Getting started on a paper or proposal

Key points:
- Know your message before you start writing
  - Message of paper= conclusion; message of proposal= overall goal
  - Statement of message should be as accurate, powerful, and direct as possible
  - Ways to draft the message
    - Talk about it, then write it
    - Draft and revise, revise, revise
    - Synthesize results, then simplify and polish
- Planning before you write can make writing go faster and more smoothly
  - Ways to plan
    - Color coding helps organize
    - Mapping helps generate content
    - Note cards/ Powerpoint slides help organize
    - Outlining helps you move from a general plan to a draft
  - Can always change the plan later if it doesn't work

For some writers, especially those who find writing an intimidating task, beginning a document is the most difficult part of the writing process. Getting started is less of a challenge if you break it down into steps and use a strategy to tackle each one. The first step is knowing what you're going to say—what the overall message of your paper or proposal will be. The second is planning how to convey that in each of the sections—what arguments you will make, what evidence you will use to support them, and how all of the ideas will be organized. Another advantage to thinking and planning before you start writing is that it helps make your first draft more focused and reduces the amount of revising you will need to do.

Know your message
Though scientific writing may seem simply to describe results or planned experiments, it also makes an argument about them. We've already covered the argument that proposals make—that the author's experiments are worth doing and that he or she should be the one to do them. Papers and other communication about completed research also makes an argument—that the author's interpretation of the results is correct. This means scientific writing is persuasive, like other academic writing, which centers around a thesis. Good academic writing has a clear, identifiable thesis, which you may recall spending a lot of effort crafting when writing papers for humanities classes in undergrad (or getting comments on from instructors), and similarly, good scientific writing should have a statement of the central argument.
→ *Papers and proposals make a point*

This "thesis" is the overall message of the piece of writing, the thing the whole document will be about. The overall message is the one sentence that sums up everything—the one thing you want your reader to remember and be convinced of by reading your paper or proposal. *In a paper, the message is your conclusion*—what all your results allow you to say that you couldn't have said before you did the experiments, and *in a proposal, it's the goal*—the thing your experiments will allow you to discover. Knowing the conclusion or the overall goal before you start writing makes the writing process easier, since it helps you decide what you should include and what you should leave out and in what order you should present your material. Using the "thesis" to inform these decisions makes the resulting paper or proposal more effective, that is, more likely to convince your reader that your proposal should be funded or your paper should be published (or read or cited).

Since this one statement will shape the whole document, it's important that it reflects all of your important results or all of your aims. Making your message statement comprehensive will help the reader see how all of the experiments relate to the story as a whole, since they will all relate to the conclusion or goal, which summarizes the story. We'll cover how to make the statement comprehensive with the first example. Also, because this statement is what you're trying to convince your reader that you can and should do (if it's a proposal), or have done (if it's a paper), it should sound certain and confident, not hesitant. Your reader likely won't believe that you can accomplish your goal, or have demonstrated your conclusion, if the statement of it includes "may" or "could." If your experiments won't or didn't actually show the thing you're trying to use as your goal or conclusion, then you need to back up a step to something you can say without those modifiers. (See lessons 4 and 5 for further explanation of how to come up with a conclusion). Further, since you want your readers to remember the message, it should be written in a way that's most likely to convey to your readers what you're trying to say. In other words, it should be a sentence that a reader can understand easily the first time he or she reads it. Easy-to-understand sentences are generally simple: they state one idea in as few words as possible.
→ *The conclusion or goal should be* <u>*accurate, powerful, and direct*</u>

Ways to draft the message
But how do you come up with that statement, and how do you make it as accurate, powerful, and direct as possible? If you have a strategy that you know works for you, stick with it, but if you think your statement of the message could be improved, try something new. One approach is to start by talking about your results or your planned project with a colleague (or two or three) to find out what he or she thinks the conclusion from the results or the major goal of the project is. Even if you disagree, the discussion may help you realize what you want to say, and talking can often be less overwhelming than writing since you don't have to commit anything to a file or paper. (Of course, your "thesis" can always be revised as you plan and write.) Another way to get to a clear statement is to draft something without trying to get a

perfect first sentence, then comparing it to your results or planned experiments and refining it, then comparing it to a message statement that you find particularly effective and refining your draft, then trying to make it more direct (see "Conveying action" for how to do this; a simple way is to use fewer words without losing any meaning) and refining again, continuing to re-consider the sentence until you can't improve it any more.

→ *Come up with the message statement by talking or by drafting and refining*

Here's an example to show what this process might look like. We'll use the MAGL paper (Nomura DK et al., *Cell* Jan 2010) again since it's familiar.

Example: composing a message statement

Key results:
- aggressive cancer cells express more MAGL than other cancer cells do
- aggressive cancer cells contain more free fatty acids that MAGL produces
- disrupting MAGL impairs pathogenicity
- MAGL regulates tumorigenic signaling pathways

Let's make a stab at integrating these results:

> Increased expression of MAGL in cancer cells increases metabolism of lipids to produce free fatty acids, which regulate protumorigenic signaling pathways, making the cancer more aggressive.

That's an awfully long and unwieldy sentence, so we have a lot of room to improve. Maybe there's something in there that we don't need to say—let's consider what's already known: that malignancy requires production of tumorigenic lipid signals.

> Increased expression of MAGL in cancer cells increases metabolism of lipids to provide the free fatty acids necessary to synthesize protumorigenic lipid signals.

OK, now it's shorter, but it leaves out the distinction between aggressive and non-aggressive cancers. That distinction is important, so let's place it at the beginning:

> Aggressive cancer cells express high levels of MAGL, causing increased metabolism of lipids to provide the free fatty acids necessary to synthesize protumorigenic lipid signals.

