

Elsevier Research Intelligence

Whitepaper: Navigating the Research Funding Environment



Junior researchers find success through networking,
mentors and doing their homework

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Summary

An injection of new research funding into the National Science Foundation and National Institutes of Health through the federal stimulus package will provide new opportunities for junior researchers seeking critical grant funding.

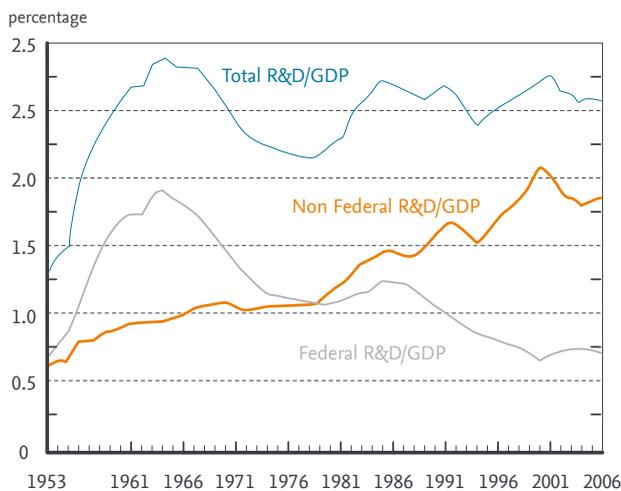
But new funding won't ease the rigor of the peer review system for applicants. Junior researchers who are unfamiliar with the grant-making system should immediately begin increasing their chances for success by researching successful proposals, finding helpful mentors among senior researchers, building networks of peers for professional relationships and building a track record through foundation grants. Rejection of a grant application should be used as an opportunity to find out more about review panels' interests in order to revise applications and resubmit them.

New opportunities, same challenges

The difficulties confronting junior researchers in obtaining critical grant funding is seen as a significant contributor to the loss of young scientists in the pipeline to tenure and senior researcher status. The problem is of such concern that federal grant-making institutes now offer multiple avenues for early career funding for young researchers. The federal decision to expand research funding is also in part a response to this ongoing brain drain.

Improving federal outlays to expand government's commitment to scientific research and innovation should allow more junior researchers to get better access to federal research grants. And so should commitments by the National Institutes of Health (NIH) and the National Science Foundation (NSF) to special programs for new and emerging investigators. However, both of these actions are in response to past downward trends in federal research and development funding that have seen a decline in real dollars since 2003, and a decline as a percentage of U.S. gross national product since the 1960s. The federal government is playing catch up.

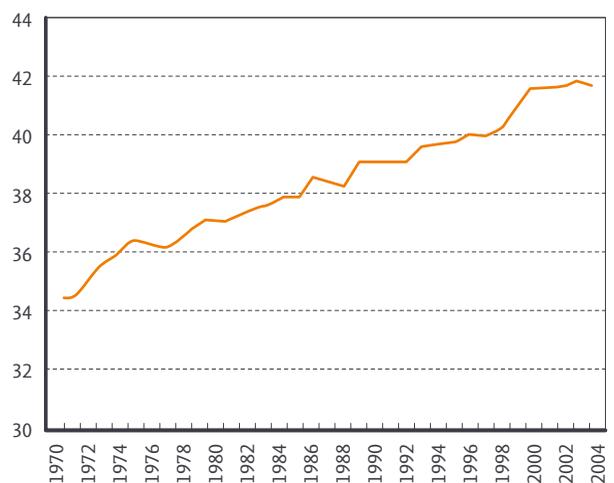
As funding levels declined in recent decades, the selectiveness for grant awards increased. This trend fueled a systematic bias in favor of experienced researchers, who review panels see as more likely to succeed than junior researchers, and therefore a better investment for grant dollars. The result is that the average age for a first-time R0I equivalent award has been steadily rising in recent decades. Today, it stands at 42 years old, a daunting figure for young scientists considering a career in research.



GDP = gross domestic product

SOURCE: National Science Foundation, Division of Science Resources Statistics, National Patterns of R&D Resources (annual series).

Science and Engineering Indicators 2008



SOURCE: Office of Extramural Research, National Institutes of Health.

Figure 1: U.S. R&D share of gross domestic product 1953 – 2006

Figure 2: Average age of new investigators at initial R0I equivalent award

The American Recovery and Reinvestment Act (ARRA), also known as the stimulus package, signed into law by President Obama in February, provides one of the largest increases in research funding in decades. New research funding from ARRA is being distributed primarily through new and continuing grants from government funding agencies, such as the National Institutes of Health and the National Science Foundation. This means more grants for eligible researchers and greater opportunities for current grants to be renewed. The Recovery Act supplements this year's funding at the NSF by \$3 billion. Of that, NSF will invest \$2 billion in new funding for research and related proposals. NIH received \$10.4 billion from the Recovery Act, of which \$8.2 billion is used in extramural funding. Both NSF and NIH are targeting funding for existing grant applications and for new research applications, which means that existing applications may have a better chance of acceptance. NIH is specifically seeking applications for research that can be accomplished within two years, the duration of the Recovery Act.

