

Rotating at the National Science Foundation

John B. Conway



The activity referred to in the title means that the National Science Foundation (NSF) has temporarily employed me to supervise a part of its grant-awarding business.

The staff members with whom the mathematical public interacts at the NSF are called program officers (POs).¹ Some of these are permanent professional staff and some are rotators. These latter are temporary employees who come from outside the foundation for a short period and then return to their jobs. They stay for two or three years, although a few leave after one year, others stay for four, and still others eventually become permanent. How long they stay depends on them, the NSF, and for how long their permanent employers are willing to let them be gone. In the Division of Mathematical Sciences (DMS) the rotators are a bit less than two-thirds of the approximately twenty-one POs. That fraction fluctuates, and there is a move to decrease it. Some other divisions have far fewer rotators. The virtue of having rotators is that they bring a fresh perspective to NSF's business as well as, presumably, the opinions of people fresh from an involvement in research.

I have been a rotator at the NSF for a year and a half. Why did I do this? What is it like? Do I enjoy it? What are the best and worst parts of the job? How does it compare to being a department head? Is there time to do research? I have been asked those questions ever since I started working here. Of all those questions, perhaps the easiest to answer is the comparison between a PO and a head. There is indeed a similarity between the two jobs, and each is good preparation for the other. In both cases you have to be organized, capable of articulating a position, able to hear what others have to say, and know how to cooperate. I think I am a better PO for having been a head, and, conversely, were I to return to being a head, I am certain I would be better at it for having been a PO.

There are also many distinctions between the two positions. At the DMS all of my colleagues are adults.

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¹ *They are also called program managers and program directors, an ambiguity that initially perplexed me.*

Of course that sounds like a harsh indictment of academia, and it has induced more than one person to draw some unintended conclusions. But I will stick with it in all its starkness if you allow me to specify the definition of the word *adult*: a person who realizes they live in an environment inhabited by others and that this calls for cooperation, accommodation, and flexibility. I have yet to find a department where there aren't faculty who think they are the center of the universe and refuse to believe that there are issues that call for them to make a sacrifice. At the NSF there is enormous cooperation among POs. I have yet to make a request for help to another PO and not get their assistance. In fact, it is almost always the case that they stop whatever they are doing and give me their attention. I found that attitude attractive when I first arrived, and I still do. I have had university colleagues who were similar, but they were far from the dominant species.

Another difference is that as a PO, when I give someone bad news, he/she is usually several hundred miles away. Turning down a reasonable request that will aid another mathematician in his/her professional life is not pleasant. I don't think that is unique to me, and, indeed, your sadistic streak would have to be rather pervasive for it to be otherwise. But there is an enormous difference between saying no as you are looking a friend in the eye and doing so by email to a person far removed from you whom you may have met only at a conference or two.

Another distinction is that when I go home at night, I am away from the job. That was not true while I was a head, where I frequently mulled over departmental matters well into the night. Now my mind is free when I leave the office. I might think a bit about some DMS matter, but usually by the time I get off the subway my mind is clear. That allows me to spend my evenings on whatever mental activity I want.

There are as many reasons for becoming a rotator as there are rotators. Almost all share a desire to be involved in setting national mathematical policy. Some, for personal reasons, want a break from their university routine. Some want to spend time in the Washington area. Some want to add a dimension to their professional résumés. Some,

like me, are nearing retirement and use this as a coda to their careers.

I was attracted by the specific prospect of starting the two new progeny of the VIGRE (Vertical Integration of Research and Education) program: The Mentoring at Critical Transition Points and Research Training Groups programs. These programs address problems about the education and training of mathematicians that have been on my mind for years. Another attraction was that the programs were new and I felt I could put my stamp on them. Finally, the prospect of living in the Washington area was very appealing. (I also handle a couple of dozen research proposals in analysis, but that was less compelling.)

