بسم الله الرحمن الرحيم

يأيها الذين آمنوا إنا خلقناكم من ذكر وأنثى وجعلناكم شعوبا وقبائل لتعارفوا، إن أكرمكم عند الله أتقاكم، إن الله عليم خبير
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تقديم

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WRITING SCIENTIFIC RESEARCHES AND THESIS

كتابة البحوث والرسائل العلمية

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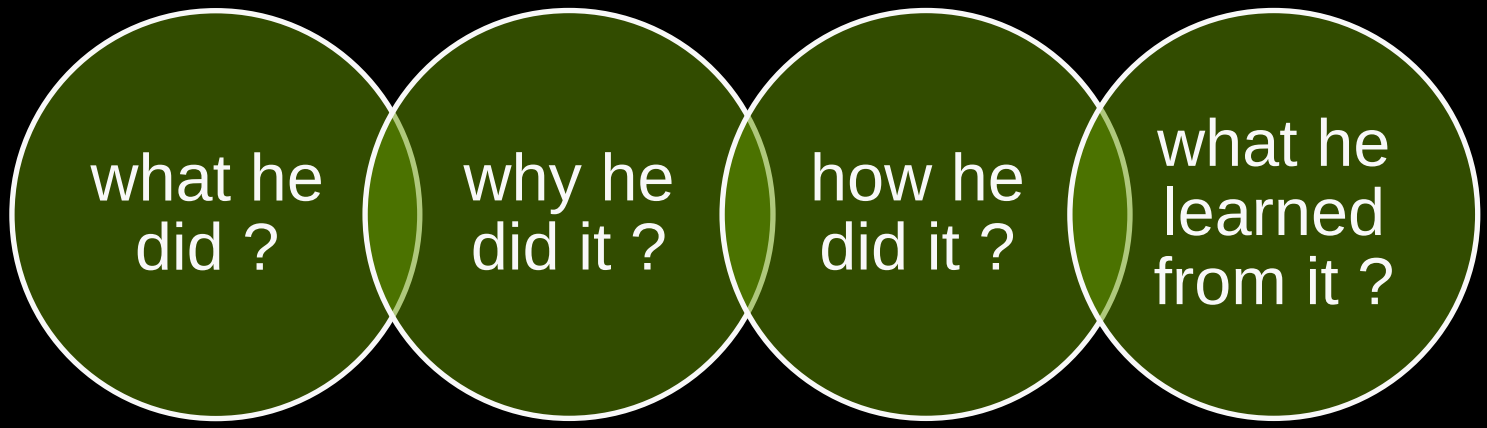
Introduction

- The goal of scientific research is publication.
- The scientific experiment is not completed until results are published.
- Researcher must provide a written document showing



- The scientist must “do and write” science.
- Many good scientists are poor writers.

Accordingly

Scientist must learn how to prepare manuscripts that:

- Have a high probability of being accepted for publication
- Are completely understood by interested authorities in that field when published.

Types of Scientific articles

Prof. Abdelwahab A. Ibrahim

A scientific paper

A scientific paper or thesis is a written and published work in a certain way to fulfill the following requirements:

- ✓ being the 1st publication of original research results.
- ✓ Put in a form where other scientists can repeat experiments and test conclusions (reproducible).
- ✓ Published in a journal or other source document readily available within the scientific community.

Theses

It differs from a published article in:

- it may deal with more than one topic.
- It results from individual effort.
- It is written in a more detailed style.
- The format of a thesis varies among institutions.
- The student is guided by the supervisor.

PhD thesis

- Opens a new area
- Provides unifying framework
- Resolves long-standing question
- Thoroughly explores area
- Contradicts existing knowledge
- Experimentally validates theory
- Produces ambitious system
- Provides empirical data
- Derives superior algorithms
- Develops new methodology
- Develops new tool
- Produces negative result

Due to Alan Newell?