The increase in funding apparently means that a greater number of meritorious applications will be funded. But experts in the field of research administration say that the demands of the grant application process will not become easier. Junior researchers who are first entering the grant-making system will continue to face significant challenges. The complex and highly competitive peer review system for grant-making on the federal level will remain as rigorous as ever.

"The No. 1 thing that study sections reviewing grant applications will always be looking for is good science and science that will have an impact," said R. Timothy Mulcahy, Ph.D., Vice President for Research at University of Minnesota. "If you don't have that, it won't matter how well you write a proposal or how good your ideas sound, you won't succeed. But there are strategies that will make you more successful, and junior researchers need to focus on those strategies."

Mulcahy points out that junior researchers will always be at a disadvantage because senior investigators have a track record of productivity and success, so that when it comes down to two equal proposals, the senior will always have the advantage. Also favoring established investigators is the fact that they may be running large labs with substantial personnel, training and ongoing research, all of which would be disrupted without the grant award, he said.

The decline in awards and paylines since 2003 "has created a difficult environment for someone without a track record," said Samuel L. Stanley Jr., M.D., Vice Chancellor for Research at Washington University in St. Louis. "Reviewers are naturally looking for past accomplishments and successes when deciding how to award a dwindling amount of dollars. Both the NIH and NSF are working hard to change that and improve the chances for new investigators who have not yet won an R01 award. And a new influx of research dollars on the federal level should improve the situation. But we'll have to see. It will never become easy."

Arthur Ellis, Ph.D., Vice Chancellor for Research at the University of California, San Diego, urges junior researchers to get into the grant-making system as quickly as possible to improve their chances for success, including participating on review panels to learn how peers critique proposals, talking to program officers, visiting funding agencies, developing a network of peers through professional gatherings and identifying mentors who can help in the grant application process.

"Having a sense of urgency about grant funding can be helpful," he said. "The system may be daunting, but that doesn't mean you can coast for awhile once you've become an assistant professor. Teaching, building up a laboratory and all the other responsibilities of being a new faculty will certainly take up a lot of your time. By going after major research grants as soon as possible, you obtain valuable feedback from reviewers that can improve your chances for success with subsequent submissions."

The art of grantsmanship

On the University of Washington's "Fundamentals of Grantsmanship" website, faculty advisor Janet S. Rasey, Ph.D., of the University's Health Sciences Research Funding Service writes that the basic principles of grantsmanship include that a good idea alone is not enough, the system helps those who know the system and rejection is an opportunity to revise and re-submit, but never to quit.*

Research administration experts and investigators who have successfully navigated the grant-making system agree that one of the most common difficulties for junior researchers is developing research subjects that are finely honed and tailored to the funding agency or institute's proposal requests.

"I've seen a lot of proposals that were too long-winded or too detailed, or in which the researcher failed to see the big picture and where his or her proposal fit into the big picture," said Stuart Aitken, Ph.D., Chair of the Department of Geography at San Diego State University. "Or, it will be a great idea that's just not doable. And a review panel will see that problem straight away."

Aitken and others recommend that junior researchers spend time reviewing research proposals that have been accepted for funding and the notes and other materials from proceedings of the various bodies that oversee grants at funding institutes. Aitken advises young researchers to remember that the people who sit on review panels of an institute usually are people who have been funded by that institute, which creates continuity in the standard of what will be approved and what will be rejected. By studying proposals that have been funded in the past, a junior researcher can gain insight into what will be funded in the future.

Kelly Suter, Ph.D., assistant professor of Computational Biology at the University of Texas at San Antonio, said that junior researchers often fail to do their homework when applying for a grant. Suter received her first NIH grant as a senior postdoc, and has since been awarded two ROI grants as an assistant professor.

"Researchers can have great ideas and great skills, but they need to go to the other side to learn about the grant process and how it works. That's what they often fail to do," she said. "Before you start to write, you need to find out what the agency or institute that you're applying to is really interested in."

Suter said that the way to do that includes examining successful proposals to that institute or agency, and also looking at other requests for proposals and program announcements. Suter suggests reading the council notes from the proceedings of the board that oversees a program because that's a good way to find out what new money may soon be available. She also advises developing relationships with program officers at funding institutes. All proposal requests include a point of contact; these are not just administrators but scientists who can provide programmatic guidance, she said. "A good relationship with a program officer is one of the best assets that a researcher can have."

