Introduction to Grant Writing

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Why is learning grant writing important?

- Obvious reason: fund your research
- But, also…
  - Hone critical thinking and communication skills
    - Written communication
    - Oral communication

Objectives

- Introduce grant writing fundamentals
- Discuss NIH grant mechanisms and other sources of funding
- Describe grant submission process and grant review

Resources

- Lisa Chasan-Taber. Writing Dissertation and Grant Proposals: Epidemiology, Preventive Medicine and Biostatistics. New York: CRC Press. 2014.
  crcnetbase.com/doi/book/10.1201/b16851

- Stephen W. Russell and David C. Morrison. The Grant Application Writer's Workbook: National Institutes of Health Version. Los Olivos, CA: Grant Writers' Seminars and Workshops, LLC. Revised October 2010.

Grant Writing Fundamentals

Where do we start??

Start with a good idea

- Novelty, balancing novelty vs. risk
- Addresses important (public health) problem
- Builds upon/expands/advances scientific knowledge on a topic (no matter how the results turn out)
- Definable end point
- Feasible (logistically and financially)
- Ethical

Also..

- Interesting to you!
- Something you believe in
- Something that moves you further along the path

Developing an idea

- Identify your area of interest
- Read the literature (where the field currently stands, gaps)
- Come up with your "angle"; be creative
- Take time to think about it
- Commit → you will need to "sell" your idea
- Get advice from mentors, colleagues

Mentorship

- Find a good mentor
  - Start close to home: your dept, school, Bay Area
  - Conferences
  - Do your homework
- A good mentor..
  - Prioritizes your interests, career development
  - Finds opportunities that further your training
  - Prepares you to be independent
- Find different mentors
  - Scientific, career, work-life balance
  - Different levels of mentoring: Jr faculty, Sr faculty, peers

Idea with Funding Potential

- A good idea isn't always a fundable idea
- Public health issue
- Feasible – can you answer question with funds requested?
- Goals, interests and priorities of funding agencies
  - NIH: strategic plan http://report.nih.gov/strategicplans/
  - Foundations
- See what funding agencies have funded previously
  - NIH: http://projectreporter.nih.gov/reporter.cfm
- Talk to funding agency (program officer at NIH)
- Ask colleagues, mentor(s)

Getting down to writing

Grant Structure

- Specific Aims
- Research Strategy
  - Significance
  - Innovation
  - Approach

Also..

- Abstract
- Protection of Human Subjects
- Inclusion of Women and Minorities
- Inclusion of Children
- Consortium/Contractual Arrangements
- Letters of Support
- Biosketches
- Project Narrative
- Bibliography
- Facilities and other resources
- Budget

Specific Aims

From *Grant Application Writer's Workbook*:

"Strategically, the *Specific Aims* section should be written to create a 'partnership' with the assigned reviewer who will represent you in the review-panel meeting. You will provide the conceptual framework on which they will orally hang the details of what will be done."

Specific aims

- The hook – grab your reader
- Foundation for the rest of the application
- Clear and concise (1 page)
- General format:
  - What is known
  - Gaps in knowledge
  - Overall objective (should be clear how you will address gap)
  - *Concise* outline of project
  - List individual specific aims/hypotheses
  - Impact/significance of your study on the field (public health importance)

SA: Iterative Process

- You will come back to this page more than any other in the application
- Will probably change substantially over the course of writing the proposal, especially:
  - Significance and Innovation
  - Research Approach

SA: Pitfalls

- Not interesting, not exciting
  - Dense, repetitive writing
  - Boring
- Overly ambitious
- Interdependent aims
- Order of aims not logical
- Too much detail/not enough detail
- Editorial problems

Research Strategy: Significance

Purpose of Significance section

- Communicate the importance of the problem
- Sets the stage for your study
- Convinces the reviewer that there is a big gap in the previous literature/knowledge on this topic → your study is then positioned to fill this gap
- You've already started making a case in the Specific Aims: here's where you build in the details for your case.

Also..

