UNIVERSITY OF JOHANNESBURG

FACULTY OF HEALTH SCIENCES

GUIDELINES FOR THE PREPARATION OF THESES, DISSERTATIONS AND RESEARCH REPORTS

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1. INTRODUCTION

This guide is intended for postgraduates who are preparing research reports, dissertations or theses. The intention is to provide a concise guide covering all aspects of the required document. It does not, however, aim to provide comprehensive information on detailed stylistic features. There are, in addition, usages which are specific to each of the manifold subject areas falling under the control of the Faculty of Health Sciences. Candidates should therefore, consult their supervisors about the specific requirements for their topic and discipline.

It should be noted that the terms thesis, dissertation and research report have specific meanings: a 'thesis' is the document submitted for the degree of Doctor of Technology; a 'dissertation' that for the degree of Master of Technology by research only, and a 'research report' that for the degree of Master of Technology by coursework and research report. The word 'thesis' is used in this document for simplicity, but the information given applies to theses, dissertations and research reports.

The student should regard this document as a guideline for preparing research reports, dissertations or theses. Any preferences that the supervisors might require must be considered. Assessment of merit is based on the student demonstrating a clear and logical flow of presentation.

2. THE STRUCTURE AND FORM OF THESES, DISSERTATIONS AND RESEARCH REPORTS

This chapter does not aim to provide comprehensive information on all matters relating to form and structure in research writing.

2.1 The Structure and Form of Theses

The essential elements of the theses are presented below in the order in which they should normally appear.

- Title and Title Page
- Candidate's Declaration
- Abstract
- Dedication
- Acknowledgements
- Table of Contents
    - List of Figures
    - List of Tables

  - List of Symbols
  - Nomenclature
- Introductory Chapter
- Central Chapters
- Concluding Chapter
- References and / or Bibliography (Optional)
- Bibliography
- Appendices

2.1.1 Title and Title Page

The following information is given on the title page.

Title

The title should indicate the contents and scope of the thesis in as few words as possible. While the title should be as brief as possible it should be accurate, descriptive and comprehensive, clearly indicating the subject of the investigation. It is most important that titles of theses are fully relevant to the contents of the work in order to avoid misunderstandings at the time of examination. The title is best typed in capitals, with a space between each letter and three spaces between words, beginning on the chapter line.

Author's Name

The full forenames followed by surname are usually given under the title. They should be typed with the first letter of each name in capital letters and the remainder in lower case.

Thesis Statement

The following are examples of the appropriate wording.

Degree of Doctor of Technology / PhD:

'A thesis submitted to the Faculty of Health Sciences, University of Johannesburg, in fulfilment of the requirements for the degree of Doctor of Technology'.

Degree of Master of Technology / MSc by research only:

'A dissertation submitted to the Faculty of Health Sciences, University of Johannesburg, Johannesburg, in fulfilment of the requirements for the degree of Master of Technology.'

Degree of Master of Technology / MCur / MSc by coursework and research:

'A research report submitted to the Faculty of Health Sciences, University of Johannesburg, in partial fulfilment of the requirements for the degree of Master of Technology.'

Year when the thesis was completed

This lowest line should be no more than 25mm from the foot of the page, and should include the place and date of completion of the thesis, e.g. Johannesburg, 1985.
(A specimen title page is shown in Appendix A).

Names of Supervisor and/or Co-supervisor and /or Promoter

The names of the Supervisor and/or Co-supervisor and /or Promoter must be typed on the bottom left hand corner of the title page.

2.1.2 Candidate's Declaration

An example of the conventional form of declaration is as follows:

DECLARATION

I declare that this thesis* is my own, unaided work. It is being submitted for the Degree of Doctor of Technology** at the University of Johannesburg, Johannesburg. It has not been submitted before for any degree or examination in any other Technikon or University.

_____
(Signature of Candidate)

_____ day of _____

* Dissertation or Research Report as applicable.
** or Master of Technology as applicable.

This declaration should appear on a separate page and each copy of the thesis should be individually signed by the candidate.

2.1.3 Abstract

The abstract is a brief informative summary of not more than 150 words for a master's dissertation or research report and not more than 350 words for a doctoral thesis. It outlines the purpose of the thesis, the research methods and procedure employed, as well as the major results and conclusions. The abstract should always start with a topic sentence that is a central statement of the major theme of the thesis.

The abstract is extremely important. It should give as concisely as possible the significant facts, especially anything new, the main conclusions and any recommendations. The reader can then decide whether or not he/she is interested in reading further. An abstract should be written in normal and not telegraphic style.

2.1.4 Dedication

This is a brief, optional statement paying tribute to the writer's spouse, family, or other associated person. It is typed centrally on a separate page starting on the chapter line and does not require a heading, e.g.

In memory of my mother
Ruby Johnson
1896-1975

2.1.5 Acknowledgements

All assistance received in carrying out the work in preparing a thesis should be acknowledged. It is, common practice to acknowledge supervisors, co-supervisors and promoters, financial assistance, permission to publish, as well as special facilities provided by a company, technikon, university or research institution.

