

## *Psychology and the Reviewer*

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By Lucy Deckard, co-publisher

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It's hard to think of a more complex set of cognitive processes than those that a reviewer employs when she reads a stack of research grant proposals, rates each according to multiple review criteria, and recommends which to fund. In recent years, psychological research has yielded a number of fascinating discoveries related to how humans understand and process complex concepts, and how they make decisions based on complex and multi-faceted evidence. Many of these studies, reported in the popular press as well as in academic journals, typically focus on decisions such as how people decide which car to buy when given a large number of choices and metrics. However, they can also provide valuable insight into the psychological processes that affect the way a reviewer reads and understands (or fails to understand) complex research proposals and then decides how to rate them. PIs developing a research grant proposal would be wise to take these new findings into account. Below are a few of those insights which can help inform how you structure and write your research proposal.

### **The Emotional Nature of Complex Decision Making**

A number of [studies](#) have indicated that as people are required to take into account more variables and criteria, complex decisions become more influenced by “unconscious” factors, especially emotions. So, [for example](#), if a subject is asked to choose from among several different car models and is given a raft of data on each model, the “rational” processes of the brain become overwhelmed, and intuition starts to exert a powerful influence on decisions. There is still a lot of [debate](#) over whether decisions made this way are [better](#) than those made using conscious, logical processes, but the fact remains that when a reviewer must read and evaluate four proposals in an evening after a full day of teaching and committee meetings, he is unlikely to make a spreadsheet that will allow him to meticulously weigh all factors in each proposal that are relevant to the review criteria. Instead, he's likely to give each proposal a quick read and then use his (hopefully well-informed) “gut” reactions to fill out the review sheet. Even more interesting, the reviewer is often [unaware](#) of the various unconscious factors that influenced his decision.

### **How can these findings inform how you write your proposal?**

Think about that poor reviewer who is already tired when he starts reading the stack of proposals he has to get through that evening. When he gets to your proposal and starts reading the first page, he will have an emotional reaction. Does this proposal look exciting and interesting? Am I going to enjoy reading this proposal, or will this be a long, hard slog? Now consider how he will feel if he opens your proposal and the first page looks like this:

## Project Description

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The reviewer will likely have an emotional reaction before he even reads one word. That reaction might very likely be summarized as something like, “Ugggggh!” He knows that reading this proposal is probably not going to be any fun. He also may, at least unconsciously, feel that the PI of this proposal does not care about him, the reviewer, and has not made any effort to make his job any easier. He may be already be feeling some resentment toward the PI of this proposal.

So, there your proposal is—the product of countless hours of your hard work. You agonized over how to explain your rationale, made sure to cite all relevant references, included an insightful and thorough discussion of the state of knowledge on your proposal topic, and developed a strong experimental plan, but your reviewer is already developing a budding antipathy toward your proposal before he’s read a single word. This will be a tough hole for you to climb out of. If you are depending on the logical brilliance of your arguments without considering the emotional reaction your reviewer will have to your proposal and how powerfully those emotions will influence the reviewer’s assessment of your proposal (likely without his even being aware of it), you may be out of luck.

What if, instead, the reviewer opened your proposal, and the first page looked like this...



## Project Description

### INTRODUCTION AND OVERVIEW

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### Approach

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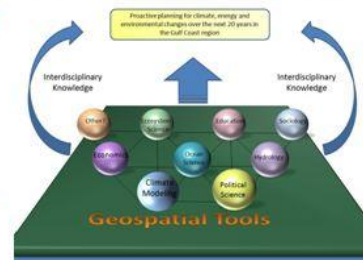


Figure 1. This figure explains our approach

### Innovation

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Your reviewer will likely have a much more positive emotional reaction to your proposal. This page looks inviting, the figure provides a quick and aesthetically pleasing overview of the proposed approach, the presence of headings, bullets, and white space indicates that this proposal is likely to be well-organized, easy to follow, and a pleasure to read. Clearly, the reviewer will not have decided to give this proposal a positive review at this point, but he's definitely starting off with a much more pleasant attitude. He's probably thinking, at least unconsciously, that this PI has put a lot of effort into making this proposal easy to read and seems to know what she's doing.

