Research Development @Rutgers

Guide for Formation and Operation of a Grant-Writing Support Group

Overview: This guide is for research deans, department chairs or individual faculty who wish to implement the utilization of grant writing support groups to improve funding success rates. The materials below are derived in large part from a program run at Northwestern's Feinberg School of Medicine. Their Associate Dean for Professional Development, Dr. Rick McGee, uses the method described herein to bring faculty together to apply a focused set of rules to improve their grant-writing skills. Initiation of this program at Rutgers is being supported by the Office of Research and Economic Development.

The program at Northwestern is freely accessible online and also forms the basis of the Grant-Writing component of the National Research Mentoring Network. Links to these and other support for grants can be found at the Rutgers Research Portal

Step-by-Step Grant Writing Group Instructions

Deans or chairs or other leadership should identify an *independent* moderator for the group(s), preferably an experienced grant-writer who has thoroughly reviewed these guidelines. This moderator should follow the steps below.

1. Four months ahead of a grant deadline, send a query to find individuals who plan on submitting.

2. Set up groups of no more than 5 faculty members with preferably mixed areas of expertise so that the conversations focus on writing rather than the quality of the science.
    a. Note, ideally a separate and differently composed group would form to discuss the merits of the science. This could occur prior to or coincident with the grant writing group.

3. Schedule introductory session to deconstruct the elements of the specific proposal type (NIH, NSF, etc).
    a. Make sure participants know about the 5 rules for clear scientific writing and the tools for creating coherent paragraphs, videos for which can be found on the Northwestern University's CLIMB website (http://www.northwestern.edu/climb/resources/written-communication/index.html).
        i. written versions of these videos are supplied at the end of this packet.

4. Schedule weekly meetings to work on writing. The meetings should be limited to 90 minutes.
    a. Plan on working on the Specific Aims (or Project Summary) pages for most of the meetings.
    b. The participants should arrive with drafts of their specific aims pages. They should NOT be distributed ahead of time.
    c. One at a time, the moderator and each participant reads specific aims pages, one paragraph at a time. Plan on spending ~30 minutes per participant.
        i. Feedback is structured in terms of the moderator's and participant's immediate interpretation of the written document: "When I read this, my brain is hearing…"
            1. this allows constructive criticism without making value judgements
    d. Move on to the Significance and Innovation sections (NIH) only after the Specific Aims pages have been rigorously reviewed. About 75-80% of the sessions should be focused on the Specific Aims page.

5. Make audio recordings of all sessions and distribute to participants. Contact res-dev@rutgers.edu for tips on how best to capture and distribute recordings.

See below for detailed description of Grant Writing Groups structure and function. Please contact the Rutgers Office of Research Development (res-dev@rutgers.edu) with any questions or with help finding moderators.

Grant Writing Group Structure and Function

The following is excerpted from a presentation by Rick McGee, PhD, Associate Dean for Professional Development at Northwestern's Feinberg School of Medicine

Principles upon which this method is based:

- Research mentoring is idiosyncratic and variable, thus it is impossible to get a big impact relying on improving it
- Core principles of teaching and learning – conscious thought into what needs to be learned, design of teaching to achieve it, practice with feedback, led by expert with dedicated time
- Social science principles also integral to design!
- Cultural Capital – knowledge and behaviors passed on by those in 'power' and high social status which is much less available to those who are not – but it CAN be taught – norms of behavior (e.g. style of writing) critical
- Communities of Practice – groups acquire tacit knowledge of what an insider (someone who belongs) knows but this is often invisible or unstated – unfortunately, judgements are based on it
- Display of thinking and behavior of experts vs. novices
- Facilitated Group process, display multiple cognitive views

Faculty Grant Writers Groups

- Every 4 months – "Whose writing a proposal?"
- Session 1 deconstructs the elements of NIH style proposals – since replaced with similar annual sessions for broader audience
- Session 2 – everyone comes with paper copy of research questions, hypotheses or Specific Aims (if they are that far)
- In real time, read then discuss each one – I model talking through what my brain is hearing from what I read – others do as well once they see the method
- Each week refine and revise questions, hypotheses, aims, aims page
- Move on to Significance, Innovation, other sections only after specific aims pages are optimized
- Especially effective done early during writing
- May go on to Approach but most often these are beyond the expertise of the group
- Still requires input of scientific mentors, and other mentors for NIH K awards, but focuses that time on the science while we develop writing skills and give fresh eyes to improve writing
- Audio recording of discussion BIG improvement - captures thinking and discussion which otherwise often lost

