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Suggestions for new NIH grant applicants

immediate

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1 Introduction

I've learned a few things from my experience with NIH grants, and in talking recently with a former research trainee, I realized those lessons might be helpful to others.

What experience? I've successfully competed for NIH grants including R01s, R21s, a K08, a K24, an R13, and an ARRA supplement. I've also contributed as investigator or key personnel to other PIs' R01s. I've served on several NIH review panels and was a standing member of the Clinical Neuroscience and Neurodegeneration (CNN) study section for 4 years. An NIH biosketch is [available here](#) with all the details. [Bibliography is here](#).

Disclaimer: this is free advice ... and guaranteed to be worth every penny. As they say, [YMMV](#).

2 Suggestions

2.1 Why apply

- Very few grants are funded on the first round. “In 2015, the success rate for original R01 applications was 13.1%, whereas the success rate for resubmission applications was 33.5%” (from the [NIH grants web site](#)).
- Good ideas with a reasonable plan are likely to get funded eventually.
- There are almost no perfect grants, and very few where you think, “wow, I wish I had thought of this! This person will probably get a Nobel prize.” On the contrary, often when I was reviewing a grant I would think, “we could totally do this at our place! Why didn't I write a grant like this?” So if you have a good idea, write the proposal.
- NIH is actively trying to help applicants with less NIH grant experience. Specifically, NIH gives special treatment to New Investigators (more or less, people who've never had an R01) and to Early Stage Investigators (less than 10 years since Ph.D. or residency). (But check [the actual definitions](#), which exclude certain other grant recipients, too, and allow delaying the 10-year deadline in some circumstances.)

2.2 Preparing

- Start early! It will take several months.
- What to do first?
 - Formulate your hypothesis and study concept first. Run it by experienced colleagues if possible.
 - Then write an early draft of your Specific Aims.
 - Send the draft Aims to your [program officer](#). Ask them if the aims align with the institute funding priorities. They will also likely give you other helpful feedback, such as questions they expect reviewers may have, or alternative funding mechanisms that may better fit your research goals at their current stage.
 - Let others review the draft Aims and give feedback.

- Then write a sample size justification (with power analysis if possible). The aims and sample size will largely dictate the budget.
- You probably need to submit the budget to your institution’s business office quite early.
- Everything else follows from the aims and sample sizes.
- Ask your program officer to be there at the grant review, if they can.
- Preprints, or rapid publication platforms like [F1000Research](#), can let you cite an article you just wrote within NIH rules, rather than waiting months for reviews, revisions, acceptance, and publication from a PUI (paper user interface) journal. Preprint servers include [PeerJ PrePrints](#), [bioRxiv](#), [OSF Preprints](#) and [Preprints.org](#).

2.3 Writing the application

- Find someone (usually your research mentor) who will share with you a successful NIH grant application. Seeing one is a huge help when you’re starting out. Similarly, you don’t have to write the Equipment and Facilities sections from scratch (see [this example](#)) unless you’re the first person at your institution to use that equipment for NIH-funded research. Of course you’ll want to avoid plagiarism, adapt any borrowed text to your needs, and check it carefully for accuracy.
- Generally, the reviewers try surprisingly hard to do a difficult job well. Nevertheless they are probably tired and overworked when they read your proposal. As my college technical writing teacher said, “Always remember that the reader is torpid and dull.” So you have to make it easy for the reviewer. Specifically:
 - Make it easy for the reviewer to know why your application is good. Include subsections titled “Impact” and “Innovation” (or Novelty) etc. Spell it out for them.
 - Make it easy for the reviewer to find stuff, like figures or new sections or paragraph numbers. Use lines across the page, or color, or useful figure labels.
 - Sometimes a picture is worth 1,000 words (or \$1,000,000). If you can show a flowchart for a complicated experimental plan, or a timeline, it’s totally worth it.
 - [Here](#) are some delightful suggestions on eschewing obfuscation in your writing ([archived here](#)) ([Prabhune, 2016](#)).
- After talking about your grant for 20-30 minutes, (almost) everyone on the panel is done looking at it. So endlessly perfecting the application after you have a decent application, or adding in another 20 references that no one will look at, mostly wastes your time.
- The reviewers have done this before, so . . .
 - . . . so although you want to provide some background for people who are statisticians not psychologists, or who are rat PhDs not human imaging PhDs, don’t spend 3 pages reviewing a topic well known in the field, like working memory for a cognitive review section.
 - . . . so you probably won’t get away with hiding something or hoping they won’t notice. Better to just be upfront with it, like this: *Potential Concerns: Ideally I would have experience with MEG, but since I don’t, my colleague Jane Doe, a renowned MEG researcher, is doing that part of the study (see her letter). See also the detailed plan for dealing with my subjects’ tin foil hats under ‘MEG methods,’ above.*

