

# Introduction to Grant Writing

Sharon Sagiv  
Division of Epidemiology, School of Public Health

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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](http://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

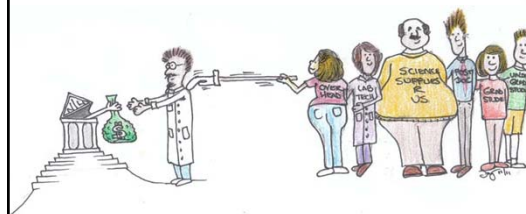
## Other sections

- 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..."
- Avoid obvious grammatical errors/typos
- Proof, proof, and proof some more!
- Solicit feedback (colleagues, friends)
- Your mother should be able to understand your grant

## The writing center

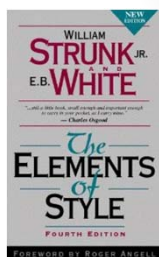
STUDENT LEARNING CENTER

<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.



FOREWORD BY ROGER ANSCELL

\$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/>

**Berkeley Graduate Division**  
Serving the UC Berkeley Graduate Community

Admissions • Graduate Programs • **Financial Support** • Academic Progress • Professional Development • Policy

### Graduate Fellowships and Grants

Fellowships	Deadline
<b>Monitored Research Award (Application PDF)</b> Gives academically promising graduate students an opportunity to conduct pre-doctoral research while developing and strengthening relationships with faculty advisors. Must be U.S. citizens or permanent residents whose backgrounds, life experiences, and/or work contribute to diversity. The Graduate Division requests nominations from departments in the Spring semester.	March 6, 2014
<b>University of California Dissertation Year Fellowship (Application PDF)</b> Open to doctoral students who demonstrate strong potential for university teaching and research, and who are in their final year of dissertation work. Must be U.S. citizens or permanent residents whose backgrounds, life experiences, and/or work contribute to diversity. The Graduate Division requests nominations from departments in the Spring semester.	March 6, 2014
<b>Doctoral Completion Fellowship (DCF)</b> The Doctoral Completion Fellowship (DCF) provides an incentive for students in certain graduate programs, to complete their degree within a reasonable time. This is a new fellowship program available to students in participating graduate programs who enter in Fall 2013 or later. It replaces the Dean's Normative Time Fellowship (DNTF). Students in qualifying programs admitted in Spring 2013 and before remain in the DNTF program, as described in the Guide to Graduate Policy.	Before beginning of semester in which you want to use the award.
<b>Dean's Normative Time Fellowship (DNTF)</b> <b>NOTE:</b> For students entering eligible departments beginning in Fall 2013, a new fellowship program replaces the DNTF. Please visit the Doctoral Completion Fellowship (DCF) section of the Guide to Graduate Policy for more information. The Dean's Normative Time Fellowship (DNTF) provides an incentive for students in certain graduate programs, to make progress to their degree within normative times.	Before beginning of semester in which you want to use the award.

<http://spo.berkeley.edu/>

**Research Administration and Compliance**

**Sponsored Projects**

The Sponsored Projects Office (SPO) at the University of California, Berkeley is 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.

**What's New**

On Friday, September 11, 2014, the majority of SPO staff will be involved in a regional meeting with sponsored project offices from Stanford University and UCSF. SPO services on this date therefore will be limited to front desk administrative duties. Proposal and award set up activity will resume on Monday, September 15th. Individuals submitting proposals or other time sensitive transactions during this time frame should plan accordingly.

**Key Policies and Procedures**

- **UCR Policy on Requirement to Submit Proposals and to Accept Awards through SPO/SAG**
- **UCR Time and Personnel Submission Policy Instructions and Frequently Asked Questions**
- **Electronic routing and approval of campus proposals using Proton**

**Award Spotlight**

- Patricia Crawford, CNR, \$15,362,525, California Department of Public Health, "Obesity Prevention Evaluation and Research"
- Roberto Hernandez, Civil and Environmental Engineering, \$4,797,496, California Department of Transportation, "California Partners for Advanced Transportation Technology, Program Management"
- Stephen R. Lema, Chemistry, \$1,750,000, Army Research Office, "Toxic Born-Oppenheimer Dynamics Using Isolated Atomized Fuel"
- Maria C. Lim, Education, \$2,995,748, NSF, "GRIDS: Graphing Research on Inquiry with Data in Science"
- John M. Colford Jr., Public Health, \$2,271,443, NCI/NIH, "Effects of Sanitation of Pathogen Transmission and Child Health in Bangladesh"
- Craig Steffenius, Public Health, \$2,215,713, NCI/NIH, "Cancer in Adults Following in utero and Early Life Exposure to Aromatics"

Sponsored activities with industry and academic Mutual Transfer Agreements are managed by SPO-6.

## 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."

**Research Administration and Compliance**

**Sponsored Projects**

**Funding**

**Funding Search**

- Search: Ezyet Funding Opportunities Database
- Print Guide
- Email SPO for help with Searches
- Recent Funding Program Announcements - Research Advocate Newsletter
- Funding Alert Services
- Funding Editorial Funding

**Funding Lists**

- Limited Submission Programs
- Faculty Individual Prizes and Awards
- Equipment Grants
- New and Young Faculty Grants
- Travel Grants
- Parent and Mentors Grants
- Postdoc Funding in the Sciences
- Postdoc Funding in the Social Sciences
- Postdoc Funding in the Humanities

**Agency Links**

- Federal Agencies
- Nonprofit Organizations
- State of California
- University of California Grant Programs

**On this page**

- Funding Search
- Funding Lists
- Agency Links

**Related Links**

- Proposal Writing Resources
- Procedures, Proposal Preparation
- UC Berkeley Corporate and Foundation Foundations
- UC Berkeley Graduate Division, Graduate Fellowships, and Grants



UC Berkeley Research Administration and Compliance

Sponsored Projects

**Pivot Guide**

Pivot is a funding opportunity and expertise database system that combines a funding database of over 25,000 opportunities with a database of over 3 million researcher expertise profiles. Along with powerful search features, the system provides tools for individuals to save searches and opportunities, explore possibilities for collaboration, share opportunities with colleagues, and choose to receive email alerts when records are added or changed. Pivot replaced the COS Funding Opportunities database.

