HOW TO WRITE AN ACADEMIC GRANT PROPOSAL

RESOURCE PACKET

26 SEPTEMBER 2014
1-3 P.M.
110 T-SPROUL HALL

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ACADEMIC SERVICES
GRADUATE DIVISION
UNIVERSITY OF CALIFORNIA, BERKELEY
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TABLE OF CONTENTS

General Information


Information Specific to the Humanities and Social Sciences


Information Specific to the Sciences and Engineering


Miscellaneous Information


November 11, 2010
Grant-Writing Tips for Graduate Students

By Lisa Patrick Bentley

Financial pressures have shifted grant writing to the forefront of skills that graduate students need to survive academic life. Some students receive instant gratification and get a grant the first or second time they apply. Far more common are repeated rejections.

With any luck, the agency or foundation that denied your grant proposal sent along comments from reviewers along with the rejection letter. But what if you take their advice, revise your proposal, and it still gets turned down? Is there a secret to grant-writing success as a graduate student? In the hope that one exists, and as a postdoc myself, I surveyed 104 graduate students with 2009 fellowships in the life sciences from the National Science Foundation, 64 postdocs with 2009 NSF fellowships in biology, and 22 graduate students who applied for grants unsuccessfully.

Some of their advice was obvious: Write about a project that excites you. Make sure it’s achievable and has the potential to contribute new knowledge. Make sure your results will be interesting to journal editors. But they also offered plenty of suggestions that were new to me. The tips that follow constitute a combination of my personal advice on the art of writing a grant with the science of the survey responses.

Know your grant agency. Look at an agency’s calls for proposals—especially the ones that interest you the most—to see what its funding priorities are for the year. Then call the program officer or appropriate grant representative to confirm that you and your project qualify. Don’t be afraid to make that call, and don’t think that only experienced PI’s (the grant world’s jargon for “principal investigator”) call an agency. In my survey, 16 percent of graduate
students and 49 percent of postdocs who had received research money spoke directly with someone at NSF at least once (and sometimes more than three times) regarding their proposal.

**Think, talk, write, reread, rewrite, repeat.** Discuss your proposal with as many people as possible before you start writing to ensure that you have a solid experimental design. Have many different types of people (peers, mentors, family members) review your entire application proposal.

If you doubt this step is crucial, believe the statistics: 63 percent of graduate students who did not receive a grant had only one to three people read their proposals. But 21 percent of the successful graduate students had seven or more people review their grant proposal before submission. Postdocs seemed to have recognized the importance of this strategy, as well, as 32 percent reported that four or more people had reviewed their proposal before submission.

**Really talk to your advisers and peers.** They might be busy, but they want you to get funded. They write their own grants and have most likely overseen other students’ proposals. Think about organizing weekly or monthly meetings with a group of peers to review each other’s work. In addition, some universities or laboratories keep successful student-grant proposals on file that you can use for reference as you write your own.

**Be specific in stating testable hypotheses.** Add preliminary data (your own data, your adviser’s, or from the literature) to your proposal corroborating your hypotheses, theory, and/or methodology. You want to show that your project is doable and that you have thought about a framework in which you will interpret, analyze, and present your results.

**Don’t forget to include relevant literature.** Keep organized files of PDF’s to help streamline the writing process. Invest time in learning how to use reference software. Reviewers want to know that you recognize the importance of familiarity with past research in your topic area, so cite a range of papers that includes research conducted before 2000.
In addition, list your relevant first- or co-authored publications in your application. Don’t worry if you don’t have a first-authored publication yet—67 percent of funded graduate students in my survey did not include any of their own publications. Just don’t forget to keep publishing in graduate school if you are thinking of applying for a grant as a postdoc: 36 percent of funded postdocs in the survey listed two or more first- or co-authored publications in their grant proposals.

**Start the application months early.** Sure, you can pull together a quiz at the last minute for that laboratory course you are teaching, but don’t put off working on your grant proposal. From the pool of graduate students I surveyed who received NSF fellowships, 27 percent spent a month preparing their proposals for submission, 24 percent spent two months, and 19 percent spent three months. Only 3 percent of the successful students spent a week preparing their submission. On the other hand, 23 percent of the unfunded students in the survey spent only a week preparing their applications.

Last but not least, don’t wait until five minutes before the deadline to submit your application. Computers crash, electricity goes out, and servers go down.

**Don’t save the hardest bits of the application for last.** Many people find the project summary, the "intellectual merit" section, and the "broader impacts" section to be the most difficult to write. Read the project summaries of successful grant recipients; many of those summaries are posted online by grant agencies for reference. If you are confused as to what really counts for intellectual merit or broader impacts, talk to your advisers or other students who have had proposals accepted. If all else fails, call the grant agency and ask!

**Emphasize your most important points in a bold, concise, and logical way.** Reviewers have a short amount of time to read multiple applications. Consider using bulleted lists instead of long narratives, especially in your research statement. When I was in graduate school, the consensus seemed to be that inserting statistics and numbers into your proposal would help guarantee
its acceptance. But don’t always believe what you hear: 74 percent of funded graduate student proposals in my survey did not include such numbers. So don’t insert figures into your proposal because you think they’re necessary; only add them if they improve its readability or help describe methods and preliminary results.

**Don’t take rejection too seriously.** Every successful scientist has had grant proposals turned away. It’s part of the process. Take the reviewers’ comments to heart and talk to an appropriate program officer regarding resubmission.

While I recognize that this list does not cover everything, it should give you a good start for rethinking your grant writing. Preparation, perseverance, and a positive outlook can make a difference.

*Lisa Patrick Bentley is a National Science Foundation postdoctoral fellow in bioinformatics at the University of Arizona’s department of ecology and evolutionary biology.*
Timeline

Writing an effective and persuasive proposal is a time consuming task. Although the groundwork for your research must start when you begin graduate school, here are the final stages in preparing to submit a grant proposal. While some people may be able to turn out a grant-winning proposal in a number of days, these are truly exceptional cases. Depending on whether this is your first effort, how familiar you are with your case or cases, how quickly you write and how quickly your colleagues and advisors can give you feedback, the process can take up to six months. What follows is a list of tasks that almost every writer will need to address. In developing this timeline, we have assumed that you already have a good idea of the kind of research you want to do.

In developing your own timeline (and having personal deadlines is critical), consider realistically how long you will need to accomplish the tasks at hand. Also consider how best to use your faculty and friends. Doing this involves judicious requests for guidance and assistance and allowing plenty of time for them to write references and feedback. In asking for help, always be very explicit about your timeline and as specific as possible about the kind of feedback or assistance you require.

<table>
<thead>
<tr>
<th>Time until due date</th>
<th>Task</th>
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<tbody>
<tr>
<td><strong>PHASE 1a—Prewriting</strong></td>
<td></td>
</tr>
<tr>
<td>26 weeks</td>
<td>Carefully review grant applications and foundation websites. Identify substantive and administrative requirements. Note due dates and submission requirements (e.g., transcripts, letters, writing samples). If possible, speak to previous grant recipients.</td>
</tr>
<tr>
<td>25-23 weeks</td>
<td>Develop a one to two page preliminary statement of potential research question, topic, and approach. Identify relevant theoretical and empirical sources; develop a preliminary bibliography.</td>
</tr>
<tr>
<td>23 weeks</td>
<td>Present short version and bibliography to advisor and graduate student colleagues.</td>
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<tr>
<td>22 weeks</td>
<td>Use feedback to identify areas requiring further background research or conceptualization</td>
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<tr>
<td>21 weeks</td>
<td>Research empirical context, history, background. Refine conceptual architecture.</td>
</tr>
<tr>
<td>19 weeks</td>
<td>Write a 2-3 page document exploring various theoretical frames/justification, questions, and respective methodological approaches</td>
</tr>
<tr>
<td>17 weeks</td>
<td>Speak to people about feasibility and academic relevance of various approaches. Also consider which methods best suited to your skills, the available data, and your disciplinary requirements.</td>
</tr>
<tr>
<td>16 weeks</td>
<td>Continue research, Peruse existing works, and further develop your understanding of historical and contemporary contexts. This should help you become familiar with the reality of your case and how your work will relate (methodologically, empirically, and conceptually) to past approaches to the topic.</td>
</tr>
<tr>
<td>14 weeks</td>
<td>Refine your question in light of the kind of data you are may be able to collect and the way such a question is embedded in a theoretical frame.</td>
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PHASE Ib—Early Administration

20 weeks  Identify and contact relevant data or support sources. This could be institutions, archives, organizations, or people who may facilitate your research once you are in the field.

18 weeks  Begin budget research (living expenses, travel, etc.) and visa and residency requirements.

14 weeks  Begin research protocol process

13 weeks  Request transcripts (especially from other schools); Revise CV

PHASE II—Focused Writing and Administration

13 weeks  Integrate research question, theoretical frame, and a provisional research design into a single document (5 pages)

12 weeks  Spend a week gathering your thoughts and additional 'data' you may need to complete draft

12 weeks  Reconnect with potential collaborators, institutions, or organizations and determine which will be useful and reliable

12-10 weeks  Flesh-out document into a complete draft following the grant requirements

9 weeks  Get feedback from colleagues

8 weeks  Revise draft, create a tentative budget, and submit to faculty along with C.V. or other support materials. Ask faculty advisors for letters of reference

PHASE III—Editing and Submission

5 weeks  Review specific requirements for grant application.

5 weeks  Revise proposal to incorporate faculty suggestions

4 weeks  Let sit for a week

3 weeks  Gently remind faculty of letter due date

2.5 weeks  Assemble materials (transcripts, c.v.)

2 weeks  Review proposal, carefully edit, and finalize.

10 days  Get help copy editing from friends and/or colleagues

3-4 days  Print final copy and collect materials (allow time for last-minute catastrophes)

2-3 days  Submit proposal

DUE DATE

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The Art of Writing Proposals

By Adam Przeworski and Frank Salomon

Writing proposals for research funding is a peculiar facet of North American academic culture, and as with all things cultural, its attributes rise only partly into public consciousness. A proposal's overt function is to persuade a committee of scholars that the project shines with the three kinds of merit all disciplines value, namely, conceptual innovation, methodological rigor, and rich, substantive content. But to make these points stick, a proposal writer needs a feel for the unspoken customs, norms, and needs that govern the selection process itself. These are not really as arcane or ritualistic as one might suspect. For the most part, these customs arise from the committee's efforts to deal in good faith with its own problems: incomprehension among disciplines, work overload, and the problem of equitably judging proposals that reflect unlike social and academic circumstances.

Writing for committee competition is an art quite different from research work itself. After long deliberation, a committee usually has to choose among proposals that all possess the three virtues mentioned above. Other things being equal, the proposal that is awarded funding is the one that gets its merits across more forcefully because it addresses these unspoken needs and norms as well as the overt rules. The purpose of these pages is to give competitors for Council fellowships and funding a more even start by making explicit some of those normally unspoken customs and needs.

Capture the Reviewer's Attention?

While the form and the organization of a proposal are matters of taste, you should choose your form bearing in mind that every proposal reader constantly scans for clear answers to three questions:
• What are we going to learn as the result of the proposed project that we do not know now?
• Why is it worth knowing?
• How will we know that the conclusions are valid?

Working through a tall stack of proposals on voluntarily donated time, a committee member rarely has time to comb proposals for hidden answers. So, say what you have to say immediately, crisply, and forcefully. The opening paragraph, or the first page at most, is your chance to grab the reviewer’s attention. Use it. This is the moment to overstate, rather than understatement, your point or question. You can add the conditions and caveats later.

Questions that are clearly posed are an excellent way to begin a proposal: Are strong party systems conducive to democratic stability? Was the decline of population growth in Brazil the result of government policies? These should not be rhetorical questions; they have effect precisely because the answer is far from obvious. Stating your central point, hypothesis, or interpretation is also a good way to begin. Workers do not organize unions; unions organize workers. The success, and failure, of Corazon Aquino’s revolution stems from its middle-class origins. Population growth coupled with loss of arable land poses a threat to North African food security in the next decade.