2.1.6 Table of Contents

The table of contents should be given on a separate sheet and follow the plan of the structure of the thesis and the headings in the thesis itself. The contents should only contain the first three levels of headings in the thesis. It must also include the relevant page numbers. (Examples of table of contents pages are shown in Appendix B).

2.1.7 List of Figures

A list of figures follows the contents on a new page, and precedes the list of tables. (A specimen list of figures is shown in Appendix C).

2.1.8 List of Tables

A list of tables follows the list of figures on a new page. (A specimen list of tables is shown in Appendix D).

2.1.9 List of Symbols

Each thesis should provide a list detailing the symbols for physical quantities used. These symbols vary from discipline to discipline and candidates should consult their supervisors with regard to the correct symbols for their field of research.

2.1.10 Nomenclature

If there are acronyms or unusual technical terms, these should be defined in alphabetical order in a nomenclature, as well as when they first appear in the text. Authors should avoid jargon and abbreviations, which are not in common use in the field or which, have not been defined.

2.2 Body of the Thesis

In most theses, the chapters may readily be divided into three categories: the introductory chapter or chapters; the central chapters comprising the major report of the study, divided into logical chapter divisions; and the concluding chapter or chapters, which should contain the findings, conclusions and recommendations of the report.

2.2.1 Introductory Chapter and Literature Review

The first chapter, or chapters, should contain the following items:

- A clear and complete **statement of the problem** investigated and the **purpose or aim of the study**;
- A justification of the problem, which, by a discussion of selected reasons, establishes the **importance of the problem**. Drawing from all the related literature the most pertinent issues that demonstrate the researched problem must be summarised;
- A resume of the history and present status of the problem by means of a **literature review** comprising a critical analysis of previous investigations of this and closely related problems. The contribution of each of these problems to the question as a whole should be made clear, together with the fact that the investigation may have arisen from the inadequacies or recommendations of earlier studies. In qualitative studies a more

extensive literature review may be required at a later stage as part of a separate central chapter;

- A **preview of the organisation** of the remainder of the thesis. This will make it easy for the reader to see at a glance the relationship between the various parts of the work. In qualitative studies it may be required to explain the context of the study.

2.2.2 Central Chapters

It is impossible to give specific directions for organising the findings of all studies, because of the wide variety of topics investigated, techniques employed, and kinds of data accumulated. Suffice to say, that the chapters of this portion of the thesis **are the thesis** – they are the student's contribution to knowledge. All other portions of the manuscript are subordinate to what actually has been discovered and is being made known here. The student should, therefore, take great pains to present his/her material in a clear and orderly fashion, in terms that will be readily understood. The organisation and distribution of content should be such that each chapter represents an important division of the subject investigated and reported. Each chapter, other than the introductory and final chapters, should open with a paragraph or two containing:

- a statement of the portion of the problem to which the chapter is devoted
- a description of the materials and methods used in connection with this part of the investigation, and
- an enumeration of the points to be covered (if applicable).

2.2.3 Concluding Chapter

The concluding chapter, or chapters, should be a discussion, restating the developments of previous chapters and showing clearly the more important findings and conclusions of the whole study. Refer to relevant literature that supports arguments and outcomes. The author may list unanswered questions that have occurred to him/her but which require research beyond the limits of the undertaking reported. Contradictory findings should not be avoided or left out of a thesis – they need to be refuted or even acknowledged. This chapter should reflect the actual intellectual contribution of the student to the area of research. In this respect this is the most crucial element of the thesis as it reflects the problems encountered in the course of the study, contribution to the field of study and recommendations to other researchers.

2.2.4 Appendices

Appendices are convenient places for recording complicated mathematical or other formulae, descriptions of experiments or apparatus, and any other specialised or lengthy material such as computer programme listings, copies of spectra or other instrumental outputs that would otherwise detract from the readability of the text. Readers should be able to study or refer to these later, and only if they wish to do so after they have read the main work. Appendices must be numbered or lettered consecutively in large print at the top right-hand corner of the page to facilitate their location in the text. Each appendix must start on a new page. The appendices should be placed immediately after the list of references.

2.3 References and/or Bibliography (Optional)

References should be chosen and cited to:

- indicate the source of the writer's statements
- acknowledge another person's work
- provide a source of additional information.

The relevance of any reference should be carefully considered and the number of references kept to a necessary minimum. All references appear together at the end of the publication. The citations must be given in sufficient detail for easy retrieval of the information. It is crucial that the system chosen should be followed consistently.

2.3.1 Referencing systems

There are a number of different referencing systems. The two most commonly used in scientific literature are the Harvard system and the Numerical system. Candidates should consult their supervisors on this matter. You should note that styles for citations vary tremendously from discipline to discipline, and that not all the points mentioned (e.g. title of paper, or inclusive pagination) may be necessary.

