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Mathematics and Ethics

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I want to start off by correcting any possible false impression that I'm going to tell you what is ethical, or that I've solved any big problem regarding mathematics and ethics, because I certainly haven't, and make no such claim. Of course, the next question you ask is, why am I standing up here anyhow? It's only because I have thought about the question, and in the process of thinking about it have had some ideas which I'd like to offer you.

The observation that got me started on this was that in many professional fields, there has been for a while a well established concern with ethics. What that means varies from field to field. But the idea that a professional association of engineers or statisticians might concern itself with ethical behavior in that field is not radical at all. It's a very standard thing. Often it's done officially by the establishment. Often there are active concerns on the part of special organizations, editorials in journals, and so on.

One of the first organizations of this type that I had contact with, long before I was a mathematician, was the Society for Social Responsibility in Science. I'm not sure it still exists. In its day, the 50's and the 60's, it was primarily concerned with nuclear arms, nuclear warfare, nuclear destruction of the human race. It consisted largely of physicists, many of them Quakers or Quaker sympathizers. They took the position that there was a question of social responsibility, for the physicist particularly, whether he should be working on nuclear weapons. Some people refused to work on nuclear weapons, or quit military jobs. Whether you agree with that or not, this was a legitimate issue in the physics community.

Another example arose with the environmentalist movement. Barry Commoner, of St. Louis, was an outstanding spokesman. This movement involved biologists and also chemists, because chemists do a lot of polluting. Not chemists themselves, the things that chemists create. There again, was a question of social responsibility, which is one aspect of ethics.

I have in my band two actual codes of ethics. One was adopted by the statisticians' society, and the other by the professional engineers' society. These are not so political. They have more to do with proper behavior toward one's client, ethical issues of that sort. No doubt you could find other examples.

For a mathematician, it's natural to ask, how come we don't seem to be concerned about ethical issues or discuss them? It is true, as many of you know, that recently there was a referendum in the American Mathematics Society. There was a long-drawn-out political hassle, and in the end seven motions were passed by the membership. The one that is probably most controversial says that the Society should not involve itself in helping the Star Wars SDI activity to recruit among A. M. S. members. That issue certainly has ethical implications. But it was a one-time, ad hoc thing, not an indication of continuing concern or involvement with ethical issues by mathematicians. In my opinion, the reason it became a big issue in the AMS was that there had already developed strong opposition to the SDI among physicists and computer scientists, both in individual departments and in national organizations. I think that was why some mathematicians felt that we should also get involved. In the end, after a lot of back and forth haggling, the membership approved the anti-SDI motion. So there is an example of an ethical issue that did come before and actually passed the American Math Society. That's not the main thing I want to talk about. I just mention it because some of you might have it on your mind and might remember it.

The thing that is striking, you see, is that in all the other examples I've given-the biologists' involvement in environmental issues, and the chemists as well, and the physicists in nuclear war, and the statisticians requiring that if you are a good statistician you won't give away your client's data-these are all different, but they have one thing in common. They are all in some way intrinsic to the actual practice of the particular profession. The physicists are the ones who make the bombs, the chemists are the ones who pollute, and so on. When I thought about the situation of mathematicians, I found I was oscillating between two different viewpoints. On the one hand, a mathematician is somebody who solves a problem or proves a theorem and, of course, publishes it. And it's hard to see significant ethical content in improving the value of a constant in some formula or calculating something new, say cohomology of some group. You might say it's beautiful or you might say it's difficult, but it's hard to see any good or evil there,

in the way physicists and biologists, and so on, do have ethical problems. On the other hand, if you step back from that particular way of looking at the role of mathematicians and just think about your own activity, or mine, think of what we actually do, daily and yearly, there are constant decisions and conflicts involving right and wrong.

