

Volume 10 | Issue 5 | Page 15

by Liane Reif-lehrer

PROFESSION

Following Instructions Is Critical To Success Of A Grant Application

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Of A Grant Application

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Getting financial support for research -- especially basic research -- has become very time-consuming and frustrating for scientists. At the National Institutes of Health, for example, the number of applications reviewed increased 14 percent, from 11,487 to 13,141, between October 1991 and October 1995, according to the October 1995 issue of Peer Review Notes, a newsletter published by NIH's Division of Research Grants (DRG). A consequence of this rise in the number of grant applicants vying for limited dollars is a decreased likelihood that one's proposal will be funded: The overall success rate for NIH research grant applications has hovered at only about 25 percent for the past several years.

In such competitive times, there are measures that principal investigators (PIs) can take to increase the chances that their applications will be viewed favorably, according to NIH study-section members and directors of university grant offices. For many researchers, not having that slight edge can mean the difference between getting or not getting funded.

Some PIs do work of such quality and relevance that they are generally funded at first submission of an application. At the other end of the spectrum are PIs proposing projects that, while interesting, are not of high enough quality to be near the payline. But close to the funding cutoff there are good grant applications that contain innovative research ideas but do not get funded because the ideas are not presented clearly or convincingly.

Nancy Lamontagne, scientific research administrator (SRA) of NIH's molecular and cellular biophysics study section, cites an example of one borderline application "that was outstanding but was not funded because the principal investigator had failed to make clear the biological significance of the project." How can such scientists ensure that their proposed investigations are explained sufficiently to be deemed worthy of funding by those charged with reviewing their proposals?



'Communications 101': Janet Rasey advises PIs to network with NIH institute program officers.

One way is to contact the relevant NIH personnel at the outset to confirm that there indeed is interest in the idea, says Janet Rasey, a veteran of two four-year terms as a member of the NIH radiation study section. Rasey, director of research funding services at the University of Washington School of Medicine in Seattle, notes the benefits of discussing one's proposal with program officers -- the funding institute administrators who oversee programs and help to make program policy.

"To some extent," Rasey maintains, "it all comes down to 'Communications 101' and 'Relationships 101,' because now -- more than ever before -- it is critically important for PIs to get to know and network with the program officers at their potential funding institute. It's imperative to run your ideas past the program officer to determine if there is a really good match with the current relevance and priorities of the institute. If there isn't sufficient enthusiasm at this level, there's no point in taking the time and energy to write and submit the application."

A Question Of Focus: Jane Koretz finds that some applicants include all the necessary information, but don't organize their proposal in an easily understandable way.



"PIs need to understand the climate at the study-section meetings during these times of low funding," comments Jane Koretz, who serves on the NIH National Reviewers Reserve, a body of scientists who are on call to serve as ad hoc members of study sections in need of a particular type of expertise. Koretz, a professor of biology and biophysics at Rensselaer Polytechnic Institute who was a member of a DRG vision study section from 1989 to 1993, explains that "the unwritten message is to find reasons to weed out proposals because so few can get funded."

*Funding of Research Grant Applications, 1970-1995
 NIH Independent Research Support and

	Total		Total	Success Rate =
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Transition Source: Year Information	No. of Applicants Received	Amount Requested (Thousands of \$)	No. of Grants Funded	Amount funded (Thousands of \$)	[~100x (Applications Funded/Applicants Submitted)]
IR01 (New Research Grant Applications)					
1970	5,390	250,177	1,367	49,252	25.4
1980	11,662	1,245,613	2,556	228,315	21.9
1990	12,647	2,655,599	2,217	399,994	17.5
1995	13,945	3,493,730	2,482	553,626	17.8
IR01 (Competing renewal applications)					
1970	2,862	147,857	1,427	60,379	49.9
1980	4,394	580,434	2,234	246,196	50.8
1990	5,110	1,199,763	1,839	361,500	36.0
1995	6,100	1,660,654	2,489	581,717	40.8
R29 (FIRST* Awards)					
1990	1,703	174,271	486	47,125	28.5
1995	1,197	220,918	617	62,587	28.1

will be returned if it fails to follow the instructions. Yet many capable researchers fail to adhere to the agency's directions, study-section members and administrators report.

For example, Gilbert Meier, SRA of a DRG study section for AIDS and related research, estimates that 95 percent of the applications that come to his group for review "have an abstract that is written in the first person singular or plural despite specific [directions] to the contrary in the NIH instructions." Meier says he corrects these errors in the project description of the summary statement, the critique of the application that is sent back to the PI after study-section review. But, "worse yet," he reports, "the revised applications still come back with the abstract written in the first person."

Not following NIH instructions is just one of several things that PIs do that annoy busy reviewers. Lamontagne adds: "Many good PIs do things that turn reviewers off -- for example, using lots of undefined abbreviations."

This and other problems occur because PIs forget to consider the reviewers' situation when they describe their projects. "PIs often think that some point is obvious," says Koretz, "but chances are the reviewers are not exactly in the PI's field, and the point is not obvious to these reviewers." She strongly urges PIs to "get someone responsible and knowledgeable -- someone who is not in their field -- to critique their proposals before submitting the application to NIH."

Although the research idea is all-important, the way a grant application is

put together is also crucial. Koretz finds that "many good PIs don't understand how to structure a proposal. Some PIs include all the necessary information, but the proposal is not styled in such a way as to make the connections between subprojects easy to understand. Often, it's a question of focus and emphasis."

