A Brief Introduction to Grant-Proposal Writing

Part I—General points

1. A proposal should answer the following questions. All these questions should be addressed briefly in the abstract, and then throughout the proposal text.
   a) What system are you studying, and why is it important?
   b) What is your research approach?
   c) How does your approach differ from previous work and work by others?
   d) What are your preliminary results?
   e) Why are you uniquely qualified to carry out the research?
   f) What specifically are you going to do?
   g) What are the expected results of your proposed research?
   h) Why is the specific research you propose important?

2. In the first page of the proposal, and possibly in the abstract, give a numbered list of 2-4 specific aims or objectives. Use the term *specific aim* if you are requesting money from NIH, and do not use this term if you are requesting money from NSF. For the US military (ARO, ONR, DARPA, DTRA, etc.) use the term *task*. In the later parts of the proposal, you should elaborate on the specific aims in separate subsections.

3. Be modest in what you propose. The most common beginner's error is to propose too much. Unless you request millions of dollars, each specific aim should correspond to a single set of clearly delineated experiments. For a proposal that you are writing during graduate school, each aim should correspond to at most one paper.

4. Do not propose specific aims that depend on each other, in the sense that a failure to complete one aim as planned will jeopardize all other aims. Dependent specific aims guarantee rejection.

5. It is imperative that you propose very specific work, for which you can make a strong case that you are going to be able to carry it through. As a rule of thumb, have already completed 30-50% of the work you are proposing. For example, if you have carried out a particular study on one gene, you can propose to do the same study on other, similar genes. If you have never performed a particular experimental technique you are proposing to use, reviewers will likely argue that success is uncertain.

6. Follow the formating and sectioning requirements of the granting institution to the letter. Each granting institution requires a different format, different sections, and different numbering of the sections. Deviate from these requirements at your own peril.

7. Subdivide the proposal into short subsections with clear titles. A reviewer may want to jump quickly to a particular part of a proposal, say where you describe what system you are studying, why the work is important, or what shortcomings your proposed research approach might have. If there are subsections for each of these items, reviewers will find them.

8. Usually, granting agencies list specific questions they want to have addressed in the proposal, such as *why is the research important* or *what could go wrong*. Make absolutely sure you have subsections for each of these questions, reviewers will certainly be looking for them.

9. Carefully list potential shortcomings of your research. Every research approach has weaknesses, and you want to demonstrate that you are aware of those that apply to your work. Where appropriate, discuss alternative research strategies that you could follow in case you run into trouble.

10. Keep in mind that the typical proposal reviewer will not be an expert in your field. Write for a fairly general scientific audience. Never submit a proposal that you haven't had read by a colleague, preferably one who does not work in your direct area.

Part II—Outline of aims page/executive summary

The most important part of a grant proposal is the first page, the aims page, where you outline the entire proposal and list your specific aims. This page has a very specific structure, subdivided into four paragraphs.

Paragraph 1. Introduction
- *Opening sentence*
- *Current knowledge (1-3 sentences)*
- *Gap in knowledge/critical need*

Paragraph 2. What is going to be done by whom
- *Your long-term goal*
- *The objective of this proposal*
- *The central hypothesis (not needed for proposals that develop a resource, such as a database)*
- *The rationale for undertaking the project*
- *The competitive edge that you/your team has*

Paragraph 3. Specific Aims, Goals, Objectives
- *List your specific aims with titles in bold-face. Give 2-4 sentences of description for each aim. It can help to state a specific hypothesis for each aim.*

Paragraph 4. Payoff
- *Novelty/innovation of your work (optional)*
- *Expected outcomes*
- *General impact of work/fulfillment of the critical need*

From Russel and Morrison, The Grant Application Writer's Workbook.