Freie Universität Berlin

Fachbereich Mathematik und Informatik

Origins and losses of parasitism

an analysis of the phylogenetic tree of life with a parsimony-like algorithm

Version 2

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Abstract

TODO: The abstract is a concise and accurate summary of the scholarly work described in the document. It states the problem, the methods of investigation, and the general conclusions, and should not contain tables, graphs, complex equations, or illustrations. There is a single scholarly abstract for the entire work, and it must not exceed 350 words in length.

Summary

TODO: 1 page presenting the research problem, the main results, conclusion and how the thesis advances the field.
The lay or public summary explains the key goals and contributions of the research/scholarly work in terms that can be understood by the general public. It must not exceed 150 words in length.

Preface

TODO: The Preface must include a statement indicating the student's contribution to the following:

- Identification and design of the research program,
- Performance of the various parts of the research, and
- Analysis of the research data.

Certain additional elements may also be required, as specified below.

- If any of the work presented in the thesis has led to any publications or submissions, all of these must be listed in the Preface. Bibliographic details should include the title of the article and the name of the publisher (if the article has been accepted or published), and the chapter(s) of the thesis in which the associated work is located.
- If the work includes publications or material submitted for publication, the statement described above must detail the relative contributions of all collaborators and co-authors (including supervisors and members of the supervisory committee) and state the proportion of research and writing conducted by the student. For further details, see "Including Published Material in a Thesis or Dissertation".
- If the work includes other scholarly artifacts (such as film and other audio, visual, and graphic representations, and application-oriented documents such as policy briefs, curricula, business plans, computer and web tools, pages, and applications, etc.), all of these must be listed in the Preface (with bibliographical information, if applicable).
- If ethics approval was required for the research, the Preface must name the responsible UBC Research Ethics Board, and report the project title(s) and the Certificate Number(s) of the Ethics Certificate(s) applicable to the project.

In a thesis where the research was not subject to ethics review, produced no publications, and was designed, carried out, and analyzed by the student alone, the text of the Preface may be very brief. Samples are available on this website and in the University Library's online repository of accepted theses.
The content of the Preface must be verified by the student's supervisor, whose endorsement must appear on the final Thesis/Dissertation Approval form.
Acknowledgements, introductory material, and a list of publications do not belong in the Preface. Please put them respectively in the Acknowledgements section, the first section of the thesis, and the appendices.

A preface is best understood, I believe, as standing outside the book proper and being about the book. In a preface an author explains briefly why they wrote the book, or how they came to write it. They also often use the preface to establish their credibility, indicating their experience in the topic or their professional suitability to address such a topic. Sometimes they acknowledge those who inspired them or helped them (though these are often put into a separate Acknowledgments section). Using an old term from the study of rhetoric, a preface is in a sense an "apology": an explanation or defense.

Contents

6. LIST OF TABLES (REQUIRED IF DOCUMENT HAS TABLES)
7. LIST OF FIGURES (REQUIRED IF DOCUMENT HAS FIGURES)
8. LIST OF ILLUSTRATIONS (REQUIRED IF DOCUMENT HAS ILLUSTRATIONS)
9. LISTS OF SYMBOLS, ABBREVIATIONS OR OTHER (ADVISABLE IF APPLICABLE)
10. GLOSSARY (OPTIONAL)
11. ACKNOWLEDGEMENTS (OPTIONAL)
Students may include a brief statement acknowledging the contribution to their research and studies from various sources, including (but not limited to)

Their research supervisor and committee,
Funding agencies,
Professional or community collaborators,
Fellow students, and
Family and friends.

12. DEDICATION (OPTIONAL) (Widmung)

13. DOCUMENT BODY
The text of the thesis must contain the following elements, presented to conform to the standards and expectations of the relevant academic discipline. In some cases, the ordering of these ingredients may differ from the one shown here.

