David Evans · Paul Gruba Justin Zobel

# How to Write a Better Thesis

Third Edition



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ISBN 978-3-319-04285-5 ISBN 978-3-319-04286-2 (eBook) DOI 10.1007/978-3-319-04286-2 Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014931845

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This book is dedicated to David Evans

### **Preface to the Third Edition**

When I began to help to write the second edition with David, my own thesis was still under examination. I had used the first edition of his book, and—perhaps with a bit of bravado—asked David if he would like some assistance when he produced a second edition. He agreed to collaborate. At that time, many of my insights into writing a thesis were based on fresh, personal experience. Sadly, since then, David has passed on. I myself have been lucky enough to gain a full-time academic position and have now supervised several students. More than ever, I can see how important it is to manage the writing process throughout a research project.

I am fortunate to be working with Justin. Not only is he an accomplished supervisor and researcher in his own area of computer science, but he is also the author of a book on writing that is a strong seller in the field. His skills and interests are complementary to mine. Justin works and supervises in science and engineering; I tend to work on qualitative studies in the social sciences.

We have made numerous changes to the second edition. As well as a thorough revision of the text, we have added several new sections that clarify the process of thesis writing. We have eliminated dated advice on word processing and use of computers, for example, and brought forward and updated material concerning written expression. We put greater emphasis on the challenges of thesis writing, the experience of being a research student, the thinking that underlies methods, results, and analysis, and the issues of working with supervisors. Much of the material in this edition is completely new or rewritten, and our book is longer.

Over the years, as I have taught thesis writing seminars, I have used examples of work from my own students to illustrate good writing; I have also used work from John McDonald to show the characteristics of both good and bad theses based on his analysis of examiners' reports. I would like to thank my students, and John, for allowing us permission to use their work here.

For ease of reading, we decided to blend each of our perspectives and experiences—David's, Justin's and my own—into a single collective voice. I hope that you find our collaborative efforts help you to write a better thesis.

Melbourne, February 2011

Paul Gruba

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Many years ago I was given a copy of Peter Medawar's *Advice to a Young Scientist*. Though written from the perspective of a biologist, I felt it had lessons for me (in computer science) despite the gulf in research practice between our disciplines. It touched on themes that I felt were lacking in other books on doing research, in particular, what it *felt like* to be a scientist, how one might change and grow as a consequence of doing research, how one might *become* a researcher. It was not that the whole book was on these topics—such a book would probably be rather dull—but I was struck by the perspective that it offered, and how it made Medawar's book different from any number of 'here is a formula for your dissertation' books that tried to reduce being a student to a mechanical process that somehow entirely sidestepped the core of the question of what doing research involves.

Some years ago I was introduced to the second edition of Evans and Gruba's *How to Write a Better Thesis*, and found in it some of those qualities that I had admired in Medawar. It became one of the three or four books I asked every student to read. In working with Paul to produce this new edition, I think we have found ways of strengthening its core messages and have built a text that complements and extends the many 'dissertation' books already on the shelves. Of course, in producing a book like this, it helps enormously to have as a basis a strong existing text, and thus I am grateful to David (who, sadly, I did not have an opportunity to meet) for having created *How to Write a Better Thesis*, and to Paul and David for the revision that produced the second edition.

The framework of this book is the mechanics of thesis writing, but the aim throughout is to help students understand how to conceptualize and approach the problems of producing a thesis, as well as to walk through the details of what a thesis should (or shouldn't) look like. Writing a book like this is something of a journey. It has furthered my understanding of how a student learns to become a researcher, and I have had to sharpen my thinking across a range of topics; it has been illuminating to capture some of the specific lessons learnt from the successes and failures of our students. I hope the book is also a journey for our readers.

A note on style: as Paul has said, we've made no attempt to distinguish between our experiences, including those of David, and have written in the first person. Every example is based on our experience of individual research students, and some of them have been fictionalized to an extent, both to avoid embarrassing people and, in many cases, to make the research more accessible to a general reader. Perhaps confusingly, we've sometimes changed the fictions for the students who were discussed in the previous editions. (Think of it as artistic licence.) In cases where we have quoted from a student's work as an illustration of good work, a full citation is given.