Other Types of Writing

Prof. Abdelwahab A. Ibrahim

Review articles

- Review almost anything, most typically the recent work, in a certain field, or the work of a particular author or group.
- They summarize, analyze and integrate information that has already been published in primary journals on a specific.

Conference reports

- Papers published in a book or journal as part of the proceeding of a symposium, national or international congress, workshop, round table, etc.
- Such preliminary reports are not considered as typical scientific papers. They are published later in a proper manner in 1ry journals and only then they are considered scientific papers.

Multi-authored books

- These books are written by several authors under the guidance of an editor(s).
- The editor sends to the author instructions including the form, style & length of the manuscript, number & types of graphics permitted, terminology, abbreviations, key words & type of reference citations.

Synoptics

- Used by limited numbers of publishers.
- It is a concise, usually 2-pages, first publication in a 1ry journal.
- It presents key ideas & results from a simultaneously available full paper on completed work which the author selected as being most important & useful to others.

Abstracts for oral or poster presentations

- Published in connection with meetings.
- May be considered 1ry communications since the work has not been previously published.
- The abstract contains a concise statement of the problem, the experimental methods used, the essential results (in summary form) & conclusions. It does not contain tables, illustrations or references.

Posters

- Poster are presented in meetings.
- It provides an opportunity of personal communications.
- Can be easily seen from a distance, especially the title (seen from about 40 ft) & the text (seen from about 2 ft).
- Usually divided into: problem, materials & methods, results & conclusions. Well designed tables & figs are important.

Symposia

- Each usually deals with a single topic & may contain 3-10 manuscripts.
- The chairman often serves as editor.
- The manuscripts are either reviewed or not.
- Symposia may be published as monographs or books, or in certain journals.

Book reviews

- To acquaint readers with features of books.
- They contain title of the volume, name of authors or editor & publisher, year of publication, number of pages, major topics, critical interpretation of their value.

Grant proposals

- Written in accord with the requirements of the institution to which it is submitted.
- Being brief as possible without sacrificing details required for clarity of presentation.

They should include:

- An original idea with a measurable conclusion, within the time frame of the grant.
- Related & antecedent work in the field.
- A careful outlined plan & timetable.
- The importance of any conclusions to the field of work, & any social benefit.
- C.V. of the involved personnel.
- A complete realistic budget.

Contents of the scientific work

The Title

The Title

- The title orients readers to the whole document.
- The title will be read by thousands of authors, though few only will read the entire paper.
- The indexing and abstracting services depend mainly on the accuracy of the title, thus an improper titled paper may be lost and rarely reach the interested personnel.
- All words in the title should be chosen with care.
- It should have “the fewest possible words that adequately clearly describe the contents”.

Length of the title

- Very short titles are not helpful at all.
- Too long titles are less meaningful than short ones.

Avoid too short title

Studies on Bacteria

Taxonomic studies on bacteria

Biochemical studies on Bacillus bacteria

Avoid too short title

Studies on Diptera

Biological studies On Diptera

Biological studies On House flies

Avoid too long title

Studies on flies abundant throughout the four seasons of the year in rocky and sandy regions along the whole length of the northern coast of African Continent, during the period between the years 1980 & 1988

Studies on flies abundant in rocky and sandy regions along the northern coast of Africa, during the period between 1980 & 1988

Use Specific words

Action of hormones on insects

Action of juvenile hormone on insects

Action of juvenile hormone on Diptera

Action of juvenile hormone on *Musca domestica*

Use Specific words

Preliminary studies on the effect of some hormones on various species of insects

Action of juvenile hormone on *Musca domestica* and *Culex pipiens*

Inhibition of growth….. of …… by ……..

Use Specific words

Studies on the Electro-deposition of Lead on Copper

Effects of Rhodamine-B on the Electrode position of Lead on Copper

Orients readers to your area of work

Effects of Humidity on the Growth of Avalanches

Effects of Humidity on the Growth of Electron Avalanches in Electrical Gas Discharges

Avoid Syntax (word order)

Isolation of phospholipids from the haemolymph of Pectinophora gossypiella by paper chromatography

Isolation of phospholipids from the haemolymph of *P. gossypiella* by the use of paper chromatography

The title as a label

- It should contain key words suitable for Abstracting systems.
- It should provide the right “keys” to the paper.
- The terms in the title should be limited to words that highlight the significant contents of the work.