1 Introduction

TODO: A. Introduction. The thesis must clearly state its theme, hypotheses and/or goals (sometimes called "the research question(s)"), and provide sufficient background information to enable a non-specialist scholar to understand them. It must contain a thorough review of relevant literature, perhaps in a separate chapter.

On the first page, you should present

- The area of research (e.g. implementation of information systems)
- The most relevant previous findings in this area
- Your research problem and why this is worthwhile studying
- The objective of the thesis: how far you hope to advance knowledge in the field

Target group
To whom are you writing, what do you assume that the reader know? A normal target groupd would be new Master students.
Personal motivation
Why did you choose this topic?
Research method in brief
How will you find out?
Structure of the report
A paragraph about each chapter. What is the main contribution of the chapter? How do they relate?

1.1 Definitions

Definition 1. parsimony [COO98]

Definition 2. taxonomy
Taxonomic tree – Taxonomy is the classification, identification and naming of organisms. It is usually richly informed by phylogenetics, but remains a methodologically and logically distinct discipline. The Taxonomic levels are Kingdom, Phylum, Class, Order, Family, Genus, Species and maybe some superclasses between them.
coarser classification
In each level the nodes can have more than 2 children

Definition 3. phylogeny
Phylogenetic tree – Phylogenetics is the study of evolutionary history and the relationships among individuals or groups of organisms. The result ot these analysis is a phylogeny or phylogenetic tree. The phylogenetic tree is a hypothesis about the history of the evolutionary relationships of a group of organisms.
A perfect tree would be binary
no levels only time TODO: synthesis tree [HSA+15]

Definition 4. parasite
Parasitism – Parasitism is an interaction relationship between two organisms living together in more or less intimate association in a relationship in which association is disadvantageous or destructive to one of the organisms.
http://www.ebi.ac.uk/QuickGO/term/GO:0072519
ontology definition of the interaction 'is parasite of' from GloBI [PSM14] the database we use here.
exist very different types of parasites: endoparasites, broodparasitism, ...
40% of species are parasites, but the most of them are understudied. [Win98]

ontology definition.. explanation...
Property Hierarchy from ontobee:
ecologically related to $\supseteq$ biotically interacts with $\supseteq$ participates in a biotic-biotic interaction with $\supseteq$ symbiotically interacts with $\supseteq$ has host $\supseteq$ hyperparasite of, pathogen of, parasite of $\supseteq$ parasitoid of, obligate parasite of, facultative parasite of, stem parasite of, root parasite of,

hemiparasite of, lays eggs in, ectoparasite of, endoparasite of, mesoparasite of, kleptoparasite of

1.2 Motivation

Weinstein und Kuris Paper [WK16]
study parasites:

- für jedes Ökosystem unentbehrlich [Marius]
- Wechselwirkungen in 75% der Verbindungen in den Nahrungsmittelbahnen [Marius]
- agglomerieren Schadstoffe, binden 30 bis 50% der Schadstoffmasse innerhalb eines Ökosystem [Marius]
- Dezimierung der Bevölkerung der störenden Arten [Marius]

big data:

- data accumulates faster than ever. Biological data is no exception but scientists still struggle to harvest this rapidly growing pile of databases. [Marius]

origins of parasitism:
Many studies tried to find the origins of parasitism. For example in Nematodes [14, 29], in Lice [28], in Plathylminthes [30, 31] and in Metazoa in general [32, 33, 1] scientists searched for these origins. The most recent analysis is the one from Sara Weinstein and Armand M. Kuris. They came to the conclusion that parasitism evolved at least 223 times indepedently in the kingdom of Animalia. They found most of the origins inside the phylum Arthropoda [1]. [Marius]
Wenn wir die Ursprünge des Parasitums verstehen können, können wir die Evolution von Pathogenen vorhersagen und welche genetischen Anpassungen für eine Transition vom freien Leben zu einem parasitären Lebensstil notwendig sind [21]. Es könnte sogar zu einem Punkt führen, an dem wir die Immunität gegen Antibiotika von Pathogenen vorhersagen konnten. [Marius]

2 Research/Scholarship

The account of the scholarly work should be presented in a manner suitable for the field. It should be complete, systematic, and sufficiently detailed to enable a reader to understand how the data were gathered and analyzed, and how to apply similar methods in another study. Notation and formatting must be consistent throughout the thesis, including units of measure, abbreviations, and the numbering scheme for tables, figures, footnotes, and citations. One or more chapters may consist of material published (or submitted for publication) elsewhere, or other artifacts (e.g., film, application-oriented documents) placed in a scholarly context. See "Including Published Material in a Thesis or Dissertation" for additional details.

