

Comment

James V. Zidek

I congratulate Dr. Trumbo on his thoughtful and very comprehensive article. All grant applicants, new and old, should find useful advice in it. The author's experience as a National Science Foundation Program Director and acquired wisdom are revealed in the paper by its scope and detail.

I find myself in agreement with most of Dr. Trumbo's ideas, many of which never occurred to me. Thus, as a discussant, I find myself in the somewhat awkward position of wishing I had written the paper and wondering what else to say about it. I have chosen the only apparent course open to me, that of digression, but will at least try to stick to tangential directions.

Although my experience of research administration is not as extensive as Dr. Trumbo's, it is not negligible in that I have served on the Statistical Sciences Grant Selection Committee of the Natural Science and Engineering Council of Canada (NSERC) and been its Chairman for 1 year. As well, I am currently its Mathematical Sciences (computer science, mathematics and statistics) Group Chairman. (Roughly speaking, NSERC is the National Science Foundation's (NSF's) Canadian counterpart, and the source of research funding for most statistical researchers in Canada.) I have even applied for and held grants from various agencies in the United States and Canada so I know something about the agony and the ecstasy involved!

A fundamental question to be answered affirmatively by a prospective applicant before starting to fill in the forms and following Dr. Trumbo's good advice is: Should I apply for a grant? This is not a rhetorical question! I know of people who have declined to apply for research support either selectively from certain agencies or period. And various reasons have been given for not doing so, the most general being that the need is not as great as the cost, measured in the broadest terms.

The amount of work involved in preparing a good grant application, along the lines described by Dr. Trumbo, is a daunting prospect. It has even been said that only two/ninths of summer salary is provided because the remaining month is needed to prepare the next grant application. Beyond the actual writing, preliminary analysis and so on, there is all that strategic planning.

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These days, the most likely outcome of a grant application to most agencies is failure, Dr. Trumbo's good advice notwithstanding; those who react badly to failure can avoid it by not applying in the first place. Incidentally, a particularly discouraging aspect of rejection are the negative reviews. An applicant told me recently he received two reports, one praising his work and the other arguing that he was working in a dead subject (which I will not disclose)! This individual is still soul-searching months later.

Some people really hate the administrative hassles of managing a grant. Satisfying the typical university grants and contracts officer in itself can be quite arduous. Organizing and hosting site visits takes time and can be quite enervating. Then there is the effort involved in actually making the disbursements and supplying the requisite justifications. Finding graduate research assistants interested in working on your project in these times of diminishing graduate enrollments in statistics can take a lot of active recruitment. And if you do not find such a student you have to find ingenious uses for the funds before the end of the fiscal year. I am reminded of a well-known Canadian mathematician who, to avoid all the hassles, has for years, requested (and received) only \$1500 per year, much less than the (approximately) 1988 CAN\$50,000 to which he was prospectively entitled by virtue of his reputation.

Then there are the objections in principle. I know of individuals who refuse to apply for or accept funding from military agencies. At the same time, their colleagues try to persuade them that their consciences would be better served by taking as much money as possible from them to take funds away from genuinely useful but morally repugnant projects on which it might otherwise be spent.

Some individuals argue that modern research and development funding has eroded the quality of universities and that accepting such funding is merely contributing to that trend. They abhor the industrialization of the campus. They oppose centers of excellence programs on the grounds that these are contrived simply to enable governments to get around university autonomy and so selectively fund politically attractive projects often without peer review. They see these programs as deriving partially from the misguided task force theory enunciated by Gilman (1965) "that nine pregnant women can produce a baby in one month." They may see research and development as eroding the quality of education at universities;

increasingly their colleagues seek teaching release and less well-qualified instructors to replace them in the classroom. They see research and development increasingly biasing research away from free inquiry toward goals of relevance and economic benefit. Getting a research grant may thus be viewed as one more nail in the academic coffin.

A beginning researcher might decline to apply for a grant because the implicit contract he or she would thereby establish with the grantor may be viewed as intolerable. There is no such thing as a free lunch after all, no matter how seemingly beneficent the grantor. Despite Dr. Trumbo's assurances on the desirability of imaginative, path-breaking research, the new applicant faces an invisible and potentially hostile and potentially unimaginative reviewer. The would-be applicant may recognize a priori the need to propose original work, but at the same time the need to make it credible by tying it into well-defined, existing mainstream research activities. I think it was Rene Dubos who said that scientists were like sailors trying to rebuild their ship at sea—the trick is to change only one plank at a time! My own experience as an NSF reviewer suggests that most researchers are cautious in selecting their topics and typically propose derivative albeit novel research, well within their capabilities. H. L. Mencken argued “scientists are but dogs sniffing tremendously at an infinite series of rat holes”; these proposals suggest those rat holes are very close together indeed. Fortunately for our profession, many of these applicants ignore their implicit contract with the grantor and make great strides. But the new applicant has to compute whether he or she will be strong enough retrospectively, to do so during the formative stages of their careers. To put the point a slightly different way, most successful new applicants would probably not gamble by moving into an entirely new research area, even when it seemed propitious to do so. Although the grantor might forgive her or him for doing so and Dr. Trumbo assures us that the grantor will not mind if things do not go according to plan, much harder-to-get results in the new field would still be demanded at the end of the day. A prospective applicant recognizing this serious encumbrance at the outset might well decide to side step it by not applying for a grant in the first place. And this might well be an excellent strategy for an imaginative newcomer who can get by without the support and wants to make major achievements in his or her field.