Do not use Abbreviations and unintelligible words (jargon)

- Titles should never contain abbreviations, chemical formulas, unintelligible or unusual words or proprietary names, e.g. HCL.,
- Exceptions, may occur for most common abbreviations, e.g. DNA.

Avoid Abbreviations

Effect of Hcl on…..

Effect of hydrochloric acid on…..

Avoid Unfamiliar words

zwitterion

dipolar ion

Avoid Trade Names

Aureomycin	Chlortetra-cycline

Avoid series titles

- The reader should read the whole series consecutively.
- Annoying to editors because of scheduling problems and delay in appearance not in order.
- The title before the Roman numeral is so general as to be meaningless.
- The hanging title is same as series title, except that a colon ":" substitutes the Roman numeral.
- The hanging title avoids some defects of series title.

Avoid Title-subtitle" arrangements

Studies on Schistocerca gregaria I. Morphology and anatomy",

&

Studies on Schistocerca gregaria. II. Histology and biology".

Morphology and anatomy of Schistocerca gregaria"

Histology and biology of Schistocerca gregaria

Indicative titles:

- Conventional titles are usually indicative rather than informative.
- They state the subject of the article rather than the conclusions.
- e.g. “effect of radar electromagnetic fields on migrating birds” .
- An informative title gives the main conclusion in a concise statement.
- Migrating birds respond to electromagnetic fields”.
- Informative tiles, are used when the research has lead to definite conclusions.

Use indicative rather than informative title

Migrating birds respond to electromagnetic fields

Effect of radar electromagnetic fields on migrating birds

Informative tiles, can be used when you reach to definite conclusions.

Summary of title specifications

- Avoid too short \ long titles.
- Use specific words which are familiar & short.
- Should contain the right key words.
- Does not contain abbreviations, chemical formulas or proprietary names.
- Avoid “title-subtitle” & “hanging title” arrangements.
- Take care of faulty syntax.
- Conventional titles are usually indicative rather than informative.

Arrangement of Authors

Arrangement of Authors

- Listing authors is not agreed upon in all cases.
- Some British journals list them alphabetically.
- The logic tendency defines the 1st author as the 1ry motivator of the work and did most of the research, even if the 1st author is a graduate student.
- The 2nd author is the 1ry associate, who may be the head of the laboratory or has Nobel Laureates.
- The 3rd author may be equivalent to the 2nd or having a lesser role.
- This encourages young scientists & is probably the best system.

Arrangement of Authors

- Some journals use full names rather than the initials to prevent confusion in the literature & avoiding problems that may arise in bibliographic data bases.
- The preferred form of writing the author's name is the 1st name, middle initials & last name, e.g. Abdelwahab A. Ibrahim.

Addresses

Addresses

- The address of the author (s) is the laboratory in which the work was undertaken.
- If before publication the author changed his address, the new address should be indicated in a “Present Address” footnote.
- When 2 or more authors are listed, each in a different institution, the addresses should be listed in the same order of the authors.

The address serves several purposes

- Identifies the author, especially when more than one author have the same name, but in different institutions.
- Supplies the author's mailing address, in order to denote the source of reprints.
- Some journals use a system of asterisks, footnotes, etc., to indicate the person from whom reprints are asked.

Abstract

The “Abstract”

- The abstract is a summary of the information in a document.
- It is placed before the text of the manuscript, so that the reader might grasp the main results of the work.
- A well prepared abstract enables readers to identify the basic content of a paper quickly & accurately, to determine whether the work lies within the scope of their interests.