There was another factor. People often complain about the NSF and criticize its actions. At times that group of grumblers has numbered me among its members. If mathematicians are not willing to come to work at the NSF, then when things do not go their way, they should blame themselves. In addition, there is something that I have often said and, as time goes on, I have begun to realize more fully: Mathematics has given me a good life, so some service to the profession makes a lot of personal sense.

What is the work like? Most are familiar with the process of submitting proposals. It is the PO who handles the proposals once they enter the DMS, makes sure they are properly reviewed, and then makes a decision whether to recommend them for funding. When you first start work here you are often told that you make recommendations only; you do not make awards. After the PO recommends an award or declines a proposal (a “dec”), the division director either concurs in your judgment or sends it back to you. If (s)he agrees, it goes to the Division of Grants and Agreements, which makes the actual award. The point is, however, that in all but a tiny fraction of cases, the PO’s recommendation is followed. Therefore, in a practical sense the PO does make awards.

It might be that in very large grants, like those for VIGRE or the two programs I am in charge of, there will be extensive discussion with the director as well as with a sizable portion of the DMS staff. In other words, there is a lot of input from many that determines the recommendation. But for individual grants the PO effectively determines the fate of the proposal. Of course the decision must be justified, and the POs must fully explain how they arrive at their decisions. The POs do an analysis of the reviews and explain why they agree or disagree. If they disagree and properly explain why, it is likely that decision will stand. That is probably more power than most mathematicians think resides in the hands of POs, and it is more power than most rotators anticipate having. Realize that POs are not robotic, blindly following review ratings. They use judgment and their perspective.

If in reading the preceding paragraph you think any part of the decision making proceeds with whimsy, you have not understood the process. To begin, there are some measures that are taken that help assure fairness. There are government laws and NSF regulations about what constitutes a conflict of interest. For example, I cannot have anything to do with a proposal that involves any former Ph.D. student, a collaborator I’ve had in the last four years, or anyone from my university. I am not even supposed to read their proposals. Unlike congressmen, I cannot accept gifts, such as a meal, or have a university pay my expenses to come give a talk. Violate one of these conflicts and you are subject to legal penalties. Yes, there have been POs at the NSF who were prosecuted for such transgressions (but not, as far as I know, in the DMS).

I long ago stopped defending the social and ethical practices of fellow faculty, so I am not going to try to say that all POs are totally fair 100 percent of the time. They are, after all, human beings. But I will say that I am very impressed with the level of professionalism I observe in the mathematics POs. They work hard and are extremely conscientious. They contradict the judgment of a review panel with great reluctance. If your proposal is declined, you may disagree with the assessment, but you can be assured, with a probability approaching one, that the process was fair.

What is the worst part of the job? It is a lot of work. More than that. The tasks you have to do come at you unpredictably, randomly, and unrelentingly. It starts with your assignment. To add some interest and variety to the job, each PO is given several different tasks for the year. Some jobs, like managing the Focused Research Groups program, are too small to need someone’s complete attention throughout the year. Others are too large for a single mathematician to handle, like the analysis program. So each PO wears several different hats in any given year. That adds interest to the job, but it also means you must frequently switch gears from one program to the other. Many is the morning when I enter my office with a specific task to accomplish and find when I go home that I have hardly begun it.

Also there is a lot of routine and tedious work that you must personally do. A very large percentage of your time is spent sitting at the computer clicking away at various buttons on the screen to route and process documents. The NSF is highly computerized. In fact, it is supposed to be working toward being a paperless operation. For example, for each proposal that goes before a panel, I must upload a copy of the panel’s minutes into its computer file. The designers of the software apparently never saw the need to be able to do this en masse. So I must do this for each proposal in a one-at-a-time process. It takes less than two minutes to do one, but I have a hundred proposals. So that is on the order of three hours. OK, it is not a lifetime. But first, it is tedious. Second, it is just one of several similar

operations I have to perform for each proposal. Finally, I was meant for better things—my apologies to those misguided souls who think all work is noble.