Practical Details about Groups

- Group size is pretty critical – If group too small hard to get good dynamic – 3-4/group is good size – can work with smaller but more contribution from coach is required
- Groups can't be too diverse in research field/methodology but some diversity is good
- Need at least 30-40 minutes on each 1-2 pages of writing no matter what stage
- Coaching also is need beyond just grant writing – but GREAT way to identify that more is needed!
- Recording of conversations – background noise and sharing of files
- Important to develop a plan with a group – may vary as you see stage and content but usually easy to figure out

What is happening during writers groups?

- Development or refinement of scientific thinking, ability to define research questions, hypotheses
- Scientific writing skills – down to level of sentence construction
- Viewing proposal writing as a highly refined stylistic pattern –
    - including rhetorical patterns (see below)
- Detailed knowledge of what goes into each section and why
- Developing ability to 'think like a reviewer'
- Demystification – grant writing is a very learnable skill
- Simulation of grant review process and realities
- Positive peer group – all in it together
- Career development guidance – sometimes harsh reality check
    - Some realize it is not for them – often a positive outcome!
- Must emphasize that you can't salvage weak science!

Let's dig deeper into teaching/learning…

- If you think of this approach compared to reading and returning comments, what are some of the key differences you could imagine?
- Guided deliberative practice
- Multiple examples being viewed, watching and contributing to evolution and refinement – easier to learn first on others
- Safe setting, no judgment, combination of peers and coach – lowers need to try to get something perfect first

- Oral processing allows fluid consideration of different options – MUCH richer and dialogue not one-way
- If coach comfortable, extremely efficient use of time
- Recording allows for engagement in both writing and science
- Normalizes learning the writing style as new for everyone

Challenges you may face…

- Facilitating feedback outside your area!
- Oral feedback vs. written – both valuable but don't lose oral
- Preparing beforehand vs. real-time – comfort & time
- Managing feedback from participants – eager but novice
- Varying levels of time/readiness to write – group vs individual needs
- Complement not replace research mentors but…
- Different advice from different mentors/reviewers
- If working with proposals being revised – essential to start from critique but it can be 'sensitive' to share criticism.
    - If possible, sharing reviews with group and talking through them is an ideal teaching tool

Limitations

- Some need much more intense input from scientific mentors or colleagues - content Mentors/Advisors may be option
- Relies on scientific mentors or colleagues to help with Approach section and all of the 'boilerplate' sections
- Really can't save poor science but can make limitations visible
- For postdocs, navigating IP with mentor and moving on to next
    - position can be very complicated