Obviously some projects are too complex and some conceptualizations too subtle for such telegraphic messages to capture. Sometimes only step-by-step argumentation can define the central problem. But even if you adopt this strategy, do not fail to leave the reviewer with something to remember: some message that will remain after reading many other proposals and discussing them for hours and hours. She’s the one who claims that Argentina never had a liberal democratic tradition is how you want to be referred to during the committee’s discussion, not Oh yes, she’s the one from Chicago.

Adam Przeworski and Frank Salamon. The Art of Writing Proposals

Downloaded from http://www.ssrc.org/publications/view/7A9CB4F4-815F-DE11-BD80-001CC477EC70/ (16 March 2014)
Aim for Clarity

Remember that most proposals are reviewed by multidisciplinary committees. A reviewer studying a proposal from another field expects the proposer to meet her halfway. After all, the reader probably accepted the committee appointment because of the excitement of surveying other people's ideas. Her only reward is the chance that proposals will provide a lucidly-guided tour of various disciplines' research frontiers. Don't cheat the reviewer of this by inflicting a tiresome trek through the duller idiosyncrasies of your discipline. Many disciplines have parochial traditions of writing in pretentious jargon. You should avoid jargon as much as you can, and when technical language is really needed, restrict yourself to those new words and technical terms that truly lack equivalents in common language. Also, keep the spotlight on ideas. An archeologist should argue the concepts latent in the ceramic typology more than the typology itself, a historian the tendency latent in the mass of events, and so forth. When additional technical material is needed, or when the argument refers to complex ancillary material, putting it into appendices decongests the main text.

Establish the Context

Your proposal should tell the committee not only what will be learned as a result of your project, but what will be learned that somebody else does not already know. It is essential that the proposal summarize the current state of knowledge and provide an up-to-date, comprehensive bibliography. Both should be precise and succinct. They need not constitute a review of the literature but a sharply focused view of the specific body or bodies of knowledge to which you will add. Committees often treat bibliographies as a sign of seriousness on the part of the applicant, and some members will put considerable effort into evaluating them. A good bibliography testifies that the author did enough preparatory work to make sure the project will complement and not duplicate other people's efforts. Many proposals fail because the references are incomplete or outdated. Missing even a single reference can be very costly if it shows failure to connect with research directly relevant to one's own. Proposal writers with limited library resources are urged to correspond with

Adam Przeworski and Frank Salomon, *The Art of Writing Proposals*
colleagues and libraries elsewhere in the early stages of research planning. Resource
guides such as Dissertation Abstracts International and Social Science Periodical
Index are highly recommended. For many disciplines, annual reviews (e.g., Annual
Review of Anthropology) offer state-of-the-art discussions and rich bibliographies.
Some disciplines have bibliographically-oriented journals, for example Review of
Economic Literature and Contemporary Sociology. There are also valuable area
studies-oriented guides: Handbook of Latin American Studies, International African
Bibliography, etc. Familiarizing yourself with them can save days of research.
Powerful bibliographic searches can be run on CD-ROM databases such as the
Social Science Citations Index, Social Sciences Index, and Modern Language
Association International Index. Also, on-line databases such as CARL and ERIC,
available by library or network access, greatly increase your bibliographic reach.

What's the Payoff?
Disciplinary norms and personal tastes in justifying research activities differ greatly.
Some scholars are swayed by the statement that it has not been studied (e.g., an
historian may argue that no book has been written about a particular event, and
therefore one is needed), while other scholars sometimes reflect that there may be a
good reason why not. Nevertheless, the fact that less is known about one's own
chosen case, period, or country than about similar ones may work in the proposer's
favor. Between two identical projects, save that one concerns Egypt and the other
the Sudan, reviewers are likely to prefer the latter. Citing the importance of the
events that provide the subject matter is another and perhaps less dubious appeal.
Turning points, crucial breakthroughs, central personages, fundamental institutions,
and similar appeals to the significance of the object of research are sometimes
effective if argued rather than merely asserted. Appealing to current importance may
also work: e.g., democratic consolidation in South America, the aging population in
industrialized countries, the relative decline of the hegemony of the United States.
It's crucial to convince readers that such topics are not merely timely, but that their
current urgency provides a window into some more abiding problem. Among many
social scientists, explicit theoretical interest counts heavily as a point of merit. Theoretical exposition need not go back to the axiomatic bases of the discipline, proposal readers will have a reasonable interdisciplinary breadth, but it should situate the local problem in terms of its relevance to live, sometimes controversial, theoretical currents. Help your reader understand where the problem intersects the main theoretical debates in your field and show how this inquiry puts established ideas to the test or offers new ones. Good proposals demonstrate awareness of alternative viewpoints and argue the author's position in such a way as to address the field broadly, rather than developing a single sectarian tendency indifferent to alternatives.

Use a Fresh Approach

Surprises, puzzles, and apparent contradictions can powerfully persuade the reviewer whose disciplinary superego enforces a commitment to systematic model building or formal theorizing: Given its long-standing democratic traditions, Chile was expected to return to democracy before other countries in the Southern Cone, and yet... Is it because these traditions were already extinct by 1973 or because the assumption on which this prediction was based is false? Everyone expected that One Big Union--the slogan of the movement--would strike and win wage increases for workers. Yet statistical evidence shows just the contrary: strong unions do not strike but instead restrain workers' wage demands.

It is often worthwhile to help readers understand how the research task grows from the intellectual history or current intellectual life of the country or region that generated it. Council committees strive to build linkages among an immense diversity of national and international intellectual traditions, and members come from various countries and schools of thought. Many committee members are interested in the interplay of diverse traditions. In fact, the chance to see intellectual history in the making is another reason people accept committee membership. It is a motive to which proposals can legitimately appeal.
It pays to remember that topics of current salience, both theoretical and in the so-called real world, are likely to be a crowded field. The competitors will be more numerous and the competition less interesting than in truly unfamiliar terrain. Unless you have something original to say about them, you may be well advised to avoid topics typically styled of central interest to the discipline. Usually these are topics about which everyone is writing, and the reason is that somebody else has already made the decisive and exciting contribution. By the time you write your proposal, obtain funding, do the research, and write it up, you might wish you were working on something else. So if your instinct leads you to a problem far from the course that the pack is running, follow it, not the pack: nothing is more valuable than a really fresh beginning.

Describe Your Methodology
Methodological canons are largely discipline-specific and vary widely even within some disciplines. But two things can safely be said about methodological appeal. First, the proposal must specify the research operations you will undertake and the way you will interpret the results of these operations in terms of your central problem. Do not just tell what you mean to achieve, tell how you will spend your time while doing it. Second, a methodology is not just a list of research tasks but an argument as to why these tasks add up to the best attack on the problem. An agenda by itself will normally not suffice because the mere listing of tasks to perform does not prove that they add up to the best feasible approach.

Some popularly-used phrases fall short of identifying recognizable research operations. For example, I will look at the relation between x and y is not informative. We know what is meant when an ornithologist proposes to look at a bird, but looking at a relation between variables is something one only does indirectly, by operations like digging through dusty archive boxes, interviewing, observing and taking standardized notes, collecting and testing statistical patterns, etc. How will you tease the relationship of underlying forces from the mass of
experience? The process of gathering data and moving from data to interpretation tends to follow disciplinary customs, more standard in some fields than in others; help readers from other fields recognize what parts of your methodology are standard, which are innovative. Be as specific as you possibly can be about the activities you plan to undertake to collect information, about the techniques you will use to analyze it, and about the tests of validity to which you commit yourself. Most proposals fail because they leave reviewers wondering what the applicant will actually do. Tell them! Specify the archives, the sources, the respondents, and the proposed techniques of analysis.

A research design proposing comparison between cases often has special appeal. In a certain sense all research is comparative because it must use, implicitly or explicitly, some point of reference. Making the comparison explicit raises its value as scientific inquiry. In evaluating a comparative proposal, readers ask whether the cases are chosen in such a way that their similarities and differences illuminate the central question. And is the proposer in a position to execute both legs of the comparison? When both answers are positive, the proposal may fare particularly well.

The proposal should prove that the researcher either possesses, or cooperates with people who possess, mastery of all the technical matters the project entails. For example, if a predominantly literary project includes an inquiry into the influence of the Tupian language on rural Brazilian Portuguese, the proposal will be checked for the author’s background in linguistics and/or Indian languages, or the author’s arrangements to collaborate with appropriate experts.

Specify Your Objectives
A well-composed proposal, like a sonata, usually ends by alluding to the original theme. How will research procedures and their products finally connect with the central question? How will you know if your idea was wrong or right? In some disciplines this imperative traditionally means holding to the strict canon of the

Adam Przeworski and Frank Salomon, The Art of Writing Proposals
falsifiable hypothesis. While respecting this canon, committee members are also open to less formal approaches. What matters is to convince readers that something is genuinely at stake in the inquiry, that it is not tendentiously moving toward a preconceived end, and that this leaven of the unknown will yield interesting, orderly propositions.

Proposals should normally describe the final product of the project: an article, book, chapter, dissertation, etc. If you have specific plans, it often helps to spell them out, because specifying the kind of journal in which you hope to publish, or the kind of people you hope to address, will help readers understand what might otherwise look like merely odd features of the proposal. While planning and drafting your proposal, you should keep in mind the program guidelines and application procedures outlined in the brochure specific to the Council program to which you are applying. If you have specific questions about the program, you may wish to consult with a staff member. Your final proposal should include all requested enclosures and appendices.

Final Note
To write a good proposal takes a long time. Start early. Begin thinking about your topic well in advance and make it a habit to collect references while you work on other tasks. Write a first draft at least three months in advance, revise it, show it to colleagues. Let it gather a little dust, collect colleagues' comments, revise it again. If you have a chance, share it with a seminar or similar group; the debate should help you anticipate what reviewers will eventually think. Revise the text again for substance. Go over the language, style, and form. Resharpen your opening paragraph or first page so that it drives home exactly what you mean as effectively as possible.

Good luck.
The Art of the Fellowship Proposal
John Lippincott

With appreciation to the editor of Humanities, Judith Chayes Neiman, for her kind permission to let us recopy this. Mr. Lippincott wrote this as a member of the endowment staff.

Each year the NEH receives thousands of individual fellowship applications from good scholars for good projects. A few hundred are recommended by review panels for funding, but only a few score elicit a unanimous recommendation of “Absolutely Yes!” As budgetary constraints on the endowment increase, the importance of a strong panel endorsement to the success of an application also increases.

Writing a fellowship proposal that receives enthusiastic endorsement from panelists is both an art and a science. The science is in carefully following the guidelines for the format of the application and in presenting a proposal that clearly reflects knowledge of the subject being studied and the methodology appropriate to it. The art is more difficult to describe and is the subject of this article.

The art of writing a successful proposal is not a matter of knowing arcane secrets of grantsmanship, a presumed hidden agenda at NEH, or that influential someone in the Fellowships Division. Nor is it achieved by mimicking proposals that received NEH grants in the past. (Examples given in this article are intended to demonstrate levels of quality, not to serve as models.)

The art of writing a successful proposal is largely a matter of understanding how individual fellowship applications are selected for funding.

There are three fellowship programs that award grants for individual study and research in the humanities: Summer Stipends; Fellowships for College Teachers; and Fellowships for Independent Study and Research. They are all highly competitive because of their limited budgets and the large number of good proposals submitted each year. The ratio of grants to applications varies among the programs and from year to year, ranging from a low of one-to-five in the College Teachers program to a high of one-to-nine in Independent Study.

All three programs use ad hoc review panels—composed of scholars representing the disciplines of the applications under consideration—to evaluate the proposals. Panel ratings serve as the basis for the National Council on the Humanities’ funding recommendations to the NEH chairman, who gives final approval on all endowment grants.

In making their assessments of an application, panelists consider the evidence provided by the applicant—the description of the project, the letters of reference, the curriculum vitae, and the bibliography of works relevant to the study. (Directions for proper completion of application materials cannot be recapitulated here; they are given in the guidelines for each program and should be followed carefully.)

In evaluating this evidence the panelists adhere to the four selection criteria stated in the program guidelines. A review and discussion of these criteria (which vary only slightly among the three individual fellowships programs) will help reveal what makes for an “artful,” i.e., competitive, application.

