

## Writing a research proposal

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Remember that following this advice is not sufficient for getting a grant. Whether it is a necessary condition is debatable since I have seen proposals that were funded and did not follow all the advice below. Those proposals, however, had other things going for them.

Keep Your Audience in Mind. Remember that most proposals are reviewed by panels, with the rest sent out for reviews by mail. Some are done both ways. The audience will vary greatly depending on which process is followed. You cannot tell in advance which it will be for your proposal. My advice is to assume it will be a panel. Now the membership on the panel is a compromise. We need three reviews and it is unlikely that there will be 3 people on the panel who are totally familiar with the subject of your proposal. (Let's agree to call such a person a "specialist" as opposed to an expert in the general area of the proposal. Someone who works in MR Classification X might be considered by us as an "expert" for just about any proposal that would fall in X, whereas someone who works on X.B would be considered a "specialist" in X.B.)

For example, I once helped organize a panel entitled "Operator Theory and Operator Algebras." It also included Banach space proposals and reviewers. In this panel there were 12 reviewers and 57 proposals in single operators, the place where operator theory meets function theory, non-self adjoint algebras of operators,  $C^*$ -algebras, von Neumann algebras, non-commutative geometry, and Banach spaces. Each panelist had to review about 14 proposals. There is no way we can get three specialists for every proposal on the panel. We hope each proposal has a specialist reader and an expert reader and another who is generally familiar with the subject. If we couldn't we took that proposal out of the panel and used mail reviews. After the panel we sent out a couple of the proposals for additional mail reviews because we didn't feel the panel was up to the subject matter.

Your proposal should answer the following questions. What is the problem? Where does it come from? What is new and why is it important? Why are you the best or most likely person to solve it? (If you prefer, What gives you hope that you can solve it?)

So when you are writing a proposal take the time to put your problem in context. Do not assume the audience knows the literature. Explain why you are attracted to the problem and why others should be as well.

Use Good English. Show that you care about what is under discussion. It matters. Avoid abbreviations. Proof read your proposal. By the way, my experience is that you cannot rely on a friend to do your proofreading. Everybody is busy and nobody cares about your writing as much as you do. The following are available from Amazon: “The New York Times Manual of Style”; “Usage and The Chicago Manual of Style”; “The Elements of Style” by Strunk and White.

Follow the rules for submitting proposals. Consult the Grant Proposal Guide (GPG). You don’t have to digest this whole document but get familiar with it and look at it if you have a question about format and procedure. When it says that your summary cannot exceed one page, that’s a rule. When it says your personal bibliography cannot have more than 10 entries, it means it. We send proposals back that do not meet such criteria. The GPG also says the Summary must discuss the Intellectual Merit and the Broader Impact. (It also defines these terms.) Have a paragraph labeled Intellectual Merit and another labeled Broader Impact. If those labels aren’t there, your friendly Program Officer will search for discussions about them, but if he/she cannot find them the proposal is returned without review. You probably know what is meant by one of these labels, but I would strongly urge you to read what the GPG says about Broader Impact. It has examples.

If there is a solicitation, read it. READ IT!

Don’t make your proposal weird. Use a standard font with standard margins. (These are discussed in the GPG but we aren’t finicky about this unless it’s bizarre.) Reviewers do not like subterfuge. Try putting yourself in the shoes of the reviewer who has a dozen proposals to read. Also organize the proposal for “skimmability”: Use subheadings, a logical outline, etc.

Finally put yourself in the shoes of your friendly NSF program officer who handles about 100 proposals. He/she will likely read your proposal at some point, but is likely to assign it to a panel and maybe even to the reviewers on the basis of the one page Project Summary. So try to make the summary give an accurate reflection of where it belongs in the spectrum of mathematical activity.