Fatal Flaws in Grant Applications and How to Avoid Them

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The US Peer Review System

- **Good aspects**
  - Relatively fair (minimal favoritism)
  - Everyone gets feedback
- **Not so good aspects**
  - Constant change (shooting at a moving target)
  - Changes not necessarily for the better
  - Severe paucity of funds

What are fatal flaws in a grant?
How do we avoid them?
Heard at Study Section (really!)

“The proposal is based on a single premise – if this does not hold, the entire experimental plan collapses”

“The grant breaks down catastrophically in the area of biology and does not meet the test of scientific plausibility”

“The grant consist of some rather contrived Specific Aims grafted onto a technical detail”

“There is serious doubt that it is possible to revise this grant to a competitive level”

“The proposal is completely delusional in scope”
Fatal Flaws

• Fatal flaws are issues that may “sink” a grant proposal
• There are degrees of “fatality” (it is possible to recover from some of them, but not from others)
• It is not only essential to avoid obvious fatal flaws, but also to pro-actively address issues that could be (mis)understood as fatal flaws
• Fatal flaws may appear in any grant section *(pay attention to all sections of the proposal)*
From the Applicant’s Side
Grantsmanship

• Abstract
  – Be concise and clear: Why do it? What is proposed? What will be the benefit?
• Budget
  – Not supposed to affect the score, but still does (apply the Goldilocks principle)
  – Pay attention to the personnel justification
• Biosketch
  – Emphasize relevant aspects of your expertise (do not dilute with irrelevant information)
• Support letters
  – Collaborators must specify what they will do, companies what they will provide
• Narrative
  – What the reviewers mainly base their scores on

Make life easy for the reviewer

• Do prepare a logical, clear, and easy to understand proposal
• Don’t make the reviewer have to look things up
• Don’t include unnecessary appendix material or supplementary information
Grant Narrative
The key to getting funded

- Specific Aims
- Significance
- Innovation
- Approach

- Preliminary Data & Progress Report
- Bibliography & References Cited

- Start early
- Familiarize yourself with the peer review process and mission of the particular funding agency/institute
- Don’t submit until you are ready
Specific Aims
The most important section of the proposal

- The section that more than any other “sells” the grant to the reviewer
- Should be concise, logical, and to-the-point
- Aims should be connected conceptually (focused proposal), but absolutely not interdependent (fatal flaw)
- The terms exploratory, correlative, descriptive, and fishing expedition in a review constitute a “kiss of death”

Spend more time fine-tuning the Specific Aims than on any other section of the grant

What is the question?
(it should be interesting, novel, and important)
Research Strategy
Significance & Innovation

• “Need to know” – don’t try to impress with how much you reading you have done
• Spell out why the work has mechanistic and/or translational significance, and what aspects are particularly innovative
• The biggest risk is to bore the reviewer with a section that is too diffuse, verbose, and hard to read

Information overload is the most common problem with the Significance & Innovation sections
Research Strategy
Approach

- Provide sufficient detail to show that you know what to do and how to do it, but avoid overkill
- Don’t make the reviewer have to look things up
- Provide details on expected outcomes and interpretations
- Address problems, limitations, and alternative approaches
- Include sample size and data analysis section

Show that you have the methods in hand, that you have considered what various outcomes may mean, and that you have thought about problems and how to handle them
Research Strategy
Approach – Preliminary Data/Progress Report

• Stay focused – only present information that supports the aims or shows that you have a particular technical capability
• Figures should be easy to read and include error bars and p-values where applicable
• For renewals:
  – Show that the Specific Aims from the previous funding period were accomplished and that the results have been published (ie, that the previous funding was money well spent)
  – Be straightforward – separate original articles supported by the grant, review papers, and other relevant articles)

Do not oversell preliminary data or progress during the previous funding period – present it and let the reviewer draw his/her own conclusions
Research Design

Literature

• Reviewers actually do look at this section
• Be relevant and up to date
• Be careful when citing review papers
• For resubmissions, check what has come out since last time
• Be accurate (a bibliography that does not correspond to the citations in the text is irritating)
• Include all authors and the whole title in the bibliography

Do not make life difficult for the reviewer, your grant is only one of many, and study section service is considered "voluntary non-committed cost share"
From the Reviewer’s Side
Grant Review Criteria

• **Significance**
  – Does the study address an important problem?
  – How will scientific knowledge be advanced?

• **Innovation**
  – Are there novel concepts or approaches?
  – Are the aims original and innovative?

• **Approach**
  – Are design and methods well-developed and appropriate?
  – Are problem areas addressed?

• **Investigator**
  – Is the investigator appropriately trained?
  – Does he/she have the commitment of the department/institution?

• **Environment**
  – Conducive to success
  – Unique features

• **Human subjects**
  – Protection against risks etc.
  – Balanced in terms of gender, minority, and children inclusion

• **Animal welfare**
  – Sample size and power analysis
  – Five required points

Overall Impact
Comments to be Avoided
Significance

- The grant outcome is of little interest
- The project has no obvious translational potential
- Lack of generalizability

Be honest, straightforward, and realistic when pointing out the significance of the work
Comments to be Avoided
Innovation

- Lack of original ideas
- Lack of ideas that challenge existing paradigms
- Lack of novel concepts
- Lack of novel approaches

Innovation is more important than frequently realized
Comments to be Avoided
Approach

- Diffuse, superficial, or unfocused
- Formulaic (e.g., drug testing proposals with laundry list of endpoints)
- New models or methodology without characterization or standardization
- Questionable methods, lack of experience with methods, lack of critical details
- Overambitious
- Technology-driven
- Phenomenology, not mechanistic, descriptive, correlative
- Interdependent aims

Be structured and maintain the “big picture” view
Include alternatives if things don’t work out as expected
Response to Previous Critique
Don’ts and Do’s

• Don’t rush – take an extra cycle if necessary
• Don’t fight the “pink sheet”, heed the advice of Study Section
• Don’t bend over backwards (“I’ll do whatever you say, just give me the money”)
• Don’t think you can guess who wrote the critique and tailor your response thereafter
• Don’t attempt to fool Study Section

• Do address as many points as possible with data
• Do say if you disagree with something and can prove it, but be diplomatic
• Do address all important points (really all)
New Investigators - Demonstrating Independence
Between a Rock and a Hard Place

Residence of Ms. Sigrid Uglehus
Mundheim (Kvam County, Norway)
March 9, 2004, 6:30 AM
New Investigators – Demonstrating Independence

• Better payline (at least, it used to be)
• Less emphasis on preliminary data, more on capabilities and environment
• Fatal flaw: questions about independence, institutional commitment, and relationship to mentor frequently appear as a Catch 22

How to preempt questions about independence:
• Get a strong, sincere, and specific letter of support from Department Chair
• Show that you already have your own laboratory space (ie, not just if the grant is awarded)
• Show that you have protected time for the project
• Show what resources you have at your disposal
• Explain relationship to mentor in detail – emphasize differences to the mentor’s main line of research (ie, show that you are not simply trying to pad your mentor’s budget)
• Specify what the department and institution are committing to your development as an independent investigator
Take-Home Messages

- Avoiding fatal flaws does not guarantee funding, but committing one is a virtual guarantee of non-funding
- Submit when you are ready – it is better to sit over a cycle than to have to recover from a fatal flaw
- Make life easy for the reviewer – submit a concise, logical, easy to follow grant with all relevant information, but no more

What is the question?
Why is the question important?
Why are you the right person to provide the answer to the question?
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