The ethical demands of all the scientific groups seem to fall into three categories: What you owe the client, what you owe your profession and what you owe the public. Now, if you are a math professor, the word "client" may be unfamiliar. Who is the client, anyhow? But there is always a client, in the sense of the one who's paying your salary. The ethics of the statisticians and engineers are almost entirely concerned with duties to the client. And then there is the profession. What do you owe your partner, colleague, or fellow professional? In some ethical codes, that's up at the top. I think that's the way it is with lawyers and doctors. Doing something unethical means treating some other lawyer or doctor unfairly. Duty to the public is an afterthought.

Now to the mathematicians. I can list five different categories of people to whom we have duties: staff, students, colleagues, administrators, and ourselves. First are the staff, the people who do the work that we don't want to do. It would be interesting to think about the situation or treatment of the non- faculty employees of your department. Do you regard it as equitable? If you don't, does anybody ever try to do anything about it?

Then there are the students. For instance, there is the problem of mathematical illiteracy. I don't mean to suggest that we owe students mathematical illiteracy. Rather, the existence of mathematical illiteracy poses an ethical issue. Is the prevalence of mathematical illiteracy among students in part a responsibility of us, their teachers? If so, what can we do about it? This issue needs to be mentioned because so many of us deny our responsibility and blame the high schools. Next example: grading. Again, we don't usually think of this as an ethical issue. We try to make it a mechanical matter, a rule, and let a machine do it. But despite our machinery, there are always hassles and disagreements about grades. I think that the grade you finally give, whether it's a number or a letter, is not just an objective application of some rule, but also to some extent an ethical choice. What do you think is more important, more valuable than something else? I would say grading should be included in the ethical life of the mathematician. I've had a student from some place in the Near East tell me that if I didn't change his grade, he'd have to go home and go in the army and

get killed, and it would be my fault. For all I knew it might have been true, except I didn't change his grade and he was still there a year later. That's an extreme example of an ethical issue: murder associated with grades.

Finally, gender and ethnicity. This has been subject of a good deal of talk in recent years. There are, to some extent, special programs to help women and to help Blacks, Hispanics and Indians to attain a higher level in mathematics. Not many people here, I would guess, are involved in that activity. And there are certainly differences of opinion about it. But it's a clear case of an ethical issue.

Colleagues. This, I think, is the big one, the one that most of us are most involved in. Hiring, tenure, promotion-these are the issues that department meetings hassle about. Sometimes, I suppose, decisions are made entirely on an objective basis of what's best for the department. And then again, sometimes people try to help their friends. But before you get down to who gets hired, and who gets tenure, I think there has to be some value, some assumptions about what's important, what's legitimate, what you want to do. It's usually assumed that this is already given. Everybody is supposed to know already what the department needs to do to improve itself. But actually, that's not tenable. The standards for hiring, promotions, etc.. we subject to differences of opinion, depending on what you believe in, what you think is the right thing for the department to be doing. In other words, your ethical stance.

Here is a story about an ethical problem in relations between colleagues. It's a little out of date, but interesting. You probably know that back in the '30's many mathematicians were leaving Germany in order not to be killed. Emil Artin was one of the great algebraists of his time. Artin wasn't Jewish, but his wife was, and they had two kids. Artin was approached by Helmut Hasse, who was another outstanding algebraist. Hasse was almost a pure Aryan, though he did have a Jewish ancestor someplace back in his family tree. He had become the head of the Institute at Gottingen after Courant and Weyl and Neugebauer had been kicked out. Artin was planning to leave because of his wife being Jewish, their children half-Jewish. Hasse said he could give Artin a deal. The kids could be made Aryan!

Do you see any ethical questions there? Hasse was a great mathematician. After the war he was quoted as being annoyed that some of the de-Nazification programs instituted by the American army were too severe. And he wasn't the worst. There were people like Teichmuller and Bieberbach,

brilliant mathematicians who were whole-hearted, all-out Nazis. Their ideology affected their professional work too, driving people like Landau off the lecture platform. Probably it could never happen here. But racism is a problem everywhere. It's not only a political problem, it's an ethical problem. We tend, many of us, to throw it under the rug, to think it's of no relevance to us. But maybe learning a little history will enlighten us about that. So much for ethical problems between colleagues.