Harvard systems

The references are referred to in the text by the author's surname followed by the year of publication (in brackets) and are listed in alphabetical order by year of publication in the list of references. If the same author is cited more than once for a given year the letters a, b, c are used to distinguish the articles. If their citation is only to a particular page then this is shown by the use of a colon followed by page numbers (after the date). If there are more than three authors, only the first (senior) author's name is given in the text followed by '*et al.*'.

Specimen text

A succinct account of the basics of interactive television programming has recently been given (Bolton *et al*., 1981). Nyhan and Johansen (1980:399) have summarised the economic implications. Robertson (1979) has reviewed some of the technical aspects. Veith (1981a, 1981b) has provided the best all round accounts of teletext and videotext.

REFERENCES

Bolton, W.T., Clark, A., Smith, G.H., and Harper, P. (1981) A lesson in interactive television programming, *Journal of Library Automation*, vol.14, no.2, pp. 396-400.

Nyhan, M.J. and Johansen, R. (1980) Videotext and teletext in the United States, *Telecommunication Journal*, **46**(6): 396-400.

Robertson, A. (1979) Teletext and viewdata, In: Johansen, P. ed. *Television to Home Computer*, Poole: Blandford Press, pp. 119-145.

Veith, R.H. (1981a) *Teletext*, Urbana: University of Illinois, 1981.

Veith, R.H. (1981b) *Videotext*, Urbana: University of Illinois, 1981.

The style used in the abovementioned citations is based on ISO 690, International Organisation for Standardization (1987).

Numerical system

The references are numbered in ascending order in the text, and are listed in this order in the list of references. In the text itself, the numerals are typed slightly above the list of the text.

Specimen text

Bolton[1] and co-workers have given a succinct account of the basis of interactive television programming. Nyhan and Johansen[2] have submitted the economic implications. Robertson[3] has reviewed some of the technical aspects. Veith[5] has provided the best all round accounts of teletext and videotext.

REFERENCES

1. Bolton, W.T., Clark, A., Smith, G.H., and Harper, P. A lesson in interactive television programming, *Journal of Library Automation*, vol.14, no.2, Feb. 1981, pp. 103-108.
2. Nyhan, M.J. and Johansen, R. Videotext and teletex in the United States, *Telecommunication Journal*, vol.46, no.6, Mar. 1980, pp. 396-400.
3. Robertson, A. Teletext and viewdata, In: Johansen, P. ed. *Television to Home Computer*, Poole: Blandford Press, 1979, pp. 119-145.
4. Veith, R.H. *Teletext*, Urbana: University of Illinois, 1981.
5. Veith, R.H. *Videotext*, Urbana: University of Illinois, 1981.

The style used in the abovementioned citations is based on ISO 690, International Organisation for Standardization (1987).

2.3.2 Citations

The order in which items in the references are listed is as follows:

- author's names
- title of article, book, report, thesis or dissertation
- edition numbers of book or report number of report
- location of publisher(in the case of a book)
- name of journal, publisher, conference, sponsor or report or the word Transactions or Proceedings followed by name of report
- location of journal, conference, sponsor or society if not well known
- volume number, issue number, month (abbreviated) and year of journal article or report.
- Year of book, thesis or dissertation
- inclusive page numbers of journal articles.

2.3.3 Punctuation guidelines

- comma is inserted after author's surname, but full stops are inserted after author's initial(s)
- names of journals are written in full unless the abbreviation is accepted practice in the relevant discipline
- titles of books, reports, theses, specifications and journals are capitalised; those of articles submitted to journals and conference transactions and proceedings have the first word only capitalised
- titles of books and journals are either typed in italics, typed in bold print or underlined.

2.3.4 Examples of citation for different types of publication

Journal article:

Del Sasso, L.A., Bey, L.G., and Renzel, D. Low-scale C-flight ballistic measurements of guided missiles, *Journal of the Aeronautical Sciences*, vol. 15, no.10, Oct. 1958, pp. 605-68.

Book:

Segre, E.Ed, *Experimental Nuclear Physics*, 1st ed. New York: Wiley, 1953, vol. 1, pp. 6-10.

Report:

Brook, E. *Using Compilers to Build Compilers*, Santa Monica: Systems Development Corp, 1960, pp. 1-3. (Systems Publication, 176).

Electronic references:

Computer programs
Author (if given), title of program (underline or use italics), version (in round brackets), form i.e. Computer program (in square brackets), date (if given) and availability i.e. distributor, address, order number (if given)

CD-ROM
Database (underline or use italics), [CD-ROM], inclusive dates (in round brackets), place, producer, availability, distributor file (if any)

Journal abstract/index entry from a CD-ROM or Online bibliographical database
Author, title (not underlined or italicised), [CD-ROM], journal information (journal title underlined or italicised), abstract/index entry from: give information sufficient for retrieval of the abstract/index entry from the database

Personal communications:

Personal and private communication may be used as a reference:
Lloyd, M. 1999: The effects of air pollution on health. Personal discussion, 25 June 1999, Pretoria. (Chief Director: Air Pollution Management, Department of Environmental Affairs and Tourism. Tel. +27 (011) 555 2244)

Transactions or Proceedings:

Brutsaert, W. Some methods of calculating unsaturated permeability, *Transactions ASCE*, vol.49, no.3, Nov. 1953, pp. 400-405.