Suter and other researchers remind their junior colleagues that rejection is part of the grant-making landscape. NSF receives approximately 40,000 proposals each year, and funds about 11,000 of them. "When a proposal is turned down, it should be seen as another opportunity, not as a refusal," she said. Researchers who have succeeded in the system say that junior researchers need to develop respect for the peer review process. They should never see it as antagonistic, and should not get discouraged when the answer is no. Too often, she said, junior researchers will take the rejection personally and then back off on their efforts to get funded.

"Everybody has to go back in on revision – it's part of the process," Suter said. "Remember that most people don't get funded on their first submission. What's important is your response to that initial review. You can't get emotional and try to rebut a summary statement. Reviewers are really looking out for you and are providing you guidance for your revision. If you take that attitude, you can be successful."

* <http://healthlinks.washington.edu/rfs/gw/fundamentals.html>

The importance of collaborations

Federal funding agencies and institutes put a premium on collaborative research; researchers increase their chances for success in funding awards by collaborating, both within and outside their institutions. Solo research will always be important, but experts in research administration agree that collaborative relationships are key for many reasons. Not only do many proposal requests require them, but researchers also need to find the expertise and resources necessary for their own successful proposals. However, finding the best people to collaborate with can be difficult. While researchers generally have relationships with colleagues in their own department or field, collaborating across disciplines, across institutions and across disciplines and institutions is a problem throughout research and academia.

Traditionally, researchers have found collaborators through personal networks developed over a career, often begun at professional conferences, while junior researchers may seek out senior researchers for entrée into a network, though institutions and professional organizations are sponsoring an increasing number of events to promote professional networking. While personal networking may always be the best way to find collaborators, because a bond of collegiality is often as important as a bond of professional interests, some researchers say there needs to be new mechanisms to support networking.

“There’s a culture of collaboration at Washington University and at many other universities. There needs to be a free flow of ideas and communication to help promote young faculty members both in their departments and outside of their departments,” said Stanley, Vice Chancellor of Research. “But finding ways for faculty to develop collaborations outside of a field or institution is a challenge for any large university.”

Aitken at San Diego State University noted that the professional relationships he built as a junior researcher have blossomed into collaborations later in his career. His university and many others host various events for new faculty across disciplines to acquaint them with each other and each other’s work, which can foster cross-discipline collaborations. At the same time, the professional organizations in his field facilitate exchange of ideas on a national level through workshops and conferences. “But there are not many ways to get like interests together across disciplines on a broader national or global scale,” he said. “There’s no mechanism to help do that, although you can of course do it on a personal level.”

Mulcahy, Vice President for Research at Minnesota, noted that cross-discipline contacts are necessary not only for collaborative research but also for expertise and services on grant applications. Researchers often need statisticians, economists and other specialists in a variety of study areas when putting together a research project; reviewers want to see that proposals include the necessary expertise to increase chances for success of the project.

“The funding institutes and academies are moving toward more collaborative approaches, but it’s a huge problem for most disciplines,” Mulcahy said. “Universities are struggling to find ways to achieve it.”

An assistant professor at an East Coast university who recently was awarded an NSF Early Career Development award stated bluntly that “nobody knows what other people are doing inside a big university, never mind outside. We desperately need to get people together in thematic areas, not just at universities or in individual fields of study. But I don’t see anybody doing it very well.”

Mentors and mentoring

Most universities have some type of mentoring programs for junior researchers, but their success may have more to do with relationships between individual mentors and mentees rather than with the structure or administrative commitment to a mentoring program. Mentors can be of significant help in providing guidance and advice on the grant-making system or on a research subject, but the onus remains on junior researchers to craft individualistic proposals.

The assistant professor above said that in his experience, “a lot of people talk about mentoring, but I’m not sure it often meets the needs of junior researchers. I’ve found that the best mentoring situations are talking to people who are just a step up from you. For example, a postdoc’s best mentor would be an assistant professor who has just walked in his shoes. People are so busy that though we try to create formal mentoring systems, the mentoring relationships become informal. Full professors also have a lot of inertia, so they’re often on a very different wavelength from hungry junior researchers.”

Others said that their mentors were very helpful, particularly for professional connections, insights into peer review processes at institutes, and fine-tuning research subjects. Farah Sheikh, Ph.D., an assistant professor in the School of Medicine at University of California, San Diego, said that her relationship with her mentor was fruitful, “but I still had to do all the legwork on my own. Mentors can give you some good insight and ideas, but you have to get out from under them and set up your project yourself.”

