

ON WRITING MAJOR ACADEMIC PAPERS (AND SOME NOT SO ACADEMIC)

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INTRODUCTION

A number of student of my acquaintance have struggled mightily over their major research papers or theses. They want to know whether it is possible to survive such a painful process. When I describe my own writing difficulties to them, they often ask if I have anything specific to suggest based on my own experience. The following very modest short document is an initial attempt to answer this question. The following sections briefly talk about finding the research question for the paper, reviewing the literature then challenging it, planning the research, and getting through the writing process. Finally, I identify other resources, as well as offer some thoughts on why writing is so difficult and what is to be done about it.

FINDING THE QUESTION

Most (all?) research begins with a primary research question or a hypothesis that is to be proved, not disproved, or disproved. Most people who have survived the process strongly recommend that the question be interesting to you at the outset, because it is hard to get to the end if it isn't. You will want to think carefully about the question you plan to answer, and be prepared to change it as you find out more about the topic. An example of a primary question would be: "is it feasible to measure the stability of data models?" The key in choosing the primary question is to get the degree of focus correct. You want the topic to be broad enough to be worthwhile and narrow enough to get to the end of! For example, "how could we solve world hunger" would be problematic as a topic.

The question / hypothesis typically has a number of sub-components that you will have to address. You want to be as clear as possible about these, recognizing that they too may change over the course of the study. The sub-components to the sample primary question above might be:

- What do we mean by "data model?"
- What do we mean by "measurement?" (No, this is not a trivial question.)
- What do we mean by "stability?"
- Why is the question important? (This is a good all-purpose question that you really **must** be able to answer!)
- How does the community do data modeling? (This might have a serious impact on how we might go about measuring.)
- How might we construct such measure of data model stability?
- What issues might emerge in applying the measure?
- What results do we get when we do apply the measure?
- Are the measures and the processes designed to generate the results worthwhile?

In summary, choose a primary question that is very interesting to you. Articulate the primary question into a series of subsidiary questions. Be prepared to modify all of them based on your subsequent reading in the literature.

THE LITERATURE REVIEW

Once you've settled on a tentative primary question and some tentative subsidiary questions a literature review is vital. This effort will give you an idea of what has already been said and done about the topic and its sub-components. You get to think about previous work, assess where it is incomplete, how it might be done better, where it applies to your question and where it doesn't. Unless there is a compelling reason to do so (such as replicating and validating previous work), generally we want to avoid a simple repetition. Where possible, we want to advance knowledge.

One way to organize the literature review is to focus on the primary question, and its sub-components. Therefore the same piece of literature might be cited in a number of different sections of the literature review. This is acceptable, even desirable, since it is your job to organize the previous thinking related to the question in a way that helps the reader to understand **your** argument.

In the above research example, the first six bullets will have references in the academic and industrial literature that speak to one or more of the sub-components. For example, in the case of data modeling and the ongoing prevalence of the relational data model, it would be difficult to review the literature without making reference to E. F. Codd and P. P. Chen. The credibility of the work in part rests on the author demonstrating that she has taken previous thinking into account in the work. It is rather like a violinist having to master some of the work of Bach or Mozart, even if his heart's desire rests with Schoenberg. It's part of the standard repertoire. Your literature review has to identify the standard repertoire in the domain of the question you are examining, and you have to demonstrate its relevance (or alternatively challenge its relevance) to your question.

CHALLENGING THE LITERATURE

The only literature we might ascribe to God is religious literature. There is no academic literature that has been handed down by the Almighty notwithstanding the formality and solemnity of the writing style. It is produced by humans and is therefore fallible to varying degrees. It is your responsibility to identify its fallibilities and challenge it where appropriate.

One of the major differences among a thesis, a research project, and a research paper is the depth of literature review that is undertaken. A thesis is more comprehensive. In both cases, the contribution of the literature and your contribution to the project have to be clear and separate. In both cases, you will want to demonstrate what the current theory has to say about the questions. You will want to demonstrate where there are differences of opinion in the existing thinking, in part because this typically helps to justify the research you undertook. It is not appropriate to simply accept what others have said as being gospel. The nature of research is that we make progress most effectively when we think carefully about what has been said, and subject it to appropriate challenges.

PREPARING THE RESEARCH PLAN

Let us assume that you need to conduct original research. With the background of the literature in mind, you can then articulate the process(es) by which you propose to answer the question. In other words, you will propose a research work plan that presumably clearly helps to answer your

question. The Sunny Marche 60 Second Planning Sermon states that every plan must have at least six elements in it:

1. an overall objective that is clearly stated and actually worth achieving;
2. a list of the tasks necessary to achieve the objective;
3. a clear indication of who has primary responsibility for each task;
4. what the resource requirements (such as the amount of time, money, expertise, cooperation necessary to complete) for each task might be;
5. the target date for each task; and,
6. the deliverable or outcome of each task (how you will know when the task is completed.)