Thesis or Dissertation:

Patton, F.D. *Multiple Modes of Shear Failure in Rock and Related Materials*, PhD Thesis, University of Illinois, Urbana, III, 1966.

Conference reference:

Pecknold, D.A.W. and Sozen, M.A. Calculated inelastic structural response to uniaxial and biaxial earthquake motions, *Proceedings of the International*

Association for Earthquake Engineering Fifth World Conference on Earthquake Engineering, Rome Jun. 1973.

Discussions or Closures:

Bell, J.M. Discussion of Dimensional parameters for homogenous earth slopes by Jamieson, A.R. *Journal of the Soil Mechanics and Foundation Division*, *ASCE*, vol. 94, no.SM3, May 7 1968, pp. 763-766.

Specification or Code of Practice:

British Standards Institutions, *Specification for the Use of Structural Steel in Buildings*, London: British Standards Institutions (1969) (BS 449 Part 2).

2.3.5 Bibliography (Optional)

Any supplementary literature not referred to in the text, but considered to be relevant and of interest, may be put after the references in a Bibliography.

3. HEADINGS AND NUMBERING

The arrangement of headings of various levels (hierarchical positions) reflects the organisation of the contents of the thesis. The levels of headings may be indicated by typeface and format alone. For example, the heading '**TWO-PHASE FLOW**' is recognisably of higher level than '**Onset of flow instability**'. The numbering of such headings further clarifies the importance, sequence and interrelation of the portions of text under each heading. Thus the headings '**2 TWO-PHASE FLOW**' and '**2.3.3 Onset of flow instability**' are more informative than those in the example above. Numbering also facilitates cross-referencing within the text: compare the economy of ' … see 2.3.3. ….' with '…. see **Onset of flow instability** in the **TWO-PHASE FLOW**…'.

3.1 Rules of Numbering

The recommendations given below are compatible with the International Standard ISO 2145 (1978).

- Arabic numerals should be used throughout.
- First level headings (usually chapter headings) of a thesis are numbered continuously beginning with 1.
- Each main division of text (chapter) may be divided into any reasonable number of subdivisions, having second level headings, which are also continuously numbered. This method of division and numbering can, in

principle, be continued to any level, but tends to become clumsy and confusing at the fourth level and beyond.

- Numbering should thus be confined to the first three levels. Further (unnumbered) levels of headings may be identified by typeface and format (see 3.2).
- The numbers designating headings of different levels are separated by full stops (the present document serves as an example). No full stop appears after the last number; this holds also if only one number (that of a first level heading) is present (thus, '**2 TWO-PHASE FLOW**' and not ' **2. TWO-PHASE FLOW**').

3.2 Typeface and Format

The typeface and format of all headings should reflect their levels, independently of numbering. The typographical details of the system of headings will be dictated largely by the printing system that is used in final production of the thesis. Whatever the typography, it is essential that the system is logical and that it be applied consistently. Modern practice favours left-hand-justified, rather than centred headings. Note also, that no full stop appears at the end of a heading.

3.3 Examples of Systems of Headings

Where a typewriter or a word processor and daisy wheel printer featuring bold typeface are available, the following system could be used:

1 FIRST LEVEL HEADING or **CHAPTER 1**
FIRST LEVEL HEADING

1.1 Second Level Heading

1.1.1 Third level heading

Fourth level heading

Fifth level heading. This leads into the text on the same line.

For production by typewriter or word processor having both roman and italic typefaces the following arrangement has found favour:

1 FIRST LEVEL HEADING or CHAPTER 1
FIRST LEVEL HEADING

1.1 Second Level Heading

1.1.1 Third level heading

Fourth level heading

Fifth level heading. This leads into the text on the same line.

Where neither bold nor italic typefaces are available the following system could be adopted:

1 F I R S T L E V E L H E A D I N G or C H A P T E R 1

FIRST LEVEL HEADING

1.1 SECOND LEVEL HEADING

1.1.1 Third Level Heading

Fourth level heading

Fifth level heading. This leads into the text on the same line.

4. STYLE AND PUNCTUATION

Style implies choice. However, in technical writing there are also constraints, which limit choice. The following are some points, which must be considered in thesis writing.

4.1 Text Structure

A good thesis should be comprehensive and precise. To be concise at the same time as being comprehensive the writer must watch his/her presentation carefully. He/she should read through his/her draft critically and eliminate unnecessary material. Where the writer's language is not English, it is most important that he/she should seek help in the draft reading process.