1. The quality or promise of quality of the applicant’s work as a teacher, scholar, or interpreter of the humanities.

This criterion focuses more on the applicant than on the project. The panel looks for evidence that the
individual has the knowledge and ability to carry out the project and a commitment to excellence in scholarship. In making this determination, the panel considers more than just the curriculum vitae and record of previous publications. Reference letters provide critical information as well, and the project description itself, in its conception and presentation, is an important indicator of the quality of the individual’s thought.

The phase “the promise of quality” in this criterion indicates that panelists are concerned not simply with past accomplishments of the applicant. All three programs make grants to scholars early in their careers, as well as to senior scholars. Panelists try to judge the quality of applicants’ work by standards appropriate to their career stages. There are no quotas set for awards to junior or senior scholars, nor is there any prejudice against either group. Among the Independent fellowships awarded last November, forty-eight percent went to junior scholars. (Forty-nine percent of the applications were from junior scholars.)

One of these junior scholars is studying the origin of the economic decline in New England from 1840 to 1925. The applicant was awarded a doctorate in history in 1979 and is currently an assistant professor at a major university. Her record of publications includes two journal articles and three conference presentations.

In evaluating her application, panelists took note of her status as a younger scholar. The sophisticated knowledge of the subject revealed in the proposal itself and strong letters of reference were instrumental in convincing the panel that there was “promise of quality” from this applicant. “Extremely impressive proposal,” commented one panelist. “Well-reasoned, clear and attractive.”

When panelists evaluate the “quality of work” of senior scholars, they may place greater emphasis on some aspects of the application.

One of the 1982-83 Independent Study awards to an established scholar (doctorate awarded in 1968, college professor since 1966, currently an associate dean at a major university) was for a biography of Anne Sexton. Certainly the proposal description was a principal element in panelists’ consideration of the quality of work of the applicant, as were the letters of reference. But panelists also took careful note of the applicant’s record of achievement—nine academic honors; three books and numerous articles of high quality; and poems published in a variety of journals.

Without this level of accomplishment it is unlikely a panelist would have concluded, “Seldom have I found an applicant I could bet on with more certainty—an absolutely first-rate proposal and person to do it.” Another remarked, “Publications are quite good, references are excellent, and the candidate obviously has access and can do the biography.”

It should be noted that the “work” whose quality is being judged under this criterion need not have been conducted in an academic setting. Two of the three programs entertain applications from scholars unaffiliated with colleges or universities; they also include unaffiliated scholars on their panels.

2. The importance of the proposal to the specific field and the humanities in general.

The best evidence of the importance of the project is given in the applicant’s project description, though certainly letters of reference provide necessary corroboration. An applicant cannot assume that panelists will appreciate the importance of a project or have a predisposition toward the subject matter. It is incumbent upon the applicant to make the case for the importance of the study to be undertaken.
Because applications are competitive and reviewed in groups, panelists look for those projects likely to make the greatest contribution to the humanities. The contribution an applicant expects to make may be through teaching, through the production of materials that will serve other scholars, or through development of new perspectives on the discipline that will encourage further discussion and understanding of the subject among all interested audiences.

A project that will serve only the applicant (such as remedial work by the applicant to "catch up" in a field) will not be competitive with projects that offer to add to the knowledge of students, colleagues, or a wider public.

A summer stipend was recently awarded for a project to write an archaeological commentary on the Wasps of Aristophanes, applying vase paintings and other monumental evidence to a study of the play’s terms, puns, metaphors, objects, actions and the mise-en-scene of the Athenian law courts.

In his proposal, the applicant argued the importance of the project by citing other scholars who have affirmed the value of applying archaeological evidence to interpretation of Aristophanes’ comedies. He then offered his own view of the significance of providing a “material and historical context” for understanding literature in general and the Wasps in particular. He suggested the study would serve classicists as well as a wider group of readers and would provide a basis for more authentic and effective productions of the play.

He persuaded the panel that a new understanding and appreciation of Aristophanes was needed and could be achieved through this project. One panelist commented, “This kind of study is something we should see more of and that is an approach to a classical text which attempts to conceptualize a drama as it was originally conceived and produced as, among other benefits, a stimulus to the production of ancient comedy.” Another noted that “it is the sort of work that combines ‘scholarly’ and ‘practical’ use; it may well help directors and actors present more visually meaningful performances of the play.”

In addition to the importance of the subject matter, the proposal may argue for the value of its methodology, as in this excerpt from a 1982-83 Independent Study proposal:

Political history is currently out of fashion, largely because it tends to be biographical and narrative in orientation and, except for vote counting, does not lend itself to social-scientific techniques and analysis. Political history, however, deserves attention, partly because it contains the central questions of history—how are decisions actually made—and partly because political, old-fashioned elitist history needs redoing. I propose to take a fresh look at the political history of Tudor England and study the political environment in which individuals translated their culturally conditioned aspirations and assumptions into the realities of political success and failure. It is customary to approach politics from the perspective of those who succeeded because the documentation is skewed in that direction and successful ideas live on in terms of their historic consequences. Unfortunately, successful people also tend to be well-adjusted and to know how to make the system work for them; as a result, they do not usually have much to say about the functional and psychological strains under which they operate. It is the unsuccessful who flounder and cry out and thereby reveal in their lives and writings the pressures and emotional strains under which all the natural leaders of society must work. As Scott Fitzgerald said: ‘It is from the failures of life and not its successes that we learn the most.’ The ultimate tour de force is to relate theory to practice and to offer an explanation of Tudor politics in terms of a multitude of failure stories, thereby rewriting and reinterpreting the sixteenth-century political scene... Irrationality in politics, political failure and paranoia are, alas, sufficiently relevant themes.
to need no special pleading. That they are being studied within a sixteenth-century context should not distract from their importance to the scholar, from their interest for the general reading public, or from their impact upon our knowledge about mankind.

Panelists were convinced. "It appears that the realization of this project would shed new light on the political dynamic of a crucial period... I think his approach will serve as an important scholarly model in terms of developing understanding of the political process in any era." "The book would likely reach not only specialists but intelligent readers generally and make a significant and original contribution to both. This is one among two or three proposals that I rank as the very best -the reflection of a mature and brilliant scholar on a field in which he has long worked, that is at the same time an act of imagination—an asking of fresh questions of material long familiar that will influence all our thinking."

Importance of the project is not a function of the discipline or scope of the project. There are no favored fields, time periods, or cultures. It is rather what the applicant makes of the subject that determines its importance—a point to be taken up under the third criterion.

3. The conception, definition, and organization of the proposal.

This and the preceding criterion are mutually supportive. The importance of a project is dependent on the way it is conceived, and its conception cannot be judged without regard for its importance.

Good conception, definition, and organization of the project obviously result from the applicant’s command of the subject and thus fall within the realm of the science of proposal writing. There is, however, also an art to conceiving, defining, and organizing the project. Put simply, the most successful applications seem to be those in which applicants let their ideas and enthusiasm for the subject “shine through.”

A potential applicant once contacted an NEH program officer and said she had two projects for a summer stipend in mind. After describing the projects, she asked the staff member which she should submit. The program officer counseled her to submit the one that interested her most.

Conception of the project involves asking the right questions about the subject to be studied, drawing the right comparisons with other works and subjects, and setting the right scope for the project. The operative term here is “right.” The right questions, right comparisons, and right scope—in addition to being appropriate to the field—are those that capture the interest of the panel. And since a panel is made up of scholars in the discipline, their interests will be similar to those of an applicant’s colleagues.

Competitive proposals are those that go beyond a naive or redundant treatment to explore the subject’s real potential, to yield new perspectives (including interdisciplinary views), or break new ground.

Among the applications for 1981-82 Fellowships for College Teachers were two projects treating ethical issues related to science. Both studies were intended to improve classroom instruction and serve as the basis for new courses. Of these two projects in essentially the same discipline and with the same purpose, only one was funded. The quality of the conception and definition of the project made the difference.

The successful proposal focused the study on ethical issues relating to medicine and explained clearly the value of the project to the institution and students it would benefit. It then discussed the nature of and reasons for recent moral problems associated with medicine and appropriate ways for approaching these problems. The proposal concluded with the specific questions to be explored and the methodology that would be applied.
The project received a strong recommendation from panelists. Typical of their comments was, "This is an excellent proposal both in terms of care with which it is worked out and the probable significance for teaching."

The unsuccessful application proposed a two-part study on 1) "the history of the biological sciences and of philosophical issues peculiar to them" and 2) "contemporary work in the area of ethical issues in science and technology." The proposal discussed the applicant's teaching responsibilities, academic background, and current approach to and problems with teaching ethical perspectives on science, and offered as a plan of study only a brief paragraph noting resources and faculties to be consulted.

Panelists expressed concern at the application's lack of a clear focus for the study, or specific issues to be tackled of the approach to be taken. "In comparison with the other proposal which takes biology as background for considering ethical issues, this one is not as well developed," one panelist remarked.

Another called the proposal "too broad, too vague." A third said, "not clear that this really takes her enough beyond what she already does and knows to constitute a 'project.'"

As these examples illustrate, it is important that applicants state clearly what they intend to do, what questions they intend to ask and why. It cannot be left to the panel to infer or the references to imply what the plan of study will be. Panels must know how the grant period is going to be used.

4. The likelihood that the applicant will see the project through to completion.

This criterion simply means that panelists will consider whether or not what is proposed can be and is likely to be achieved.

The criterion does not mean that the entire project must be completed during the grant period, only that it should eventually be completed and that the portion slated for the period of the fellowship can be handled in that time.

A 1981-82 College Teachers fellowship was awarded for a study of gambling in eighteenth- and nineteenth-century England, focusing on how this leisure activity reflects changes in social and private values resulting from industrialization.

Following an intensive discussion of the significance and approach of his study, the applicant stated:

As ambitious as the project is, I believe that it is not an unrealistic one, and my previous work suggests that I can undertake it successfully. I am already familiar with much of the literature, both primary and secondary, on "sporting" topics, and I have had some success in using this material in a constructive way.

In addition to favorable reactions to the applicant's abilities and the potential value of the study, panelists were convinced of the likelihood the research and a monograph would be completed. "Proposer offers convincing argument and has evidently pursued work to point where it can be completed," said one. Another said, "[He] has background to indicate likelihood of completion."

Finally, there are a few additional factors a panel may consider in making decisions on a group of applications. Geographical and institutional diversity are sought among fellowship awards, though no quotas are set. Panelists often take this into consideration as a tiebreaker among highly rated proposals.
The individual fellowship programs give preference to applicants who have not had major grants or postdoctoral fellowships in the last six years. Panels are also sympathetic to able applicants in situations or institutions that offer few research opportunities.

There is also a je ne sais quoi a "sparkle," an appeal that distinguishes successful proposals from the nearly successful proposals. This special quality is synergistic, combining and transcending all the previously mentioned qualities, as the following excerpt from a highly rated summer stipend proposal demonstrates:

An extensive study of Russian twentieth-century literature for children is long needed. It would provide us with an observation point from which the very formation of the “Soviet mind” could be observed, because children’s literature in the USSR reflects that process in its complexity; from ideological indoctrination by the state to inoculation with critical attitudes and ways of independent thinking by dissenting writers. For this author the study of Russian children’s literature is a lifelong commitment. I was born and raised in a family of children’s writers: my father was the author of more than sixty books of prose and poetry for children and about two dozen plays for the same audience. And my mother has published several books of poems for children as well. I had the privilege of knowing almost every contemporary significant children’s writer personally. For fifteen years I worked as a writer and, from 1962 to 1975, as an editor for the children’s magazine Kostyor in Leningrad. I published a few books of my own and translated poetry for children. Nine of my plays for children were staged and published. At the same time, I was studying and collecting materials related to the history of Russian children’s literature, beginning with the 1920s, when the Russian literary avant-garde became involved in children’s literature.

At this point I am entering the conclusive stage of my project: to complete my manuscript on the “History of Modern Russian Literature for Children” I need to carry on some additional research in earlier Soviet periodicals and rare books and to double-check the materials that I copied in Soviet libraries some years ago. The NEH stipend would enable me to complete my work during the summer of 1982 by working in the libraries of Harvard and Yale, and, primarily, in the Library of Congress.

“Absolutely yes!” was the funding recommendation from one member of the review panel. The other members agreed.
Stress the Significance

The importance of the proposed study should be communicated clearly and should be readily apparent to someone outside the field. Present the burden of the problem in quantitative terms, and demonstrate the impact of the proposed research on the field. The grant writer needs to convey why this research is important—innovative, incremental knowledge or paradigm shift—and its implications.