This book rests on our experiences with supervision and advising of upwards of a hundred students, as well as the hundreds of students who have been in our research methods subjects over the past two decades; far too many to name and thank individually, but I am grateful to them for the insights they've brought me and for our experiences together. It is not always obvious to a student how much the supervisor is learning from them, so let this book stand in part as a testament to how mutual a process graduate study can be.

Melbourne, February 2011

Justin Zobel

### Introduction

Thesis writing can be challenging for students and supervisors, but one of the many rewards for both parties is to receive positive examiners' reports. I was there when Brian found out that his PhD thesis required just a few minor corrections. He was clearly relieved after years of hard work to discover he had passed with little fuss, but he shouldn't have been too surprised. Brian had written a thesis that, from the start, was well-motivated and purposeful; it was well situated in the field and fluent in the current debates in the discipline; was based on sound principles for data collection; presented results that made it clear what he had achieved; and concluded with his own insightful contributions to the field and observations on how others could pursue further research in the area.

From the start, Brian knew that he had a straightforward task: to convince the examiners that his work had merit, that his data collection and analysis was sound, and that his recommendations were based on firm evidence. In practice, of course, he encountered challenges and worked hard to convey his thinking. Few people have the gift of getting it all down with ease, or with polish. Most students need guidance and editing and criticism, and many struggle during their early attempts to construct and sustain a coherent academic argument. The purpose of this book is to help you to produce a thesis that passes examination.

From the start, good students tend to be independent, confident, and are in the habit of *thinking like a researcher*. Some students have such skills at the beginning, but most have to learn them, and do so by working with their supervisors and other students. In this book, I provide examples of what successful students have done as they have made progress in their work. I point out, too, some of the mistakes that are possible if the task of writing a thesis is not approached in the right way. My examples are based on the students, like Brian, that I have worked with for several years each.

Completion of a thesis, especially a PhD thesis, involves mastery of a range of technical accomplishments, from learning an appropriate writing style to managing references, and from developing techniques for writing quickly to being effective at self-criticism and at criticizing the work of others. There is also the basic issue of learning what a finished thesis should look like. This book is structured as a discussion of the components of a thesis, and of the sequence of tasks you need to

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complete to get the thesis finished. The emphasis is on what you need to learn in order to do these tasks well, rather than on technicalities; other resources, including excellent books and websites, can provide help with different aspects of producing a thesis.

#### **Using This Book**

Chapters 1, 2, 3 and 4 concern how to get started, and what decisions to make before you even begin. Chapters 5, 6, 7, 8, 9, 10 and 11 show you how to tackle the various parts of a thesis and bring it to the point of submission. As a developing researcher, as well as writing a thesis you are probably presenting your research in journals and conferences, perhaps in collaboration with your colleagues or supervisor, a topic considered in Chap. 12; in this chapter I also consider some of the other challenges of being a PhD student.

I have used versions of this book as a source for graduate seminars and workshops on thesis writing. Those who are well into their writing seem to get immediate benefit from it. However, if you are at an early stage, I suggest you first read Chaps. 1 and 2 and—although this may seem surprising—Chap. 12. Some of it may not take on an edge of reality until you are well into your writing. As you will see, a key piece of advice (I would love to make it a command!) is that you start writing as early as possible, right at the beginning of your candidature. So you should also read Chap. 3, and get a sense of how best to make use of a word processor for authoring of a thesis, and of what the technicalities of thesis writing are. Make sure that you check the chapter summaries, which in some cases include discussion of useful kinds of online resources.

A book of this kind must navigate the variations in terminology and spelling between institutions and countries. I've had to make choices that might seem contentious, but to me the important thing is to be consistent. For example, I've chosen *program* instead of *programme*; *degree* instead of *program* (in another sense of the word); *graduate* rather than *postgraduate*; *thesis* rather than *dissertation*; British/ Australian rather than American spelling (with the exception of the suffix '–ize'); *supervisor* rather than *advisor*; and *PhD* rather than *doctorate*.

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### Chapter 1 What Is a Thesis?