The following are some of the techniques that will help:

- Break down complex statements into lists
- Use the active voice where appropriate
- Do not use pompous words or jargon where simpler words are as effective
- Avoid empty phrases such as 'it is interesting to note that ….'

- Avoid unnecessary words, e.g. ‘the precipitate was found to be in a wet condition’ which means simply that ‘the precipitate was wet’.

4.1.1 Word Choice

Use of the personal pronoun

The argument against using personal pronouns in theses is that the subject matter is the important thing and not the author. This principle is basically sound as long as it is not carried to excess. When, however, it leads to vagueness in phrases like 'it is considered' or to ponderous writing like 'the author is of the opinion', then it is better to use a personal pronoun, e.g. 'I consider' or 'I think'.

Technical language and jargon

Technical language is a necessary part of scientific writing. The writer must, however, be certain that his/her audience will understand the language he/she uses. Where there is doubt, he/she should define his/her terms, either in the text or in a glossary.

4.1.2 Tenses

A guide like this cannot cover the ramifications of the uses of tenses in thesis writing. However, the following points may help to avoid the more common errors.

- Reports of work done are usually written in the past tense.
- Where, however, universal truths such as natural laws are stated, then the present tense is generally used.
- Do not change tenses in a sentence unless there is good reason for it.

4.1.3 Sentence structure

Active and passive voice

Traditionally technical writers have regarded the passive voice as the only acceptable form of presentation. In modern writing, however, the active voice is used far more often

Sentence length

Long sentences with a number of dependent clauses are difficult to follow, particularly if the subject itself is complex. Reading tests have shown that sentences with more than 25 words are generally difficult to comprehend.

4.1.4 Paragraphing

Paragraphs are there to help the reader. They do so by breaking up the text into manageable sections. This objective is often not achieved because of poor paragraph construction. The following guidelines will assist in organising paragraphs.

- A paragraph should consist of a central statement supported by a group of details.
- In technical writing the main statement is usually at or near the beginning. For argument or persuasion, however, the central statement is often placed at the end as a climax to the supporting details.
- The transaction between paragraphs should be smooth, with some form of connecting link in the text.
- Long unbroken sections of text are discouraging to the reader and, therefore, paragraphs should not be unduly long. If your writing has many paragraphs exceeding 100 words, you should examine it critically.

4.2 Conventions

4.2.1 Capitals

There is much confusion about the use of capitals and authorities differ considerably. The modern trend, however, is to use capitals sparingly. The following are some general guidelines;

- The first word in a sentence and in a direct quotation is capitalised; proper nouns are capitalised and common nouns such as river and company are also capitalised when they form part of a name e.g. River Amazon.
- Common nouns are capitalised when they are used with a number or letter to designate a specific thing, e.g. Laboratory D.

4.2.2 Acronyms

An acronym is a word formed from the initial letters of a name or by combining initial letters, or parts of a series of words, e.g. words such as ‘radar’ have become dictionary words. In general, however, use acronyms sparingly and, when using them for the first time, spell them out. Where the acronym is not an accepted dictionary one it should be in capitals e.g. ESCOM.

4.2.3 Spelling

In a language as complex as English there is no simple set of rules. When in doubt (e.g. when to use ‘s’ and when ‘z’) consult the Shorter Oxford English Dictionary (1993) which gives the accepted standard English spelling (preferred to the American) or the Oxford Dictionary for Writers and Editors (2000). This dictionary, in addition to guidance on spelling, gives useful information on punctuation. Either English or American spelling may be used, however, consistency must be adhered to throughout the report.

4.2.4 Abbreviations

Use only generally accepted abbreviations and symbols.

4.2.5 Punctuation

There are some 36 chief marks of punctuation. However, many of these are used only in specialised linguistic contexts and all should be used sparingly.

4.2.6 Pagination

Pagination should run consecutively through the thesis with all pages (including figures, tables, etc.) numbered. It is customary to use Roman numerals (i, ii), for the pages preceding chapter 1. From chapter 1 onwards Arabic numerals (1, 2) must be used. Page numbers must feature on the bottom right hand corner of the page.

5. EXTRA-LINGUISTIC MATERIAL

The customary medium of communication is language. However, in the sciences and engineering extra-linguistic material such as numbers, symbols, mathematics, tables, graphs and illustrations of various kinds are frequently used. A cardinal principle for such material is that it should be used only when it is the most effective means of communication and understandable to the target audience.

5.1 Numerals

The rules for the correct use of numbers are simple and are in the main based on common sense.

- In the text use words rather than numerals for integers below ten. Exceptions to this rule occur in illustrations and tables, or when integers

are associated with unit symbols. For numerals above ten, use whatever provides optimum clarity and good appearance.