Follow All the Rules

Obtain and follow all of the guidelines exactly. Grant proposals that do not meet guidelines are commonly returned without review. Even if they proceed through the review process, the score may be adversely affected. Determine the requirements for documentation of Institutional Review Board (IRB) approval because these vary by funding agency and mechanism. Most applications involving human participants require a description of the proposed methods for their protection. Some grants allow the investigator to provide evidence of IRB approval after peer review has been completed but before funding is awarded. Determine the procedures of the specific funding agency to which you are applying. Follow all instructions regarding font size (characters per inch and lines per vertical inch), margins, format, and content. Grammatical and typographical errors annoy reviewers and convey a sense of carelessness that does not reflect favorably on the skills of the grant writer. Indicate the principal investigator’s name and grant number on every page, and number each page. Do not expect any flexibility about submission dates.

Get Advice and Input from a Biostatistician

Input on the methods and analyses from an experienced biostatistician will enhance the success of your proposal. Seek advice early on for input about study design, data analysis plans, and sample size calculations.

Allow Enough Time for Prereview and Revision

Set yourself an internal deadline for completing the application 4 to 6 weeks before the actual deadline to allow time for prereview by mentors and colleagues, as well as by an experienced investigator outside of your field. Give colleagues at least 2 weeks for their review. Allowing enough time to revise the proposal in response to this feedback before submission will maximize the chances for success. It is important that you prepare the application carefully and convincingly. A high-quality product is more important than meeting a funding deadline, particularly when the application could be submitted for a future funding cycle or a different funding mechanism. In addition, allow ample time to refine budgets and subcontracts, and to obtain letters of support. See Figure 1 for a proposed timeline for tasks related to grant preparation.

Write the Abstract Carefully

The abstract should distill the essential elements of the research project into short, concise, and clear statements. The abstract will guide the assignment of a grant to a particular study section and is generally the first portion of the grant that reviewers read. Therefore, the abstract must engage the reviewers’ interest immediately and sustain their interest throughout. The abstract should highlight the nature of the problem, the need for the research, the hypoth-
Figure 2. Grant-writing timeline: example 2.

<table>
<thead>
<tr>
<th>Year</th>
<th>Study month</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>7/04</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
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<td>9</td>
<td>54</td>
<td>7/08</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>1/09</td>
</tr>
</tbody>
</table>

1. Specific aim 1
2. Specific aim 2
   a. Data acquisition
   b. Chart review
   c. Data analysis/manuscripts
3. Specific aim 3
   a. Subject Interviews
   b. Data management
   c. Data analysis/manuscripts
4. Specific aim 4
   analysis and synthesis

section shows the reviewer that the investigator knows how to do research; shows the thoughtfulness, rigor, and preparation needed for the study; and gives important preliminary data for the proposed project. This important section warrants space and detail. For each preliminary or pilot study indicated, present the specific objectives, methods, results (with brief description and data), and significance (provide direct linkage with the proposed study—one quarter to one half a single-spaced page for each) (for examples, see Appendix 3 at www.annals.org).

Indicate which studies provided experience with the proposed methods (for example, design, intervention, assessment instruments, and enrollment strategies) in the current study, even if they are on a different topic. Pilot work to assure availability of study participants is key. The presentation of pilot data on a proposed intervention strategy—its feasibility, reproducibility, and standardization—is crucial here. This is one section where “more is better,” as long as the contributions and linkage to the proposed project are clear.

General Issues

Reviewers often raise issues on the layout and formatting of the grant, such as comments about typographical errors, small font sizes, formats that were difficult to read, excessive use of topic-specific jargon or abbreviations, and information presented in the wrong sections (for example, background information in the Methods section, new aims in the Analysis section).

Reviewers are unlikely to be convinced that the principal investigator is a good researcher if the grant is sloppily written or poorly laid out. Give time and attention to proofreading and making the grant easy to read. Provide spaces between paragraphs and between sections. Address study limitations thoroughly and realistically. For revised grants, the reviewers will focus on the degree of responsiveness to previous critiques. Provide an itemized, cordial, thoughtful response to each reviewer comment.

Methods

This section represents the heart of the grant, and all of the grants reviewed had comments on the Methods section (Appendix Table 1 at www.annals.org). The most common general issue is that the methods were underdeveloped. We recommend that grant writers devote at least 50% of the page allowance of the grant to methods, with particular attention to the specific issues raised in the following paragraphs.

Design and Setting. Describe the study design in detail. If randomization is involved, describe the procedure. Describe the method for blinding of participant allocation to treatment groups. If applicable for observational studies, describe how you will select case-patients and controls. Will you enroll a representative sample of the target population? If not, will there be any potential biases? How will you handle them? Describe the setting or settings in enough detail so that reviewers can understand how this setting would compare or extrapolate to other study settings.

Study Sample: Inclusion Criteria. The major purpose of this section is to carefully describe and justify the choice of the study sample. Common critiques from reviewers are that the study sample is potentially biased or nonrepresentative, or that the inclusion criteria are poorly described or not well-justified. We advise addressing any potential biases and assuring that these will not invalidate the study results. The NIH requires inclusion of women, minorities, and children; grant writers must justify the exclusion of these populations.

Study Sample: Exclusion Criteria. Exclusion of partici-
Hints for Writing Successful NIH grants

Prof. Ellen Barrett
Department of Physiology and Biophysics
University of Miami School of Medicine
October, 1995

A successful grant application will convince reviewers that:

a. your proposed research addresses important questions in basic and/or applied science.
b. your proposed experimental plan will answer many of those questions in an efficient and convincing way.
c. you know and understand the contemporary research literature in your field.
d. you have sufficient mastery of all the relevant techniques needed to execute your experimental plan - that you are in fact the best person in the world to do this project.
e. you have access to all the equipment and reagents needed to execute your experimental plan, and have budgeted appropriately.
f. you will analyze your data in a thoughtful and honest manner.
g. you will publish your results in a timely manner.
h. you will accomplish your experimental plan in the time requested and for the amount requested.

Allow at least 3 months to write the grant after you have collected all (or most of) your preliminary data. It takes longer than you think to assemble all the needed information and organize it clearly, secure appropriate letters of collaboration and consultation, etc. Read the published NIH instructions and follow them to the letter. There is a law or a scientific rationale for every piece of requested information, and the funding of a grant can hang on what appear to be small details.

Write your entire application, then put it aside for a few days. After that, re-read it in its entirety; you’ll be surprised how many errors of repetition/poor logic/inconsistency you will find in the early drafts. Then give your revised draft to outside readers, allowing 2 weeks for their reading and critique, and then an additional two weeks to incorporate their suggestions. Give these outside readers your best draft, not your first draft. Don’t waste their time, patience and expertise by giving them a draft that is incomplete or full of mistakes you could have fixed yourself.

Who should read your application?

1. Biomedical editors from UM’s Medical and Grant Writing Resources.
2. Nonspecialist in the field (preferably a funded scientist with study section experience) should read Budget with Budget Justification, Abstract with Specific Aims, Background and Significance, and Preliminary Data, to be certain that these sections are understandable and logical to a non-specialist. At least one of the
two-three persons who reviews your application will likely be a nonspecialist.

3. Specialist should read Preliminary Data and Experimental Methods, to make certain that experimental plan is efficient and compelling, using the best available techniques to answer the questions proposed.

Look upon grant writing as the rigorous intellectual challenge that it is. You can learn an amazing amount in preparing a good grant application, and that learning can not only help get you funded, but also help you do better work once you are funded.

Concerning ABSTRACT and SPECIFIC AIMS
These two very important sections should mesh well together (avoid excessive repetition). They should be the first sections you write, because it is always good to outline what you plan to do before beginning your detailed writing. They should also be the last sections you revise, because it is imperative that they agree with what you have written in the Experimental Design and Methods section.

These sections should introduce the reader to:

1. the problems you are addressing, with some minimal background to orient the non-specialist.
2. the overall hypotheses you are testing, and the corollaries of these hypotheses that are being addressed by specific sets of proposed experiments,
3. the main techniques you will be using (to help study section personnel decide which reviewers to assign to your grant)
4. your overall experimental plan. Indicate how the results of the various proposed experiments will mesh to form a cohesive whole that will advance significantly your field of research.

Most good research is hypothesis-driven. Make certain that you understand what an hypothesis is: It is your overview of the mechanisms underlying the process you are studying, not just your prediction about how one particular experiment will turn out. Design experiments that will test various predictions of your hypotheses from multiple angles. Make certain that your experimental plan never assumes that your hypotheses are true; this error has doomed many applications. Include only experiments that you have the expertise to do, and for which you have some preliminary data demonstrating feasibility.

Concerning Background and Significance
The Background section should convince the reader that you have a good command of the current research literature in your field, and that you can be objective and thoughtful in your analysis of data. Don’t dodge controversies, but make certain that you are diplomatic and non-dogmatic in your treatment of opposing hypotheses/points of view. You need to convince the reviewer that you are planning to test hypotheses, not simply to collect data to confirm your favorite hypotheses, and that you are open-minded enough to reject your hypotheses if the experimental results so indicate.

Make certain that your background discussion remains focussed on the issues your experiments will address. Identify relevant published papers to which you/your laboratory contributed. Cite the work of as many different laboratories/points of view as possible, consistent with clarity and space limitations. At the end of each topic, point out to the reader how your proposed experiments will help resolve important issues in the field.
Your Significance section should be thoughtful, but brief. If your project concerns basic research, don't overstate its clinical significance.

**Concerning Preliminary Results**
This section helps demonstrate to the reviewer that:

1. You have experience (hopefully published) with most of the experimental techniques proposed in the application,
2. You can design logical, well-controlled experiments, and
3. You will present your results in a clear and thoughtful manner.

Show data demonstrating your ability to conduct the most difficult of the proposed experiments. Present your results (even if they are preliminary) in as professional a manner as possible, with clear and complete figure/table legends, calibrations, statistical analysis, etc. A great picture/graph is worth a thousand words. Don't just show raw data. Show only results that are relevant to the proposed experiments, and explicitly point out their relevance.

Present your preliminary data as objectively as possible. Don't overstate your claims or ignore different possible interpretations.

Publish as much of your work as possible in the most rigorous journals in your field. Their reviewers will provide expert commentary on your work, and the study section reviewers pay attention to what journals you publish in. It gives them an additional clue concerning the standards you set for your work.

**Concerning Experimental Design and Methods**
Indicate how you will design and execute experiments addressing each of your Specific Aims. Propose only experiments that are directly relevant to testing your hypotheses and that you have the expertise to execute successfully. Be aware of the limitations of each technique, e.g., don't use a qualitative assay to address a quantitative question. Include appropriate controls. Don't propose more than your laboratory can reasonably do within the allotted time.

It often helps to divide this section into Detailed Methods (where you give all the important specifics) and Experimental Strategy, where a clear narrative indicates the rationale and design of each experiment, and the interpretation you would give to each possible experimental outcome. Address the most basic issues first. For specific representative experiments, indicate not only how you will execute the experiments, but also how you will analyze the data, interpret various possible results, and revise your experimental plan as results unfold. Indicate important specifics: which exposure times, what concentrations of reagents, which statistical tests, etc., citing appropriate literature. Indicate why you are using each proposed reagent, and be up-to-date on that reagent's specificity. Minimize your use of abbreviations, and always explain the abbreviations you do use. Indicate your source for reagents that are not commercially available.

Address detailed attention to the techniques with which you have the least published experience, checking with experts to make certain your plans are realistic, state-of-the-art, and rigorous. It is helpful to state that you will consult with an expert concerning techniques in which you have less demonstrated expertise, but remember that all relevant techniques must be explained in your application. Remember that you are trying to sell yourself as a
person qualified to oversee the entire project. If you do mention using expert consultants and collaborators, make certain that their Biographical Sketches and Support pages are included, as well as letters signed by them that specifically agree to do the things indicated your proposal. It is a good idea to send these experts a sample letter indicating the specific statements you would like them to include.