- Section where you convince the reviewer that you possess knowledge of this topic
  - You are up on the latest research on this topic
  - You can recognize shortcomings of the previous studies
  - You have an idea that will address these shortcomings

Significance: Tell a story

- Start by writing the first line of every paragraph
  - Underscores the main point of the paragraph
  - Could read each of these sentences and get an overview of the story
  - This will be important for demonstrating the flow of your ideas
- Story contains:
  - Description of exposure, outcome
  - Biologic plausibility for association
  - ***Critical*** analysis of previous epidemiologic literature (for each hypothesis)
  - Direct reference to gaps/limitations and how they will be addressed in proposed study
  - Public health impact
- Conceptual Diagram: a picture's worth a thousand words

Significance: Pitfalls

- Low impact
- Broad, global statements
  - Be specific
- Not a critical summary of literature
  - Discuss limitations, be critical
- Redundant, superfluous ("so what?") text
  - Make each word count
- Lack of enthusiasm
  - Energize your reader → make it exciting
- Poor flow
  - Remember, you are telling a story
- Incomplete citations
  - Be sure to cite all of the seminal studies and recent literature

Research Strategy: Innovation

Purpose of Innovation section

- Explain how the study seeks to shift current research/clinical practice paradigms
- Describe novel concepts, methods, measures, instruments, interventions
- Describe how novelty is an advantage over existing approaches
- Length: usually <1 page
- Consider bullet points

Challenging for epidemiologic studies

- In epidemiology the importance of showing consistency of associations across studies and study populations is critical
- Therefore, you may need to be creative in how you define innovation
- Do not underestimate the importance of this section for epi study proposals

Innovation: Pitfalls

- Restating significance
  - Focus on innovative aspects of the proposal
- Not innovative enough
- Too innovative
  - Borders on high risk – may need to reconsider funding mechanism

Research Strategy: Approach

Approach – typical layout

- Overview
- Preliminary studies
- Study team
- **Study sample**
- **Exposure assessment**
- **Outcome assessment**
- **Covariates**
- **Statistical analysis** (by aim)
- Power
- **Strengths and limitations**
- Study timeline

What you typically include in a journal article

Why do you need preliminary data?

- Address concerns about whether you (and your team) can do the work
  - Shows that you can perform necessary methodological aspects of the study
  - New techniques are feasible, reliable and yield interpretable data
- Demonstrates your expertise
- Demonstrates established relationships with your team
- You are committed to this area of research and are off and running

Approach → Pitfalls

- Not enough/too much detail in methods
- Unaddressed sources of error/limitations
- Insufficient power
- Unrealistic timeline

Other sections

- Abstract
- Protection of Human Subjects
- Inclusion of Women and Minorities
- Inclusion of Children
- Consortium/Contractual Arrangements
- Letters of Support
- **Biosketches**
- Project Narrative
- Bibliography
- Facilities and other resources
- **Budget**

The NIH biosketch

- Purpose
  - Emphasize your accomplishments and showcase your scientific contributions beyond a list of publications
    - Good opportunity for new/early stage investigators to demonstrate accomplishments (especially if publications are sparse)
  - Demonstrate collaborations with co-investigators
- Tailored to each application
- Includes:
  - Personal statement
  - Positions & Honors
  - Contribution to Science
  - Research Support

The Budget

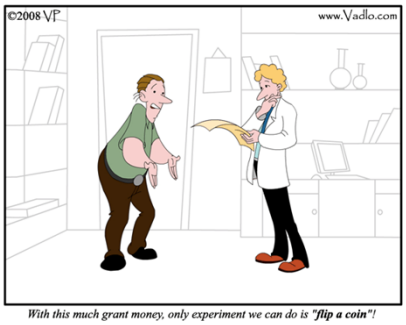
Budget Items

- Personnel
  - Senior/key
  - Other personnel
- Consultants
- Consortium/contractual costs
- Equipment
- Materials & Supplies (computer, lab supplies)
- Travel
- Other costs (tuition, publication costs)

Budget Justification

- Provides a narrative explanation of each of the components of the budget; each line item should have a justification
- Convinces the reviewer that each item included in the budget is important to the project
- Another opportunity to demonstrate expertise and collaboration with co-investigators

Your budget will probably be cut..



