Grant writing and ethics, Zoology 599

Syllabus Summary

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Week 2. Hook
Week 3. Specific aims
Week 4. Plan of action
Week 5. Background
Week 6. Research Plan
Week 7. Broader impacts
Week 8. Paragraphs
Week 9. Holiday
Week 10. Style and wrap-up

Note: The sections that follow report the discussion and plans from the 2012 version of course. In future years the course will follow a similar but not an identical trajectory.
Preparation for Week 1: Topic and agency

For our first meeting on Friday be ready to tell us the topic of your grant proposal and the specific type of grant that you will apply for. After a few opening remarks about mechanics, we'll go around the room and introduce ourselves. Then we'll do another pass around the room so that each of us can talk briefly about the proposal we intend to write. If you haven't decided where you will apply, try and make some headway before this coming Friday. For a list of specific kinds of proposals see http://zoology.science.oregonstate.edu/?q=grants

Week 1 and preparation for Week 2: Hook

At our first meeting, participants introduced themselves and then talked about their proposal topics and funding agencies. Everyone has a proposal topic in mind, but some of you are undecided about a target funding agency and hence about the kind of proposal you will write. We suggested that you solve this decision problem through discussions with your research advisor and members of your research group. Your fall back plan might be to apply for one of the small research grants, such the grants-in-aid-of-research awarded by Sigma Xi. The point is that you need to settle the issue of a target so that you can focus on the proposal itself.

With respect to the target funding agency, we made the point that you need to master all the details of the grant application, especially due date, form, etc. In class, establish who among your classmates is applying for the same type of grant as you. Once you've identified such classmates, you can compare notes along the way to make sure that you have faithfully mastered such crucial details as form, length, etc.

Next we turned to the hook or fundamental rationale for your proposal. A separate document outlined the idea of the hook, illustrated with an example. The basic idea is to start your proposal with a three sentence argument for your proposal that contains the hook. The three sentences (1) state a problem, (2) point out a nagging limitation, and (3) present your solution to this limitation and hence to the problem. The argument needs to be stripped of jargon so that it will readily be grasped and remembered.

On a third pass around the room, participants presented their hooks as succinctly as possible. As expected on this first pass, arguments were typically longer than three sentences. We made the point that verbal presentation of the argument in a conversational style is often easier than writing down the argument from scratch. The verbal presentations were instructive because they often revealed impediments to understanding. As expected, jargon was often a problem. Some participants also yielded to the temptation to present detail that cluttered the hook argument. While jargon can usually be avoided, contextual detail is important. Such necessary detail will be presented in the 2nd and 3rd paragraphs of your proposal. Nevertheless, your immediate goal is to compose a comprehensible hook argument that includes only the detail that is absolutely necessary.

For our meeting in Week 2, please bring a written, three sentence version of your hook argument. Make 12+ copies to hand out in class. You might also provide a provisional title for your proposal on this handout.
**Week 2 and preparation for Week 3: Specific aims**

This week we continued to work on our hooks and reviewed two documents that are the foundation for next week and beyond. Most of our time was spend on a single pass around the room, presenting and discussing our hooks. Hooks are now in pretty good shape, although they will continue to improve with more attention. A common problem is flow in the three-sentence argument. The push to present a sentence devoted to each of the three elements (problem, limitation, solution) can produce a disjointed argument. We discussed various solutions to the problem of a disconnected argument. One solution is to write sentences with clauses that bridge between the three elements. “Although herpes infections are widespread and serious problems, the ability of the virus to hide in an inactive state within the host (latency) has frustrated the search for a complete cure.” This opening sentence is more useful than a bald statement that viruses are bad and found everywhere. Instead, we dispense with those simple truths in the first clause and focus the second half of the sentence on the main issue, latency. This opening is more complex, but it is not too much for the reader to handle. Another solution is to advertise the transition from ‘problem’ to ‘limitation’ by beginning the second clause in a way that makes the transition obvious: “but unfortunately ...” or “Despite the many successes of ..., we still do not ...”.