Take-Home Messages

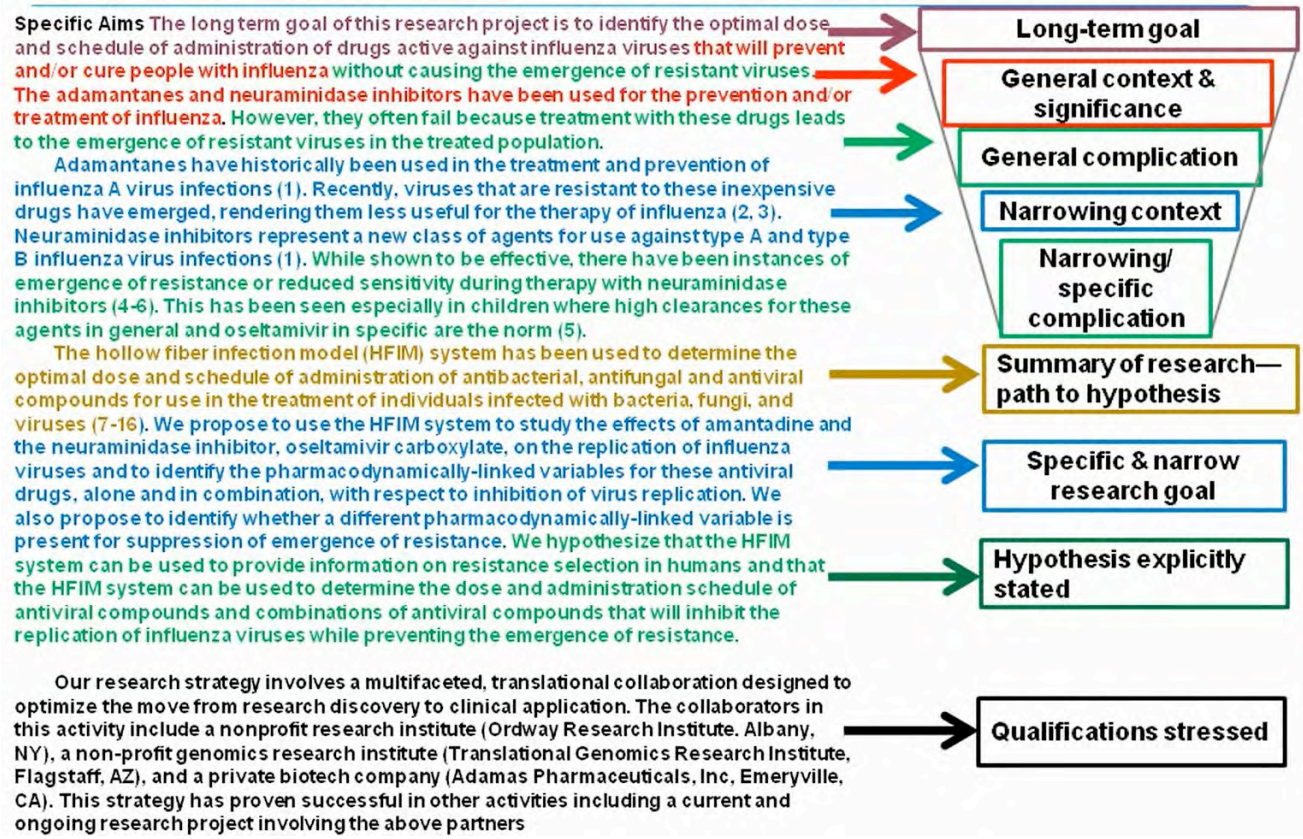
- Writing research proposals is an invaluable element of high quality research
- Writing research grants is a teachable, learnable skill
    - Often not approached as such because of the focus of research training on informal mentoring
    - Effective grant writers (i.e. mentors) often can't explain or deconstruct why they write the way they do and why it works
- The ability to write and sound like what reviewers expect is a central ingredient of being judged as a legitimate member of the research community – strong social underpinnings

- It is extremely difficult to become a skilled writer by yourself – colleagues and groups are invaluable resources