*With this much grant money, only experiment we can do is **"flip a coin"**!*

A little about style..

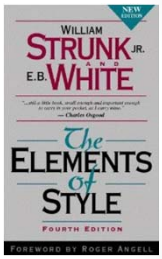
- Clarity!
- You can be specific and concise
- Avoid passive voice
  - "Exposure will be measured.." - **by whom?**
  - Consider instead "We will measure…"
- Avoed obious gramacital erros/typoss
- Proof, proof, and proof some more!
- Solicit feedback (colleagues, friends)
- Your mother should be able to understand your grant

The writing center

STUDENT LEARNING CENTER

http://slc.berkeley.edu/writing/

Writing Program | Overview
What We Do ....
The SLC Writing Program works under the assumption that all writers, regardless of their experience and abilities, benefit from informed, individualized, and personal feedback on their writing.



$9.95 on Amazon!!

Persuasive writing

- Seek: clear, contributory, novel, important, feasible
- Avoid: Confusing, dull, already been done, long shot, unfeasible

NIH Grant Mechanisms & Other Sources of Funding

Getting Started

- Identify your research goal
- Clearly define your research question
- Talk to mentors
- Understand your funding goals
  - science
  - career development
  - timeline
- Come up with a plan

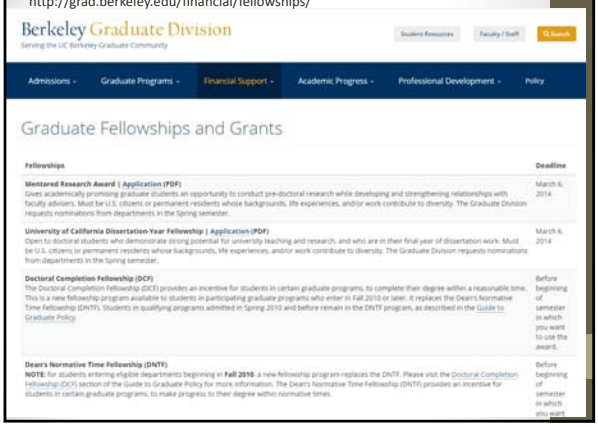
Start With a Strategy

- Career stage
  - Predoc, postdoc, early career faculty
- What do you want to fund
  - salary
  - study-related items (e.g., data collection)
  - career development activities
- Think ahead: career vision

Types of Funders

- NIH
- Foundations
- Internal institutional funding
  - Seed grants
  - Pilot grant program
  - Pre/postdoc fellowships

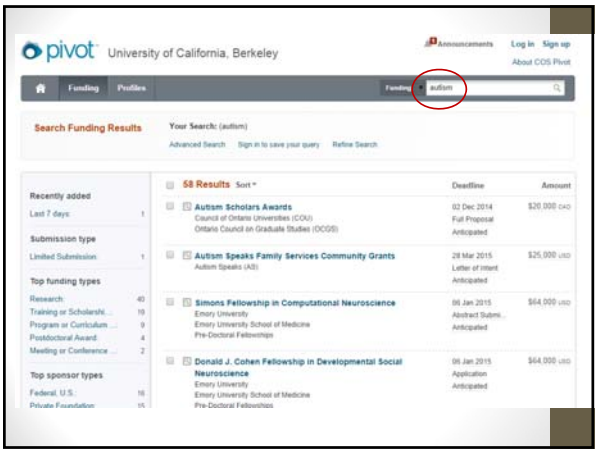
http://grad.berkeley.edu/financial/fellowships/



http://spo.berkeley.edu/

SPO: Sponsored Projects Office

- "responsible for reviewing and authorizing proposals for submission and for interpreting, negotiating, and accepting contracts and grants for sponsored projects funded by federal and state agencies, foundations, and other public and private sources. SPO prepares and negotiates all subawards for collaborative research. SPO also provides resources for finding funding opportunities."



