Postdoc Academic Chat #2

Generating Research Ideas Most Likely to Lead to Funding

October 20, 2015

Questions/discussion items to Consider

1. What are some suggestions you might have for the "Integration of Research and Education" into your research area along the lines that would be required by NSF (and other funding agencies)?

2. With respect to your research interests, what are some suggestion for finding the right balance between uniqueness on the one hand (you are one of a small number of researchers working in the field) and critical mass on the other (you have lots of colleagues, resources – and competition)?

3. What can you do, learn, and acquire now before you leave Stanford that will help you move forward with the best research ideas?

Readings

(1) NSF Proposal Processing and Review
(2) Getting Research Ideas
(3) Common Myths About Grants and Grant Seeking

(1) NSF Proposal Processing and Review

http://www.nsf.gov/pubs/gpg/nsf04_23/3.jsp#IIIA

Proposals received by the NSF Proposal Processing Unit are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Program Officers may obtain comments from assembled review panels or from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards.

A. REVIEW CRITERIA

All NSF proposals are evaluated through use of two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities. For example, proposals for large facility projects also might be subject to special review criteria outlined in the program solicitation.

The two merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions, and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity? 33

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students, and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens, women and men, underrepresented minorities, and persons with disabilities, are essential to the health and

vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. PROPOSAL FILE UPDATES

It is the responsibility of the proposing organization to thoroughly review each proposal prior to submission. On occasion, however, a problem is identified with a portion of the proposal after the proposal has been submitted electronically to NSF.

The FastLane Proposal File Update Module allows the organization to request the replacement of files or revision of other Proposal Attributes, associated with a previously submitted proposal. A request for a proposal file update must be submitted by an individual who is authorized to submit proposals on behalf of the organization, and electronically signed by the Authorized Organizational Representative (AOR). An update request must contain a justification that addresses:

1. why the changes or file replacements are being requested; and

2. any differences between the original and proposed replacement files.

A request for a proposal file update automatically will be accepted if submitted prior to:

- the deadline date specified in a program solicitation;

- initiation of external peer review in cases when a target date is utilized; 34 and

- initiation of external peer review in the case of an unsolicited proposal.

A request for a proposal file update ***after*** the timeframes specified above will require acceptance by the cognizant NSF Program Officer. Such requests may be submitted only to correct a technical problem with the proposal (i.e., formatting or print problems). Changes in the content of the proposal should not be requested after the timeframes specified above. When a request is accepted, the proposed files or revisions to proposal attributes will immediately replace the existing files and become part of the official proposal.

PIs can access the Proposal File Update Module via the "Proposal Functions" section of FastLane. Authorized individuals in the organization's Sponsored Projects Office (or equivalent) can initiate or review requests for proposal file updates using the "Submit Proposals/Supplements/File Updates/Withdrawals" Module via the FastLane "Research Administration Functions." 35

NSF will consider only one request for a proposal file update per proposal at a time. It is anticipated that it will be a rare occurrence for more than one file update request to be submitted for a proposal.

C. REVISIONS TO PROPOSALS MADE DURING THE REVIEW PROCESS

In the event of a significant development (e.g., research findings, changed circumstances,

unavailability of PI or other senior personnel, etc.) that might materially affect the outcome of the review of a pending proposal, the proposer must contact the cognizant Program Officer to discuss the issue. Submitting additional information must not be used as a means of circumventing page limitations or stated deadlines.

Before recommending whether or not NSF should support a particular project, the NSF Program Officer may, subject to certain constraints outlined below, engage in discussions with the proposing PIs.

Negotiating budgets generally involves discussing a lower or higher amount of total support for the proposed project. The NSF Program Officer may suggest reducing or eliminating costs for specific budget items that are clearly unnecessary or unreasonable for the activities to be undertaken, especially when the review process supports such changes; however, this would generally not include faculty salaries, salary rates, fringe benefits, or tuition. Note: indirect cost rates are not subject to negotiation. The NSF Program Officer may discuss with PIs the "bottom line" award amount, i.e., the total NSF funding that will be recommended for a project. NSF Program Officers may not renegotiate cost sharing or other organizational commitments.