After working on our hooks, we discussed the ingredients for a generic grant proposal (see INGREDIENTS doc) and a suggested series of steps for writing such a proposal (see STEPS doc). We made the point that a proposal with 15 pages or more might have sections with labels that correspond to all the categories in INGREDIENTS, but a shorter proposal still should have all these section, even if the labels are dropped off. In shorter proposals, some issues are addressed by a single sentence. The main point of STEPS is that the simple strategy of starting at the beginning (first ingredient) and writing to the end (last ingredient) is not the best strategy. STEPS makes the point that you should be prepared to jump around in your grant writing. You will jump around because changing one ingredient will often mean that other parts of your proposal will have to be changed in parallel.

**Week 3**

For class this week bring copies of single-page document that includes your proposal title, the latest 3-sentence version of your hook, and your specific aims. Notice in INGREDIENTS that the 3-sentence version of your hook will become the first part of your Background section. Why aren’t we working on the rest of the Background, which follows the 3-sentence opening? We’re putting off the rest of the Background because what we will write there depends on our research plan.

To launch our research plan, we will first focus on our Specific Aims. As we discussed in class, one specific aim is too few and five is too many. Three is about the right number. With that number in mind, try to distill your project into three aims. These should be stated as questions or hypotheses. Easier said than done, but take a stab at it nevertheless. Later in the proposal, these aims will also serve as headings for the major sections of your Research Plan, in which you outline the actual plan of attack on your research project. Keep that dual function in mind. In other words, you need to break the conduct of your research project into three sections, each of which can be stated as a hypothesis.
Week 3 and preparation for Week 4: Plans of action

Last week we talked about deadlines, letters of recommendation, biosketches, and broader impacts. We spent most of the remaining time discussing our Specific Aims. Half the class has a deadline of mid-Nov for NSF GRFP and EPA-Star applications. To accommodate those deadlines, we will shift to focusing on just GRFP and STAR proposals in a week or so. Then after those deadlines we will double up on other types of proposals until the end of term. If letters of recommendation are part of your proposal, now is the time to decide on your letter writers and alert them. We will spend some time in class helping you work on personal essays and broader impacts, but we will wait until the Research Plans are further along.

A few general points emerged as we discussed Specific Aims. We made the point that these aims (stated as questions or hypotheses) should also serve as labels for the main sections of your Research Plan. That label requirement can also serve as an assay for whether the Aims are well formulated. Sometimes the formulation of Aims comes easily, but in other cases it is more difficult. When formulation is difficult, it may help to lay out a time-structured list of the things you know you need to do. Then break that list into about three parts and try and formulate a research question that goes with each part. Another major point was the virtue of having Aims that are stated as simply as possible. Stripping away jargon and detail will help the reader grasp the main idea of each aim. Details will follow in each section that has an Aim as a label.

Simplicity is also a virtue that applies to your proposal Title. One way strip back to the basics is to make a list of your most important key words. The scientific name of your study organism and the geographic location of your study probably won’t be at the top of that list and accordingly they shouldn’t be in your title. You want the title to be short, snappy, and memorable.

Week 4

For class this week, rough out your plan of action under each Specific Aim (see #3 in STEPS document). An easy way to start is to make a list of the things you intend to do in the pursuit of a particular Aim (e.g., “survey study area for ... lay out experimental plots ... collect data ...”). It will help both you and the reviewer if you list these activities in the order in which you will do them, so either start with that order or rearrange the list into a temporal sequence. Try and produce a rough plan for each Aim by Friday. You can fill in details and make complete sentences later. The idea for now is to cover all the bases under each Aim, from experimental design to data collection to data analysis.

Bring no more than a single page to class. If you have room after roughing out your plans of action for each Aim, provide an updated version of your hook (the three-sentence version). In any case, provide the latest version of your proposal title at the top of the page.