That doesn't seem as direct as it could be. There are an awful lot of verbs in there, and not all of them add meaning.

> Aggressive cancer cells express high levels of MAGL, which liberates the free fatty acids necessary to synthesize protumorigenic lipid signals.

We could probably do even better with more rounds of revision, but we'll stop there.

Why planning helps

Now that you know what your paper or proposal is about, you can use it to motivate your plan for each section. (There's no need to plan the whole paper at once since the purpose of each section is distinct [and you may need to write one section in order to plan another]. Further, moving from planning a section to writing it helps keep you from forgetting what you intended by your scribbled or abbreviated plan.) Not everyone plans before writing, and there's nothing inherently wrong with moving straight from an idea to a draft, especially if you write efficiently or can keep your

plans in your head. However, if the first draft requires a lot of effort and stops and starts, or goes in circles or skips among unrelated ideas, planning might help. As with any stage of the writing process, many strategies have been invented for planning, and as with the number of steps in your process, there's nothing inherently better about one than another. Trying lots of approaches will increase the odds that you find something that works with the way you think. Further, planning an individual section may involve more than one planning strategy, especially if you start with something like a list and need a more detailed plan to feel ready to write.

> → *Planning makes your writing more organized and efficient*
> → *There's no one right way to plan a piece of writing*

Here are a few approaches for planning a section. There are undoubtedly many more (and I would love to learn more so I can share them with other research writers—please be as detailed as possible in your answer to question 5 if you do use a different strategy from those listed), but these are some starting points.

Color coding is especially useful if you know most of what you want to say but are unsure of how to organize it.

- Write out all the ideas, arguments, and evidence that you want to include in the section. The form of this brainstorm doesn't matter—it could be sentences, phrases, or words. Also, it doesn't have to be complete; this is an early step and you will likely come up with more details and connections as you plan and write. Nonetheless, the exercise will be more useful if you have a lot of material to organize
- Highlight the most closely related material in the same color, using as many colors as you like. If you don't have many colors of markers or pens, indicate the groups by underlining, circling, drawing stars or squiggly lines, etc.
- If any item is highlighted in a different color from everything else, it might belong with another set of items, if they're different types of evidence supporting the same argument or different comments about the same result. If it doesn't belong with anything else, it should be its own paragraph, as long as you can elaborate on it.
- Make a key: write what each color represents, or what all the things highlighted in that color have in common. These will be the topics of paragraphs or sets of paragraphs.
- If necessary, re-write so that all items highlighted in the same color are adjacent to one another.

Mapping helps generate content in an organized fashion.

- Write the overall message in the middle of a piece of paper.
- Brainstorm related topics, writing each near the overall message and connecting the topics to the message with lines. If you're planning a discussion, these topics might be alternative interpretations, possible

mechanisms underlying your observations, and implications for the broader field.

- From each topic, expand by writing specific ideas and evidence within them, connecting the specific material to the topics with lines. If these ideas suggest further elaboration (for example, if there are two pieces of evidence supporting a possible mechanism), add further branches.
- This map indicates the organization of the section: all of the material on each topic will be in the same subsection, which may be one or several paragraphs, depending on the degree of branching.

Using <u>notecards or powerpoint slides</u> puts ideas you already have in order. This approach is very open to adaptation.

- Write each independent thing on a card or slide. Each card could have just a few words or a heading and supporting points.
- Shuffle the cards or slides around until they're in the order that makes the most sense. This may involve grouping related things or ordering them all according to some principle (such as importance). Deciding on the order may be more complex, requiring you to think ahead to how you might write transitions between topics—the order in which transitions are easier to imagine will work best.

<u>Outlining</u> requires that you already have an idea of what the major topics are and what pieces fall under which topics. This strategy helps translate that plan into a complete written section.

- Write each main idea as a heading (all the way on the left), in the order you intend them to appear in the paper or proposal. Composing all of these in the same format (all sentences, or all infinitive phrases) will improve the continuity of the resulting text.
- Write each piece of supporting evidence or argument as a sub-heading (indented more than the headings). Each heading should have at least two supporting pieces. Continue adding supporting details below those, indenting more for each level of subordination.
- Your outline can be as elaborate as you want. I tend to outline so much that all that's left to do next is turn phrases into sentences, but others may prefer to do more of the work in the drafting stage.
- The format of the outline may determine the paragraph structure of the text—each sub-heading might be a paragraph, and each most subordinate point might be a sentence—or it might not. For example, some sub-headings might have too many supporting points for one paragraph, while others easily translate into unified paragraphs.

These approaches each help the writing process in different ways, and some may not lead you to a clear enough plan for you to feel ready to write. Thus, combining approaches may be more helpful than using just one. For example, color coding leaves you with a set of groups in no particular order; shuffling notecards on which the topic of each set is written may help determine which order works best.

As you plan a section, you may realize that you're not sure what order of ideas works best or that you need more evidence to support an argument, but you're not sure what would be most convincing. These sorts of issues may be easier to address by discussing them with someone else than by staring at a computer screen, and figuring these things out before you start writing may make drafting easier.

→ *Combine approaches*
→ *Can also plan with help from a colleague*

After you start to write, you might notice that the plan doesn't work as well as you'd thought it would—you might have more material on a minor topic than necessary, or you might have trouble transitioning between ideas. In this case, *revise the plan*—there's no reason to stick to it if it doesn't help you write. Making your writing logical and clear is more important than following a set of steps.