- Where it is necessary to have decimal fractions these should be expressed in numerals, e.g. 'The original design required 2,7 times as many components as were finally used'. Do not use numerals for numbers which are only approximations. Do not begin a sentence with a numeral. This can lead to confusion and is in any event displeasing to the eye.
- Ordinals from 'first' to 'tenth' should be written out. For higher ordinals the author should once again use his/her discretion.
- Avoid writing out large and small numbers by using either accepted prefixes or exponential notation, e.g. 253 x 10^3 or 0,253 x 10^6. Where large numbers must be written out these should be separated by a small space into groups of three counting from the left or right of the decimal sign, e.g. 5 241,2 or 0,524 65. They must be separated by a comma, point or any other means. For numbers less than unity, a zero should precede the decimal sign, e.g. 0,352 not ,352. When listing numbers – as in a table – always align them on the decimal sign. In South Africa the decimal comma is used instead of the decimal point.

5.2 Mathematics

Mathematics included in a text should form an integral part of the argument and should be intelligible to the intended readers. Mathematics must be carefully presented – using typewriter symbols as far as possible and putting in the remainder neatly in ink. The units and symbols used should be consistent and follow international practice as detailed in British Standards Institution (1979) or International Organization for Standardization (1978).

The form of presentation of a mathematical expression should be such that it:

- Brings out clearly the structure of the expression.
- Is as simple as possible to type.

Standard symbols should be used wherever possible and the recognised literature in the field consulted for these references.

5.3 Tables

Tables are best used when a number of numerical values are to be compared or contracted. They should be used only where data cannot be clearly presented in graphical form. For example, discrete data sets can frequently be compared more effectively by using a bar chart than a table. In one sense

a table is a form of graphical presentation. As such it should be kept simplex and clear. Only relevant information concerning the conclusions should be included. There is no need to put in all intermediate steps or results – they only cloud the main issue.

Tables can be arranged either vertically or horizontally. Vertical tables are those, which can be read when a page is in the normal position. Clearly they are most convenient to read. Where possible they should be arranged to fit into a single page of the document. Horizontal tables are used where their size is such that they cannot be fitted into the width of the printed page.

Each table should have a heading and be numbered with Arabic numerals. Tables in theses should be numbered as follows: first by the number of the main text division (chapter) in which they occur, and secondly, by Arabic numerals running consecutively through that text division. The two numbers are separated by a full stop. Thus, the first table in Chapter 2 is **Table 2.1** the second table in Chapter 2 is **Table 2.2** etc. The same principle holds for lettered appendices, but the full stop is omitted. Thus the third table in Appendix E is **Table E3**. Tables should be referred to in the text by means of the table number.

The columns in a table should be arranged for easy comparison, related information being brought together. Each column should carry a brief heading and include consistent units where relevant. The same symbols, units, and abbreviations should be used in the text.

5.4 Illustrations

All illustrations (graphs, photographic plates, drawings and diagrams) are referred to as **Figures**. Each has a number and a descriptive title, which should be placed below the illustration. Numbering follows the same principles as those for tables (see 5.3). Thus, the first figure in Chapter 2 is **Figure 2.1**, the second **Figure 2.2** etc. The third figure in Appendix E is **Figure E3**.

5.4.1 Graphs

Graphs can take on a number of different forms, e.g. bar charts, divided circles, pictographs, or line graphs. The appearance of a graph is its major attribute. It is therefore up to the writer, in choosing one of these forms, to decide on the impression he/she wishes to convey. As line graphs are most frequently used in scientific and technical work, attention here will be directed primarily to this type. Line graphs are mainly used to show the relationship between a continuously varying independent variable and one or more of its

dependent variables. Wherever possible use should be restricted to this purpose. In preparing graphs for inclusion in a thesis the following should be borne in mind:

- the graph should illustrate clearly the point which the writer wishes to make
- the scale chosen should be such that only the relevant parts of the curve are presented, that is, the grid should not be extended unnecessarily beyond the limits of the curve to be shown
- if it is necessary to suppress the zero this should be clearly shown
- the choice of grid size depends on the accuracy required
- the scale should be easy to read and be restricted to multiples and sub-multiples of 10
- units should be clearly stated and written so that they can be easily read
- the caption should be brief but self-explanatory and be positioned underneath the graph; any notes or supporting documents, if necessary should be placed below the title
- to ensure clear reproduction graphs should not be overburdened with detail.

Graphs should be drawn in black ink on high quality paper. The lines should usually be at least 1mm thick and numbers or figures should not be too small.

5.4.2 Drawings, diagrams and photographs

Line drawings and diagrams are made up of lines, words and a few special symbols. They must, as far as possible, be kept simple and uncluttered with detail; working drawings are normally not acceptable. Unless they serve to clarify the verbal content of the report, or express an idea more vividly than words can, drawings or diagrams serve no purpose. Only generally accepted graphic symbols should be used.

The inclusion of photographs may occasionally prove useful and sometimes even necessary. If they are to be used they should be taken with care. Cluttered backgrounds and views of unrelated equipment should be avoided. Adequate contrast should be provided, and care taken so that important details do not fall into shadows or become obscured by the glare of highlights. Some sort of scale should be included so that the size of the object is shown. Lettering on prints may be necessary, but care should be taken to ensure that the letters stand out.