Simply defined, a thesis is an extended argument. To pass, a thesis must demonstrate logical, structured, and defensible reasoning based on credible and verifiable evidence presented in such a way that it makes an original contribution to knowledge, as judged by experts in the field. Among the many types of scholarly productions, theses are an oddity: each one is different, and there are no standard or generic constructions. Most of those who supervise theses have written just one, and, despite the effort they take to produce, the only people who carefully read a given thesis are the project supervisors, the examiners, and an otherwise rather select audience of specialized academics.

From the start, it is good to have a solid idea of what a thesis *is*, and perhaps the best place to start a discussion of theses is with their purpose. What do examiners look for when they judge your work?

#### **Criteria for Examination**

When universities send out a thesis for examination, they include their suggested guidelines for the examiners. I recommend that you get a copy of these guidelines from your own university (they are almost certainly available online) and look them over carefully. Make an effort, too, to understand the process of submission and examination.

At my university, the University of Melbourne < unimelb.edu.au >, the guidelines begin by listing key attributes of a successful thesis (quoted from the university's School of Graduate Research website, as of November 2010):

#### Attributes of a Successful Thesis

• The thesis demonstrates authority in the candidate's field and shows evidence of command of knowledge in relevant fields.

- It shows that the candidate has a thorough grasp of the appropriate methodological techniques and an awareness of their limitations.
- It makes a distinct contribution to knowledge.
- Its contribution to knowledge rests on originality of approach and/or interpretation of the findings and, in some cases, the discovery of new facts.
- It demonstrates an ability to communicate research findings effectively in the professional arena and in an international context.
- It is a careful, rigorous and sustained piece of work demonstrating that a research 'apprenticeship' is complete and the holder is admitted to the community of scholars in the discipline.

At first glance these guidelines may appear to refer to the thesis, but they are really about the candidate. The first point makes this explicit: 'The thesis demonstrates authority in the candidate's field'. And consider the last point. The examiner has to consider whether the thesis 'is a careful, rigorous and sustained piece of work'—but see how it goes on—'demonstrating that a research "apprenticeship" is complete and the holder is admitted to the community of scholars in the discipline'.

At the start of introductory seminars in thesis writing, I ask students to explain the purpose of a thesis. Often they say something like, 'To tell people in my area about my research'. No doubt your research is of interest, but your primary purpose in writing a thesis is to pass an examination. These examiners are not reading your work out of mere interest: from the above criteria, we see that examiners read your thesis to assess whether or not you have demonstrated your fitness to be admitted to a community of scholars. Because a written thesis is an examination paper, not simply a report of research findings, you need to understand what examiners are looking for when they read your work. In the case of doctoral theses, examiners are encouraged to consider eight questions (quoted from the same website):

#### **Guidelines for Examiners**

- Does the candidate show sufficient familiarity with, and understanding and critical appraisal of, the relevant literature?
- Does the thesis provide a sufficiently comprehensive investigation of the topic?
- Are the methods and techniques adopted appropriate to the subject matter and are they properly justified and applied?
- Are the results suitably set out and accompanied by adequate exposition and interpretation?
- Are conclusions and implications appropriately developed and clearly linked to the nature and content of the research framework and findings?
- Have the research questions in fact been tested?
- Is the literary quality and general presentation of the thesis of a suitably high standard?
- Does the thesis as a whole constitute a substantive original contribution to knowledge in the subject area with which it deals?

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Types of Thesis

These questions really are about the thesis rather than the candidate. They roughly parallel the structure of a solid thesis, and each builds on the previous one.

The first two questions are about familiarity with the previous work in your field and the demonstration of a critical approach to it. Note that, from the start, having and demonstrating a critical attitude towards your subject sets the tone of your interactions with the examiners.

The third question is about choosing appropriate research methods and justifying your choices as appropriate to the topic. Be aware that it is you, at this point, who must set the scope of that topic that will determine the appropriateness of a methodology. Further, the third question alerts examiners to show concern for the manner in which the methods are applied.

The fourth question focuses on displaying the results, explaining them and showing that you know what they mean. Here, then, it is not simply a question of showing those in the discipline area what you have found but also that you know how to present the results.