A few more examples of successful NSF GFRPs are now on the course website. As we discussed in class, it is generally not a good idea to copy the structure of these example proposals. Instead, try and apply the template that we’ve discussed and implemented in class. The example proposals are useful because they will give you some ideas about how much space to expend on each part of the proposal.
Week 4 and preparation for Week 5: Background

Last week we talked about the rough versions of our Plans of Action (Research Plan). Specific Aims are in pretty good shape, although some participants need to do some tweaking. The rough versions of the Plan under each aim are now mainly bulleted lists, but even so they give a good idea of content. Some suggestions for improving the overall Plan and the parts under each Aim emerged from our discussion. (1) A couple of participants were urged to work on specific aspects of their experimental design that might trigger bad reactions from reviewers. Although the issues were peculiar to those participants, the take away message was that it’s a good idea to be aware of the designs others have used for research questions such as yours and the associated problems that have been discussed in the literature. (2) Another recurrent problem was that topics emerged in the rough version of the Plans that had not yet been discussed in the Background section. We will return to this problem when we turn to the topic of how to prepare for Week 5. (3) We also realized that the individual sections of the Plan often need an introductory sentence or two. The problem here is that we don’t want our reviewers to become lost in the welter of methodological detail that we supply. We need to help them by supplying introductory road map sentences. In summary, most participants need to work on three things in their Research Plans: bad reaction triggers, issues currently missing in the Background, and roadmap sentences.

Preparation for Week 5

For class this Friday, please bring a one page version of your expanded Background section. On your handout, this expanded section should be preceded by your title and the three sentence version of your hook paragraph, which you have shared with us on many previous meetings (yes, we want to see it again!). Although you should continue to work on your Research Plan (as suggested above), we want to see an expanded version of your Background rather than your Research Plan this week. The reason is that you should now follow up on those revelations of missing Background issues that emerged in Week 4. In section 3 of Ingredients, we’ve laid out a plan of attack for the Background section. As we point out there, in the new paragraphs of your Background you need to spell out the conceptual framework for your project. The goal here is to convince the reviewer that you are in command of the big conceptual picture that surrounds your project. Go, paragraph-to-paragraph, from the general to the specific. In other words, the second paragraph (right after your 3-sentence hook paragraph) might return to the big problem addressed in the first sentence of your hook paragraph. This second paragraph is an opportunity for you to supply the reviewer with the most general and important information about the problem. At the same time you need to be disciplined. You don’t want to tell the reviewer things everyone knows. Instead, you want to focus on supplying information that will help the reviewer understand both the later paragraphs in the Background and the Research Plan up ahead. You may only have room for 2 or 3 paragraphs after the opening hook paragraph, so make every paragraph count. The last paragraph will be the most specific and it may be the easiest to write. It will probably be about your study system. Stay focused on the most important details that the reviewer must know.

Begin each of your paragraphs with a sentence that summarizes the overall content of that paragraph. This important skill is best learned by following some examples (e.g., scan the opening sentences in the following book: http://biophilosophy.ca/Teaching/3170readings/Wilson.pdf).
Week 5 and preparation for Week 6: Research plan

Last week we critiqued first drafts of our Background sections. A number of issues emerged in the process, which I will take up in the order we encountered them in class. (1) Strive for short, digestible sentences. Under pressure to pack information into this section, some participants resorted to huge sentences with multiple clauses. (2) As you move from the first to the last paragraph, start with the general and move to the specific. Some participants complained that this rule was hard to follow if some paragraphs are about phenomenology while others are about methodology. One solution in this circumstance is to label subsections within the Background section. (3) Strive to write in the first person, even in the Background section, and use active, evocative verbs. (4) If you’re having trouble composing a lead sentence, the problem may be that the paragraph is about two or three things instead of one. If that’s the case, split the hybrid paragraph into two or three shorter, more coherent paragraphs. (5) Strive for informative lead sentences that give the main point of the paragraph. If you succeed at this task, reading the lead sentences in sequences should produce a compact abstract of your Background section.

