

# TIPS ON THESIS, DISSERTATION, AND RELATED WRITING

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Over the course of a number of years, it has become apparent that efforts by students in thesis, dissertation, and related writing are made more painful than necessary because of poor planning and organization. This pain is felt by the student, the advisor, and others who review the writing. With this in mind the following assistance is provided. By following these recommendations the writing process should become more palatable to all involved. In addition, it should improve writing quality.

## Things to Remember

- Quality, not quantity is the objective.
- Scientific writing eliminates personal style; scientific writing should all be the same. “Save your unique and creative personal writing style for your next novel.” (Zale)
- The best writing cannot mask a poorly designed, executed, or analyzed study.
- “He got a great name, among the weak-witted, especially by reason of obscurity of his language, for fools admire and love such things as are wrapt in dubious phrase.” (Lucretius 2060 BP)
- “An honest tale speeds best being plainly told.” (Shakespeare)
- “If you want to make a reviewer (or advisor) angry do not organize, do not follow the correct format, do not edit, do not number pages, and do not pay attention to detail.” (Scalet)
- “The use of language is all we have to pit against death and silence.” (Oates)
- In other words, write plainly and concisely. There is no reason to say in 25 words what you can say succinctly in 10. There is no reason to put the subject at the end of a sentence. There is no reason for obtuse sentence structure. “Every sentence must be drafted carefully, then revised, prodded, expanded, slashed, kicked, worried over, and polished until it is a thing of impeccable beauty – and even then it should always be subject to further manipulation.” (Sindermann)
- Do not burden a reviewer with mechanical writing errors. Mechanics are your responsibility, others should not have to edit your carelessness.
- Remember that verb tense in your thesis, dissertation, or other scientific writing falls into two general categories. If it is an existing condition or common knowledge, it is in the present tense (*e.g.*, The largemouth bass is a centrarchid.). If it refers to work you (this includes data

<sup>1</sup>Great assistance was provided by a handout that had no listed author.

in the paper you are writing) or someone else has done, it is in the past tense (*e.g.*, Jones (1982) found largemouth bass in three areas.).

- A “first draft” does not represent the first time you have written something. **It represents the first time you believe the material is ready for someone else to read and critically review.** In reality the “first draft” may be your 5<sup>th</sup>, 6<sup>th</sup>, or more attempt at writing a particular document.
- Never agree to review writing for someone unless you are willing to really “critically” review the document.
- Be consistent in your writing.
- Recognize that periods and commas are not the only forms of punctuation. Colons, semicolons, dashes, etc. can be useful forms, but know how to correctly use them.
- There are specific page margins, table formats, etc. expected by the Graduate School and other publication outlets. It is your responsibility to know their requirements and all such requirements should be followed on the “first draft.”
- When in doubt, ask.

### **The Beginning (The Outline) – This may be the most important section in this handout**

In the beginning you have a research plan that outlines your objectives, methods, and design. Sometime thereafter you have data. Then you have analyzed the data. What now?

Now you need a plan that will help you organize your thoughts. Such a plan, in the form of a detailed outline, will save you (and others) untold time and grief. The outline may take you a long time to develop, but it will greatly shorten your writing and revision time. I recommend an in depth outline that provides the thought to be included in **every paragraph** of your writing project.

After you have outlined what every paragraph will contain, you can note what tables, figures, citations, thoughts, etc. will be in each paragraph. Using word processing you can then move these thoughts around into a more logical sequence as you review the order. Great care in citation accuracy should be taken during this step; however, you will, in the end, still need to check each against the original citation. During the outlining of your materials and ideas, ask yourself those questions.

1. Is this item needed?
2. Where does it belong?
3. Are all necessary items included?

## **Sections of the Document**

The “first draft” should include all pages and sections from the title page to the references or appendix. This means everything – abstract, acknowledgements, table of contents, list of tables, etc. **Always number the pages.**

### **Introduction**

The first major section is the introduction. The introduction and discussion sections are the most difficult to write. A poor writing job on the introduction will be the proverbial “kiss of death.” Keep it short, usually 1½ to 3 pages are sufficient for a writing project, and make sure the first sentence says something that ties closely to the purpose of your paper.

Something should be mentioned here about paragraph structure. Many people are unaware of the purposes of paragraphs. A paragraph is designed to present cohesive material in a succinct form; it also divides the text into logical subunits. Each paragraph is expected to have a topic or lead sentence and to provide a transition from what has gone on before to what follows. Correct paragraph formation allows the text to flow.

If you have a one sentence paragraph it usually indicates one of two things: 1) the thought is out of place, or 2) the thought is not important enough to be included. **No one sentence paragraphs.** If you have a page-long paragraph (or more) you had better reread what you have written. You probably have numerous thoughts that require more than one paragraph.

The introduction consists of four components (**in order of appearance**).