Criteria for a good Abstract

- not exceed 250 words.
- State the principal objectives & scope of the work.
- Describe the methodology and techniques employed.
- Contain scientific & common names of organisms used.
- Use generic names of specific drugs or compounds, but not trade names.
- Summarize the results.
- State the principle conclusions, especially new theories,& interpretations

Criteria for a good Abstract

- Never give any information or conclusion that is not stated in the paper.
- Neither contain tables, graphs & direct reference to them.
- Avoid detailed description of experiments, organisms & standard methods.
- Mention geographic location like the state & country, e.g. Cairo, Egypt.
- Do not cite any reference to the literature.
- Be written in an easy language familiar to the potential reader.
- Contain no abbreviations.

Introducion

Introduction

- Introduces the work
- Supplies sufficient background information to allow the reader to understand & evaluate the results without referring to previous publications.
- So choose references carefully to provide the most important background rather than exhaustive review of the topic.
- Provides rationale for the study.

Specifications of a good introduction

- presents very clearly the nature & scope of the problem.
- Orients the reader by reviewing the most important literature on the subject.
- States the methods of investigation, & if necessary, the reason for the choice of a particular method.
- Includes the principal results of the investigation.
- Refers to any previously published preliminary note or abstract of the work, or closely related papers that have been, or about to be, published elsewhere.

Materials and methods

The “Materials and methods”

This section should contain enough details of the materials & methods used, so that a competent worker can repeat the experiments and obtain similar results (reproducible).

Methods

- If your method(s) is new (unpublished), then all details should be given.
- If the method has been previously published in a standard journal, only the literature reference should be given.
- If the journal is not at the International level, the full details must be written.
- If several alternative methods are commonly employed, it is better to refer briefly to the method & cite the reference.

Materials

- Should include the technical specifications, quantities used & source or method of preparation.
- Avoid the use of trade names.
- Use generic or chemical names to avoid advertising.
- Experimental animals, plants & micro-organisms should be clearly identified Genus, species & strain.
- Sources & special characteristics should be listed, e.g. age, sex, genetic \ physiological status, etc.
- Human subjects are characterized appropriately (age, sex, diseases, etc.).

Measurements & analyses

- Be precise, e.g. If a reaction mixture was heated, give the temperature.
- Statistical analyses are often necessary, thus discuss the analyzed data & not the statistical method.
- Ordinary statistical methods should be used without comment, though unusual methods require literature citation.
- Take care of the syntax.

Tabular materials:

When a large number of strains, spp., chemical compounds, etc., are used, it is better to list them in a table to identify items like the source, properties, structural\ empirical formula, trade names, etc.

Correct form and grammar:

- Don’t but your results in the materials & methods section.
- A good test for your work is to give a copy of your manuscript to a colleague & ask him if he should repeat the experiments.
- Take care of mistakes of grammar, spelling & punctuation’s.

Results

The “Results”

- Results are really the significant part of the paper.
- It contains the new knowledge that you are contributing to the world.
- The whole paper stands on the weight of the results.
- Results should include some kind of overall description of the experiments (big picture).

The “Results”

- If data can be described in few sentences in the text, do not present them in a table.
- Data presented in a table should be complete in itself, i.e. the title, headings & footnotes, should contain all information needed by the reader to understand the table without consulting the text.
- Tables of similar information should have similar or parallel formats, styles & titles.
- Repetitive data from laboratory notebooks should not be transferred as such, but only put representative data.
- Only include the net results, which represent the trend of the experiment, e.g. number of replicates, the range, the average ± SE, etc.

The “Results”

- Effective variables are only given in tables or graphs in detail.
- It is better to state that “under the conditions of the present experiments the results were negative”, because different results by another author might be obtained under different conditions.
- Conclusions drawn from numerical data must be supported by statistics.
- When using statistics to describe the results, they should be meaningful statistics, e.g. Don’t use 3 animals & express the results as follows: “33.3& of the animals were affected, 33.3% were resistant & the remaining animal ran away”.

The “Results”

- Results should be short & clear without excess of unnecessary words (redundancy).
- Don’t repeat in words what is fully given in tables or graphs.
- Do not omit important negative results.
- Make sure that all columns & rows are necessary, some of them may be put in a footnote, title, text , etc.