Koretz adds that "an outstanding proposal is written at a level that is readily understandable by all the reviewers, clearly defines the importance of the research problem, has only two or three interrelated specific aims, and links all the parts of the application.

"For example, the 'Preliminary Studies/Progress Report' section of the research plan should primarily provide support for the 'Specific Aims' and for the 'Methods' sections; that is, the PI should prove by virtue of presenting good preliminary data that the specific aims are achievable and that the methods are appropriate to get the desired information. If the PI wants to show productivity in other areas, that information should be added at the end in very concise form."

Koretz also thinks "PIs worry too much about the nitty-gritty methods while neglecting to explain clearly the underlying research design, discuss alternative experimental outcomes, and provide alternative approaches." She adds: "A well-thought-out timetable for the project is imperative, especially for complex proposals, because it tells the reviewers that the PI has really thought the project through; but the timetable is often omitted or given short shrift."



Recipe For Success: Fred E. Cohen compares a good application to a cookbook that is easy to follow.

Too much information can be a dangerous thing in a proposal, study-section veterans note. Fred E. Cohen, a professor of cell and molecular pharmacology at the University of California, San Francisco, who is the current chairman of DRG's molecular and cellular biophysics study section, points out that "all too often, an applicant attempts to overwhelm the reviewer with endless detail and peripheral supplementary material." By contrast, he notes, "an outstanding application addresses a difficult problem in a fashion that seems simple in retrospect, leaving the readers to wonder why they did not think of the idea first."

Keeping an application simple frequently means keeping it short. Meier points out that really good PIs write succinctly and often have research plans that are below the allowable 25-page limit. He advises applicants to "strive for 20 pages and give themselves some leeway. Write the research plan in such a way that the reviewer can tell that you know more than what's in the application."



Enough is Enough: Terence Tao says that young

scientists tend to put too much material into their proposals.

Terence Tao, senior scientist at Boston Biomedical Research Institute who completed his service on the biophysical chemistry study section last June, believes that "young investigators are especially prone to putting so much material into their proposals that the study section members deem the proposal unrealistic and not sufficiently focused." Tao says: "It's important to put together a good package that has a cohesive thread backed up by strong preliminary data." Cohen puts it this way: "An outstanding grant application is like an outstanding cookbook -- straightforward to follow and well illustrated -- with the promise of achieving wonderful results."

Because only a fraction of the NIH grant applications that are reviewed are successful (see table on page 15), it is becoming common for PIs to have to revise an application before getting funded. A revised application is an opportunity for an investigator to respond to the reviewers' critique, thereby presumably improving the proposal. Investigators who do not get funded may revise and resubmit the same application two, three, or -- in a few cases -- even as many as eight times.

According to Peer Review Notes, at NIH between 1985 and 1995, 53,325 investigators submitted 109,952 new R01 applications (not including revised applications); during this same period, 23,352 investigators submitted 42,042 amended (revised) applications. The proportion of reviewed applications that were revised increased from 25 percent in October 1991 to 30 percent in October 1995. Although more applicants have to revise their proposals these days, "many PIs don't know how to write a good revised application, and very few PIs understand the dynamics of the revision process," Tao states.

A vital part of a revised application is the "Introduction" section of the research plan. This is particularly important in cases in which the same person who reviewed a PI's original application reviews the revision, according to Tao. "The reality is that a PI may get the same reviewer, and that person may rely heavily on the introduction because she or he has already read the proposal," he explains. "On the other hand, the application may go to a different reviewer, who may not agree with the initial review. That's just an inherent part of the process."

Before setting out to write the introduction, Tao advises PIs to "first read the summary statement carefully and try to interpret what the reviewers' objections are." He suggests that they start the introduction by recapping the general shortfalls discussed in the summary statement and then explain generally what they have done to correct the situation. This should be followed, he says, by "point-by-point responses to the specific comments in the summary statement, always referring to the page and paragraph in the proposal where the reviewer can find the changes." Tao emphasizes that "PIs should maintain a neutral tone in the introduction: Don't be antagonistic

and don't be overly conciliatory."

Response Requested: Ann Stevens laments that some revised applications do not respond to summary statement comments.

Ann Stevens, associate vice president for research and director of the Office of Sponsored Programs at Emory University, also suggests "calling the SRA of the study section that reviewed the application to see if she or he can provide additional information about what the reviewers did and didn't like about the proposal -- information that may not have made it into the summary statement." But Stevens finds that "many of the PIs whose [revised] applications come through my office do not even respond to the comments in the summary statement."



Receiving a notice that one's grant proposal has been funded may be a cause for celebration, but PIs who must rely on grant money to support their research need to be on full alert at all times. "There is a natural tendency for PIs to relax a bit after getting a grant funded," says Tao. "But that is actually the time to start planning how to structure the next renewal. The PI will probably have to start writing that renewal in three years because there is currently a cap -- on average -- of four years on most NIH grants."

Liane Reif-Lehrer is the author of *Grant Application Writer's Handbook* (second printing, Boston, Jones and Bartlett Publishers, 1995). A past member of a National Institutes of Health Grant Review Board, she gives workshops on grant proposal-writing, time management, and related subjects. She is president of Erimon Associates, a consulting firm based in the Boston area.

[Return to top](#)