the *Digest*:

"The student-staff ratio at colleges and universities dropped from 5.4 in 1976 to 4.8 in 1989. During the same period the student-faculty ratio dropped from 16.6 to 15.7. The proportion of staff who were administrative and other non-teaching professional staff rose from 15 percent in 1976 to 22 percent in 1989, while the proportion of staff identified as nonprofessional declined from 42 percent to 38 percent (Table 215)."

Unfortunately these data are not fully comparable with the expenditure data referred to previously, because they treat a different time period and include all institutions of higher education, including 2-year colleges. Nevertheless it is interesting to observe that from 1976 to 1989 the ratio of full-time equivalent students to full-time equivalent faculty dropped from 16.6 to 15.7, while the corresponding ratio for "executive/administrative/managerial staff" dropped from 84 to 69.2. A more dramatic decrease affected the ratio of students to nonfaculty professionals, which dropped from 52.4 to 29. Another way to look at these data is to observe that in 1976 the proportion of full-time faculty to full-time nonfaculty professionals or administrators was 1.75 and that in 1989 the same proportion fell to 1.1.

It is tempting to formulate the following hypothesis which could partially explain budget cuts for mathematics. Universities have always had to balance limited resources with unlimited opportunities for expenditures. In the late seventies, a downard fluctuation in resources made budget cuts in one form or another imperative. The decision on where to cut was taken by a group of people which could be loosely identified with the "executive/administrative/managerial staff" of the various universities. Ultimately decisions were taken by trustees or regents, not by employees of the universities, and they certainly decided on the basis of reports and proposals made by the top nonfaculty staff. As a group, top administrative staff had a collective interest to emphasize the importance of their own work and to provide for themselves opportunities for advancement. This could be easily achieved by expanding activities not directly related to instruction, which required an increase of nonfaculty professionals and top administrators. The expansion was achieved at the expense of instruction-related activities. This meant, of course, that budget cuts would affect some areas of instruction. There was no particular reason why mathematics should not be affected. I feel that the hypothesis outlined above could be tested by analyzing the evolution of resource allocation and personnel growth in a representative sample of universities, which should include some of the major state schools. If it turned out that my conjecture was true, the mathematics community would have to draw its conclusions. Its first priority would no longer be to convince the public that mathematics needs more support than other subjects. It would rather be to inform whoever foots the bill for universities (legislators, taxpayers, students and their families, alumni) that their money is being diverted to expand activities which have little or nothing to do with the universities' real functions: teaching and research. But if we are going to appeal to parents and taxpayers and plead for more consideration for instructional needs, we should be able to offer something. This means that we should all pay more attention to our duties as teachers and give more credit and prestige in our community to dedicated teachers.

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Maurice Auslander

Maurice Auslander, a member of the AMS for over forty years, died in Norway on Friday, November 18, 1994; was buried in Massachusetts on Sunday, November 27, 1994; and an obituary was published in the *New York Times* on Saturday, December 10, 1994. This obituary gave false impressions and suffered from serious omissions. Because of Maurice's close and deep relationship to the mathematical community, it seemed to me that the errata should be published in the *Notices* of the AMS rather than in the *New York Times*.

The obituary gave the impression that Maurice's life's work was important because it could be applied. This gives a completely false impression of his work. He loved the structures of algebra and could and did build beautiful algebraic structures before knowing a single concrete example. This philosophy of mathematics is very far from the example-driven field called "applied mathematics".

But the obituary's greatest defect is its failure to even mention that he had a wife, Bernice Auslander, the mother of his children and herself a professor of mathematics at the University of Massachusetts in Boston. It failed to mention the great support that she had offered Maurice in his youth. Maurice failed his qualifying examination at Columbia the first time he took it and was considered a "late bloomer" by Sammy Eilenberg. It was only after his student days that his unique mathematical talents became apparent. If Bernice had not supported him during this difficult time in his life, his later flowering might have been lost.

Maurice Auslander at sixty-eight was still full of creative drive and wanted to work on. This was the tragedy of his death. But perhaps his death can serve a constructive purpose if the mathematical community can take the mistakes of his obituary to heart. These *Notices* have been full of statements that this is "the right" or "important" mathematics. We see little cliques that claim they are right and all others are wrong. We see bitter infighting and fragmentation of mathematicians into groups trying to get support for their important research, trying to get jobs for their students. It is time to recognize the whole magnificent diverse effort that is mathematics. We need mathematicians that love to study structure or combinatorics, algorithms or formal systems, number theory or analysis, etc. Mathematicians are people who love mathematics, be they in industry or academia, be they users, creators, or scholars.

Louis Auslander
Brother and Fellow Mathematician

(Received December 15, 1994)

Some Misconceptions in Shepp Letter

AMS member Larry Shepp has recently served as chair of the AMS Committee to Select Hour Speakers at Eastern Section Meetings. Shepp wrote a letter to the editor which appeared in the October 1994 issue of the AMS *Notices*. The letter presents a serious distortion of AMS policy regarding women speakers at AMS meetings.

If a prospective member of an AMS committee or editorial board cannot support AMS policies governing that body, then the AMS member should not accept the assignment. Shepp resigned his position as chair of the Committee to Select Hour Speakers, so the purpose of this letter is not to urge Shepp's resignation but rather to correct some misconceptions that his letter may have created.

AMS policy regarding women speakers at AMS meetings was shaped by a 1972 resolution (an accurate version of this resolution was reproduced by Shepp at the end of his message). AMS commitment to this policy was implicitly reaffirmed in August 1993 when the Council voted to extend it to joint international meetings. Shepp implies that this policy mandates the enforcement of an unwritten quota for women at AMS meetings. In addition, he says that if the number of women on a program does not satisfy this quota, conference and special session organizers are being asked to lower standards. The AMS subscribes to neither of these views. In addition, the AMS-ASA-AWM-IMS-MAA-NCTM-SIAM Joint Committee on Women in the Mathematical Sciences (JCW), a committee which is openly interested in advancing the status of women in our profession, has never proposed that the AMS adopt these views. Shepp says that AMS policy will "corrupt the reputations of those women and minorities who can succeed without such political advantage." This is a gross misrepresentation of both AMS policy and JCW goals. For the benefit of the readers of the *Notices*, we include relevant excerpts from the texts of recent JCW resolutions.

"If the preliminary list of special session invitees has few women, the organizers should consult others, particularly senior women in related fields, to ensure that they have not inadvertently overlooked some.

"Because equity for women is based upon fair treatment, rather than differential standards, the JCW supports the principles espoused in the proposed AMS ethical guidelines."

There is neither a hint of a quota nor a suggestion of lower standards in any of JCW's resolutions or in AMS policy. The Society is only being asked to diminish the possibility that qualified women speakers are inadvertently overlooked as possible conference speakers. Surely this is a desirable goal for all members of the AMS.

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