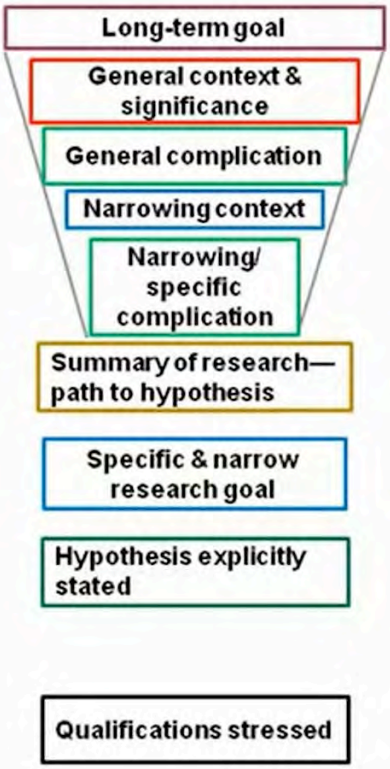
Structure of a Specific Aims Page

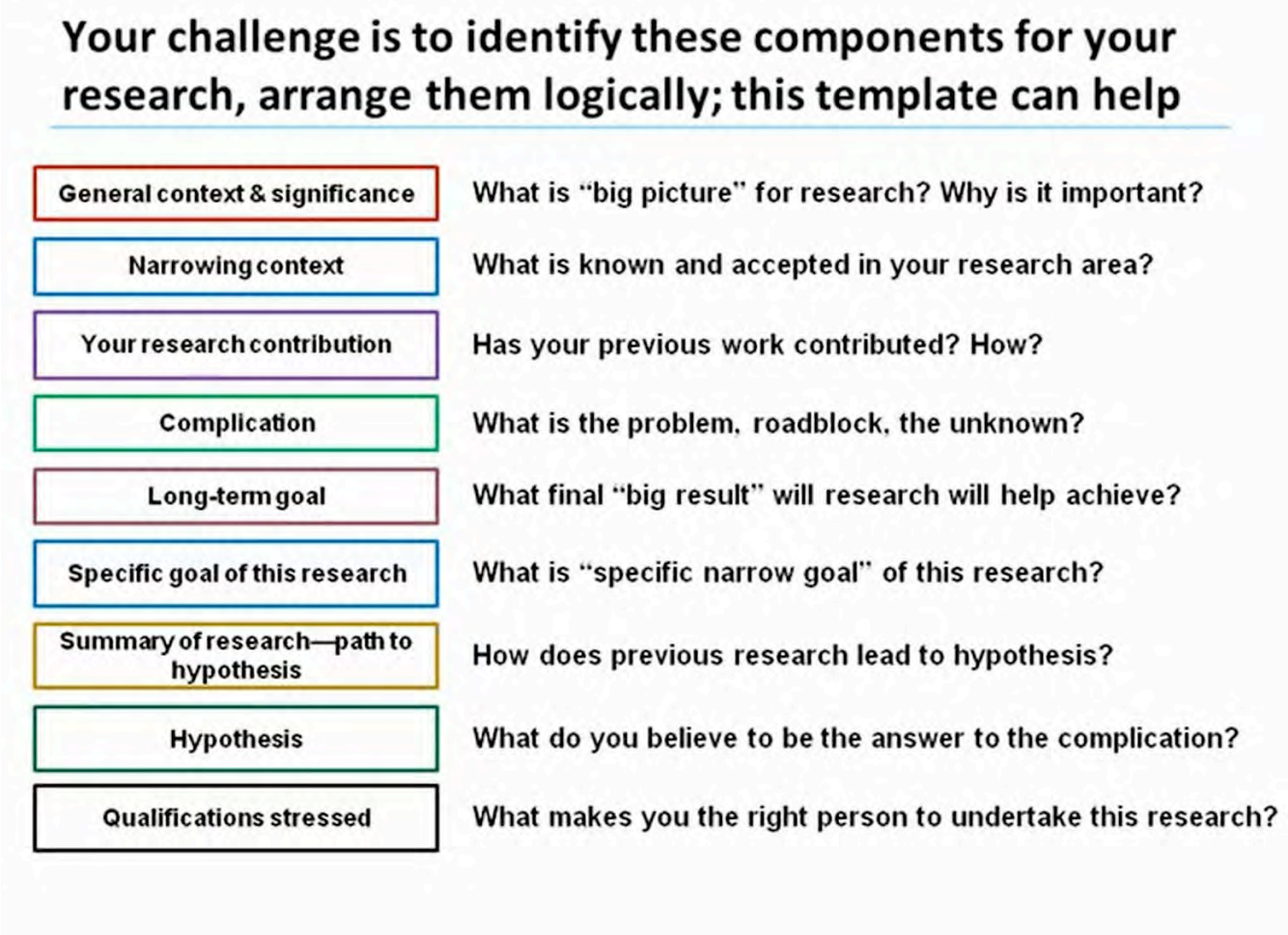
For videos about the rhetorical patterns of Specific Aims pages, see additional videos on the Northwestern CLIMB website

The introductory part of a Specific Aims Pages can be described in terms of common rhetorical patterns



So, let's look at the two rhetorical patterns, side by side—similar components different sequence





You can start your specific aims page from scratch by simply answering these questions!

Five principles of clear scientific writing

extracted from the Northwestern CLIMB program

1. Sequence Old to New

a. Proper connection between concepts

BAD:
All experiments will be conducted with stromal cells isolated from normal endometrium and diseased endometriotic tissue. Informed consent will be obtained under a protocol approved by the IRB to acquire the tissue.

GOOD:
All experiments will be conducted with stromal cells isolated from normal endometrium and diseased endometriotic tissue. The tissue will be obtained under informed consent under a protocol approved by the IRB.