Whatever the advantages, such as those suggested by Dr. Trumbo, of joining a larger group of researchers there is an important disadvantage namely that the junior researcher would need to serve the principal investigator and this too could seem unduly burdensome to the prospective joint applicant.

There must be something good about grants, judging by the enthusiasm with which they are pursued. I suppose lots of people need support because state funding for university research infrastructures is being cut; cynics go so far as to suggest that researchers are swimming hard to stay even, because states cut funding according to a university's success in attracting external funding and the juicy overheads they provide.

There are academic kudos in grants, the bigger the better it would seem. In some sciences (medical, for example), the size must be very important judging by the way awards are trumpeted in the C.V.'s coming through an awards committee on which I have served. There was even a chart giving cumulative lifetime totals in one case. This emphasis on size seems mildly perverse given that often grants are large simply because the grantees need huge chunks of equipment where a statistician might get by with a pad and pencil. And administrative loads grow with the size of the grant.

Grants even seem to have become an important qualification for promotion and tenure. In one albeit extreme example, a major North American university initially denied tenure to a candidate with a superlative research record largely because his grants record was deemed to be deficient by a senior university committee. A very worrying example.

Grants are vital to the operation of most major universities nowadays. Overheads are an important source of income, although if the state simply cuts operating grants with the sharp knife of inflation the true value of this income is less clear. The income is certainly needed to pay the officers of the university who collect it, just as oxygen tanks are needed by mountain climbers so they can carry them.

In this era of Keynesian fiscal management by big government, the research grants program is a strategic tool. It is an important way of pumping federal funds into the local areas. The researcher will be spending his or her summer salary on such things as automobiles and beer after all. From this point of view, the researcher has a duty to apply for and accept research funding; this is the most heroic reason I can think of for wanting to have a grant.

A lot of my experience with grants and the grant politics has come from Canada where things are somewhat different from the primary domain of NSF funding. There would seem to be a lot less research money available in Canada than in the United States for a start. However Canadian university salaries are paid on a 12-month rather than 9-month basis so implicitly there is a salary subsidy of two/ninths for all researchers without regard to their competence. Of course, this summer salary carries with it an implicit obligation to the university, but in practice summer places small demands on the time of most academics outside of

those connected with research. The 12-month salary does reduce pressure on researchers to seek summer support and beginners may especially benefit. There are obvious drawbacks to this system however.

NSERC, the primary source of support for statistical researchers in Canada, does not pay for teaching release. Operating grants are typically for 3 years, only a brief progress report is required at the end of period, and decisions about refunding a grantee are made almost entirely on the quality of completed research. The quality of the proposal is secondary. Consequently, proposals are brief and, in fact, are limited to about half a dozen pages. This contrasts markedly with the proposals I have reviewed and submitted to United States agencies.

There is a lot of flexibility in the way NSERC funds are used. Researchers, who are not themselves eligible for NSERC funding, may be hired for periods as long as several months or a year without justification in the original proposal, for example. Travel is limited only by the size of the grant although justification has to be made at the end of the day, of course. NSERC (and I believe each of the other Canadian federal granting agencies) pays no overhead to universities so the typical university research service office is quite modest.

The NSERC system is particularly advantageous to beginning researchers without track records. Those whose applications get reasonably good supporting letters, usually based on Ph.D. research, will almost automatically get a 1–3 year grant of about \$10,000

per year. Many of the tactics in Dr. Trumbo's paper are not needed by such applicants.

NSERC statistical research fund granting decisions, based upon a peer adjudication system, are ultimately decided on the recommendation of a committee of seven statistical researchers appointed by NSERC and broadly representative of statistical research fields and geographical subregions of the country. Policy decisions likewise are based on the recommendations by the scientific community as a whole through representatives, like the Group Chairman, who are appointed for a term of several years. Like all systems which have evolved over time, the NSERC system is complex and has a personality all of its own. My impression is it is well suited to its mission of supporting and fostering good research in Canada.

Overall, the North American system of research and development funding has worked well although I do have some concerns about present trends, which are echoed in my comments above. I am amazed by the enormous number of hours donated to its service by unpaid volunteers (reviewers and so on) and I am sure the success of the system has depended on their great but largely unrecognized efforts in search of excellence. Dr. Trumbo's very timely article, by assisting applicants in the preparation of their proposals, and reviewers thereby, must be viewed as a substantial contribution toward that goal.

ADDITIONAL REFERENCE

GILMAN, W. (1965). *Science: U.S.A.* Viking, New York.

Comment

Adrian F. M. Smith

The Editor has asked me to comment on this article from the perspective of statistics (including probability) research grant funding possibilities in the United Kingdom. However, because the current British system is substantially different from that in the United States, my discussion will largely take the form of a description of our system, rather than a detailed analysis of Trumbo's paper.

Research funds for academics in higher education establishments in the United Kingdom are distributed

by research councils. These consist of the Science and Engineering Research Council (SERC), Economic and Social Research Council (ESRC), Medical Research Council (MRC), Natural Environment Research Council (NERC) and Agricultural and Food Research Council (AFRC).

It is, in theory, possible for statisticians to apply for funding from any of these research councils. However, SERC is the appropriate council for most statistical research involving substantial methodological issues. Approaches to other research councils would typically only involve statisticians as part of a team proposing essentially applied investigations in a substantive area covered by the respective council. The remainder of my discussion will therefore focus on the mechanisms currently operating within the SERC, which is

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