Any illustrative material which cannot effectively be reduced to A4 format, but which is relevant may be included in a pocket on the inside back cover of the thesis.

6. PRODUCTION OF THE THESIS

6.1 Typing and Word Processing

6.1.1 Paper

A good quality white bond paper of A4 size should be used and text must be typed or printed on one side only.

6.1.2 Type layout

The main body of the text should be typed in one and a half spacing and generous margins should be allowed. Typed pages should be aligned at a constant distance from the top and bottom of the page, although the top margin of the first page of a chapter may be lowered slightly. (A specimen page layout is shown in Appendix E).

The following are suggested dimensions of margins:
Top, bottom and right: 30 mm or 13 spaces
Left: 40 mm or 16 spaces (to allow for binding)

All work should be full justified and should not normally be indented. Use a double space to indicate a new paragraph. (See Section 3 for suggested layout and format of the thesis headings and paragraphs).

6.1.3 Typing the copy

A thesis should be produced in typescript. A typewriter or word processor with a clear black type such as Elite, Pica, Times Roman, Helvetica or Courier should be used, and italic script or other unusual type faces should generally be avoided unless they are necessary to emphasise words. Italics must be used for foreign words e.g. *inter alia, ad hoc* etc.

6.2 Illustrations

Illustrations form a very important part of a thesis and should be carefully prepared. Whatever method of reproduction is to be used for their presentation in the thesis, the essential requirements are that a table or illustration should be neat, concise, legible and, above all, comprehensible. Originals of photographs are not necessarily required but it is essential that any reproduction of a photograph, such as a photocopy, is clear.

6.3 Multiple Copies

Photocopying is the best method of duplication in view of the limited number of copies required. The thesis should be duplicated on single side only. As many bound copies of the thesis are required as there are examiners. Additional copies are required for the TWR library, the relevant School and promoter and or supervisors. Electronic copies of the thesis must be made available on request by the Faculty office.

6.4 Binding

The covers of bound theses should be worded simply with the title and below this the first names and surname of the author: e.g.

A SURVEY OF THE GENUS *PYRAMIMONAS SCHMARDA*
(PRASINIPHYCEAE) FROM SOUTHERN AFRICA INSHORE WATERS

Stuart David Sym

7. EDITING AND REVISING

7.1 Checking, Rectifying and Polishing

Editing the first draft is the author's responsibility; he/she cannot expect his/her supervisor or any outside person to:

- determine the accuracy of the information
- clarify ambiguities
- emphasise important issues
- check spelling and grammar. (Do not rely on computer spell checks only.)

The editing process is essentially one of critical evaluation of the manuscript against the requirements set by the objectives of the research. The main requirements are those of content, or orientation to the reader and of accuracy, brevity and clarity in the functional writing style. The author should evaluate each chapter of his/her thesis and check whether it:

- has real content
- is free from inaccuracies, ambiguities and bias
- emphasises important issues and is free from verbosity, irrelevancies and unnecessary detail
- can be understood readily
- is appropriate to the situation.

Before starting the process of checking, rearranging and polishing, the writer should preferably leave his/her draft for a few days so that he/she can mentally switch to the role of a critical reader.

The editing consists of three operations, which should be done separately. These are:

- the integrity edit
- the logical progression edit
- the text and language edit.

7.1.1 Integrity edit

The contents page should be examined and the following points checked:

- Are the headings and sub-headings clear descriptions of what is covered?
- Do they form a recognisable logical pattern and is the numbering system used a reflection of this pattern?
- Are the headings grammatically parallel?

Next, the text should be checked page by page for the following:

- Are the headings and numbers identical to those used in the list of contents?
- Are the tables and figures properly numbered and in sequence, and do they have informative headings and captions?
- Are tables, figures and references correctly cited in the text?

7.1.2 Logical progression edit

Each chapter should be read as rapidly as possible to:

- check that the objective is clearly stated and that the concluding section shows whether or not the objective was achieved
- check that the logical thread is apparent; any jumps or gaps in the progression are usually an indication of faulty organisation; mark these, but do not correct at this stage
- check, in particular, whether sections contain anything, which does not belong there.

The conclusions should arise from the discussion. Structural defects must be corrected before the text and language edit.

7.1.3 Text and language edit

Only when one is satisfied with the basic format of the report should one concentrate on the structure of the text and the use of language. The text

may include non-verbal components such as graphs and illustrations. These should be evaluated as part of the text.

The criteria for evaluating functional writing, mentioned before, are:

Content criteria

- accuracy – sufficient for the needs of the audience
- brevity – leaving out irrelevancies and at the same time covering the essentials adequately
- clarity – avoiding vagueness and ambiguity
- emphasis – drawing attention to significant information.

Tonal or attitudinal criteria

- appropriate to the situation
- concern for the needs of the audience
- serious treatment of subject matter
- authoritative without being writer-centred.