2. Sequence Light to Heavy

a. Put the subject and early and succinctly

BAD:
High resolution, simple phasing and selection of stable states are the three benefits of Xray crystallography.

GOOD:
Xray crystallography provides three benefits, which include high resolution, simple phasing and selection of stable states.

3. Use Transitional Words

a. Logical relationship from sentence to sentence
   i. Addition: Also, too, again, in addition, next, finally, last
   ii. Comparison: Similarly, likewise, like
   iii. Contrast: But, yet, however, on the other hand, on the contrary
   iv. Enumeration: first, second, third
   v. Illustration: That is, for example, for instance
   vi. Place: Here, there, just to the right of
   vii. Result: Therefore, thus, consequently
   viii. Summary: In other words, in fact, in summary
   ix. Time: Immediately, then, soon after, later

BAD:
Researchers have made great strides in diagnosing Alzheimer's disease early and accurately. Physicians who examined an older patient who seemed out of touch with reality used to have to guess whether the person was senile or had Alzheimer's. Physicians are able to use new and more reliable tests. These tests raise their own problems.

GOOD:
In recent years, researchers have made great strides in diagnosing Alzheimer's disease early and accurately. Not too long ago, when a physician examined an older patient who seemed

out of touch with reality, the physician had to guess whether the person was senile or had Alzheimer's. In the past few years, however, physicians have been able to use new and more reliable tests. Nevertheless, these test raise their own problems.

4. Use Echo Words

a. consider prior and subsequent sentence - be consistent

BAD:
Histological examination of biological and medical specimens has gained its universality and undisputed significance through distinct staining techniques and microscopical evaluation. Discrimination of tissue types after specific staining and labeling is an essential pre-requisite for histopathological investigation, for example in accurate diagnosis of cancer. Histochemical staining techniques can only be used in a targed manner for known compounds, and only a limited number of such targets can be visualized from a given sample at the same time. Another limitation of classical histology lies in the fact that a considerable amount of experience is required and that even well-trained pathologists often interpret histologically stained sections differently.

GOOD:
Histological examination of tissue has gained its universality and undisputed significance through distinct staining techniques and interpretation with microscopical visualization. Discrimination of tissue types after specific staining and visualization is an essential pre-requisite for histopathological investigation, for example in accurate diagnosis of cancer. But histochemical staining techniques have two limitations. First, the techniques can only be used in a targeted manner for known compounds, and only a limited number of such targets can be visualized from a given tissue sample at the same time. Second, interpreting a histochemically stained tissue requires a considerable amount of experience, and even well-trained pathologists often interpret histologically stained sections differently.

5. Use Strong Verbs

a. find important concept and use verb to describe what happens
b. when possible, use the active voice
c. Identify the real actors

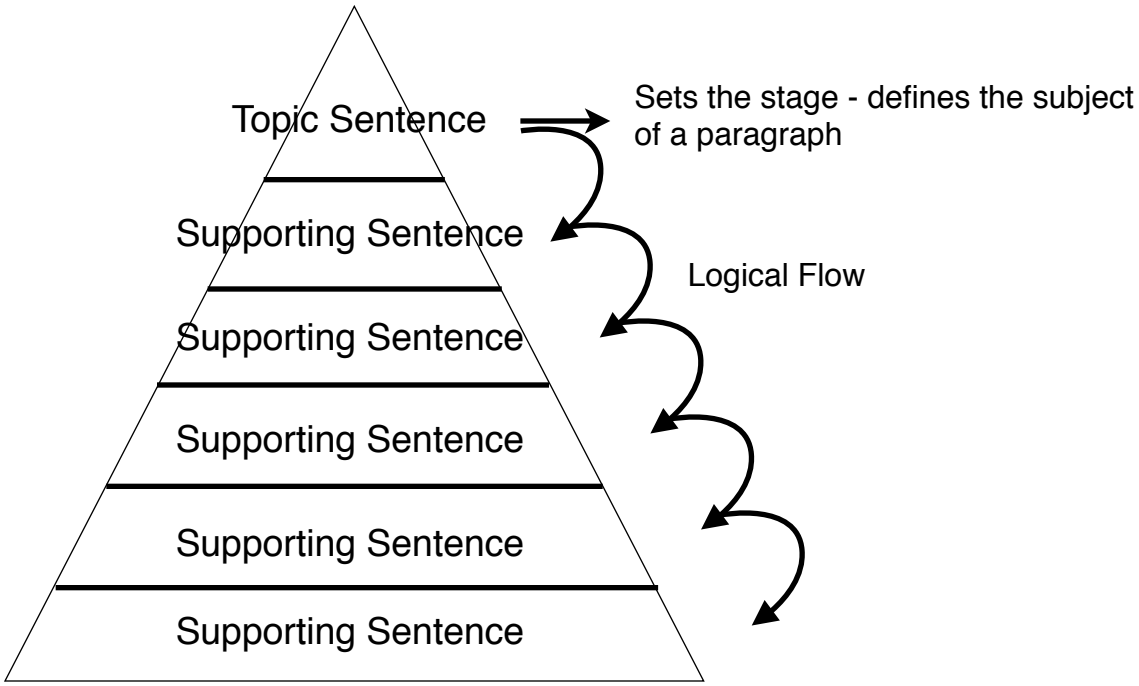
BAD:
In a study of mouse tumor models, previously characterized tumor-penetrating peptide iRGD was shown to increase vascular and tissue permeability in a tumor-specific and neuropilin-1-dependent manner.