When such discussions result in a budget reduction of 10% or more from the amount originally proposed, a corresponding reduction should be made in the scope of the project. Proposers must use the FastLane Revised Proposal Budget Module to submit this information. A revised proposal budget also must include a Budget Impact Statement that describes the impact of the budget reduction on the scope of the project.

Note: Revised proposal budgets must be electronically signed by the AOR. Paper copies of the revised budget should not be mailed to NSF.

D. AWARD RECOMMENDATION

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. Normally, final programmatic approval is at the division level. Because of the large volume of proposals, this review and consideration process may take up to six months. Large or particularly complex proposals may require additional review and processing time. For example, proposals for large facility projects also might require review in accordance with NSF's Guidelines for Planning and Managing the Major Research Equipment Account. If the program recommendation is for an award and final division or other programmatic approval is obtained, then the recommendation goes to the Division of Grants and Agreements for review of business, financial and policy implications and the processing and issuance of a grant or cooperative agreement. The Division of Grants and Agreements generally makes awards to academic institutions within 30 days after the program division makes its recommendation. Grants being made to organizations that have not received an NSF award within the preceding two years, or involving special situations (such as coordination with another Federal agency or a private funding source), cooperative agreements, and other unusual arrangements may require additional review and processing time.

Proposers are cautioned that only an appointed NSF Grants Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF or the Government should be inferred from technical or budgetary discussions with an NSF Program Officer. A PI or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants Officer does so at its own risk.

E. COPIES OF REVIEWS

When a decision has been made (whether an award or a declination), verbatim copies of reviews, excluding the identities of reviewers, and summaries of review panel deliberations, if any, are provided to the PI. A proposer also may request and obtain any other releasable material in NSF's file on his/her proposal. Everything in the file except information that identifies either reviewers or other pending or declined proposals is usually releasable to the proposer.

33 Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF Website at http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.. Back to Text 34 The status of a proposal may be found via the "Proposal Functions" section of FastLane. Back to Text 35Detailed instructions on submitting Proposer-initiated proposal file updates are available on the FastLane Website at: https://www.fastlane.nsf.gov/documents/pfu/pfu.jsp.Back to Text

(2) Finding a Topic and Beginning Research

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(1) There are some aspects of graduate school that are more daunting than others, and finding a research topic is perhaps the biggest obstacle for most students. The characteristics of an ideal topic are to some extent incompatible:

(a) The subject should be timely. Previous groundwork should leave your research problem ripe for completion, and it should be in an active area with potential for future work and employment.

On the other hand, if a field is too crowded, and the subject too prominent, then you risk being ``scooped" by a more experienced researcher who is able to work faster than you. In this case, you may be forced to start over again (rather disastrous) or at least publish jointly (possibly a blessing, but surely an inconvenience).

(b) Your work should lead to a well defined set of results to which you can lay claim. In particular, employment prospects will be lessened if you merely complete a small piece of a very large project or piece of software which is closely identified with your advisor, or is published with a long list of collaborators.

On the other hand, it is impossible to work in a vacuum, and your task can be significantly harder if you don't have a group of people working on closely related problems with whom you can interact and share code.

© The best theses show a high level of creativity - and are often somewhat speculative. It is often unclear at first how the ideas will develop.

On the other hand, a multiyear plan of research is a very valuable asset.

(d) You should really enjoy the subject, and want to spend the next several years with it!

On the other hand, an ideal subject is of no use without a thesis advisor who is willing to direct you in it.

Clearly some compromise is necessary here!

(2) Getting Research Ideas

http://www.cs.umd.edu/~oleary/gradstudy/node9.html

2.11 Becoming an Active Reader and Listener

It is very important to make the transition from the passive mode of learning that traditional lecture courses encourage to an active and critical learning style. Whenever you read technical material, evaluate a piece of software, or listen to a research talk, ask yourself these *canonical questions*:

- From where did the author seem to draw the ideas?
- What exactly was accomplished by this piece of work?
- How does it seem to relate to other work in the field?
- What would be the reasonable next step to build upon this work?
- What ideas from related fields might be brought to bear upon this subject?