Try to incorporate your timetable within the body of experimental methods rather than in a specific section at the end. In my experience reviewers often tend to disagree with timetables and you can diffuse some of their objections by spreading out your timetable information, instead of putting it in a separate section at the end.

Avoid repeating yourself - it can make a tired reviewer angry. In other words, if you want to move a section of text, use the "Cut and paste" rather than the "Copy" routine of your word processor!

Try to close Methods with some overall enthusiastic statement about the importance of your experiments, rather than just petering out leaving the reader exhausted by details.

Use the time between submission of your application and the study section meeting to gather additional data to bolster any weak points in your application, and to submit additional manuscripts for publication. Make certain your supplemental information (summarized in just a few pages) reaches the study section secretary in time to have it sent to reviewers before the study section meets.

**Concerning BUDGET and BUDGET JUSTIFICATION**

Ask for the minimum amount of money you need to do the work. If you pad the budget, the reviewers are likely to cut it by more than the amount you padded.

If you are just beginning as an independent investigator, don't ask for megabucks. Show the agency that you can complete a good small project for relatively few dollars, and they will be more willing to entrust you with more dollars to do bigger projects in the future.

Make certain your application is internally consistent. Your budget must agree with the experiments you propose.

Justify everything. Don't assume that everything will be obvious to the reviewer.

**Personnel:** Justify the amount of effort you propose to spend on the project; less than 20% raises concerns about your commitment to the study. Don't ask for more than 50% if you are on tenure-track. Indicate in detail how each salaried person (including yourself) will contribute to the project, including their experience and established expertise.

**Consultant expenses:** These are very hard to get. The request should be minimal and very well justified.

**Equipment:** Justify why you need each requested piece of equipment. If you are requesting a specialized item of equipment that costs more than standard, then you must specify in a convincing way which features of the deluxe model are vital for your project (i.e. why the standard, less expensive model isn't suitable for your project). Indicate in both the justification and in your experimental methods the specific experiments that need the requested pieces of equipment.

Study sections award equipment to beginning investigators just setting up their own laboratory, and to experienced
investigators who need to replace equipment that has worn out or become obsolete. They will not give you an expensive item of equipment in an area in which you have no demonstrated expertise, so acquire the expertise on borrowed equipment before you apply.

**Supplies:** Design your experimental plan to make efficient use of supplies and labor. Think carefully about all the experiments you will need to do to accomplish your objectives, and plan your supply budget accordingly. For example, if you propose to do immunohistochemistry using rats, but have not included a request for antibodies, rat purchase and rat maintenance, the reviewers will question your competence to conduct these experiments. Each year’s requested budget must agree with the number and type of experiments you propose to do in that year. For example, don’t ask for funds in years 1 and 2 for supplies for experiments that will not be performed until the third year. A carefully detailed supply budget helps convince reviewers that you are capable of directing the project.

**Travel:** Ask for only one person to go to one meeting each year (current NIH standard is $1200).

**Renovation expenses:** I have never seen these awarded - forget it!

**Other:** Allowable expenses include: network, FAX, long distance, Xerox expenses needed to conduct the project; costs associated with publishing your results (make certain these are realistic in light of your publication record); charges for use of shared equipment/facilities needed by the project; costs of maintaining and repairing equipment (specify the equipment items; if the equipment is shared, ask for only the percentage of the maintenance contract justified by your project’s proposed use of the equipment).

If the UM has made or will make a financial contribution to your project, e.g., funding a graduate student or helping you buy a piece of equipment, make certain that is noted. Study sections like to see a University commitment to the success of your research project.

**REVISIONS**
You will likely need to apply more than once. If your first application is rejected, read the reviewer’s comments carefully. When you first read them you will be sad and angry, so spend a week being angry - write nasty rebuttal letters, but DON’T SEND THEM TO ANYONE - they are for therapy only! Don’t call anyone at the funding agency. Then a week later, after you have calmed down somewhat, re-read the critique and your application. Gauge whether or not the reviewers show any enthusiasm for your study - a senior investigator skilled in reading critiques will be helpful for this. Consider the reviewers’ suggestions for change and their requests for more preliminary data. Figure out what parts of your application might have confused or misled them. Then decide whether your application is fatally flawed or fixable.

If you decide to fix the application and re-apply, respond explicitly to each criticism and suggestion, indicating how and where you have revised your application. If you disagree with the reviewer on certain points, state your arguments in a logical manner. Never impugn the intelligence or motives of the reviewer. Add any additional improvements that you have thought of yourself, and point these out as well. Reviewers may have found 20 problems in your first application, but only commented on the 10 that they considered most important. They will be impressed if you find and fix the other 10 on your own.

**Work hard, and good luck!**
<table>
<thead>
<tr>
<th>Section and Topic</th>
<th>Questions To Address</th>
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</thead>
<tbody>
<tr>
<td>Specific aims/hypotheses</td>
<td>Are the aims well focused and fully conceptualized? Are the hypotheses clearly articulated? Do the aims appear balanced—not overly ambitious or unrealistic?</td>
</tr>
<tr>
<td>Background/significance</td>
<td>Is the significance/importance of the work evident? Is the work innovative? Does it contribute substantially to previous work in the field? Is the need for the study (or all aspects of the study) well-justified? Is the significance overstated? Is there extraneous information?</td>
</tr>
<tr>
<td>Preliminary/pilot studies</td>
<td>Are preliminary studies well described and their contributions to the proposed project clear? Is there sufficient pilot work? Is availability of subjects assured? Are enrollment and/or intervention procedures tested and feasible?</td>
</tr>
<tr>
<td>Methods</td>
<td>Are inclusion and exclusion criteria fully described and well-justified? Are the reasons for selecting this sample clear, not merely convenience? Are there important potential biases in the sample selection? Are there too many exclusions that are not well justified, or are important exclusions overlooked? Are there postenrollment exclusions that could potentially bias the sample? Is availability of adequate numbers of participants from the sampling frame assured? Are there enough participants in the setting to do this study as described?</td>
</tr>
<tr>
<td>Study sample</td>
<td>Are procedures well-described? Are there quality assurance measures for data collectors? Is there adequate description of study instruments/measures? Are standardized, validated measures used? Are there concerns about validity or reliability of data collection methods? Are all important study variables described and collected? Are there extraneous variables that are never used in subsequent analyses?</td>
</tr>
<tr>
<td>Data collection/procedures</td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>Is the outcome adequately described, defined, and specified? Are the validity, reliability, and performance characteristics of the outcome measure provided? Are the outcome data collected by researchers who are blinded to the study hypotheses and study group assignment?</td>
</tr>
<tr>
<td>Intervention (if applicable)</td>
<td>Does the intervention appear potent (that is, is it likely to be effective as described) Is the intervention well-described—can you understand what was done, or is it a “black box”? Is the protocol standardized so that it is likely to be reproducible in other settings? Is the intervention administered by a separate individual/group not involved in outcome assessment? Is there blinded administration of the intervention protocol (e.g., double-blinding of drug trial)? Is there randomization to study groups? Is there likely to be potential bias in the way the patients were allocated to treatment groups or received the intervention? Will adherence to the intervention be monitored? Will the effects of nonadherence be considered? Are safety issues regarding the intervention addressed? Is an appropriate control group selected? Are issues of contamination or co-interventions in the control group addressed?</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Have you consulted a biostatistician? Are the analytic approach and structure of analyses adequately described? Will an intention-to-treat approach be used? Is there adequate attention to potential confounders? Are there sample size or power calculations? Are attrition rates/losses provided? Do they appear realistic/justified? Do anticipated losses threaten the validity of the study? How will missing data and nonresponses be handled in analyses?</td>
</tr>
<tr>
<td>Summary</td>
<td>Are the strengths and weaknesses of the grant presented? How do the weaknesses affect the validity or interpretation of the study results? Are potentially fatal flaws unaddressed? Are the implications of the work discussed?</td>
</tr>
</tbody>
</table>

Participants may be required for feasibility or safety reasons, but the grant writer should remember that any exclusion will make the study less generalizable. Common critiques are that the reasons for exclusion were not well justified, that the exclusions would result in important bias in the sample, or that in some cases important exclusions were overlooked. We advise that each exclusion criterion be well-justified. Address any important potential biases, and assure that these will not invalidate the study results or their applicability to more general samples.

**Availability of Participants.** A common critique from reviewers is that the availability of participants for the proposed study is not assured. Provide data and assurance that adequate numbers of patients will be available for the study in the proposed setting, given the inclusion and exclusion criteria. The strongest evidence is pilot work in the pro-
This article provides suggestions and ideas about how to make your next National Science Foundation (NSF) proposal more competitive.

NSF provides proposal information in a variety of ways: Dear Colleague Letters, Program Descriptions, Announcements, and Solicitations. The best way to keep in touch with grant opportunities is by subscribing to one or more of the available alert services, such as NSF’s notification service [1], the IEEE newsletter [2], and Grants.gov [3]. NSF also provides a guide for preparing proposals [4] that provides specific instructions for each stage of the application process.

**Planning research proposals**

As you prepare to submit a research proposal to NSF, the first step is to search NSF’s Web site broadly on each of your areas of interest to find competition solicitations and relevant NSF organizational areas. Then examine the award abstracts database [5] to see what parts of NSF have funded similar work.

As you study each call for proposals, identify the overarching goal of the NSF program. Study the review criteria critically: What are the criteria? What will the reviewers look for? Direct your proposal to the program in which it fits best; there, it will get the most appropriate reviewers and have a high priority for funding. If you list multiple programs on the cover sheet, list first the program most central to your topic.

A critical point to consider is whether the idea you’re proposing is easily differentiated from the work included in your existing grants. Your proposal should not look too similar to work that is already funded; even titles and summaries should be distinct. The new proposal should go beyond your already-funded work in terms of both intellectual merit and broader impacts. Discuss any overlap in your project description, specifying what is new.

If the problem you’re addressing is complex, it may be imperative to assemble a multi- and interdisciplinary team. An added benefit to forming such a team is the opportunity to build relationships and capitalize on strengths.

Although some programs allow you to submit more than one proposal in response to a
particular call, it may not be a good idea. The first thing to do is contact the program director. Consider whether the time spent preparing multiple proposals would be better spent preparing just one. Many programs suggest limiting the number of proposals to one. For example, the Division of Materials Research [6] "discourages the submission of more than one proposal from the same Principal Investigator (PI) during the proposal-submission window." If you do make multiple submissions, consider what will happen if they all get funded—how will you show success in each area? This factor is critical for the success of renewals and future submissions.

Before resubmitting a proposal, consider each of the reviewers' concerns and, if you want, contact the program director to gather further insight into how the proposal might be improved. Resubmitted proposals involve significant effort—not just yours but also the community's, as resubmissions are often assigned to new reviewers.

**Intellectual merit**

Proposals focused on an area in which the PI has prior accomplishments tend to get the best reviews. If you do not have documented expertise in the area, consider adding a co-PI who has that expertise or waiting until you have some preliminary results.

A strong application always demonstrates an appreciation of the background of the field, with appropriate references to the results of others. Not all research is hypothesis-driven, but a hypothesis helps focus a proposal and avoids the appearance of a fishing expedition.

Provide enough detail for the reviewers to evaluate the quality and extent of the planned activities. Be very clear about what you expect to accomplish scientifically, why it matters, and how it's different from what others have done. Risk-taking can make your proposal more exciting. Finally, ask yourself: If the project is successful, will it make an important impact?

Explain in your proposal why you want to do the work—your motivation and the scientific rationale. Describe why it is important that you carry out the work, place the work in context, and explain its likely impact. Then write a clear research plan.

**Broader impacts**

A clear explanation of the broader impacts of the proposed work is an important aspect of an application and a key to its success. In a typical funded proposal, this section takes up one to two pages within the project description. In certain types of proposals, broader impacts tend to take up even more space. For example, a successful CAREER [7] (Faculty Early Career Development) proposal typically will include three to five pages on broader impacts, focused specifically on the integration of research and education and its likely impact. The different types of broader impacts are elaborated at several NSF Web sites (GPG Representative Activities [8], General Information [9], Division of Chemistry [10], ACS Showcase [11], Division of Materials Research (DMR) [12], and DMR Highlight Request [13]).