This "first impression" emotional effect can be further magnified by your first several paragraphs, and even your first several sentences. If you start your proposal with a general discussion of the need or the problem you're addressing that could fit into several other proposals in the same stack (for example, the need for biofuels or better ways to detect prostate cancer or more secure computer networks), the reviewer's first experience with your

proposal will be boredom. Again, you'll have dug yourself into an emotional hole with your reviewer that you'll then have to climb out of in subsequent pages (assuming your reviewer continues to read your proposal carefully after the first page). To avoid this trap, start your proposal with the most exciting aspects of your proposal. Don't wait until the third page of the proposal to try to get your reviewer excited; it may very well be too late by then. (We've discussed in more detail how to make the first few pages of your proposal more engaging to reviewers in [several previous articles](#).)

### **Cognitive Load and Its Impact on Understanding**

Cognitive load is defined as the amount of information that a person is trying to process at one time in working memory. One of the conclusions of cognitive load theory is that learning happens best when you don't require a subject to use part of their working memory on non-essential tasks, but instead allow them to keep as much of that memory free to learn the new concepts you're trying to teach. So, [for example](#), it's more effective to include labels in an illustration of a heart, rather than placing numbers in the figure and then forcing the student to look in a separate place to read the text identifying the parts of the heart. The latter approach increases cognitive load on the student, making it more difficult for him to actually learn the parts of the heart.

#### **How does cognitive load theory relate to how you write your proposal?**

Think of your reviewer as a student, and you (or more precisely, your proposal) as the teacher. You're trying to clearly and efficiently help the reviewer understand many complex concepts: what your main idea is, how you will execute it, what the likely outcomes are and why they are important, how your idea will further the goals of the funding program, why you are qualified to conduct this research, etc. This is a lot of knowledge that the reviewer must comprehend on a first reading when she may already be tired, so she'll need as much of her working memory as she can get to understand the key concepts of your proposal. However, many PIs inadvertently place unnecessary cognitive loads on their reviewers that make it harder for them to grasp the important aspects of their proposal.

One common cognitive load is the unnecessary use of **acronyms**. While some acronyms are so commonly used in a discipline that it would be distracting not to use them, many are common only to a subfield or even to a particular institution or investigator. In these cases, many PIs define the acronym when it is first used and then use the acronym alone throughout the rest of the proposal. Unless these terms will be used again and again throughout the proposal, it's usually best to go ahead and spell out the term rather than using an acronym. Otherwise, the reviewer either has to devote some part of her working memory to remembering an acronym that was mentioned on page 2 and again on page 7, or she has to go back through the proposal to try to find the definition (which brings us back to the first topic of this article, the influence of emotions, which in this case would be annoyance). So, for example, rather than saying on page 2, "This research will be conducted in Big State University's Institute for Biochemical Innovations (IIBI)," and then referring to the IIBI on page 7 and again on pages 11 and 12, just spell it out each time and let your reviewer use those precious neurons to understand your research methodology.

**Overly convoluted and long sentences** are the source of another common cognitive load

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imposed by PIs on reviewers. If your proposal contains a lot of long sentences with multiple dependent clauses, try breaking the sentences up or simplifying the sentence structure. It's especially important to put the main idea early in the sentence. For example, rather than saying,

“Due to the scarcity of Unobtainium, requiring that we have samples shipped from Outer Mongolia, and the difficulty of analyzing those samples for purity, which will be done by our collaborators in Nova Scotia, we have developed a novel test method that requires only 0.4 g samples.”

you could rewrite the sentence as,

“We have developed a novel test method that requires very small (0.4 g) samples. This method will allow us to make maximum use of scarce Unobtainium samples, which must be shipped from outer Mongolia. Since less Unobtainium will be required, our collaborators in Nova Scotia will need to conduct fewer purity analyses, which are difficult and expensive to run.”

The three simpler sentences employ a straightforward sentence structure with the most important point in the first sentence. Even though they require a little more space, this approach imposes a much lower cognitive load on the reviewer. Remember that a reviewer with a stack of proposals to review is unlikely to re-read a sentence that she finds confusing; instead, she'll just skip it and go on.