Preparation for Week 6

For the next two weeks (Nov 2 and 9), we will focus on participants with deadlines near the end of this month (e.g., NSF GRFP and EPA STAR proposals). Then for the two weeks after that (Nov 16 and 30; no class on Nov 23 because of Thanksgiving holiday), we’ll focus on the other participants in class with later deadlines. In other words, you’ll bring some writing to class on Nov 2 and 9 only if you’re in the first group, in which case you should bring two things to class on Nov 2: a 2-page version or section of your Research Plan and the first sentence of your personal or professional experience essay. Let’s consider the Research Plan first. If you are writing an NSF GRFP proposal, we will want to see a complete 2-page draft of your Research Plan (title, hook paragraph, background, list of aims, plan of action, literature cited). If you are writing an EPA STAR proposal or some other proposal that has a longer than 2-page limit on the Research Plan, bring just 2 pages to class from that section.

If you are in the first group, with a late Nov proposal deadline, you should also bring a candidate first sentence for your personal or professional experience essay. Last week we talked about alternative structures for these essays, especially the personal essay. The typical structure is a linear, chronological narrative with a beginning such as “I have been interested in biology since I was 2 years old.” Over 90% of your competitors will use this structure and if you follow suit, your essay will be just a boring as theirs. Consider a more interesting, alternative structure for your essay. For example, you don’t have to start early in time and go forward. You can instead start at some particularly interesting point and then let the essay fill in forward and backward from that point. What constitutes an interesting point of departure for your essay? Consider the following three examples. “Call me Ishmael.” “I’ve always wondered what’s inside a hot dog. Now I know and I wish I didn’t.” “I must have been running a fever when I shot the monkey.” On Friday, we will discuss why these are seductive, provocative opening sentences, and hence a possible model for you. Whether you follow this model or not, bring a candidate opening sentence for your essay to class (we’ll ask you to write it on the board).
Week 6 and preparation for Week 7: Broader impacts

Last week we discussed ethics and critiqued both opening sentences for personal essays and 2-page versions of Research Plans, focusing on participants with deadlines looming later this month. With respect to ethics, we discussed some thorny issues that can arise between graduate students, advisors, and advisory committees. One such thorny issue is writing or contributing to a grant proposal that will be submitted and potentially funded in the advisor’s name, not yours. The crucial questions in this circumstance are whether you benefit directly or indirectly from the experience and are satisfied with those benefits. A second thorny situation arises when your advisor and your committee make conflicting demands. The recommendation that emerged was to make the advisor aware of the conflict and ask for help in resolving it.

The discussion of opening sentences revealed distinct avenues to success. One notable example combined irony with brevity, “I like the smell of smoke.” Another success was achieved with a gripping opening that included epiphany, “Cradling the head of a 500 lb drugged lion in the dark, I suddenly wondered if his companions were close at hand.” Whatever the avenue, the goal at the start of your narrative is to grab the reader’s attention and hold it.

Turning our attention to drafts of Research Plans, we encountered some old problems, as well as some new ones. (1) By supplying appropriate detail in your plan, you make the plan more convincing. If you plan to characterize a pheromone, it’s better to say you’ll use ‘mass spectrometry’ than to say you’ll use ‘proteomics’. Inserting specifics about sample size at crucial junctures will help convince the reviewer that you’ve thought about your plan. (2) Reviewers will be grateful for a roadmap sentence that acts as a bridge between the heading for a section and a detailed account of methods. “In this section I will collect gland secretions from 10 species, characterize their profiles using mass spectrometry, and identify those profiles using established databases.” Such a roadmap helps the reader anticipate and organize the deluge of details that follows. Without the roadmap, the reader will be lost. (3) At the beginning of each section, remind the reader why that section is important. (4) Avoid lengthy, run on sentences. (5) Use first person and active, evocative verbs.