One technique that some find helpful is to keep a written log of technical reading and listening. Review it periodically to see if some of the ideas begin to fit together.

2.1.2 Exposing Yourself to Research

Set aside some time every week for trying to generate research ideas. Some possible catalysts are:

- Make a weekly effort to read at least the abstracts from the premier journals in your field. Choose an article or two to read in depth and critique.
- Make a weekly search to find preprints in your field. Read selectively and critique.
- Attend a research seminar or colloquium series. Listen and critique.

Add these to your log, and ask the canonical questions. As you review the log 6 months from now, you may find something that has become important to you but was beyond you when you first encountered it.

2.1.3 Directed Study

Which comes first: the thesis advisor or the thesis topic? The answer is, both ways work. If you have identified a compatible advisor, you could ask for an independent study course. Both of you together set the focus for the course, with you having more or less input depending upon your progress in identifying a subfield of research.

2.1.4 Developing the Germ of an Idea

Once you have identified a topic that looks feasible, make sure you are aware of all of the literature in the area. Keep reading and listening, and keep distinct in your mind what is different between your work and others. If you do not frequently review the literature you read months ago, you may find yourself unconsciously claiming credit for other people's ideas. On the other hand, don't let other people's frame of mind limit your creativity.

2.2 A Pitfall to Avoid

It is possible to spend almost all of your time in literature review and seminars. It is easy to convince yourself that by doing this you are working hard and accomplishing something. The truth of the matter is that nothing will come of it unless your are an **active** reader and listener and unless you assign yourself time to develop your own ideas, too. It is impossible to ``finish a literature review and then start research." New literature is always appearing, and as your depth and breadth increases, you will continually see new connections and related areas that must be studied. Active listening and reading must be viewed as ``continuing education" that will involve you for the rest of your career. Don't fool yourself i2to thinking it must be finished before you can begin research.

8.3 Choosing an Idea

From reading, interacting with your advisor during independent study, or work on a research assistantship, some possible projects will emerge. Make a list of open problems and possible projects that are of interest to you, and discuss them with potential advisors.

2.4 Remain Active

Even after you have decided on your initial focus, it is important to continue a routine of reading new material and attending seminars. All of these sources can contribute to the development of your idea.

At this stage you can add one question to the canonical list: How can these ideas help me solve my research problem?

Remember that often the initial idea is quite far from the final thesis topic. If you remain active in reading and listening, it will be much easier to generate alternative topics if the time comes

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(3) Common Myths About Grants and Grant Seeking

The excerpt below gives some good advice on what to do, and what to avoid doing, when applying for grants. It is from: DEMYSTIFYING GRANT SEEKING: What You Really Need To Do To Get Grants, by Larissa Golden Brown and Martin John Brown. Forward by Judith E. Nichols, PhD., CFRE. Published by Jossey-Bass, A Wiley Company 989 Market Street, San Francisco, CA 94103-1741. Copyright ? 2001 by John Wiley & Sons, Inc. Jossey-Bass is a registered trademark of John Wiley & Sons, Inc. Reprinted with permission.

This book gives you simple techniques you can use and habits you can develop to become an effective grant seeker. But before you try to apply them, you need to free yourself of some common misconceptions about grant seeking and get a more realistic idea of what you should and shouldn't expect from the process.

Myth; Grants are something for nothing. Reality: Grants are rational deals between colleagues.

Grants are appealing because they look like big chunks of free money. Unlike most individual donations, grants are often large enough to actually buy something, that is, to fund a whole program for an entire year or to purchase a major piece of equipment. And, to get a grant you just send in an application. The funding party sends back a check, and you don't need to pay it back. A grant seems like manna from heaven or a winning lottery ticket.

This perspective feeds some unfortunate practices and beliefs. Buying a lottery ticket takes no skill, so nonprofits that see grant seeking as gambling apply on impulse, without preparation; they assign the wrong people to work on proposals, or they place no value on the work of a skilled grant seeker. The only way they can increase their chances of winning a lottery is to buy more tickets, so some organizations practice the "spray and pray" method of grant seeking sending out scores of identical proposals in hopes a few will "hit" and provide a windfall. Some non-profits go fishing for funds, returning to the

same foundations over and over again, hoping to eventually get a bite. Worse, some nonprofit staffers become sycophants, flattering grant makers and hoping this will provide an edge or an "in."