I suggest you go beyond explaining the broader impacts and applications in science/engineering, education of graduate students, publishing and presenting, and teaching. Although all of these items are important, they are all normal activities of a professor. Activities that have a good chance of diversifying the science and engineering work force will be looked on favorably by NSF staff. Other possible broader impacts include partnerships, interactions with industry, dissemination beyond scientific publications (e.g., radio, TV, museums, and K-12
education/outreach), ethics, mentoring, undergraduates, research experiences for teachers, and course development for new audiences.

One or two notable efforts often come across stronger than myriad, small, unrelated, and unconnected activities. In broader impacts, as in the other aspects of your proposal, make clear what is new and how it can be distinguished from your existing efforts and those of others. Back up your ideas with, as appropriate, an outline of your track record, references to literature--there is significant literature in this area, and you should be aware of it just as you are for your research activities--letters of support, and so on. The key factor to keep in mind is what impact the intended activity or activities will have.

**Common mistakes**

- Failing to address the broader impacts
- Not integrating education with research
- Presenting too many ideas, with the result that the proposal lacks focus (common among young investigators)
- For renewals, failing to publish in quality journals or failing to establish oneself as a leader in the field
- Not describing ideas in sufficient detail
- Making mistakes in English/grammar, figure references, etc.
- Failing to appreciate the background of the field (i.e., lacking references and/or originality)
- Proposing research in an area in which you are already funded for similar activities
- Not applying to the most appropriate program
- Making an inappropriate budget request and/or forgetting underrepresented groups (particularly in large proposals)
- For instrumentation requests: not enough users planned, failing to make a case for the impact, not justifying a replacement, or failing to justify top-of-the-line equipment.

**Dealing effectively with declinations**

Having a proposal "declined" can be disheartening or worse. Studies suggest that researchers might do better to wait until they are no longer angry to seek feedback on a declination because they will be able to think about the information they receive in a more integrative, flexible manner [see B. L. Fredrickson, "The Role of Positive Emotions in Positive Psychology" Amer. Psych. 56(3), 218-226 (2001)]

If you plan to discuss a recent declination with the program director, consider the feedback you have received from the reviewers first. Your first goal in this discussion is to get clarification regarding the reason(s) for the declination, putting aside any conclusions you may have reached earlier. Make sure you understand clearly what could be improved to make your proposal competitive. Questions you might want to ask: Is this the best program for a resubmission? Was my budget appropriate? Did my proposal fail on criterion I (intellectual merit), criterion II (broader impacts), or both?

**Renewals and prior support**

When asking for a renewal of funding, ensure that the prior-support section includes the award upon which the renewal is based. Also include other recent, relevant grants. Adhere to the NSF
format described in the Grant Proposal Guide and, in doing so, either reference or list your own papers. If you are tight for space, the reference section is your best alternative. If you decide to put these references elsewhere (e.g., in your biographical sketch), make their location clear to your readers. Discuss achievements in terms of both intellectual merit and broader impacts.

Comments, suggestions? Please send your feedback to our editor [15].

Photo: Jeff Hutton

10.1126/science.careedit.a0700108

Source URL: http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2007_07_27/careedit.a0700108

Links:
[15] mailto:smweditor@aaas.org
Advice on Writing
Proposals to the National Science Foundation

Susan Finger
sfinger at ri.cmu.edu
Carnegie Mellon University

General advice
Writing NSF proposals
Putting together your proposal
What happens to your proposal after it is submitted to NSF?
Being a panelist or reviewer

What follows is a collection of advice for writing research grants to the National Science Foundation. It includes some guidelines on how to write an NSF proposal and how to get the latest version of the NSF forms. There are some NSF forms, such as the Disclosure of Lobbying Activities, that your grants office will provide for you.

This document focuses on writing proposals to NSF, but the following general advice can be applied to writing any proposal.

General advice

Always read the RFP (request for proposal) to find out what the funders want. They will give you money only if you can help them reach their goals. The goals of funding agencies (public and private) vary dramatically. A successful proposal to NSF looks nothing like a successful proposal to NASA. Even within an agency, the style of proposals can be different among internal divisions. Find out about the agency, its goals, and its review system.

All proposals should answer the following questions in one form or another.

- What is the problem being addressed? (What is the goal of the research being proposed? What is the hypothesis being tested?)
- Why is the problem important and interesting?
- What will you DO to address the problem? If you complete the plan, will that bring us closer to an answer to the problem?
- Do you have the resources (equipment, grad students, access to industry ...) necessary to complete the research?

Writing NSF proposals

NSF is organized a lot like a university, except that instead of departments and colleges it has divisions and directorates. The program directors are like professors (and a lot of them are professors on leaves of absence). They have areas of specialization which correspond to the research areas covered by their programs. The division directors are like department chairs. They oversee the broad research areas covered by the programs and deal with administrative issues. The Assistant Directors are like Deans of Colleges. They lead the directorates and are responsible for the major research directions in Engineering, Physical Sciences, etc. The Director of NSF is responsible for the overall direction of Science and Engineering Research. However, unlike a university, NSF reorganizes constantly. This means that you
may get to know a program director who may suddenly return to his or her university or may be reassigned to another program — or that your program may be merged with a different program. While this is disconcerting in the short run, in the long run it keeps programs from stagnating and helps NSF keep on the forefront of research areas.

Find out which program supports your research area (it's not always obvious). Read the program announcements before you talk to the program director so that your questions will be direct and specific. You can call or send e-mail to the program director for your program area to discuss the ideas in your proposal. Some program directors prefer e-mail; some prefer phone calls. Some don't like to talk to PIs; some do. You can ask your colleagues to find out about the current program director for your research area. Find out if there are other people you should talk to and what special initiatives might apply to you. You can find the list of telephone numbers and e-mail addresses from the NSF web site (http://www.nsf.gov/). Listen to what the program director says. Remember to say "thank you." (Don't be discouraged if they are rough on you. They spend all day on the phone and the rest of the time they're traveling and staying in government-rate hotels.) Treat the program directors as if they are intelligent people (even if you doubt it). The program director will assign the reviewers and will make the final decision. You don't have to be a sycophant, just be polite. (This advice comes from a former NSF program director.)

Most of your correspondence with NSF will be through email, but if you call, you will probably get the program director's voice mail. Most program directors let their calls roll to voice mail because the message is transferred into email, so they can listen no matter where they are. Also, if you are calling about a proposal or a grant, then they can have all the information at hand when they return your call. So, when you call, clearly state who you are, why you are calling, give the proposal or grant number if you have it, and give several times when you will be available for a call back. Also, oddly, the NSF phone system displays the caller ID when the call is in progress, but the number disappears after the call is over and, as far as I can tell, there is no way to get it back. So don't count on the program officer being able to see that you called. Leave a message.

The instructions to proposers get more specific every year and FastLane gets better at rejecting proposals that don't meet the formatting requirements. However, You are still responsible for ensuring that your proposal meets all the particular program requirements. Follow the directions! (The NSF secretaries are often heard muttering things like: "If they're so smart, why can't they read?"

The number of proposals submitted to NSF has increased dramatically over the last decade. As a result, fewer proposals are funded. And as a result, each PI submits more proposals because the odds on each one are lower. DO NOT submit essentially the same proposal to several programs. The proposal will probably go to at least one duplicate reviewer, who will get angry that you are burdening the system, will recommend that both proposals be rejected, and will put a black mark next to your name. DO NOT submit a proposal that is rushed and not the best that you can do. Not only are you burdening the system by making everyone go through the work of rejecting your proposal, you are also damaging your reputation with your peers. No matter what incentives you have from your university for submitting proposals, they are not worth the damage done to you and to the peer review system.

**Putting together your proposal**

The rest of this page follows the general flow of creating the forms and text for an NSF proposal. Once you have a rough draft of your proposal, ask someone who is senior to you to read your proposal as if they were an NSF reviewer. The ideal reader is a senior trusted colleague in your field who has had NSF funding, has served on NSF panels, and who will not be used by NSF as a reviewer. (See Section 5.)
1. Project Summary

1 page. This is not an abstract. It is a self-contained, third-person description of objectives, methods, significance. If you are funded, this goes into NSF's Summary of Awards publication as well as being published on the NSF Web site. It will be read by your colleagues, the general public, and Congress. Be sure to include and label a section on Intellectual Merit and a section on Broader Impact.

2. Project Description

The project description has a 15 page limit. Proposals over this limit are thrown out. The formatting requirements are given in the Grant Proposal Guide, which you can get from the NSF Web site. The NSF home page usually has a link to the latest version.

2.1 Objectives and Expected Significance

What are the main scientific challenges? Emphasize what the new ideas are. Briefly describe the project's major goals and their impact on the state of the art.

Clearly state the question you will address:

- Why is it important? What makes something important varies with the field. For some fields, the intellectual challenge should be emphasized, for others the practical applications should be emphasized.
- Why is it an interesting/difficult/challenging question? It must be neither trivial nor impossible.

2.2 Background and Technical Need

- What long-term technical goals will this work serve?
- What are the main barriers to progress? What has led to success so far and what limitations remain? What is the missing knowledge?
- What aspects of the current state-of-the-art lead to this proposal? Why are these the right issues to be addressing now?
- What lessons from past and current research motivate your work. What value will your research provide? What is it that your results will make possible?
- What is the relation to the present state of knowledge, to current work here & elsewhere? Cite those whose work you're building on (and whom you would like to have review your proposal). Don't insult anyone. For example, don't say their work is "inadequate;" rather, identify the issues they didn't address.

Surprisingly, this section can kill a proposal. You need to be able to put your work in context. Often, a proposal will appear naive because the relevant literature is not cited. If it looks like you are planning to reinvent the wheel (and have no idea that wheels already exist), then no matter how good the research proposal itself is, your proposal won't get funded. If you trash everyone else in your research field, saying their work is no good, you also will not get funded. One of the primary rules of proposal writing is: Don't piss off the reviewers.

You can build your credentials in this section by summarizing other people's work clearly and concisely and by stating how your work uses their ideas and how it differs from theirs.
2.3 Research Description

Broad technical description of research plan: activities, methods, data, and theory.

This should be equivalent to a PhD thesis proposal for the big leagues. Write to convince the best person in your field that your idea deserves funding. Simultaneously, you must convince someone who is very smart but has no background in your sub-area. The goal of your proposal is to persuade the reviewers that your ideas are so important that they will take money out of the taxpayers' pockets and hand it to you.

This the part that counts. WHAT will you do? Why is your strategy an appropriate one to pursue? What is the key idea that makes it possible for to answer this question? HOW will you achieve your goals? Concisely and coherently, this section should complete the arguments developed earlier and present your initial pass on how to solve the problems posed. Avoid repetitions and digressions.

In general, NSF is more interested in ideas than in deliverables. The question is: What will we know when you're done that we don't know now? The question is not: What will we have that we don't have now? That is, rather than saying that you will develop a system that will do X, Y and Z, instead say why it is important to be able to do X, Y and Z; why X, Y and Z can't be done now; how you are going to go about making Z, Y and Z possible; and, by the way, you will demonstrate X, Y and Z in a system.

Right now, NSF is more open to application-oriented research. They need to show Congress that the money spent on research benefits the US economy. Some years ago, the word "applied" was a bad word at NSF. Now it's a good word. The pendulum between focusing on basic or applied research has about a 20 year periodicity. You always need to check to find out where it is at the moment. Check with the program director and knowledgeable colleagues.

2.4 Education and Human Resources

What are your potential contributions to developing human resources in science & engineering at postdoc, graduate, and undergrad levels?

In the last few years, NSF has started to take educational goals much more seriously. This section used to be boilerplate; it can't be any more. You need to think about what impact your research will have on education. Be specific but don't overstate.

2.5 Plan of work

Present a plan for how you will go about addressing/attacking/solving the questions you have raised.

Discuss expected results and your plan for evaluating the results. How will you measure progress?

Include a discussion of milestones and expected dates of completion. (Six months is the about the smallest time chunk you should include in an NSF proposal.) You are not committed to following this plan - but you must present a FEASIBLE plan to convince the reviewers that you know how to go about getting research results.

For new PIs, this is often the hardest section to write. You don't have to write the plan that you will follow no matter what. Think of it instead as presenting a possible path from where you are now to where you want to be at the end of the research. Give as much detail as you can. (You will always have
at least one reviewer who is a stickler for details.)