2.4 Submitting the application

- Look at [the information from NIH on review groups](#). The focus of the group and the expertise of its standing members can help you decide who you would prefer to review your application. If needed you can contact the scientific review officer of a group to see whether they feel your application fits in their group.
- Include a cover letter in which you request that the application be directed to the institute and review group you want it to go to.
- Submit early.

2.5 The reviews are back

- Start with the [official “next steps” page](#) at grants.nih.gov.
- Talk with your [program officer](#) again after the reviews are back to ask for their take on the comments. They may be able to fill in the gaps, like “they’re trying to be polite in the written comments, but at the meeting they were all saying ‘I hope he gives up on this dumb idea.’” Or, more hopefully, “at the review session they all said, ‘I don’t know why she didn’t ask for more money! It’s a great idea, but she can’t do it on this budget.’”

- Understanding “paylines” is not trivial. Start with [this helpful page from NIH \(archived here\)](#). See also recent discussions for the institute you’re interested in; some links can be found [here \(archived here\)](#). As an example: “For FY 2016 . . . most unsolicited R01 applications which have a primary assignment to NIDDK and which request less than \$500,000 direct costs per year and score at or better than the 13th percentile will receive an award”—and numerous caveats follow ([of Diabetes and Digestive and Kidney Diseases, n.d.](#)) ([archived here](#)).

2.6 It was not funded

2.6.1 What does this mean?

- Most grant applications are reasonably good, and only a fraction are funded, so there is a stochastic element to grant funding. You can’t take it all personally.
- Many if not most applications that *are* funded are funded only on resubmission.
- The only way to guarantee you will not be funded is to stop trying.
- Start planning to revise and resubmit the application. (Note: NIH calls this a [resubmission](#). They use the word “[revision](#)” for an amendment to a funded grant.) Alternatively, start planning a new proposal.

2.6.2 Writing the resubmission

- If a reviewer makes a suggestion, make sure you address it in the Introduction to the revised application, even if all you have room for is something like this: *13. ‘no controls’: Controls are described in detail on the second page of Research Strategy.*
- If a reviewer “totally doesn’t get it,” first take a short walk and cool off, and don’t even start to reply for a few days. Then try to think of it instead as a failure of educating and persuading the reviewer. After all, you don’t get to pick the reviewers, you only get to pick what you put in the application.

2.7 Hooray, it’s funded! Now what?

- Congratulations! Have a party. Add it to your CV. These are some of the moments you live for in academia, so enjoy them.
- Read the Notice of Grant Award carefully.
- If administration is not your forte (*who knew? after all, geeks usually took science, not business school classes*):
 - Ask senior colleagues for help.
 - Ask your department for skilled secretarial/administrative help (and explain how it will affect your academic success including your likelihood of future grant funding).
 - Read [The One-Minute Manager](#) or [The 7 Habits of Highly Effective People](#).
 - Look to hire organized people, including a lab manager or senior technician.
- Start planning to renew the grant, or write another one.

3 Addenda

26 Jan 2020: Good thoughts from a column in [Nature \(Sohn, 2020\)](#).

19 Feb 2020: Ditto, this time on next steps after rejections ([Crow, 2020](#))

24 Feb 2020: Cute but useful suggestions for new investigators ([Tregoning and McDermott, 2020](#))

References

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