The fifth and sixth questions remind examiners to check the alignment, and connections, between an initial aim and the final conclusions. The logic flow in the thesis must be right. Notice, too, the emphasis on linking your interpretations back to what you said you would do earlier in the thesis.

The seventh question invites the reader to step away from the empirical side of the study to consider how well you can write. In a sense, the question signals to both you and the examiners just how important it is to be able to be able to communicate well within the international research community.

Finally, the eighth question asks examiners to consider the quality of the work as a whole. For doctoral students, producing work that is a 'substantive original contribution to knowledge' is a primary goal that can be reached through writing satisfactory responses to the series of previous questions.

There are other questions an examiner might also address. In particular, an examiner would look for evidence of insightful or critical thinking, and of objective appraisal of outcomes of the study. That is, they want to be persuaded that the student can think clearly and can construct a reasoned argument.

#### **Types of Thesis**

This book focuses on PhD study, but there are several other forms of research work that are understood to be theses. In the Australian context, the word 'thesis' is used to refer to the document that a student creates to earn a degree at the Honours, Masters, or doctoral level. (In other countries, such as the United States or Canada, the word 'thesis' is commonly used to signify work at the Honours or Masters degree level and 'dissertation' is generally used to refer to doctoral work.) What is the difference between the different understandings of a thesis?

At Honours level, a thesis—strictly, a 'minor thesis'—is a work of original research of approximately 10,000 words in length. For many students undertaking a

minor thesis, it is the first time that they have conducted original research. From my experience, one of the main struggles occurs in making the transition from 'research consumption' to 'research production'. Minor theses are closely supervised and, very often, stem from research that is of direct interest to the supervisor. An Honours thesis is typically produced within a year alongside the demands of coursework. For the most part, they are assessed within the students' department; note, therefore, that the readership is well-known and thus the writing can be tailored to fit the audience.

At the Masters degree level, there are two types of theses. One is a minor thesis, with length limits ranging from 10,000 to 25,000 words. It is completed within one or two years alongside coursework, and usually requires one or two semesters of full-time effort. Much like those at the Honours level, minor theses are assessed within the department by a set of internal criteria.

The second type is a 'Masters by research' thesis of 30,000 to 40,000 words. It is much more substantial than those that are written by coursework students as it is the result of full-time research over one to two years. This thesis is examined by experts in the field outside the department. In some departments, students first join the field by writing a Masters thesis; if it is considered to be of high quality and can be extended, it can be converted into a doctoral thesis.

A 'Doctor of Philosophy' is earned by the successful completion of a PhD thesis. For PhD students, the word limit of a thesis is 1,00,000 words; most students write approximately 80,000 words. In Australia, a PhD thesis is typically produced in 3 years of full-time study. It is examined by two experts who have themselves supervised doctoral work; and they are likely to be located at an international research institution.

There are other types of doctorate, too, including those in education, by exhibition (in fine arts), or by publication, but these are beyond the scope of this book. All of these should be described in the policies on your university's website.

#### Look at Other Theses

It's now time to look at some other theses. Most supervisors have a few on their shelves that they may be willing to lend you. Reading these works will be a good start, but don't stop there. Probably they follow a pattern set by your supervisor's own ideas of a good thesis, and almost certainly they will be typical of what your own department thinks is acceptable. So go out and look at theses from across a range of disciplines, and even theses from other countries. As presentation and style change relatively rapidly, look at theses that are no more than 3 years old. If applicable, examine a mix of kinds of studies, both qualitative and quantitative (see Chap. 8). Try and find work that is outside your field, but makes use of a similar methodology. After you have skimmed several, select some that are coherent, and some that are not so clear, and go through a few of them with your supervisor.

Read the theses as if you were an examiner. With the guidelines for examiners in front of you, begin the assessment of each of them by first looking at the overall

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#### Examiners' Reports

layout. See if the table of contents gives you a clear idea of the structure of the work as a whole. Then browse the introduction and conclusions, and look through the reference section. Next, read the introduction carefully and compare it to the conclusions to see if the work is linked in a coherent manner (see the fifth question in the guidelines for examiners on page 3). It might surprise you to find that some theses fail to make this link. Look especially for specific formatting and conventions: How are particular words spelled? What is the best way to display data? What is the typical length of a chapter? You may be impressed with the virtues of some theses, such as professional layouts, innovative displays of complex material in graphs or tables, or a strong integration of online materials. Stay alert for the points that impress you, and make a note to adopt them for your own work.