3. Results from Prior NSF Support

If any of the PIs have received NSF support in the past 5 years, you must include a summary of the results of previous work. The pages in this section count toward the total 15 pages. You can use this section to discuss your prior research and how it helps to support your current proposal. One of the purposes of this section is to help the reviewers evaluate your track record.

- Award #, amount, period
- Title
- Summary of results
- List of publications acknowledging NSF
- For renewals: relation to proposed work

4. References

Pertinent literature referenced within the project description.

Program directors often look in the bibliography for potential reviewers, and reviewers often look in the bibliography to see if their work is cited. If your bibliography has a lot of peripheral references, your proposal may be sent to reviewers whose work is not directly related to yours and who may not understand your proposal. On the other hand, if you do not cite the relevant literature, your proposal may be sent to reviewers who are not cited and who will criticize you for not knowing the literature. Most of the references in the bibliography will be cited in the Related Work section. The references do not count in the 15 page proposal limit.

5. Biographical Sketches

Educational background and career, academic essentials only. List the highlights that a reviewer of the proposal needs to know about you.

List up to five relevant publications, patents, copyrights, or software systems, plus up to five other significant publications.

Graduate students advised and postdocs sponsored in the past five years and total numbers advised & sponsored.

List long-term associates with whom you have collaborated in the past two years plus your graduate and postdoc advisors. This is for conflict-of-interest: NSF will not send your proposal to your close colleagues, your thesis advisor, nor to anyone at your current institution. You may list such people explicitly, if you wish.

Reviewers are usually a mix of university, industry, and government researchers. Almost always, the majority are academics.

6. Budget

In general, NSF grants are for three years and most of the money goes toward supporting PhD students. A typical budget for a single PI grant is about $100K/year which will pay for a graduate student (tuition
and stipend), about 10% of the professor's time to supervise the student, a little bit of travel, copying, and overhead. However, the grant size varies from division to division. Ask someone in your area what is typical.

Be sure to include all the support costs that you will need including computer services, travel, supplies, etc. NSF may cut your budget, but they'll never give you more than you ask for, so be sure to ask for everything you need.

Describe, justify, and estimate cost of equipment items $1000 or more. If your equipment needs change between the time you submit the proposal and the time it is granted, you can still buy what you need -- but be sure to talk to the university grants office BEFORE you buy the new equipment. There are special rules about equipment money because it is usually exempt from overhead charges.

The business manager in your department or grants office will usually help you fill out the budget form once you have identified the direct costs.

7. Current and Pending Support

List all current and pending support on the given forms. Your budget office can probably help with these.

If you have submitted the same proposal to more than one agency, be sure that you declare it on the cover page and in the current and pending support section. If you don't and the same reviewer is picked by both agencies, you won't get funded and your reputation will be damaged. Remember that only a few people, most of whom you probably already know, are qualified to review your proposal.

8. Facilities and Special Considerations

This section should focus on the facilities available to you that you need to do your research. If you will rely on any specialized equipment, describe it. The question in the reviewer's mind is: Do you have the necessary resources to carry out the research? In addition, if you are asking for equipment in your proposal, you will want to make clear what equipment you don't have.

OPTIONAL: Special considerations if some work will occur off-campus

What happens to your proposal after it is submitted to NSF?

All proposals arrive at NSF electronically - mostly through www.fastlane.nsf.gov and occasionally through www.grants.gov. The proposals are routed based on the program announcement number or the NSF division given by the PI. (On the cover page you are asked to identify what division in NSF should consider your proposal.) Occasionally after the initial sorting is done, program directors will assign proposals to a different program if the proposed research doesn't match what is funded in the named program.

Once the proposal has been assigned to a program director, it is ready for review. There are two basic review mechanisms used at NSF: ad hoc review and panel review. Both are single blind peer review mechanisms: that is, the reviewers (who are the PI's peers) know who the PI is, but the PI does not know who the reviewers are.

Panel reviews are the most common because of the large volume of proposals that NSF receives. Here's the math: Most reviewers will not write reviews for more than 5 proposals a year without revolting.
(reviewing a proposal is a lot of work). If 150 proposals are submitted to a program, that means 900 review request must be sent out. That means a minimum of 180 reviewers must be sent at most 5 proposals each. Three reviews per person per year is more realistic - so that means the program director must have access to 300 of the proposal writers' peers in order to get the peer review system to work. And that's just for one program. All the other program directors are working with the same numbers -- and the expertise of many reviewers overlaps several programs.

**Panel review:** For a panel review, the program director selects 10 to 15 experts in a field and asks them review a set of related proposals. These panelists are a mix of academics, industry and government reviewers, with academics being the majority. Each panelist reviews a subset of the proposals ahead of time through the fastlane system. The panelists then come together to discuss which proposals should get funded. Most reviewers find it easier to rank a set of proposals than to write a detailed review of each proposal. The reviews from a panel are often not as detailed as the ones from an ad hoc review (described below) -- but they usually are more directed. If one reviewer completely misses the point of a proposal (which they sometimes do), this will come out during the panel discussion so you get fewer out-in-left-field reviews from panels than from ad hoc review. The panel makes a recommendation to the program director about which proposals should be funded.

**Ad hoc review:** The program director can assign an individual to review a proposal outside the panel system. Ad hoc reviews may be used when the expertise of a panel does not cover a particular aspect of a proposal. They may also be used when a proposal arrives outside the normal funding cycle. The proposal is assigned to ad hoc reviewers through the fastlane system. The reviewer is given about two weeks to a month to review the proposal. Again, the review happens within the fastlane system.

The program director reviews the proposal, the panel recommendation, and any ad hoc reviews, then makes a decision to fund or decline the proposal. The program directors are supposed to exercise judgment. For example, a reviewer might appear to be a perfect match for a proposal -- but when the review comes in, it may be obvious that the PI's work conflicts with the reviewers work, and the reviewer is biased.

Often the decision to fund involves deciding whether to fund the proposal at the full or reduced amount. The program director makes the decision based on the program budget, the proposals that have been funded, and the pending proposals. The program director completes a form to support the decision. The proposal goes to the division director who must concur with the decision for it to be official. You are notified by email once the decision is final. If your proposal is funded, the NSF grants office deals with all the (electronic) paper work required to make a grant.

Note: A grant from NSF goes to the institution, not to the PI. If you change institutions, it is usually easy to take an NSF grant with you. However, you must negotiate with your current and future institution. NSF will not intervene in these negotiations.

Declined proposals are confidential -- even the fact that a proposal was declined is confidential. For grants, the titles, abstracts, PIs, funding amounts, .. are public information, but the proposal itself is confidential.

**FastLane**

Almost all NSF information is available over the web. The main NSF web page [http://www.nsf.gov](http://www.nsf.gov) gives you access to all NSF program descriptions, publications (including the NSF Program Guide), program descriptions and current deadlines, the phone numbers and e-mail addresses of project directors, etc.
The FastLane system [http://www.fastlane.nsf.gov](http://www.fastlane.nsf.gov) is an interactive real-time system used to conduct NSF business over the Internet. All programs now require that proposals be submitted through FastLane or through grants.gov. The grants office at your institution can set up an account for you so that you can submit proposals and check their status through FastLane. If you are asked to write a review or be on a panel, the program officer will give you an id and password to give you access to the proposals.

## Being a panelist or reviewer

Remember that for every proposal you submit to NSF, at least five or six of your peers take the time to read it, write a review, and travel to DC to discuss it. Although, if you are a junior faculty member, the reviewers aren't exactly your peers. Panels tend to be weighted toward more senior members of the community, and these are the people who will be asked to write letters for your promotion and tenure case and they are also are the people who are on program committees and editorial boards. Only submit your best work!

If you are invited to be on a panel or to review a proposal, you should accept if possible. Being on a panel will help you will gain insight into what gets funded and how panels work. The peer review system only works if you, as a member of your community, understands that every proposal you submit, you incur a debt of six proposals to review. Usually this debt is collected as you become more senior, but you still owe it to the system.
Definition of a Personal Statement

Mary Hale Tolar
Deputy Executive Secretary, Truman Scholarship Foundation

If you are applying for nationally competitive scholarships, for graduate school, or for a number of post-graduate service or employment opportunities, you have seen the vaguely phrased request; in one form or another, it comes down to “tell us something about yourself.”

The Rhodes and Marshall competitions require a 1000-word personal essay: the Fulbright, a “curriculum vita.” You are asked to share your “academic and other interests.” A clearer charge might be: compose an essay that reveals who you are, what you care about, and what you intend to do in this life. Tell this story in a compelling manner, and do so in less than a thousand words. What’s so hard about that? Simply make sense of your life. (right.) But what does that mean? What will it look like?

Because personal statements are personal, there is no one type or style of writing that is set out as a model. That can be liberating; it can also be maddening. But while every personal statement is unique in style, its purpose is the same.

A personal statement is your introduction to a selection committee. It determines whether you are invited to interview; and if selected as a finalist, interview questions will be based on this material. It is the heart of your application.

A personal statement is:

• A picture. Your personal essay should produce a picture of you as a person, a student, a potential scholarship winner, and (looking into the future) a former scholarship recipient.

• An invitation. The reader must be invited to get to know you, personally. Bridge the assumed distance of strangers. Make your reader welcome.

• An indication of your priorities and judgement. What you choose to say in your statement tells the committee what your priorities are. What you say, and how you say it, is crucial.

• A story, or more precisely, your story. Everyone has a story to tell, but we are not all natural storytellers. If you are like most people, your life lacks inherent drama. This is when serious self-reflection, conversation with friends, family, and mentors, and permission to be creative come in handy.

A personal statement is not:

• An academic paper with you as the subject. The papers you write for class are typically designed to interpret data, reflect research, analyze events or reading—all at some distance. We are taught to eliminate the “I” from our academic writing. In a personal statement your goal is to close the distance between you and the reader. You must engage on a different, more personal level that you have been trained to in college.

• A resume in narrative form. An essay that reads like a resume of accomplishments and goals tells the reader nothing that they could not glean from the rest of the application. It reveals little about the candidate, and is a wasted opportunity.

• A journal entry. While you may draw on experiences or observations captured in your personal journal, your essay should not read like a diary. Share what is relevant, using these experiences to give a helpful context for your story. And include only what you are comfortable sharing—be prepared to discuss at an interview what you include.

• A plea of justification for the scholarship. This is not an invitation to “make your case.” Defending an assertion that you are more deserving of the scholarship than other candidates is a wasted effort—you’ve likely just accomplished the opposite.

Most importantly, a personal statement is authentic. Don’t make the mistake of trying to guess what the committee is looking for, and don’t write what you think they want to hear. They want to know you.

So, what must you include in the personal statement? An effective personal statement will answer the following questions:

• Who am I?
• Who do I want to be?
• What kind of contribution do I want to make, and how?
• Why does it make sense for me to study at Oxford (or York, LSE, Cambridge, Sussex)?

For the Rhodes, you will want to include a proposal of study, one or two paragraphs devoted to why Oxford makes sense to you. For the Marshall and Fulbright, your “proposed academic programme” is presented separately. Your proposal should be as detailed and specific as possible, including degree plans, course titles, and professors with whom you hope to study (especially if you have contacted them by email or letter). Why is this the right place and program? Is it consistent with your studies and activities to date? Draw connections.

Remember the goal: grab the readers’ interest, and make them want to meet you for an interview. Get a sense of the experiences and dreams you wish to share, then examine them for a helpful means of making sense of it all. You will find your story; and if you share it honestly, you will have written a personal statement.

Finally, know that writing a personal essay is hard and will take many drafts and much reflection. Don’t wait until you have it right to share it with others; their input will likely make it stronger, clearer, and tighter. Don’t put it off until you have it right … just write!

1 Mary Tolar is a 1988 Truman Scholar and 1990 Rhodes Scholar, served as scholarships advisor at four institutions, and has served on a State Rhodes Committee of Selection. She has helped over sixty students win nationally competitive scholarships.
Getting Started....

The personal statement comes from inside you. passionate and gutsy. Its composition is organic, a natural growth dictated by an obscure, internal logic. You don’t “make it up”; instead you listen. You “get it down.”

