The laws of writing a good dissertation

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Thanks to Peter King

What is this talk about?

This talk is about how to write a good dissertation.

A dissertation is a 15 - 300 page document in technical writing. It has an introduction, a middle, and conclusions, reporting on independent work.

For you, your dissertation is a very important part of the credit for your fourth and final year at university.

For me, your dissertation is one of two gazillion dissertations which will strike my desk with the force of a thunderbolt from Thor himself, sometime in 2009.

We need you to do this right, for the sake of both of us.

A deeper importance of this exercise

A dissertation is a structured example of what I will call carrying the reader.

To carry a reader you have to complete three steps:

- Pick up the reader and tell them where you're going (Introduction).

- Take them to another place, one which they would not have discovered on their own (Middle).

- Put them down, explain how they got there, and describe what they can do next (Conclusions).

This is a useful and important skill.

My qualifications to tell you about this

I do this for a living.

I've written over forty academic papers and I have given over a hundred academic talks. I have taught four undergraduate courses.

For better or for worse, I earn my livelihood by carrying readers to new and interesting places, mathematically and/or educationally.

When I co-author a paper, my co-authors usually ask me to write the most difficult pieces of exposition and do the final editing and arrangement of the text. Presumably, this is a vote of confidence in my abilities.

Like you, I have plenty to learn.

I try to get a little bit better every day.

Some laws

I'll now describe some basic laws of dissertation writing . . .

. . . in no particular order:

The law of spells.

If your spelling and basic grammar are wrong, then you are magically transformed into an ass in the eyes of the reader.

Incorrect spelling and punctuation are errors. The occasional typo is not a problem, but consistent errors make you look incompetent and destroy your credibility.

Sometimes, just one telling slip-up can spell disaster: Dan Quayle ran for president of the USA and misspelled 'potato'; he lost.

Some more examples:

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Is this blogger somebody you want to spend time with?

Posted by: Anonymous

Is their going to be snow tonight same on monday and the last thing going to be is their going to be a snow on friday.I would like to now very bad but i hope their is going to be a snow storm on friday thank you write back as soon as you can Thank you very much.

The law of spells.

Spelling and grammar are signs of a disciplined mind. We expect this quality of students for a university degree; it helps to make the qualification valuable.

It is an empirical fact that students with poor spelling and grammar are indifferent students.

My personal bugbear is correct use of the apostrophe. Get it right.

RESIDENTS REFUSE TO GO IN THE BINS
RESIDENTS' REFUSE TO GO IN THE BINS

(Example courtesy of Lynn Truss.)

The law of spells: if you don't respect the laws of English, then people won't respect you.

The law of structure.

The parts of your dissertation are:

- The sentence.

- The paragraph.

- The section.

- Introduction. Middle. Conclusions.

The law of structure

Sentences are the basic unit of technical writing. Don't abuse them.

Bad: High-quality learning environments are a necessary precondition for facilitation and enhancement of the ongoing learning process.

Good: Children need good schools if they are to learn properly.

(Example courtesy of

`http://www.plainenglish.co.uk/beforeandafter.htm`.)

The law of structure

Bad: Your enquiry about the use of the entrance area at the library for the purpose of displaying posters and leaflets about Welfare and Supplementary Benefit rights, gives rise to the question of the provenance and authoritativeness of the material to be displayed. Posters and leaflets issued by the Central Office of Information, the Department of Health and Social Security and other authoritative bodies are usually displayed in libraries, but items of a disputatious or polemic kind, whilst not necessarily excluded, are considered individually.

Good: Thank you for your letter asking for permission to put up posters in the library. Before we can give you an answer we will need to see a copy of the posters to make sure they won't offend anyone.

The law of structure

One paragraph should contain one idea; no more, no fewer.

It should always be absolutely clear what that idea is. If it isn't clear to you, then it won't be clear to the reader.

The law of structure

Bad:

ActiveX controls are just one part of the whole ActiveX technology, and we should really focus our attention there. ActiveX itself is a revision of Microsofts early OLE standards, which competitors found too desktop-centered. The modifications to ActiveX technology help make network objects more secure, more usable on multiple platforms, and smaller, so they move faster across the network. Of course, some competitors argue that ActiveX and DCOM do not interoperate with multivendor open object standards such as CORBA, and Microsoft has said it will upgrade to work with CORBA, but has not done the implementation at this time. The basic idea behind ActiveX technology is to support platform-independent, reusable software objects, so that an intranet or the Internet can offer a broad assortment of prebuilt functions.

The law of structure

Good:

The modifications to ActiveX technology make network objects more secure, more usable on multiple platforms, and smaller, so that they move faster across the network. ActiveX technology supports platform-independent, reusable software objects, to offer a broad assortment of prebuilt functions across a network.

Some competitors argue that Microsoft has not gone far enough in this revision of ActiveX technology and in its related standard, DCOM, because they do not interoperate with open object standards like CORBA. Microsoft has promised to upgrade to work with CORBA, but this has not happened yet.

(Example modified from

`http://www.webwritingthatworks.com/DGuideCHUNK4a.htm`.)

The law of structure

A section should develop a narrative of ideas, usually culminating in one 'big idea'.

It should always be evident what the 'big idea' is in each section; explain it at the start of each section, and/or at the end. Help the reader.

The Introduction and Conclusion should explain the flow of these big ideas, so the reader can navigate the document at whatever level of detail they wish, never losing sight of where they are on their journey.

I wrote this over the weekend:

7 Completeness

In this section we show that derivability of equality is complete with respect to the semantics. For this we need the notion of a *free term model*, which is slightly but significantly different from the definition normally used for universal algebra.

7.1 Free Term Models

Perhaps you don't know what completeness, semantics, and free term models are — but you do know what the big idea of section 7 is.