Pivot is available at UC Berkeley, based on the campus subscription provided by the Sponsored Projects Office.

Here are some suggestions for deriving the most benefit from using Pivot:

1. Take an active role in designing your Pivot funding searches. A Pivot funding search based on search terms that are too broad can generate numerous funding options, some of which may not be suitable to your funding needs. Searches can be refined by using specific keywords, sorting by the type of funding agency you are interested in, and selecting the geographic location and funding level best suited to the project.
2. Using search terms that are too specific also can yield disappointing results. The Pivot keyword glossary can help you choose search terms that fit "categories" of funding opportunities.
3. Faculty and scholars should review and update the profile Pivot has created for them to ensure that the funding opportunities and collaborators based on this profile are valid. Existing profiles may be updated by submitting a CV. New profile content submitted is checked by Pivot editorial staff then used to update the profile database.

An overview of searching for funding and using other tools in Pivot is provided below. Pivot also provides detailed support and training. If you need additional help, please contact Shelley Sprandel (sprandel@berkeley.edu, 2-8122). SPO will provide training for departments. Department contacts may contact Shelley or Pam Miller (gmiller@berkeley.edu) for more information and to set up a session.

Your feedback on Pivot is most welcome. Please note that human interaction with the system is important to create better matches and search results, in particular when using the system-generated matches between expertise profiles and funding opportunities. The more detail and the more accurate the profile, the better the matches. You may send comments to Pam Miller or Shelley Sprandel.

University of California, Berkeley

Search Funding Results

Your Search: (autism)

Advanced Search Sign in to save your query Refine Search

68 Results

Recently added	Submission type	Top funding types	Top sponsor types	Deadline	Amount
Last 7 days: 1	Limited Submission: 1	Research: 40 Training or Scholarship: 10 Program or Curriculum: 9 Postdoctoral Award: 4 Meeting or Conference: 2	Federal U.S.: 16 Private Foundation: 15	02 Dec 2014 Full Proposal Anticipated	\$20,000 CAD
				28 Mar 2015 Letter of Intent Anticipated	\$25,000 USD
				06 Jan 2015 Abstract Submit Anticipated	\$64,000 USD
				06 Jan 2015 Application Anticipated	\$64,000 USD

## 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/oe.htm

National Institutes of Health

Grants & Funding

Search NIH Guide for Grants and Contracts

Funding Opportunities & Notices  
Unpublished Applications (Parent Announcements)  
Advanced Search

Recovery Act  
Research Training & Career Development  
Small Business (SBR/STTR)  
Contract Opportunities

NIH Loan Repayment Programs  
New and Early Stage Investigators  
Stem Cell Information  
NIH Common Fund  
Opportunities (Behavioral & Social Sciences)

Upcoming Events  
10/01/2014 - SACUC 10/1/2014 Workshops: October 1-2, Rochester, NY  
10/05/2014 - Symposium on Social Modeling of Laboratory Animals, October 3-5, Denver, CO

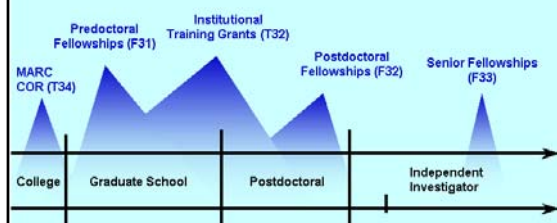
## What's an FOA?

- 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

### NRSA Fellowships and Training Grants (F & T Awards) for Individuals With or Earning a Research Doctorate



## 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>

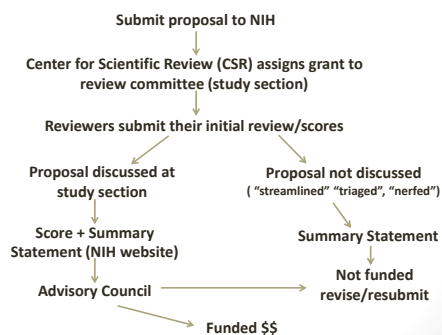
The screenshot shows the NIH RePORTER website. The top navigation bar includes links for HOME, ABOUT REPORTER, FAQs, GLOSSARY, and CONTACT US. The main content area is titled "NIH RePORTER" and includes a search bar and a list of search criteria. The search criteria include Project Number, Project Title, Project Status, Project Type, Project Dates, and Project Location. The search results table shows columns for Project Number, Project Title, Project Status, Project Type, Project Dates, and Project Location.

## 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
	4	Very good	Strong but with numerous minor weaknesses
Medium	5	Good	Strong but with at least one moderate weakness
	6	Satisfactory	Some strengths but also some moderate weaknesses
	7	Fair	Some strengths but with at least one major weakness
Low	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#rindex>

## 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 it's a minor change
- Your responses should directly address the reviewers concerns
- Don't skip any major comments
- Use your space wisely



**SUCCESS**

Because you too can own this face of pure accomplishment

Questions??