1. A solid introductory sentence that ties closely to the purpose of the paper.
2. The general field of interest (*i.e.*, “Why is this a problem or why is this work important and needed – what is the justification for doing this work?”).
3. The general important findings of others concerning the field of interest (do not go overboard, this is not the location for great numbers of citations).
4. The purpose (objectives) of your thesis, or dissertation, or paper.

Use the introduction to get the interest of the reader and provide background for your objectives. Use the statement of purpose or objectives to concisely state your **specific** objectives.

### **Study Area**

Most theses, dissertations, and papers will have a study area section. This is generally a relatively easy piece of descriptive writing, but requires your attention so that nothing is omitted. This is where your outline comes into play.

## **Methods and Materials**

Describe all methods and materials in enough detail such that someone reading the document, but not familiar with the field, would be able to understand its contents. You need to describe how and why you did things. This includes describing equipment, laboratory techniques, field techniques, statistical methods, etc. Explanations of why specific sample sizes were used, why particular equipment or techniques were used, or why you deviated from a routine are needed. Put it in an orderly and logical progression. If you have two or more divergent objectives, separate the materials and methods section into subsections.

Generally, too much detail in the materials and methods section is preferable to too little. You need to describe adequately how and why you did everything. Do not discuss materials and methods that you do not use in the results and discussion. Be careful and concise.

## **Results and Discussion**

There are two schools of thought on this portion of the paper. One is that these should be two separate sections and the other that the two should be combined. I prefer combining the two. There are legitimate arguments for each format; I prefer combination because I feel it results in a more cohesive paper that reduces repetition.

You have your detailed outline containing the order of your results and discussion. This is usually in sections and subsections (because usually you have more than just one item to report). Your outline includes what results you are presenting, the tables and figures to support results, what reference material you need, etc.

Now present the facts clearly and succinctly for your first result. Provide tables or figures, these contain your data. In the text, do not just repeat the material from the tables or figures. Point out the important points in the tables or figures and follow this with a discussion. The discussion is where you assess the meaning of results. It contains your interpretation (or meaning) of the results, what caused them, implications, etc. Use the published record to support your interpretation.

You can then go to your second result and follow the same format as above. **Remember – results go first, followed by a discussion of those results.**

Things to watch for.

1. Too much discussion of nonessentials.
2. Symptoms of megalomania.
3. Speculate, but be reasonable. A discussion must be firmly founded.

4. A single hypothesis to explain results is almost mandatory, but piling one on top of another is bad for the digestion of the reader and the reputation of the author. (See Ockham's Razor <[http://en.wikipedia.org/wiki/Ockham's\\_Razor](http://en.wikipedia.org/wiki/Ockham's_Razor)>)
5. Keep "statistics" in the background, except where they are the main point of the paper. Statistics play a supporting role.
6. Do not assume that a reader can read between the lines. Maintain in plain sight a thread of continuity in your writing. Use paragraph structure to enhance the flow of the text.
7. Do not refer to other papers just to increase the references cited section. They must fit into your discussion.
8. Do not avoid controversial issues, explain rather than refute.
9. Make sure all results are represented by techniques in the materials and methods section.
10. Make sure all figures and tables (including appendices) are in the correct format, referred to in the text, numbered consecutively, and that the material in each is discussed in the text.
11. A table or figure should appear in the paper as soon as possible after it is introduced in the text.

### **Conclusion/Management Implications or Applications**

Summarize briefly what the whole paper means. Fit the findings into some kind of framework of existing knowledge of the subject. This is not a recant or summary of results, the abstract does that. This is not a long section. All too often these writing projects just end at the discussion section; they need a real ending.

### **Abstract**

I put the abstract here, even though it goes at the start of a document, because it is usually written after the main body of the document. It is **one** paragraph and primarily summarizes the results and discussion. It does not list the contents, nor does it review the methods. It is an important section because in many cases it is the only thing people will read. It is a "stand-alone" section, so scientific names are needed.

### **References**

This section requires care and accuracy. Errors in the references section convey the impression of carelessness and disorganization. Make sure to follow the correct format down to

the commas and periods. Make sure that the citations are absolutely correct. Make sure that all citations in the text are in the references section and vice versa.

Before your document is finalized, all references must be crosschecked against the original articles (not the references section of another paper). Errors are perpetuated because of such carelessness. There is no excuse for an error in the references section. Accuracy is your responsibility, not that of the reviewers. Do it right.

### **Appendices**

This section may or may not be needed for your particular paper. I like to see it if information is cumbersome, contains a great deal of material, and is too lengthy to put in the text portion of the document. Basically it is tabularized raw data. Appendices are also a useful way of preserving data. It is possible that sometime in the future such data will gain added value as new analysis techniques are developed. All appendices should be referred to in the text. Tables or figures for the text proper are often developed from data that appears in appendix tables.

### **Title**

You will already have a title, but check to see if it still conveys the correct meaning. You may want to change it.

### **Tables and Figures**

Obviously these were done before now, but a few things need to be mentioned about them. Tables and figures are often the “meat” of a study.