### **Using frameworks, schemata, and stories to communicate complex ideas**

Research on learning has found that people learn new bits of information better when they can fit them into a pre-existing mental framework, or [schema](#), for how the world works. See [this video](#) for a great example. Similarly, people find stories much easier to learn and remember than they do collections of facts.

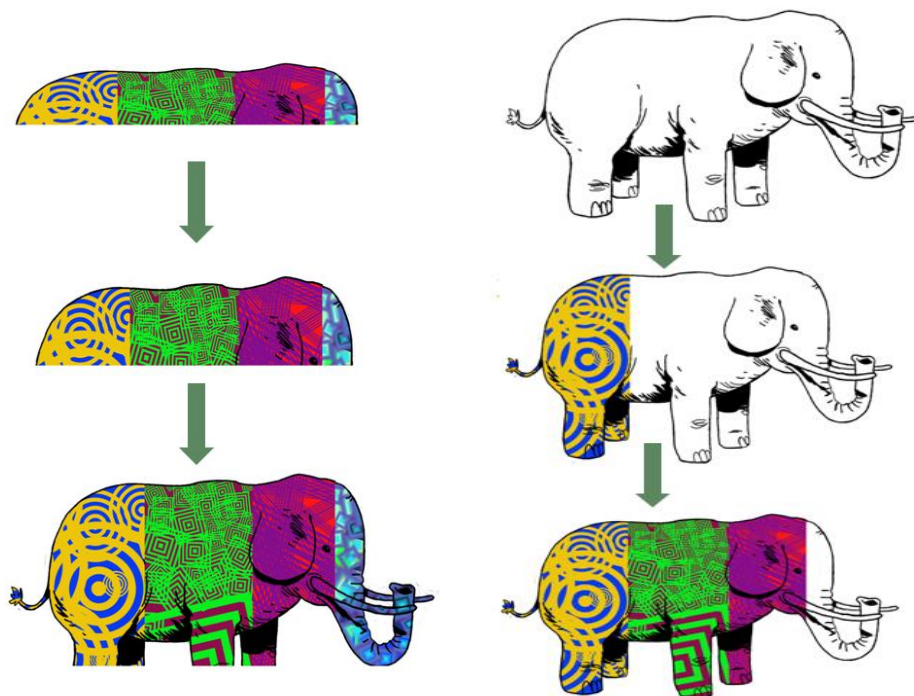
#### **How can these learning theories inform how you write your proposal?**

Many PIs start their proposals with a background discussion that may focus on the problem, need, or opportunity they are addressing. If the reader is lucky, they also include a brief statement describing their overall project goals. Then the proposal steps through the state of the art and the relevant literature, preliminary data and prior work, the research plan, etc. This approach presents a collection of disparate information spread over the numerous pages of the proposal narrative. The reader is left to stitch together this information into a story (similar to puzzling out what animal is initially shown in Figure 1). As a result, the reviewer can get bogged down in details without understanding the big picture: What is the PI trying to accomplish? What is new and exciting about her approach? How will this research affect the field? PIs can often see the result of this problem in reviews that seem to have completely missed the mark. The PI may puzzle about why the reviewer didn't seem to understand the proposal at all. In these cases, it's likely that the proposal didn't clearly articulate the “story” of the project.

To address this issue, rather than starting your proposal with a background section, make your first section an **overview** that presents the framework, schema, or story of your proposal. This one-to-two-page section should provide a concise high-level overview of the entire project

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which will then be filled-in in subsequent sections. This provides the schema or mental framework into which your reviewers will place all the detailed technical discussions you will include in the rest of the proposal (as in Figure 2).



**Figure 1.** Describing your project without a framework will make it difficult for your reviewer to absorb the new information you present.

**Figure 2.** Describing your idea by providing a framework first will orient the reviewer and make it easier for her to understand new information and why it's relevant.

This overview will explain, in no more than two pages, the **story of your project** (Figure 3).



**Figure 3.** Use the first section to provide a cohesive story of your project.

When your reviewer finishes reading those first one or two pages, she should have a general understanding of your project, and she should be excited by your ideas. Most importantly, she should be enthusiastic about reading the rest of your proposal to find out more.