CHAPTER XIX

Ten Lessons for the Survival of a Mathematics Department

Times are changing: mathematics, once the queen of the sciences and the undisputed recipient of research funds, is now being shoved aside in favor of fields which are (wrongly) presumed to have applications, either because they endow themselves with a catchy terminology, or because they know (better than mathematicians ever did) how to make use of the latest techniques in P.R. The following decalogue was written as a message of warning to a colleague who insisted that all is well and that nothing can happen to us mathematicians as long as we keep proving deep theorems.

1. Never wash your dirty linen in public

I know that you frequently (and loudly if I may add) disagree with your colleagues about the relative value of fields of mathematics and about the talents of practicing mathematicians. All of us hold some of our colleagues in low esteem, and sometimes we cannot keep ourselves from sharing these opinions with our fellow mathematicians.

When talking to your colleagues in *other* departments, however, these opinions should never be brought up. It is a mistake for you to

G.-C. Rota, *Indiscrete Thoughts*

think that you might thereby gather support against mathematicians you do not like. What your colleagues in other departments will do instead, after listening to you, is use your statements as proof of the weakness of the whole mathematics department, to increase their own department's standing at the expense of mathematics.

Departments of a university are like sovereign states: there is no such thing as charity towards one another.

2. Never go above the head of your department

When a dean or a provost receives a letter from a distinguished faculty member like you which ignores your chairman's opinion, his or her reaction is likely to be one of irritation. It matters little what the content of the letter might be. You see, the letter you have sent forces him or her to think about matters that he or she thought should be dealt with by the chairman of the department. Your letter will be viewed as evidence of disunity in the rank and file of mathematicians.

Human nature being what it is, such a dean or provost is likely to remember an unsolicited letter at budget time, and not very kindly at that.

3. Never compare fields

You are not alone in believing that your own field is better and more promising than those of your colleagues. We all believe the same about our own fields. But our beliefs cancel each other out. Better keep your mouth shut rather than make yourself obnoxious. And remember, when talking to outsiders, have nothing but praise for your colleagues in all fields, even for those in combinatorics. All public shows of disunity are ultimately harmful to the well-being of mathematics.

4. Remember that the grocery bill is a piece of mathematics too

Once, during a year at a liberal arts college, I was assigned to teach a course on "Mickey Mouse math." I was stung by a colleague's remark that the course "did not deal with real mathematics." It certainly wasn't a course in physics or chemistry, was it?

We tend to use the word "mathematics" in a valuative sense, to denote the kind of mathematics we and our friends do. This is a mistake. The word "mathematics" is correctly used in a strictly objective sense. The grocery bill, a computer program, and class field theory are three instances of mathematics. Your opinion that some instances may be better than others is most effectively verbalized when you are asked to vote on a tenure decision. At other times, a careless statement of relative values is more likely to turn potential friends of mathematics into enemies of our field. Believe me, we are going to need all the friends we can get.

5. Do not look down on good teachers

Mathematics is the greatest undertaking of mankind. All mathematicians know this. Yet many people do not share this view. Consequently, mathematics is not as self-supporting a profession in our society as the exercise of poetry was in medieval Ireland. Most of our income will have to come from teaching, and the more students we teach, the more of our friends we can appoint to our department. Those few colleagues who are successful at teaching undergraduate courses should earn our thanks as well as our respect. It is counterproductive to turn up our noses at those who bring home the dough.

When Mr. Smith dies and decides to leave his fortune to our mathematics department, it will be because he remembers his good teacher Dr. Jones who never made it beyond associate professor, not because of the wonderful research papers you have written.

6. Write expository papers

When I was in graduate school, one of my teachers told me, "When you write a research paper, you are afraid that your result might already be known; but when you write an expository paper, you discover that nothing is known."

Not only is it good for you to write an expository paper once in a while, but such writing is essential for the survival of mathematics. Look at the most influential writings in mathematics of the last hundred years. At least half of them would have to be classified as expository.

Let me put it to you in the P.R. language that you detest. It is not enough for you (or anyone) to have a good product to sell; you must package it right and advertise it properly. Otherwise you will go out of business.

Now don't tell me that you are a pure mathematician and therefore that you are above and beyond such lowly details. It is the results of pure mathematics and not of applied mathematics that are most sought-after by physicists and engineers (and soon, we hope, by biologists as well). Let us do our best to make our results available to them in a language they can understand. If we don't, they will some day no longer believe we have any new results, and they will cut off our research funds. Remember, they are the ones who control the purse strings since we mathematicians have always proven ourselves inept in all political and financial matters.

7. Do not show your questioners to the door

When an engineer knocks at your door with a mathematical question, you should not try to get rid of him or her as quickly as possible. You are likely to make a mistake I myself made for many years: to believe that the engineer wants you to solve his or her problem. This is the kind of oversimplification for which we mathematicians are notorious. Believe me, the engineer does not want you to solve his or her problem. Once, I did so by mistake (actually, I had read the solution in the library two hours previously, quite by accident) and he got quite furious, as if I were taking away his livelihood. What the engineer wants is to be treated with respect and consideration, like the human being he is, and most of all to be listened to with rapt attention. If you do this, he will be likely to hit upon a clever new idea as he explains the problem to you, and you will get some of the credit.

Listening to engineers and other scientists is our duty. You may even learn some interesting new mathematics while doing so.

8. View the mathematical community as a United Front

Grade school teachers, high school teachers, administrators and lobbyists are as much mathematicians as you or Hilbert. It is not up to

us to make invidious distinctions. They contribute to the well-being of mathematics as much as or more than you or other mathematicians. They are right in feeling left out by snobbish research mathematicians who do not know on which side their bread is buttered. It is our best interest, as well as the interest of justice, to treat all who deal with mathematics in whatever way as equals. By being united we will increase the probability of our survival.

9. Attack flakiness

Now that Communism is a dead duck, we need a new Threat. Remember, Congress only reacts to potential or actual threats (through no fault of their own, it is the way the system works). Flakiness is nowadays creeping into the sciences like a virus through a computer, and it may be the present threat to our civilization. Mathematics can save the world from the invasion of the flakes by unmasking them and by contributing some hard thinking. You and I know that mathematics is not and will never be flaky, by definition.

This is the biggest chance we have had in a long while to make a lasting contribution to the well-being of Science. Let us not botch it as we did with the few other chances we have had in the past.

10. Learn when to withdraw

Let me confess to you something I have told very few others (after all, this message will not get around much): I have written some of the papers I like the most while hiding in a closet. When the going gets rough, we have recourse to a way of salvation that is not available to ordinary mortals: we have that Mighty Fortress that is our Mathematics. This is what makes us mathematicians into very special people. The danger is envy from the rest of the world.

When you meet someone who does not know how to differentiate and integrate, be kind, gentle, understanding. Remember, there are lots of people like that out there, and if we are not careful, they will do away with us, as has happened many times before in history to other Very Special People.