Finally, what do we owe to the Dean, the Provost, the Chancellor? What they usually expect is, you should get grants, visibility, things like that. That demand from the administrators is based on certain values. It's based on a particular idea of what the university is, and what the department should become. If those values are accepted, then our present conditions follow absolutely. What the math department should be doing is to get out there and bring it in! But this kind of value system is also arguable. There are some of us who think otherwise. And recognizing that there is an ethical conflict here can only help to clarify our possibilities and our alternatives.

Now, to yourself! Does anybody here remember Polonius? It's in Hamlet, just before he got Hamlet's sword through his gut. "And this above all, to thine own self be true."

I've carefully avoided at any point giving you my own values. So there's no way anyone can disagree with me. I've just listed points of value judgment in our profession. Probably there are others that I have forgotten. But I'm sure you're ready to point out that this really has nothing to do with mathematics. It has to do with academic life. A French professor, even a mechanical engineering professor, would be involved in all these issues. I've been assuming that we're all academics. Of course, this isn't true. People here may be working in industry or other things. But being an instructor or professor involves you in all these interactions with people: students, faculty, staff, administration. And these all have an ethical component. However, this does not really deal with the issue I started with, which was, what about mathematicians as mathematicians?

Are there issues we have to face, just because we're mathematicians, the way engineers have ethical issues they have to face? Here I think we have to recognize the irritatingly vague line between pure and applied mathematics. To the extent that it is really involved in the so-called "real world," applied mathematics obviously brings in the same ethical issues as engineering, or any other applied science. For instance, nowadays people are using big computers to figure out secondary oil recovery. The

people who do this are both geophysicists and applied mathematicians. The ethical issues for the applied mathematician are the same as for the geophysicist. What are the consequences of this activity for the environment, for the economy? To the extent that an applied mathematician gets involved with a real world activity, like geology or engineering, he has to deal with the ethical issues of that field, not because he's a mathematician, but because he's involved in that application.

Therefore let me acknowledge the separation, and ask, what about pure mathematics? Mathematicians who merely prove theorems. Is there any ethical component comparable to what you find in other fields of science? Of course, depending on what you include as ethics, you can say yes or no. "It's unethical to prove an ugly theorem." "It's unethical to republish under a different title a trivial paper that you have already published." As expressions of the taste or the standards of the field, these statements are correct. But still, one laughs at the word "ethical" here. It just doesn't make sense to use the same language for such issues of taste in pure mathematics as for air pollution or nuclear war. There are "ethical" issues in pure mathematical research. But they cannot withstand comparison with the major issues of human survival arising in "real world" science.

In pure mathematics, when restricted just to research and not considering the rest of our professional life, the ethical component is very small. Not zero, but so small it's hard to take very seriously. In fact, this may be a characteristic, a defining characteristic of pure mathematics. I can't think of any other field of which you could say that. That's why people say pure mathematicians live in an ivory tower. One answer to this could be, "Well, this is fine! There's no need for mathematicians to have a code of ethics, because what we do matters so little that we can do whatever we like." And I might agree with that. I'm not going to start advocating a code of ethics in mathematics at this point. But when I think about this attitude, I find it rather scary. Because it means that if we become totally immersed in research on pure mathematics, we can enter a mental state which is rather inhuman, rather totally cut off from humanity. That's a thing we could worry about a little bit.

Therefore I come to a conclusion for most of us, those who are not doing pure research a hundred percent of the time, who are not in the institutes for advanced studies, but have students and colleagues and staff and administrators. We mathematicians, I think, have a special need to take all these other responsibilities very seriously. Because unlike people

in other fields, our research work does not automatically involve human concern. My conclusion: If our research work is almost devoid of ethical content, then it becomes all the more essential to heed our general ethical obligation as citizens, teachers and colleagues, lest the temptation of the ivory tower rob us of our human nature.

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