Note also the use of 'we'.

The law of structure

The law of structure: use structure to communicate your ideas.

The law of keywords

The law of keywords.   Use language consistently. Consistently use the same word to describe the same concept. Don't call your program a 'program', 'project', 'system', and 'code'; pick one word, use it all the time. Put the keywords in headers (see 'free term models' above).

This is because:

- Readers (me, you, everyone) scan text and look for keywords. If they're not there, your reader won't latch onto the detail.

- If you use distinct words then the reader will assume that they mean distinct things. This is true above all in technical writing.

The law of keywords: keywords are the reader's keys to the detail.

The law of the low profile.

Students are often tempted to emphasise how difficult something was.

This is irrelevant; in technical writing, the hero is the subject-matter, not the person who created it.

Your reader is a university lecturer. We guys write this kind of thing for a living; disserations, essays, course notes, instructions, talks, maths papers, publicity material. We know how difficult it is to do research, and we know — probably better than you — the price you will have to pay to produce a nice piece of research, and to present it well.

That's a given.

The law of the low profile

If something is difficult for an interesting and unusual reason, report on that reason. The first academic to study computer vision gave the project to a PhD student to finish off over the summer. How difficult could it be 'to see'? It turned out to be incredibly difficult. I hope that the student came back and explained the difficulties. That's something new and interesting.

But if it's just you discovering that this kind of study is hard, then keep quiet. Keep a low profile relative to the work you present.

The law of the low profile: you're not interesting, your dissertation is interesting.

The laws of activity and waffle

The law of activity.

Rule of thumb: use active voice. It is not recommended that the writer use passive voice.

Use first person singular (I) or first person plural (we).

I wrote my PhD thesis in first person singular and it worked just fine. I write my papers in first person plural. That works fine too. There's always the student who thinks that third person passive 'it was considered' sounds clever or correct.

It doesn't. Third person passive is useful for reporting chemistry experiments, where the experimenter's experience and opinions are not part of the equation.

The laws of activity and waffle

Reporting on a chemistry experiment:

20 grams of milk chocolate is put in a small beaker. Another, bigger beaker containing 2/3 water is heated with a gas burner. When the temperature of the water is over 50 degrees centigrade the beaker with chocolate is put into the water. The chocolate is heated to 50 degrees centigrade, at that point the chocolate is completely melted.

Reporting your experiences:

. . . we learned about different cocoa plants, tasted chocolates from around the world – including the most expensive variety on sale today – and learned the difference between Belgian-, Swiss- and French-style chocolates. We also gained insight into organic and fair trade chocolates

The laws of activity and waffle

The law of waffle.   Don't.

The laws of activity and waffle

'Waffle' often goes with third person passive.

Waffle:

1.2 Application Methodology For This Project.

For this project is has been decided that the best development lifecycle methodology to use is the waterfall model. This decision has been made due to the nature of the application to be developed, the time constraints imposed on the project and the way the project has to be structured to meet the predetermined project deliverables. It would also have been very difficult to use the spiral model for this project as the intended users of the application being developed would be extremely hard to communicate with on a regular basis.

Not waffle:

Application methodology for this project.

We have two alternatives: the waterfall model and the spiral model. We selected the waterfall model because the spiral model requires us to communicate regularly with our intended users, and that is impossible.

You tell me: what real information does this text not contain, compared with that of the previous paragraph?

The laws of activity and waffle

The law of activity: learning is an activity; your dissertation reports on your learning.

The law of waffle: it's like bad breath; the reader will become disgusted, and quickly come to dislike you.

Worked examples

Rewrite this to be more active and less waffly:

In order to determine the most appropriate structure for the application to be developed, two simple structure prototypes were produced. For this project it was assumed that the application being developed would be integrated with the existing online module material. Therefore the prototypes were designed with this in mind and where possible in a manner consistent with the existing material.

My version:

We tested ideas for the structure of our application using two prototypes. The both ensured compatibility with the existing online material.

Try this:

It has also been considered that an interesting variation on this format would be to use flash animation to act out a question scenario. The flash animations would take the place of the textual questions and would provide a more interesting and stimulating learning experience. At this stage, due to the time constraints associated with this project, there is no certainty that flash animations will be used in this way. It is something that will be considered and explored in more detail in the third terms work on this project.

Worked examples

My version:

Flash animations might liven up the user experience but we have no time to set this up. We may try to do this in the third term.

Worked examples

From the Reith 2005 lectures; I think this is ab-so-lutely awful:

One of the reasons that the earliest signicant advances were few and far
between was that the technologies of communication had yet to be created,
and communication of any kind could be rigidly controlled. While there was
only word of mouth, information must frequently have been lost, and the
process of innovation forced to repeat itself over and over again. Innovation
could not advance exponentially as it does today because there were no
means reliably to pass information from generation to generation, or between
widely-separated societies. The difficulty of transportation compounded the
problem: it was only the wealthy and powerful who could travel to distant
sources of information. It was through primitive paintings and tablets of stone,
and eventually hand-written manuscripts, that each generation rst began to
preserve and reliably to pass its precious knowledge on.

My humble version:

Technology advanced slowly because the technology to communicate was primitive, what there was of it was tightly controlled. Also, transport was difficult, so that few could travel to new sources of information.

Who knows how much information was lost or garbled to word of mouth? Slowly, each generation began to preserve and pass its precious knowledge on; first with paintings, then with stone tablets, and eventually with handwritten manuscripts.

Today, information advances exponentially because we can reliably pass knowledge across different societies, continents, and generations.

Conclusions

I hope that I have transferred some knowledge to you.

Please take this seriously; now, and in the future.

I will conclude with one more law:

The law of good writing: Think a lot of your reader, and your reader will think a lot of you.