These methods are recipes for resentment and waste labor. Rejections of desperate, heartfelt proposals naturally fuel the attitude that grant makers are fickle and unfair. Winning (or losing) a grant on the basis of flattery and connections rather than on the merits of the proposal can't do much but create a malaise that few at idealistic nonprofits will be comfortable with. And sending out scores of ill-considered proposals wastes a lot of work, not to mention paper and postage, considering that none are likely to be funded.

Grants are not free money. Foundations and other grant makers are organizations like your nonprofit. The have mission and goals just as you do. Funding parties award grants because what the grant recipients plan to do with the money fits in with the funding party's own goals, initiatives, and dreams-and with their founder's stated wishes.
It makes sense to see a grant as a fair deal between colleagues whose interests are similar but whose resources are different. Your nonprofit and the funding party have similar goals. One example might be housing the homeless. The funding party has money to use for work toward that goal. Your nonprofit has the capability to do the work, with shelter space, expert staff, connections with health care providers, and so on. Your organization performs the work in exchange for the money. Your organization and its programs have a value that is equal to grant money.

If you can recognize this value, you will stop praying, fishing, and flattering for grants. You will begin to look for and see matches with funding parties whose interests and goals are most like yours. You will behave less like a supplicant or gambler and more like a partner with funding parties. You will handle rejection better, too, because you will be able to conceive that it is possible that some other organization had a proposal that fit the funding parties goals just as well as yours.

Acknowledging the full value of your own organization and its programs isn't always easy. Grant seekers and grant makers are bound up in a status relationship so deeply ingrained it is sometimes difficult to recognize. Grant seekers are accustomed to-even proud of-being poor, fighting for recognition and justice, and having to beg for money. They have a lower status than grant makers, who often play the part of exclusive or "noble" organizations.

This status difference seems to come from a belief that money (or the ability to give it away) is more respectable than expertise, ability, or action. It hasn't helped that some funding parties have been willing to take on a superior role, hiding behind unlisted phone numbers or gatekeepers and making forbidding statements like one we heard recently: "Dr. X prefers not to meet with anyone." At one workshop we attended, a program officer from a well-known national foundation seemed to admit his organization found ambiguity convenient when he said, "It is the policy of the foundation to not be comfortable with getting too clear."

The pecking order is perpetuated every day when nonprofits flatter and supplicate in their grant seeking. They are just as complicit as funding party's, coming to believe they are "owed something" for their good work. They attempt to play their low status to their advantage, appealing to those higher up with their incredible need and devotion, Someg rants consultants might advocate that you adopt this role. But no matter how we in the nonprofit world martyr ourselves for the good of our causes, funding parties are free to make their own decisions.

Although it is unproductive to demand or expect to be funded just because foundations "have to give it away," it might empower you to remember that a funding party's money can do little good for the community unless it is invested, for example, in organizations like yours. Funding parties need nonprofits to spend their money effectively just as much as nonprofits need funding parties to pay for their programs.

It's also encouraging to remember, that although grant seeking seems surrounded by mystery, it is basically a rational process. Usually some or all of the criteria used toward a grant are presented in writing, and if you are not awarded a grant, you may be able to find out why. Often it is because your organization did not fit the written guidelines or the unwritten but discernable priorities of the foundation trustees.

That's not to say grant making is 100 percent fair. Even fair deals between colleagues involve some intangible elements like trust, and any process involving money is open to misunderstanding and corruption. Even at the fairest of trustee meetings, very good programs and proposals can end up as the least important ones on the table.

Still you have control over many elements of the process: which funding parties you apply to, how you relate to those fund parties, which information you present to them, how you present it, and how you organize your efforts. Efficient grant seekers raise more money in less time because they take charge of these parts of the process-the parts they can control-rather than leaving them to vagaries of flattery, hope, or luck.