Sheikh also noted that junior researchers’ work must be their own ideas and their own science, independent of a mentor. Review panels must be convinced that a grant proposal is solely the work of the applicant, so Sheikh said that she had to develop a research subject that was entirely her own and not linked to her mentor’s work.

Most junior researchers have more than one experienced researcher who they use as mentors. The drawback to that, though, is that they can get conflicting advice. Roman Lysecky, Ph.D., an assistant professor of electrical and computer engineering at University of Arizona, who was awarded an NSF Early Career Development grant, said that mentors have helped him narrow and focus research subjects in the past. “One of the challenges is the variability in feedback that you get from mentors and from reviewers,” he said. “What do you do when you get good feedback from several people but they say opposite things? For a junior researcher, it’s a struggle to determine who you should listen to.”

Lysecky’s solution, like Sheikh’s, was to do his own homework. “I had to look at many other proposals that were accepted and examine the researchers’ scope of work for the proposals. It’s great to get lots of feedback, but in the end you really have to find out for yourself how other people succeeded.”

Conclusion

Junior researchers face challenges that are inherent both to the grant-making system and to their lack of experience in working within that system. Success necessitates learning the art of grantsmanship while developing collaborative relationships and mentoring relationships. But mostly they need to learn about the grant-making system itself, what the funding institutes, program officials and review panels are looking for and what has constituted success in the past for related proposal requests. As Aitken of San Diego State University put it, grant proposal reviewers and officials are products of the system itself, so a look back at what's been approved in the past will inform junior researchers on how they must structure their proposals in order to succeed.

Researchers and research administrators offer specific suggestions:

Don't get discouraged – Most researchers don't get funded on their first submission. What's critical is to learn from comments made by reviewers, make changes and go back in on revision. Don't turn the peer review process into a debate; rather, use it as guidance for resubmission.

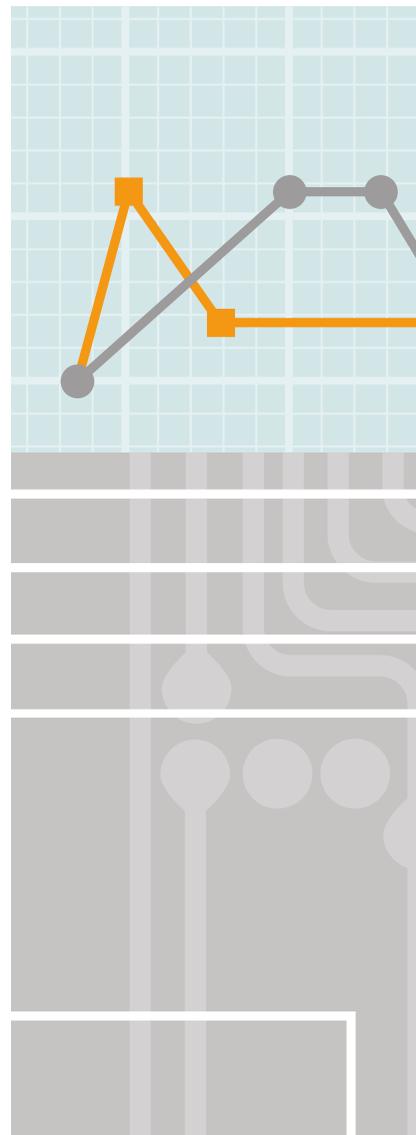
Research the funders – By reading successful submissions, and familiarizing themselves with various requests for proposals, program announcements and informative materials such as council notes from the proceedings of the board that oversees programs, junior researchers can learn what review panels are looking for.

Use mentors – Experienced researchers can help junior researchers understand the grant-making system, get to know the funding agencies, hone research subjects, and help find potential collaborators. But your project can't be too closely aligned with a mentor's work when your project goes before a review panel.

Networking – Embrace every opportunity to make contacts among peers – both in your discipline and out of it – to develop potential collaborators and experts you will need for your project. Get to know the agency you're applying to, in particular the program officers. Participate on review panels to become familiar with how peers critique proposals.

Build a track record – Begin by seeking smaller foundation grants in order to develop a track record and to develop data, both of which review panels will want to see when you're applying for NIH and NSF grants.

A large injection of new federal research dollars into the grant-making system through the Recovery Act will be welcome by the entire research community, and is expected to provide more opportunities for junior researchers. But it won't change the rigor and complexity of the system, nor should junior researchers expect that it will become appreciably easier to obtain that first major award. Good science, good planning and good communication of the proposal will always be demanded by review boards. Increased federal research outlays may create some new prospects for grant funding, but it won't change the system.





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