Tables and figures are not raw data – they represent synthesized and manicured information. Each table and figure must stand by itself and not rely on the text for meaning. In addition, just because you developed a table or figure does not mean it is needed or cannot be changed; if it is not needed, delete it.

Because it is a stand-alone item the title must be explicit. An example of a poor table title – Table 1. Comparison of rainbow trout growth data. A good example of table title – Table 1. Comparison of growth, relative weight, and survival of rainbow trout (*Oncorhynchus mykiss*) collected in six eastern South Dakota ponds, 1976.

A table or figure must be carefully planned. It has two purposes: 1) to clarify your own thinking, and 2) to communicate information to the reader. Each table or figure is a single unit of communication and should be informative. Every table or figure needs to be referred to in the text. Not only does each table and figure need to be referred to in the text, it has to be more than just “Table 12 depicts food habit information.” You need to highlight the important points of the table or figure in the text. Tables and figures are integrated into the text and the text is written around them.

Avoid undue complexity. Ask yourself, “What is the purpose of this table or figure?”. It is **not** merely to show data, this mystifies and misleads the reader. It **is** provided to accomplish something specific; to reveal comparisons or changes, to reveal why something is significant, or for some other purposeful reason. (Note – be careful when using the word significant, only use it as it relates to statistical significance.)

You will have to choose between table and figure formats to present data. **Tables present specific information, whereas figures depict trends or relationships.** The main purpose of your data will determine the format of its presentation. Do not alternate between the two forms just for variety. In a plotted relationship the data points should be shown. Do not extrapolate beyond your data points unless you make this clear to the reader. Be as clear as possible. Limit the number of trends and relationships per figure. On figures, label the axes with units used and titles. Eliminate extraneous background material and lines. On both figures and tables avoid footnotes or subscripts whenever possible. Also remember that figure titles go below the figure and table titles go above the table.

In addition, figures in the form of maps, equipment design, etc., may be needed. This will vary depending on your product.

#### Summary of Tables and Figures Section:

1. Carefully design each as a specific unit of communication.
2. Show data meaningfully.
3. Group items in tables logically.
4. Construct tables in the correct format.
5. Decide between tables and figures depending on objective.
6. Always comma numbers 1,000 or above.
7. Oftentimes, maps, drawings, etc. require citations concerning their origin.
8. Decide upon the type of figure depending on objectives.
9. Avoid extraneous lines, etc.
10. Do it right the first time.
11. Use correct margins.
12. Make sure all numbers are to the same decimal point (this is important and should be consistent through the whole document).

## Additional General Writing Comments

- Do not put only the first sentence of a paragraph on one page followed by the remainder on the next page (called a widow). Do not put the last sentence on one page with the beginning portion of the paragraph on the previous page (called an orphan).
- Do not hyphenate words at the end of a line. Put whole words on one line.
- Make sure all numbers are to the same decimal point.
- Avoid writing as you might speak.
- Avoid jargon (this takes a concerted effort).
- Avoid redundancies.
- Define your level of significance if statistics are used.
- Do not use possessives or contractions (reword to avoid these).
- I prefer that documents not be right justified.
- Be consistent and concise.
- Avoid pronouns whenever possible.
- Use a thesaurus when writing.
- Use correct abbreviations (depends on style used).
- Know when a number should be Arabic or written.
- **During review of your writing, read every word for its meaning and spelling and its location in relation to every other word. Do the same for each sentence in a paragraph. Do the same for each paragraph in a section.**
- Do not depend on spell checks, they do not catch errors such as two-too, principal-principle, and-any, etc. They also do not catch other grievous spelling errors when the error is a real word. You must carefully read everything.
- Concise writing does not necessarily mean short sentences and avoidance of details, but rather making every word tell – *i.e.*, say what you mean.
- Watch for “Warning Words”. These are to be regarded not as invariably undesirable words, but as warning signals that something **may** be amiss, in need of improvement, or slated for elimination. One should get into the habit of noticing them at a glance.

Colorless Verbs (usually to be eliminated; they occur most commonly as the past participle, as shown):

accomplished	experienced	obtained
achieved	facilitated	occurred
attained	given	performed
carried out	implemented	proceeded
conducted	indicated	produced
done	involved	required
effected	made	

Wooly Words (sometimes these have a precise meaning; more often, they are an indication that a thought has to be sharpened):

area	level	situation
character	nature	structure
conditions	problem	system
field	process	

Words Incorrectly Used as Synonyms:

amount	alternate	minimal	varying
concentration	alternative	negligible	various
content		slight	varied
level			different

Dangling Words:

All words that end in “ing” or “ed” and all infinitives.

Danger Words:

this (obscure antecedent)	their, its, and all other pronouns
it (obscure antecedent)	

Vague Qualifiers (can usually be omitted because they add nothing):

fairly	quite	rather	several	very	much
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**The publication “Writing for Fishery Journals,” edited by John Hunter (American Fisheries Society, 1990), contains much useful information for both fisheries and wildlife students.**