7.2 Graphic Material

Essentially the same criteria used in the language edit, viz. accuracy, brevity, clarity and emphasis can be applied to graphic communications. One of the main reasons for using graphics is their ability to give an overall view and show relationships. Any graphic material, which fails in these important areas probably does not justify the extra effort of using it.

7.3 Time and Space Separations

Most theses are prepared for consideration within a short time and often for a local audience. However, once accepted, a thesis becomes part of the body of scientific literature. Writers should therefore draw attention to information that is only valid for a short time. The writer should be aware that points which are valid locally (e.g. under Highveld conditions at an altitude of about 1500m) are not necessarily valid generally. For instance, a recommendation to install solar heating panels on north facing roofs will not make sense in the Northern Hemisphere. Cost data are also subject to variation by place and in time, and the exchange rate and other relevant factors may have to be specified to make matters clear.

7.4 The External Viewpoint

The author may claim to be objective. Usually he/she is not – at least, not to the extent required for a good manuscript. Therefore the external reader's viewpoint is needed. This can be provided by a supervisor or critical

colleague who does not have to be an expert in the subject of the manuscript, but who must be able to place himself/herself in the position of the intended audience. He/she should be skilled in recognising the errors authors make and should annotate the manuscript accordingly and, in addition, suggest ways of improvement. The best manuscripts are produced by a co-operative interaction of author, supervisor and independent editor.

7.5 Rewriting

Of all tasks, rewriting a text is the most unpopular, yet if we wish to develop a clear style it is usually essential. Editing tends to concentrate on the correction of errors rather than elegance of diction. Rewriting all or a substantial part of the text is usually the only way of getting an elegant well-balanced text.

7.6 Readability of Texts

One of the main objectives of editing is to improve the readability of the text. The factors affecting readability have been extensively studied and various indices have been proposed. Most of these, however, were developed for school textbooks or general reading. Comparatively little work has been done on assessing their relevance to technical writing. For this reason readability measures should be used with caution in evaluating technical writing. This applies particularly in instances where the index is given as a measure of reading age.

7.7 Computer Editing

If a computer or word processor is used in the preparation of a thesis, standard editing programmes may be available. These vary from simple spelling checks to the calculation of readability indices, and even the production of an index. Where available these should be used, although an index is not a requirement in a thesis.

7.8 Outline processor, spelling checker, cross referencing facilities, index and/or contents

Authors of theses are advised that the modern trend is to prepare your thesis yourself – right from the start. Use an outline processor, make notes, check spelling, etc.

8. LAWS AND REGULATIONS

8.1 Copyright Laws

Copyright Act 98 of 1978, which is the act currently in force in South Africa, applies both to published and unpublished sources. Direct quotations from another work are permitted to a reasonable extent for the purposes of research provided that the source and name of the author are acknowledged. Subsequent publication of the thesis as a book necessitates the explicit approval of the copyright holder for this purpose.

APPENDIX A

SPECIMEN TITLE PAGE

A SURVEY OF THE GENUS *PYRAMIMONAS SCHMARDA* (PRASINOPHYCEAE) FROM SOUTHERN AFRICAN INSHORE WATERS

A dissertation submitted to the Faculty Health Sciences, University of Johannesburg, in fulfilment of the requirement for the degree of Master of Technology: Biotechnology by

Stuart David Sym
(Student number: 984567)

Supervisor: Prof. K.L. Manchester
Co-supervisor: Dr. H. Abrahamse
Promoter: Dr. E. Dabbs

Johannesburg, 1992

APPENDIX B
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1.1.1 LIST OF TABLES, CHARTS AND FIGURES

Chart

Figure

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SPECIMEN LIST OF FIGURES

LIST OF FIGURES

APPENDIX D

SPECIMEN LIST OF TABLES

APPENDIX E

SPECIMEN PAGE LAYOUT

MATERIALS AND METHODS

1. Experimental animals

Adult male and female fruit bats (*Rousettus aegyptiacus*) were caught in the Northern Transvaal and kept in captivity in the university animal house where they were fed on a diet of fresh fruit and water. Fruit bats were sacrificed and tissue excised using sterile methods and kept in liquid nitrogen. (Animal ethics registration number: 93/46/1)

2. Media

For list of abbreviations and constituents of media refer to appendix 1**.**

3. Chemicals

For list of chemicals refer to appendix 2.

4. Preparation of cDNA probe

E.coli strain *JM109* was transformed with a 180 base pair fragment of the 9-kDa calbindin mouse cDNA, inserted in the EcoRI site of pBS-M13-expression vector. The 9-kDa calbindin mouse cDNA probe was a gift from Dr. M.E. Bruns, Clinical Chemistry laboratories, Department of Pathology, University of Virginia Medical centre, Charlottesville, USA. Chloramphenicol amplification followed by alkali extraction and caesium chloride gradient centrifugation was performed and the insert obtained by EcoRI digestion followed by low-melting-temperature agarose purification.

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