On the other hand, if you talk to those who were here at the NSF before this paperless reform took hold, you hear about an environment where twelve copies of each proposal arrived on your desk. Understand that you handle a hundred proposals, so we are talking 1,200 stapled packages, each having upward of forty pages. While that is a sure-fire way to build your upper-body strength, on the whole I guess I would rather click away at the monitor screen.

There are other tasks that are important and require my education and experience, like writing justifications for my decisions. These take two forms. The first is called PO Comments and is sent to the PI. This is important, especially when the proposal is dec'd, not because I am going to convince him/her that was a good decision, but because it is important to let the PI know why you have arrived at your decision. This takes some time to do well, and there is a value in gaining experience honing your talents at this. Frankly, it is not clear that I have gotten there yet. Also, especially when the PI is a rather young Ph.D., I can make some suggestions for improving the proposal and encouraging a resubmission.

The other document you write for each proposal is called a Review Analysis. This is pretty much what it sounds like and is a document that never leaves the NSF. It seems to have two purposes: to convince the division director that you made a sound decision and for use in case the PI asks that the decision be reconsidered or the foundation is sued. Of course you can be a bit more open when you write this, since there is no chance of violating confidentiality. The important thing here is that if there is a request for reconsideration by the division director, this is what (s)he is going to read before making a decision.

Then there are some personal things that upset me, like declining a proposal by someone I have known and respected for a very long time. Not so personal but disturbing nonetheless is that we fund less than 30 percent of the proposals we receive. If there were money, we could easily fund 50 percent and not feel that a dime was wasted. I have never seriously tried to find where that "comfort line" is, but I would not be surprised if it is at the 75 percent mark or higher.

Given this situation, you cannot help but question the robustness of the rankings arrived at by a review panel. I suspect that the proposals that fall into the top half or so of the panel rankings are rather stable and would not change much if I perturbed the membership of the panel. A similar statement holds for the very top 10 percent. But the ordering of those proposals that fall between

the 10 percent and 50 percent marks might well change enough so that those that are funded are likely dependent on a panel's makeup. That is not particularly pleasant to contemplate, but we have to live with it as long as the funding is the way it is. We certainly are not going to abandon research funding because we lack a perfect system.

Finally, there is something that I would not label as horrible, but it is grating: the difference between permanent staff and rotators. This starts with our having different colored badges, something that strikes me as either a bureaucrat's nonsense or an attempt to institute a caste system. A more disquieting fact is that there are certain discussions where no rotators take part. There seem to be certain issues where our advice is not deemed valuable.

Adding to the list of the irksome is something I experienced before I arrived here: the penchant for the DMS to be obscure and uninformative about what is going on. Part of this is bureaucratic, a disease that affects even the DMS and hence is probably part of human nature. The prevailing attitude seems to be that unless there is a rule saying you have to give out information, you should withhold it. I found that frustrating before I arrived and so I decided to give out all information unless there is a reason why I shouldn't. I am sure that will strike some at the NSF as risky behavior, but it seems to be appreciated by the mathematicians I deal with, and I have experienced no aftershocks.

What is the best part? Helping to set policy was what I thought it would be before I arrived, and to a large extent it is. The difficulty is that I spend so much time doing the routine and mundane that I do not have enough time to think and reflect about general issues the way I thought I would. But the division has many staff meetings; an occasional retreat; and, of course, all the hall, office, and coffee room discussions. These give ample opportunity to express your opinion and advocate your point of view on a variety of important issues. So I still feel I am having an influence on what happens, but less than what I had anticipated.

When I finish, will I feel as though I made a difference? I don't know, but that question has less importance for me than it might for others. The reason for that lies more in my personal approach to life and career and my view of how the world works, both topics best left for my autobiography.

You have to keep your goals for doing this job realistic. For example, when I arrived I had a desire to increase the interaction between the DMS and the Education and Human Resources (EHR) Directorate. I have made some progress here, with EHR's Division of Undergraduate Education participating with us in conducting the mentoring competition. I was not so dumb or arrogant as to think I was going to reshape the entire structure of these two divisions to mesh their educational activities.