Preparation for Week 7

This week we will focus again on participants with deadlines near the end of this month (e.g., NSF GRFP and EPA STAR proposals). If you are in this group, for our Nov 9th meeting you should bring either a 2-page version of your Research Plan or a 2-page draft of some other section. If the 2-page draft of your Research Plan was heavily marked up and discussed by participants last time, your best bet is to bring a new draft to class on Nov 9th. We have not discussed the ‘Broader impacts’ section, but you should include that section in your draft. Your conception of what kinds of things are appropriate for this section may be improved by reading the 4 examples posted on the course website (see the Course Documents folder for Week 4). Reviewers will be swayed by outreach proposals that are genuine, specific, and feasible. For example, instead of a vague proposal to talk to K-12 classes about your research, identify an education problem that you will solve with your presentations.
Week 7 and preparation for Week 8: Paragraphs

Last week we discussed ethics and critiqued Research Plans and personal statements, focusing on participants with deadlines at or beyond the end of the term. We had a brief ethical discussion about the situation that arises when you meet some but not all the criteria for a granting program. In that situation you might be tempted to just roll the dice and apply. The problem, of course, is that you may be wasting the time of your letter writers. We agreed that it’s better to save the efforts of your letter writers, and yours as well, for proposals that are likely to count. On another ethical front, we touched on the issue of submitting multiple proposals to do the same project. The ethical issue here is that one should not accept funds from multiple sources to do the same work. Some funding agencies have policies about such ‘double dipping’ and may even ask about it on their proposal forms, but in any case you should avoid this treacherous territory. You can avoid fraud in several ways: (1) you can budget one kind of cost with one agency and other costs with another agency, (2) you can propose to do separate parts of the project with separate agencies, or (3) if redundant applications are allowable, and you are funded by two agencies, you can turn down one. It is also a good idea to disclose each of these courses of action in your proposals.

The two major problems that we encountered on Research Plans were density and flow. Participants working on NSF GRFP proposals tended to pack too much information into each sentence, making them dense and hard to understand. It may help to put yourself in the reader’s shoes as you read your draft. What can you eliminate from long dense sentences that will aid comprehension while still getting the main point across? If you have multiple points to make in Background section - all in support of your argument - try to say a few words about how each point relates to the argument. Finally, test for overall flow by conducting the following 3-part assay. The lead sentence of a paragraph should give an overview of that sentence. When just the lead sentences are read in sequence, they should produce a narrative that summarizes your main argument. The last sentence of each paragraph should bridge to the lead sentence of the next paragraph.

A quandary emerged when we discussed one participant’s personal statement. That statement resorted to a contorted construction in one paragraph because the participant could not remember the last name of one of her teachers. In the contorted construction, last names were omitted for all teachers. In class, we suggested inserting a fictional last name for the one teacher (‘Jones’ or ‘Smith’) or avoiding both first and last name of that teacher. Whatever the solution, the point is that you should not let a simple problem warp your prose.

Preparation for Week 8

This week we will focus exclusively on participants with deadlines at or beyond the end of this term. If you are in this group, please bring a 2-page section from any part of your proposal. We will not meet on Friday Nov 23rd, because of the Thanksgiving holiday. Our final class meeting will be on Friday Nov 30th, when we will again focus on participants with late deadlines.
Week 8 and preparation for Week 10: Style

Last week we critiqued personal essays, Background sections and Research Plans, and touched on one ethical issue. One participant’s personal essay illustrated a successful escape from the usual, boring chronological account of professional experience. That solution opened with a bit of irony that served as non-chronological thread connecting the various paragraphs that followed. Another participant’s Background and Research Plan sections suffered from discordance that could easily be removed with some work. A key paragraph in the Background listed three points. These three points, however, were not in register with the three specific aims that gave structure to the Research Plan. We suggested that the two sections be brought into register by changing either the three Background points or the three Specific Aims.