NIH Grants

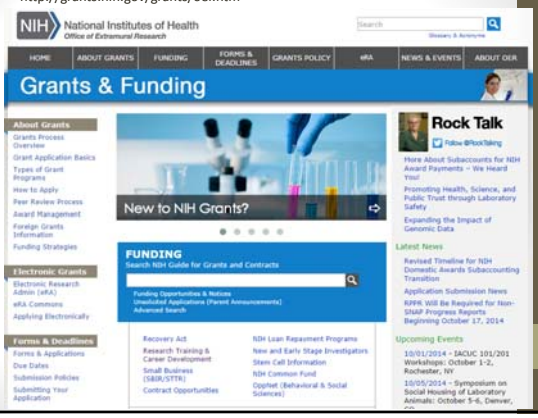
NIH Institutes (20)

- National Cancer Institute (NCI)
- National Eye Institute (NEI)
- National Heart, Lung, and Blood Institute (NHLBI)
- National Human Genome Research Institute (NHGRI)
- National Institute on Aging (NIA)
- National Institute on Alcohol Abuse and Alcoholism (NIAAA)
- National Institute of Allergy and Infectious Diseases (NIAID)
- National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
- National Institute of Biomedical Imaging and Bioengineering (NIBIB)
- Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- National Institute of Dental and Craniofacial Research (NIDCR)
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
- National Institute on Drug Abuse (NIDA)
- National Institute of Environmental Health Sciences (NIEHS)
- National Institute of General Medical Sciences (NIGMS)
- National Institute of Mental Health (NIMH)
- National Institute on Minority Health and Health Disparities (NIMHD)
- National Institute of Neurological Disorders and Stroke (NINDS)
- National Institute of Nursing Research (NINR)
- National Library of Medicine (NLM)

NIH Centers (6)

- Center for Information Technology (CIT)
- Center for Scientific Review (CSR)
- Fogarty International Center (FIC)
- National Center for Complementary and Alternative Medicine (NCCAM)
- National Center for Advancing Translational Sciences (NCATS)
- NIH Clinical Center (CC)

http://grants.nih.gov/grants/oer.htm

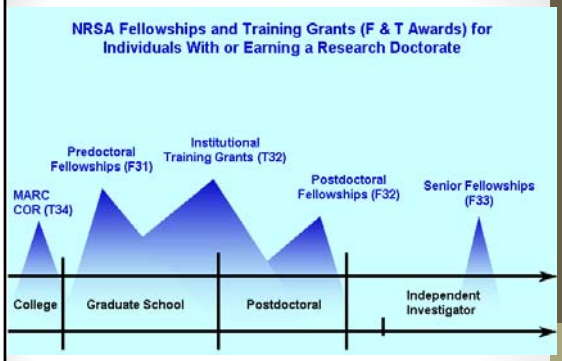


What's an FOA?

- FOA: Funding Opportunity Announcement
  - publicly available document by which a Federal Agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds.
  - Include:
    - Parent announcements - unsolicited
    - Program announcements (PA) – institute specific, unsolicited
    - Requests for applications (RFA) – formal statement on well-defined area, specific deadlines, special review panel, set aside funds
  - Read the instructions!!

NIH Research Training and Fellowships

- Ruth L. Kirschstein National Research Service Award (NRSA)
- T series: Institutional Research Training Grants
  - T32
    - Institution applies
    - Institution determines trainees
    - Pre- and postdoctoral
- F series: Individual Fellowships
  - F31: predoctoral
    - Also, separate mechanisms for diversity and MD-PhDs
  - F32: postdoctoral
  - F33: senior fellowship



NIH Career Development Awards (K)