To begin, EHR focuses on helping large numbers of students. A program that affects one hundred students would not be thought of as one of their shining lights. By that standard, the DMS is an elitist organization. When we discuss an educational or training program, we are interested only in reaching the best and brightest of students. No one is going to come in and change that cultural difference. In fact, such a change would be a disaster, since both approaches have merit.

Another goal I had was to increase communication between the NSF and the mathematics community. I don't think I have made much progress on that. I did discover that one of the community's pet complaints about the NSF, their unwillingness to dispense small grants to a large number of mathematicians, is misdirected. Increasing grant size is mandated by the National Science Board, a presidentially appointed group that oversees federal science policy. You can complain about this, but doing so to the DMS is pointless. Were the DMS to fight this policy, the budgetary consequences would not be to our liking.

On the other hand, why didn't I understand this before I came to the NSF? I think that I was more aware of policy matters than most, but I had never heard about this one. I had been to several meetings with NSF-DMS folks where this issue arose, and the response was always "It can't be done." It was sometimes mentioned that to try this would jeopardize mathematics funding, but never a word as to why. That strikes me as a bad job of communicating by the DMS.

Something I enjoy that was totally unanticipated before I started working here is organizing and conducting a review panel. We still use the classical mail review system, where a proposal is sent to several mathematicians to review at their university. But to achieve increased efficiency with an increased number of proposals, the division uses a panel review system for something in excess of 80 percent of the proposals. A panel of 10–16 mathematicians is assembled in Arlington for two or three days to review between 30 and 75 proposals. The panelists read the proposals and write their reviews before the meeting, then assemble at the NSF headquarters to discuss their findings and rank the proposals.

Organizing this takes time, but it certainly is not tedious. There is even some skill involved in selecting a good blend of panelists to suit the proposals, choosing the proposals to assign each panelist, and making sure the written reviews arrive before the meeting. But the real enjoyment is the meeting itself. The intellectual involvement is very high, the arguments for or against a proposal are almost always well reasoned, and the debate very productive. What I get out of a panel review far exceeds what I get from mail reviews, where no one is available to challenge any-

thing that is written. Given my curiosity about people and human behavior, this is also a splendid opportunity to observe interchanges, foibles, personality traits, and character.

Another highlight of the job is lunch. This is not a comment on the abundance of excellent cuisine near the NSF headquarters, though what's here certainly beats the university cafeterias that I am familiar with. Rather it is a comment on the quality of social conversation that takes place. The people who are prone to accept positions at the DMS seem to have a very broad range of interests, and this makes for interesting conversation. This is one of the highlights of my day, and when we interview candidates for rotator positions, I find that I ask myself what they will contribute to the lunch discussions.

There is also considerable opportunity to broaden your familiarity with mathematics. You see proposals with lots of different mathematics pass through your hands, and you have an opportunity to become familiar with much of what is happening in your area.

How about personal research? You are allowed fifty days a year to pursue your individual research projects. You can take a bunch in the summer if you want, or you can take one a week. It's up to you. That is, it's up to you provided you get your work done. On the other hand, the DMS administration is very supportive, and the travel possibilities far exceed anything a university can offer. Also, as I said before, when I hit home I leave the NSF behind and I am not drained of psychic energy, so I have something to devote to my personal work. But if you have done a lot of research, you know there are hot spells when you want to minimize everything in your life except for the mathematics. That cannot happen while you are a rotator, except possibly in the summer, when the pace of work really slows down. You have deadlines, and many others are depending on you—far too many obligations to shunt to the side. I prefer to spend my personal time writing, where a measured pace is more easily realized. Some rotators have done research, but I am sure they would admit that they did not do as much as while teaching.

If you have concluded that I am happy for having come to the NSF, you are correct. In fact, without hesitation I can advocate that others emulate my decision. It is not the easiest work around, but if your expectations are realistic, if you approach this with an open mind, if you keep the important goals in focus, and if you eschew bureaucratic nonsense, it can be a very satisfying experience.