#### **Examiners' Reports**

Students are sometimes advised to track down examiners' reports on submitted theses. For the most part, the examination process is confidential, but make an effort to ask a completed student for a report or see if a supervisor is willing to share an examination that is anonymous. As you read examiners' reports, or the associated studies on them, get in the frame of mind of these expert assessors. What do they look for, and what do they ignore? Do they directly answer the suggested questions put forward by the university? These reports will be highly variable in detail and approach; What can you learn from these differences? Additionally, seek out academic studies that concern thesis examination (search for the keywords: thesis quality, doctoral assessment, research training, PhD examination) with a view to developing a better understanding of the assessment process. Feedback from examiners is summarized in the Appendix, which is a digest of observations from examiners' reports.

I have examined numerous theses of each type: minor, Masters, and doctoral. In each case, my purpose is to assess the work with reference to the criteria at hand. My considerations vary. At times I focus my comments on the big picture; at other times I hone in on details. My motivations for examination are not necessarily to hand out criticism, or even praise, but to sharpen a study. Academics examine theses partially out of service to the profession and partly as a favour to those who ask, but mostly to learn something new before the work is presented at conferences or published in journals. In short, as an examiner, I am looking to learn and, in this way, I'm just like the candidate.

Consider the five potential outcomes of PhD examination at my university (edited slightly for clarity) that an examiner can choose from:

- Be awarded the degree of Doctor of Philosophy without further examination or amendment.
- Be awarded the degree of Doctor of Philosophy without further examination, subject to inserting in the thesis the minor corrections or additions as specified

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to the satisfaction of the Chair of Examiners, without further reference to the examiner.

- Be awarded the degree of Doctor of Philosophy subject to revising part or parts of the thesis to the examiners' satisfaction.
- Not yet be awarded the degree, but be permitted to resubmit the thesis in a revised form for re-examination. Areas requiring major amendment are identified in an examiners' report.
- Not be awarded the degree of Doctor of Philosophy and not be permitted to submit for re-examination.

Think for a moment of the implications of each of these outcomes. Remember, first of all, that there are two expert examiners who are assessing the work. If a student is awarded a PhD because both examiners have marked that it fits the first criteria, no more amendments are required. Nothing, not even occasional typos, requires change: the only thing left to do is to make a bound, final copy to be archived at the university, and perhaps submit an electronic copy to be placed online.

Many students (including myself) earn the second mark. That is, they have been awarded the PhD, and no further examination is required, but there is a need to make some corrections, write out a report to the Chair detailing the required changes, and reprint the thesis for submission. By awarding a PhD based on the third outcome, an examiner indicates that the student must revise entire sections. Substantial work is required, and the revised and reprinted thesis must be sent back to the examiner for checking. The use of the fourth mark by an examiner indicates that the thesis requires such major revisions that a PhD cannot yet be awarded, but the work can be re-submitted. Finally, on occasion, examiners use the fifth outcome to deny both an award of a PhD and a chance to submit a revised thesis.

Examination processes for minor theses are highly variable, with students being awarded pass/fail in some cases or a mark in others. Some processes allow for resubmission; some do not; examination may be within the department. In many institutions Masters theses are handled in the same way as PhDs, but in some places different processes are used. Make sure that you are familiar with the mechanisms that apply to your degree.

#### Summary of Chapter 1: What Is a Thesis?

On theses:

- There is no 'standard' definition of a thesis but it is generally understood to be the result of structured, original research that is produced for assessment.
- The expectations for a thesis vary from university to university, field to field, and supervisor to supervisor.
- There are several types of theses in the range of research higher degrees. Some theses are produced alongside the demands of coursework, and others fulfil the total requirements of the degree. The types of thesis vary in length, complexity, comprehensiveness, and even purpose.



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