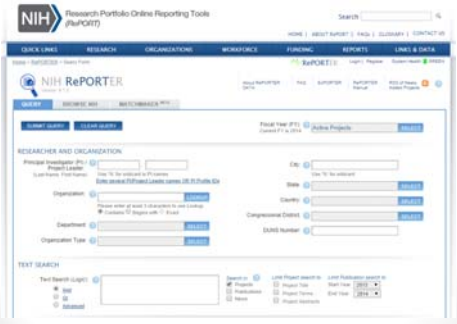
- provide support for senior postdoctoral fellows or faculty-level candidates
- designed to promote the career development of specific groups of individuals based on their past training and career stage
- bring candidates to the point where they are able to conduct their research independently and are competitive for major grant support

NIH Research Grants (R)

- R01: NIH Research Project Grant Program
  - most common grant program
  - 3-5 years
  - ≤500,000 direct costs per year
- R03: NIH Small Grant Program
  - pilot or feasibility studies, preliminary data, secondary data analysis
  - Limited to 2 years
  - ≤50,000 direct costs per year
- R21: NIH Exploratory/Developmental Research Grant Award
  - new, exploratory and developmental research projects
  - "high risk"
  - Limited to 2 years
  - ≤275,000 direct costs total for 2 year project

What has NIH funded previously?

http://projectreporter.nih.gov/reporter.cfm

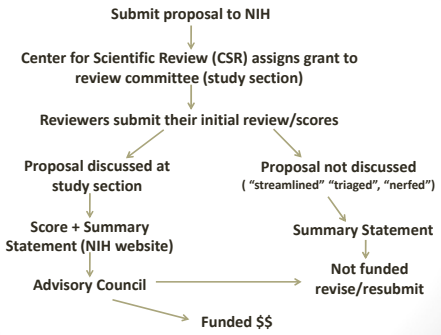


New Investigators

- Defined as PIs that have not received an R01
  - could have had Fs, Ts, Ks, R03, R21
- Early Stage Investigator
  - New investigators that are within 10 years of doctoral training
  - Given special consideration during peer review
    - More focus on approach than track record/preliminary data
  - Sometimes different paylines
  - Sometimes more time to resubmit application

Grant Submission and Grant Review

NIH grant submission process



What is a study section?

- Scientific Review Group (SRG): 20–40 scientists that focused on a particular research field - charged with reviewing applications
  - Standing study sections
  - Special emphasis panels
- Reviews scientific and technical merit *only*
  - No discussion of funding
- *Not* tied to a specific Institute

NIH Scoring

- 9-point scale for both overall impact scores and scores for individual review criteria

Impact	Score	Descriptor	Additional Guidance on Strengths/Weaknesses
High	1	Exceptional	Exceptionally strong with essentially no weaknesses
	2	Outstanding	Extremely strong with negligible weaknesses
	3	Excellent	Very strong with only some minor weaknesses
Medium	4	Very good	Strong but with numerous minor weaknesses
	5	Good	Strong but with at least one moderate weakness
	6	Satisfactory	Some strengths but also some moderate weaknesses
Low	7	Fair	Some strengths but with at least one major weakness
	8	Marginal	A few strengths and a few major weaknesses
	9	Poor	Very few strengths and numerous weaknesses

Funding decisions

- Impact scores and corresponding percentiles (mostly given to R01s) sent to appropriate NIH Institute
  - Advisory council review
  - Score within payline
    - Not a guarantee of funding
  - Some institutions publish their paylines, some don't
    - 2014: NCI=9, NHLBI=12, NIA=11, NICHD=9, NIEHS=10, NIDDK=13, NINDS=14

Summary Statement

Summary Statement

- Will include the reviewers' critiques + numerical scores for each individual review criteria
- You will get this regardless of whether your proposal was discussed
- Examples:
  http://www.niaid.nih.gov/researchfunding/grant/pages/appsamples.aspx#rpindex

Should you resubmit?

- Assess whether weaknesses are addressable
  - E.g., approach
- Contact your PO – discuss critiques
- Timing?
  - ASAP: maximizes chances of getting the same review panel
  - May need to delay if you were advised to collect pilot data

Response to Reviewers

- Don't disagree with the reviewer, even if you do
  - Find a way to be responsive, even if a it's minor change
- Your responses should directly address the reviewers concerns
- Don't skip any major comments
- Use your space wisely

Questions??