First, you must trick your brain into letting you play. It wants everything nice and tidy, arranged in neat, labeled cubbyholes. Your artist brain is messy; like playing with finger paints. Lull your logic brain to sleep:

- Engage in mindless, repetitive activity. Turn off the TV and stereo; go for a run, do dishes, dig holes. Do anything that keeps you busy but allows your mind to wander. Be sure to keep a micro cassette recorder handy! Ideas may come thick and fast.
- Begin writing as soon as you wake up in the morning. Don’t shower, don’t eat (OK, you can have coffee), just turn on the computer. So you’re not fully awake; that’s good. Neither is your logic brain.

Now do this everyday. Well, maybe not every single day; make appointments with yourself. You won’t have brilliant ideas each time. Some days you sit and stare at the computer screen. Nothing happens. You develop imaginary rashes that need immediate medical attention. You suddenly remember a test you should be studying for. But you sit there; you focus; eventually, an idea bubbles to the surface. You start writing.

From Getting Creative with the Truman Personal Statements, written by Jane Curlin, Ph.D.: Director of Student Academic Grants & Awards, Willamette University; writer and consultant.

An Exercise in Self-Reflection

Reflect on some specific questions that may lead you to a more general expression of yourself.

- What errors or regrets have taught you something important about yourself?
- When have you been so immersed in what you were doing, that time seemed to evaporate while you were actively absorbed?
- What ideas, books, theories or movements have made a profound impact on you – be honest.
- To what extent do your current commitments reflect your most strongly-held values?
- Where or how do you seem to waste the most time?
- Under what conditions do you do your best, most creative work?
- To what extent are you a typical product of your generation and/or culture? How might you deviate from the norm?

(Taken from From a Faculty Representative: The Truman and Marshall Scholarship Processes As Educational Experiences, by Cheryl Foster, Ph.D., Associate Professor of Philosophy and Scholarships Coordinator at the University of Rhode Island)
Budgeting

Budgeting is a natural and critical extension of your research design. A realistic and detailed budget is also often a prerequisite for convincing potential funders that you know what you need to accomplish your research and how you are going to conduct it. Not all funders require a budget, and those that do often require specific formats or include particular conditions. These need to be considered seriously or your proposal may be prematurely dismissed. Even so, some general considerations may prove useful.

Demonstrate that your budget is realistic by specifying costs for each line entry. Doing this well may include extensive and difficult research into the real costs in your country of study. Consulates or tourism offices may help, but you will probably be better off speaking to recently returned researchers who are more likely to have dealt with the problems you are going to address. Be wary of budgeting from guidebooks or past experience as prices may have skyrocketed due to inflation or monetary devaluation. Prepare for continued devaluation or possible price rises. It will also help your readers if you include subtotals of various budget categories (e.g., transportation, living expenses, supplies, and research assistants). See samples below.

Consider every possible expense. You are not just funding your research, but your life for the time you are in the field. Any expenses you incur in the field will have to be paid by someone and if you don’t ask for adequate support, your research will be compromised and you may come home even poorer than when you left. When sitting down to write a budget, think about all of your daily expenses at home, from the big-ticket items like tuition and books to the more trivial expenses like taking the bus to class. Something costing as little as three dollars a day will add up to over a thousand dollars a year. Also consider those things that you may get for free at home but will have to pay for overseas. These costs may range from things as major as health care to expenses as seemingly minor as charges for photocopies, computer use, or printing documents. When asking for money, however, be careful. Make sure that the funds you are requesting are only for expenses that will be incurred during the research period and that the items you intend to buy are allowed (e.g., many grantors will not fund computer or automobile purchases).

Compare your budget to available funds. If your actual budget is likely to be higher than that which a particular funder is likely to support, indicate how you will make up the difference. To do this, you may want to mention other fellowships for which you are applying, university support to which you are entitled, available private funds, or payments you expect to receive for consulting. If you already have other funding secured, be upfront about it and detail which funder will cover what costs. It is far better to show that you have other funding that to submit a budget request that is far below what will be realistically needed to complete your research. Similarly, you may raise suspicions if your total expenses are perfectly matched to the maximum grant on offer.
Sample Budget One

Travel

Three trips to the National Archives, Washington, D.C. @ $275 roundtrip airfare. $825.00
Ground Transportation $65.00
Per diem @ $64, for 10 days $640.00

Sub-total, Travel $1,530.00

Communications

Telephone $250.00
Postage $80.00

Sub-total, Communications $330.00

Materials and Supplies

Printing and Duplicating $150.00
Miscellaneous supplies $100.00

Sub-total, Materials and Supplies $250.00

TOTAL $2,110.00

Source: Rubin (1983)
Sample Budget Two

Estimated Resources at Present

At present, I have secured no funding earmarked specifically for the proposed project. It may become possible to upon personal savings to supplement an awarded fellowship for an amount no greater than $1,500.00

Estimated Total Expenses for Fellowship Period

The following budget indicates travel and research expenses association with the completion of the project outlines in the attached narrative. Although my fieldwork will be executed entirely within Tanzania, the project involves time spent at three discrete locations: the capital, Dar es Salaam, and two yet to be determined village settings in Rukwa district. As such, the budget details the rail, bus, and accommodation funds required for my frequent relocations. Also included are fees to obtain a cellular telephone and email address. Such services are central to the maintenance of contacts and the collection of information during my time in Western Tanzania where the telecommunications infrastructure is poorly developed and unreliable. The airfare reflects the average of quotes obtained for student tickets from a number of discount travel services. In country expenses (transportation and otherwise), are based on inquiries undertaken while previously in Tanzania.

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<td>Accomodations and Storage</td>
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<tr>
<td>University Fees/Tuition (Dar es Salaam)</td>
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<tr>
<td>Health Insurance and Medi-vac ($300/month)</td>
<td>$2,700.00</td>
</tr>
<tr>
<td>Round-trip airfare from San Francisco to Dar es Salaam</td>
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</tr>
<tr>
<td>Communications (e-mail, telephone) ($60.00/month)</td>
<td>$540.00</td>
</tr>
<tr>
<td>Translator/Research Assistance (Rukwa)</td>
<td>$600.00</td>
</tr>
<tr>
<td>Ground Transportation in Tanzania</td>
<td>$700.00</td>
</tr>
<tr>
<td>Photocopying</td>
<td>$250.00</td>
</tr>
<tr>
<td>Survey expenses</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$17,925.00</strong></td>
</tr>
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Potential Sources of Alternate Funding

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<th>Source</th>
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<td>Rejected</td>
</tr>
<tr>
<td>Institute on Global Conflict and Cooperation</td>
<td>Pending</td>
</tr>
<tr>
<td>Institute of International Studies, University of California</td>
<td>Pending</td>
</tr>
<tr>
<td>Joint Center for African Studies, Stanford-Berkeley</td>
<td>Pending</td>
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</tbody>
</table>

Source: The preceding budget was written for an application to the Institute for the Study of World politics.
Requesting a letter of recommendation

by Michael Ernst (mernst@cs.washington.edu)
October, 2002

(Also see my advice on writing recommendation letters.)

Advancement in your professional career (such as obtaining a job or fellowship) often requires that you obtain letters of recommendation from previous colleagues, supervisors, etc. In general, letters tend to be more important in academic jobs than for industrial ones. You shouldn't feel that you are imposing when you ask for such letters: the letter-writers recognize that it is part of their professional responsibility. However, you should also do everything in your power to ease the burden on your references.

Choose carefully. The ideal letter-writer is knowledgeable about you, about the place you are applying to, and about the norms of letter-writing. Knowledge of you permits the letter to include specific examples and anecdotes, which are much more powerful than generic bromides or undifferentiated praise. Knowledge of the place you are applying permits the letter to specifically play up your strengths and qualifications. Knowledge of the norms of letter writing prevents the letter from being ignored because it is completely inappropriate. A good letter-writer also should not have a conflict of interest (such as being the advisor of another applicant). You should only request letters from people who will write you a good letter; you probably know whether this is the case but may want to double-check. Many applications request 3 letters. Including 4 strengthens your application; however, it's better to have 3 very strong letters than to have 4 letters, only 3 of which are very strong. Don't omit obvious people such as past supervisors and advisors from your list; these glaring omissions will lead those evaluating your recommendation to the conclusion that things did not work out and that person would have written a negative recommendation. Do try to include people with multiple backgrounds or who have seen you in multiple lights (corporate and academic supervisors, and teachers), but remember that people most similar to the letter readers will be able to write most persuasively — they understand, and can speak to, the needs of the job. For a corporate job, your industrial bosses will provide the most compelling recommendations. For an academic or research job, focus on academics and researchers (in your research area) as references. For example, suppose that you are applying to graduate school in computer science, and you have done programming for a biology lab on campus. A biology professor does not know what it takes to succeed in a computer science graduate program, and does not have wide experience with many computer scientists. Such a letter won't carry much weight, unfortunately.

Start early. Give letter-writers a minimum of two weeks, and preferably a month or more, to write letters. (This is particularly true for the crucial job recommendation letters.) The letter-writers have other responsibilities and deadlines, and you don't want them to do a shoddy rush job or to resent a demand for immediate gratification.

Provide full information.

- Write a brief description of the position or honor (and possibly provide a URL or a pamphlet), so that the letter-writer can provide the correct variety of detail. If you have not been in recent contact with the letter writer, you should provide an update on what you have been up to recently. (Actually, in that case you should consider getting letters from others who know you better.)
- Provide a filled-out form, a pre-addressed, stamped envelope, and any other necessary materials: don't impose on the letter-writer to get that minutia correct. (With electronic applications, this point is less relevant.)
• Provide your resume or c.v. Provide your personal statement, if one is required for the application. (Obviously, you should never send Word (.doc) files, which can be a hassle to print and which tend to format differently using different software. PDF is much better.)

• Tell your references all the places you are applying, so they can calibrate their letters. For instance, when writing letters for multiple people to the same place, they can put both in the best light. Don't blindside them with requests for additional letters later on. Another reason to provide a full list of all programs to which you are applying (and their addresses, etc.) is that it lessens the letter-writer's logistical burden: it's easier to send out lots of letters at once rather than in small batches.

• Remind your references of any specific details that might be helpful or that are more appropriate for a letter of recommendation than for your personal statement. For instance, I had once drafted a (positive) letter for someone who reminded me that I had nominated him for a special pay raise; I was able to include that detail in the final letter, which buttressed my case that he was a top performer. (It's easy to say in a letter that someone is a top performer, but specific details may convince the reader that it is actually true.)

• Some people will ask you to write the letter for them, and they will (possibly) modify and sign it. You should do so if requested, but this is not such a good idea in general. First, it indicates that the letter writer is not enthusiastic enough about your application to write his or her own letter. Second, you may not know the hidden language of letters of reference, so you may inadvertently err by commission or omission. Third, the letter won't sound like the person's other letters. Fourth, the letter won't add much to your own statement, and this homogeneity will make your application less compelling: it's better for the evaluators to have multiple perspectives on your personality and accomplishments.

Don't read the letter. It is traditional for letters to be sent directly to the entity evaluating the application; when that isn't the case, the evaluation will be sealed before being given to you. Don't be paranoid about this: it is completely standard. (An ethical letter-writer would warn you before writing a negative recommendation, but then again, you should only be asking people with a good impression of you.) You may be asked on an application whether you waive your right to view the letters of recommendation. You should always agree to waive that right. There are two reasons. First, if you don't waive the right, then whoever is reading the letter will assume that the letter isn't being totally honest. (The letter-writer knows you can read the letter and thus might make it more positive or less complete.) Second, many writers by policy do not write letters unless that clause is waived. (I know of some people who never write recommendation letters to some universities because those universities do not guarantee confidentiality of recommendation letters.)

Follow up.

• Letters sometimes get lost, and people sometimes forget to write them. You should double-check that the letter has arrived, and if not, ask the writer (more likely, the writer's secretary) to send another copy.

• After you have completed your application/interview/etc., tell your letter-writers the outcome. The letter-writers care about you and want to know whether their letter was effective. Furthermore, letter-writers will often lobby directly on your behalf, but they will look silly (and you will look bad) if the letter-writer isn't aware that this is moot because you already either got an interview or got rejected.

• Don't give gifts. It is not appropriate. The letter-writer is just doing his/her job.

Back to Advice compiled by Michael Ernst.

Michael Ernst