

A Day in the Life of a Study Section Member [or Grant reviewer?]

(or how to avoid some common mistakes that hurt your grant score)

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It is 2 AM Monday morning, and I still have two grant applications to read. I have already read all eight of my assigned applications once, but now I know I need to enter the scores of the last two on the Commons website for the rest of the study section to view. I take my job on study section very seriously, yet it is not uncommon that I need to read or re-read applications in the middle of the night. Life is just like that—I have days full of responsibilities, and being a study section member is not part of my normal daily schedule. It is an add-on activity among many other add-ons, so nights are the primary time for review. On this night, I am privileged to read two applications that demonstrate well some of the Do's and Don't's of grant writing.

I cringe unconsciously when I pull up grant #1. I know this investigator's work, and I think he (could be she) is very capable, enthusiastic, and creative. But he/she is a terrible grant writer. I skim through the biosketch and facilities pages quickly, because I am familiar with these aspects of the application and they are acceptable. I focus intently on the Specific Aims, and here is where serious problems begin. The abstract presents a biological problem in somewhat vague terms, and the Aims are not compelling. The wording goes something like "To assess the role of X in the HIV lifecycle" for Aim 1, and "To determine if X is important in macrophage infection by HIV" for Aim 2, and "To identify cellular partners for X" in Aim 3. At 2 AM, these Aims make me think that X has not yet been demonstrated to be important, and I am already guessing that Aim 3 will be a proverbial "fishing expedition." Still, I give him the benefit of the doubt and read on. After all, if the Preliminary Data section demonstrates some new, exciting findings and the proposed experiments follow logically, I can get on board and get excited about the grant.

I should know better than to get too excited. The Background section is acceptable, and it goes by very quickly because I work in the field and don't really need it. In the Preliminary Studies section, the first figure is a killer. Here I see a Western blot with wavy, indistinct bands, and it looks like it has been pieced together with scissors and glue. After that I don't care what the interpretation is, because I have lost all faith in the data. The next figure is an immunofluorescence micrograph that is supposed to show that X colocalizes with the HIV Gag protein. However, the cells are shrunken, the magnification is too low to indicate any specific subcellular localization, and the figure legend is confusing. Having only seen two figures, my mind now classifies all the rest of the data as "poor quality." Nevertheless, I persist and read further. The text refers to real-time PCR data shown Figure 8, but I am unable to find Figure 8 (turns out it is 2 pages away). When I do find it, Figure 8 is an electron micrograph of budding particles. I guess that the writer actually means Figure 7. As I finally arrive at the end of this section, I have lost faith in the bulk of the data that forms the basis for the rest of the grant. Furthermore, my attitude toward the writer has not been helped by the fact that he did not proofread his own application. I curse under my breath, and move on.

I read slowly and painfully through the remaining 15 pages of text. I nearly nod off on the pages where there are only solid walls of text, with no diagrams or figures. Some pages even lack headers to orient me to the organizational scheme or thinking of

the writer. The Experimental Design section should ideally be a series of logical and well-controlled experiments testing specific hypotheses. Instead, I encounter rambling text that goes back-and-forth between background information, rationale, and actual experiments that are planned. At the end of some of the pages, I cannot honestly tell what specific experiments the investigator plans to perform, or what the anticipated outcomes might be. As I move into Aim 3, I see that the investigator proposes a yeast 2-hybrid screen that looks too familiar. In fact, it is identical to the section from a previous round of review of his application. During that review I wrote specifically that “this seems to be a fishing expedition, and should not constitute an entire aim of the proposal.” The investigator has now re-submitted the grant with the exact same experiments. I feel like he has slapped me across the face, or perhaps that he didn’t even bother to read the critique. Finally, I score this grant as a 2.9. I feel a little bit badly for the investigator, who has published some important work, because I know this score will again put the grant in the 50% of applications that are “triaged.” However, I have no choice, because the plans and the writing are clearly inferior to most of the other applications. I’m also a little mad at him for ignoring previous criticism, although I try not to let this affect my score. After reflecting and letting my anger cool, I wish I could give this investigator some advice. If I could, the advice would be the following:

- 1) You seem to have some exciting ideas. However, they do not come through clearly in the Specific Aims or the Experimental Design. Moreover, they are not well substantiated by the data shown in Preliminary Studies.
- 2) Work on refining your Specific Aims. These must encompass the most important ideas to be tested, and they should be crisply stated.
- 3) Never show poor quality data. Have a colleague proofread your grant, and make sure the points come across through each figure, not just in the text.
- 4) Keep the experiments in the Experimental Design section, and keep the background data in the Background section. We should already know your ideas and the background information by the time we reach the experiments.
- 5) Break up the application text with spacing, figures, or creative diagrams. This will keep a reader interested and awake.
- 6) Use a logical lettering/numbering system as you progress through the grant. Proofread the grant carefully to avoid mislabeling or sloppy numbering. You really don’t want to offend the reviewer.
- 7) Consider having a pre-review by colleagues who have been on study sections. Your assigned study section members obviously cannot give you this type of feedback, but others can. You can send your grant to colleagues at your institution or at other places. Some investigators or Departments will pay reviewers to do this. Take this seriously, especially if bad scores are recurrent.
- 8) Never, never, never ignore the criticism from a previous round of review. You can explain why you do not agree with the criticism, but you **MUST** respond completely and respectfully. Failure to respond or modify the application infuriates reviewers, and is basically the kiss of death for your application. Envision the reviewer’s face becoming red; visualize him or her forcefully throwing your application in the trash. Imagine how this emotional response affects your score.

Things are now getting blurry, and I know I have a full day tomorrow at work before boarding the plane to DC for the study section meeting. To my great relief, the next grant is a great pleasure to read. The investigator has recently published an outstanding paper relating that X inhibits HIV replication, and the grant will follow-up on this exciting and important area. The novelty and importance of the finding comes through in every page. The Aims are logical, flowing from the new discovery. Aim 1 is “To define the interaction of X with cytoplasmic dynein”, and I know that there will be some data in Preliminary Studies that implicates an important role for dynein. In fact, the Preliminary Studies section goes far beyond the recent paper, and shows new data connecting X with several cytoskeletal motor proteins that may play a role in HIV replication. I get the feeling that the investigator is very near to another important paper in this area. Each Aim is connected to the overall objective of the grant, and the experiments are clearly laid out with appropriate controls. A novel imaging technique pioneered in the investigator’s laboratory will be applied to examine the kinetics of the proposed interactions between HIV structural proteins and X. Each page has beautiful figures, ample space between sections, and clear headers that allow my sleepy mind to recognize exactly where the investigator is going. I re-review my previous score (1.5), and I like it even better this time. I enter a 1.3 on the website, and I am confident that I can argue at study section that this application is outstanding and significant to the field.

As I turn in, I feel satisfied that the scores are fair, although I still feel badly for investigator #1. I can only feel, however, that the grantsmanship flaws in his application are his own fault. Only he has the ability to fix the flaws. If he would simply take the time and care to work critically through his application, get outside help prior to submission, and respond carefully to criticisms raised previously by the study section, he could make a strong case for his ideas.