Another participant shared a Background section and Research Plan that elicited a more complicated diagnosis and set of suggested solutions. Paragraphs in the Background sections were composed of comprehensible sentences, complete with citations. The problem for the reader was that the connection between these sentences was unapparent and not revealed by the opening sentence of the paragraph. One solution in this situation, suggested in class, is to add clauses and sentences that bridge between the sentences, and to add an opening sentence that captures the overall message of the paragraph. The other, more drastic solution is to go back to the drawing board. Instead of forcing the paragraph to obey the will of already crafted sentences, one can go back to basics, examine the point of each paragraph and make the content match that point. Charles Darwin was a master of this approach, and he used it to outline each chapter in every one of his many books. Applying the approach to a paragraph, one first writes a shorthand phrase that carries the essential point of the paragraph: ‘sexual selection, different from natural selection.’ Next, one lists the points to be included in that paragraph separated by spacers: ‘competition between rival males … structures without significance in the struggle for life … vying for the attention of the female … structures used to assault other males … structures used to withstand the assaults of other males.’ Next one rearranges the order of the points as necessary to strengthen the argument, adding or dropping points as necessary. Then one expands each point into a sentence and finally adds clauses to enhance flow and make the argument comprehensible. As a final touch, it’s a good idea to check the opening sentence to make sure that it conveys the full content and intent of the paragraph. Also, in the ideal case, the concluding sentence in the paragraph should bridge to and anticipate the opening sentence of the next paragraph.

We circled back on the ethical issue of telling a white lie by making up a last name for the forgotten name of an elementary school teacher. The participant who wrestled with this dilemma, avoided the problem by using the internet to sleuth out the forgotten name, but it did take 6 hrs of work. Not too much to pay for a guilt-free conscience?

Preparation for Week 10

We will meet next on Friday Nov 30th, after the Thanksgiving holiday, at the end of Week 10. For that meeting please bring a draft of any section you want, but do limit the draft to 2 pages or less.
Week 10: Style and wrap-up

Last week we again critiqued 2-page sections from proposals with due dates in the near and distant future, and we discussed a few ethical issues. Some of our sections displayed writing problems that we have grappled with throughout the term. I’ve summarized three common problems and remedies in the following table.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Diagnosis</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>“This is …”</td>
<td>indefinite reference (ir)</td>
<td>“This {insert noun} is …”</td>
</tr>
<tr>
<td>“There are …”</td>
<td>ir; false subject</td>
<td>Delete and create new subject for sentence</td>
</tr>
<tr>
<td>“In order to …”</td>
<td>superfluous opening</td>
<td>“To …”</td>
</tr>
</tbody>
</table>

Other principles that we have tried to embrace throughout the course include:

- Use first person
- Use active, evocative verbs
- Use simple, easily comprehended language instead of jargon
- Use parallel construction within a sentence
- Be consistency in verb tense
- Open each paragraph with a roadmap or overview sentence that anticipates the main point and full content of the paragraph
- Use transition sentences to enhance flow in paragraphs
- End each paragraph with sentence that summarizes its contents or bridges to the next paragraph
- Place all citations at the end of a sentence
- Arrange each set of citations in chronological order
- Demonstrate mastery of the literature by citing originators as well as recent reviewers
- If space permits, begin each section of your proposal with a roadmap paragraph
- Avoid a simple, chronological account of personal history or experience. Instead, open your narrative with an illuminating epiphany. Return to the point revealed in the epiphany at the end of your narrative
- Make your proposal for outreach (broader impacts) compelling by having it mesh with your personal experience

We also discussed some ethical issues: (a) asking for permission to use photographs that colleagues have posted on websites, (b) dealing with unauthorized appropriation of website material and (c) the consequences of awards to institutions rather than to individuals (e.g., moving award money to a new institution may be at the discretion of the original institution). What about overlap with ethics discussions in other courses (e.g., MCB 557, IST 520)? Two points are relevant here. First, because our primary focus is on the ethical issues that arise in the context of proposals and awards, we have probably gone into more depth in those domains. Second, by discussing ethics in a workshop rather than lecture setting, we have learned by interacting and by sharing experiences.