2.1 Related literature and theoretical focus

A survey of the literature (journals, conferences, book chapters) on the areas that are relevant to your research question. One section per area.
The chapter should conclude with a summary of the previous research results that you want to develop further or challenge. The summary could be presented in a model, a list of issues, etc. Each issue could be a chapter in the presentation of results. They should definitely be discussed in the discussion / conclusion of the thesis.

2.2 Presentation of the part of the world to be studied

Which could be the health system in Mozambique, the rural areas where the telecentres are located, the financial businesses in which the accounting system you will develop will be used.

2.3 Method

The research method by which you will investigate the world.

- A short summary of the available methods
- Your choice
- Detailed report of how you actually carried out your research. Presenting how you selected the people taking part is of special importance.

2.4 ... Your research results (and discussion)

Which could be the system you made and the reasons for various design decisions, what your interview objects said, observations of people using a computer system, stories of a development process, numeral data from a questionnaire, etc.
The discussion of the findings can be included in these chapters, or the discussion can be put in a separate chapter.
The issues from the theory chapter 2 should be discussed here.

3 Conclusion

In this section the student must demonstrate his/her mastery of the field and describe the work's overall contribution to the broader discipline in context. A strong conclusion includes the following:

- Conclusions regarding the goals or hypotheses presented in the Introduction,
- Reflective analysis of the scholarly work and its conclusions in light of current knowledge in the field,
- Comments on the significance and contribution of the scholarship reported,
- Comments on strengths and limitations of the research/scholarship,
- Discussion of any potential applications of the findings, and
- A description of possible future research directions, drawing on the work reported.

A submission's success in addressing the expectations above is appropriately judged by experts in the relevant discipline. Students should rely on their research supervisors and committee members for guidance. Doctoral students should also take into account the expectations articulated in the University's "Instructions for Preparing the External Examiner's Report".

(Summary of the problem, the main findings and the discussion. Structured according to the issues in chapter 2.
Comparison with the literature presented in chapter 2: how do your results fill in, advance or contradict previously reported research?
What are the implications of your research for people working in the field that you have studies?)

Bibliography

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Eigenständigkeitserklärung

Hiermit versichere ich, dass ich die vorliegende Masterarbeit selbständig verfasst habe.
Ich versichere, dass ich keine anderen als die angegebenen Quellen benutzt und alle wörtlich oder sinngemäß aus anderen Werken übernommenen Aussagen als solche gekennzeichnet habe, und dass die eingereichte Arbeit weder vollständig noch in wesentlichen Teilen Gegenstand eines anderen Prüfungsverfahren gewesen ist.

(Datum und Unterschrift) TODO: englisch!

4 APPENDICES

TODO: Appendices must be limited to supporting material genuinely subsidiary to the main argument of the work. They must only include material that is referred to in the document. Material suitable for inclusion in appendices includes the following:

- Additional details of methodology and/or data
- Diagrams of specialized equipment developed
- Copies of questionnaires or surveys used in the research
- Scholarly artifacts (e.g., film and other audio, visual, and graphic representations, and application-oriented documents such as policy briefs, curricula, business plans, computer and web applications, etc.) not included in the body of the thesis

Do not include copies of the Ethics Certificates in the Appendices.
Material supplemental to the thesis but not appropriate to include in the appendices (e.g., raw data, original plan for research and analyses) can be archived in cIRcle as Supplementary Materials.