You execute the work plan, generate results, do analysis, and present your thinking in the body of the document. In most research processes, wise people build in checkpoints where they review and report progress and problems to their supervisors. No one – not the student, not the supervisor, not the dean, and not the external reviewer – wants to get an unpleasant surprise at the end of the process.

ON WRITING

For many of us, writing is the problematic part of the whole process. What is to be done about this? For me, the CLAP process works. In my consulting days with Currie, Coopers and Lybrand, there was a documented discipline to writing that went by acronym CLAP – Concept, Logic, Accuracy and Presentation. Let's begin with Concept. The idea here is that you are not really ready to start writing your paper until you can articulate the basic idea in about three sentences. It's a smart thing to get the agreement of the supervising academic team to the basic Concept before going too far. Step two is the Logic phase – documenting the structure of the argument. You want to get the agreement of the team at this stage too. The Accuracy phase happens when it comes time to filling in the outline of the paper; you want to think about every assertion you make. Is the assertion true? What evidence do I have for it? Finally you will want to make sure that the Presentation is appropriate for the paper (correct margins, spelling, grammar, citations, font type, font size, page numbers).

When you are writing, you must have the prospective reader in mind. You want to achieve your communication objectives as effectively as possible. This usually means making as few cognitive demands as possible on the reader. Make it as easy as possible for him. As a general rule for long and complex documents such as a research report or a thesis, this can be very challenging. There are many techniques for keeping the reader engaged and connected to the material. First and foremost among these techniques is a clear and clean structure to the argument. Hemingway said that good writing is more about architecture than it is about interior decorating. If that rule is good enough for Hemingway, it is good enough for me. And for you.

Second among the techniques is alerting the reader in advance to the structure as you drill down. This is done by giving the reader a little preview of what they can expect. Third is reminding the reader about the logical thread at the end of each major section; in other words, summarizing what they have just read and showing how it connects backwards and forwards. Fourth, the physical design of the document can lower the cognitive demand on the reader. Font choice, in both style and size, is material. The general rule is to use a serif font in 11 points for text, and sans serif headings in sizes appropriate to the importance of the heading. Long texts warrant intermediate headings as signposts. Introductions and summaries to major sections help. Good transition paragraphs help. Spacing in the margins and between sections help. Parallelism helps. It is well and good when the document is clear to you, but your job is to make it clear to the reader.

Wise students submit the work in sections to their supervisor so they are in a position to make mid-course corrections. This means version control of the document becomes an issue and having the date in the footer helps with that. If you don't have a supervisor available, you should find a second set of eyes to have a look at what you have written. Editing your own work is very difficult to do well. These are a few tricks in a very long list of suggestions offered by many others.

OTHER RESOURCES

There are many other resources to help you with this. May I suggest the following:

<http://spectrum.troyst.edu/~sltaylor/success.html#grades>

There is no shortage of help out there. The key is turning that help into action. That means overcome the fundamental difficulty of writing. Another interesting group is the Dead Thesis Society <http://is2.dal.ca/~dts/>, that has a number of really good references, most notably on procrastination and time management.

WHY IS WRITING SO DIFFICULT FOR SO MANY OF US?

After 25 years of business and academic writing, the process is still difficult for me. In my experience the primary reason for this struggle is simple: the process of writing demonstrates very clearly that our thinking is inadequate, our data collection is incomplete, and we've often left the project too close to the deadline. The key antidote to this diagnosis is to recognize that it **isn't** the writing that counts; it's the **re-writing** that's important. If you recognize the truth of this, then the obvious thing to do is to start writing as soon as possible in recognition that you can't ever make it perfect. You are not even likely to make it good on the first pass. You might get it to "good" after three or four times through the work. It's just that you can't get to the good draft until you've finished the first one.

CONCLUSION

This paper has taken a very cursory look at two complex activities – research and writing. The structure and approach of the document are designed to put into practice the advice found in the body. You can go back over the document and identify:

- the question being answered;
- the concept of the paper;
- the logic of the paper;
- the structure used to lower cognitive demands, including advance notice of structure;
- presentation (including font selection, margins, spacing between sections, etc.), and
- parallelism.

When I was doing my Master's thesis, I got one other piece of good advice – the A to C principle. To get to the end of the process, at some point you have to apply your Anatomy to the Chair! The sooner, the better.