BETTER:
A study of mouse tumor models showed that previously characterized tumor-penetrating peptide iRGD increased vascular and tissue permeability in a tumor-specific and neuropilin-1-dependent manner.

BEST:
According to a study of mouse tumor models, previously characterized tumor-penetrating peptide iRGD increased vascular and tissue permeability in a tumor-specific and neuropilin-1-dependent manner.

Writing coherent, easy-to-read paragraphs: Topic Sentences, Echo Words and Transitions - also extracted from the Northwestern CLIMB Program.

1. **A paragraph can be understood as a pyramid - the topic sentence at the point and the supporting sentences underneath.**
2. **A paragraph succeeds when it:**
   a. Follows the "BLOT" pattern - bottom line on top - with its topic sentence cueing the reader about what is to come next.
   b. Constitutes a self-contained unit...when all the follow-on sentences in the paragraph relate specifically and exclusively to the topic sentence. In other words, keeping a ***topic focus.***
   c. The topic sentence sets up expectations in the mind of the reader. The paragraph should fulfill those expectations.
   d. Ideally your concluding sentence should lead into the topic sentence of the next paragraph.



Example of a well constructed paragraph:

from Kimran Hayer, The effect of ultrasound exposure on the transformation efficiency of Escherechia coli HB101. Bioscience Horizons 2010 3:141-147

Transformation is one of the key mechanisms in which bacteria are capable of DNA transfer. Transformation refers to the mechanism by which bacteria uptake naked DNA from the environment across their cell membranes and incorporate it into their genomes. This mechanism of DNA acquisition often has significant implications, whereby bacteria are able to pick up and acquire advantageous traits like antibiotic resistance. Some bacteria like *Bacillus subtilis* are naturally capable of transformation and are regarded as "genetically competent." E coli, however, is a bacterial species that is not capable of undergoing natural transformation and so requires some sort of artificial intervention to perform this process. The treatment of non competent cultures like E. coli with chemical or physical agents can permit the uptake of DNA, via the induction of artificial 'competence' under laboratory conditions.

Topic sentence: signals paragraph subject
2nd sentence: defines and elaborates on the topic
3rd sentence; pinpoints implications of the topic
4th and 5th sentences: gives two examoles of the topic in a compare/contrast juxtaposition
6th sentence: concludes with an additional elaboration that logically connects with the previous sentence

The next paragraph begins:
One potential novel technique to induce artificial competence is ultrasound - a recognized method known to cause biological effects.

Note that although this paragraph introduces a new topic (ultrasound), it is linked to the last sentence of the previous paragraph.

3. You can use transition words to smooth the flow within a paragraph

Transition Categories	Transition Words
Adding to	also, furthermore, in addition, moreover
Showing sequence	then, next, after, finally, first, second, etc
Contrasting	however, nevertheless, in contrast, on the other hand, conversely
Showing cause and effect	therefore, as a result, consequently, thus, for this reason
Providing examples	for instance, for example
Show similarity	similarly, likewise