Discussion

“The Discussion”

- The hardest section to write.
- Many papers are rejected by editors because of faulty discussion.
- Interprets your data , to answer the question posed in the introduction.
- Presents the principles, relationships & generalizations shown by the results.
- Don’t restate the results, but just discuss them.
- Points out any exception or lack of correlation & defines unsettled points.

“The Discussion”

- Shows if the results & interpretations agree or contrast with previously published work & consider reasons for disagreement.
- Discusses the theoretical implications of the work, as well as any possible practical applications.
- States the final conclusions as clearly as possible.
- Summarizes the evidence for each conclusion.
- Ends with a short summary or conclusion regarding the significance of the whole paper.

“The Discussion”

- To reach the goal of the discussion, it is not necessary to reach big conclusions.
- It is difficult to reach the whole truth in a single paper, so you have to “shine a spotlight on one area of the truth”.
- When you describe the meaning of your little bit of truth, do it simply. If you extrapolate to a bigger picture than that shown by your data, you may appear foolish.

Acknowledgments

“Acknowledgments”

- Its not really a scientific section, but it is a sort of being courteous & having ethics.
- Acknowledge significant help from any individual, e.g. the source of, cultures, materials, ideas, etc.
- Acknowledge any outside financial assistance as grants, fellowships, etc.
- Be very specific when acknowledge an idea, suggestion or interpretation of some body; don’t endorse him in your conclusions.

Literature cited

“The Literature cited”

- It includes published & unpublished documents.
- Published documents include journals, books, reports, theses, & maps.
- Unpublished documents include handwritten or typewritten documents as letters, preliminary drafts & reports, field notes in single copies, not accessible to the public, or distributed to limited segments of the scientific community.
- Unpublished documents are usually put in footnotes of the text or in statements within the text.

“The Literature cited”

- Only list significant published references.
- References to unpublished data, papers in press, abstracts, theses & other 2ry materials should be avoided as possible.
- If such reference is absolutely essential it may be added parenthetically or as a footnotes in the text.
- If you must cite a reference not readily available, indicate in a footnote that you have not read that reference in the original, but depended on other article written by other author, e.g.. Ibrahim (1996, cited by Ali, 2010).

“The Literature cited”

Name and year system (Harvard system):

References are arranged alphabetically by author name & then chronologically when the author of 2 or more references are the same.

- Advantages:
- Convenient to the author, as the references are not numbered.
- References can be added / omitted easily.
- If 2 or more papers for the same author(s) are quoted, they are numbered “a, b, c ….”, e.g., Ibrahim (1950, a) Ibrahim (1950, b), etc.
- Disadvantages:
- As to the reader when a large number of references must be cited within one sentence or paragraph (often in the introduction), the reader sometimes jump over several lines of references.
- As to the publisher, it means increased cost.

“The Literature cited”

Citation order:

References are listed by numbers in the order that they first appear in the text, & then numbered sequentially.

- Advantages:
- Reduce printing expenses.
- As to the readers it is easier to refer to cited references ordered by numbers.
- Useful for journals which are basically a “note” journals , where each paper contains only few references.
- Disadvantages:
- Not good for long papers which contain many references.
- As to the author it requires renumbering each time he adds \ omit a paper.
- As to the reader this non alphabetical system separates several references of the same author(s).

“The Literature cited”

Alphabet–number (Harvard Reference Style):

- Citation by number from an alphabetical list of references.
- Advantages:
- As it contains the number system it saves money in printing.
- As it follows the alphabetical system, particularly if it is too long, it is easy to the reader & author (addition \ omission).

- Disadvantages:
- Some authors claim that the reader should be told of the name of the authors cited & years of publication on the spot in the text, because papers of famous authors or those appearing in recent years attract more attention than of ordinary authors or old publications.

Harvard Reference Style-examples

Works by the same first authors, published in the same year

Single author entries come first in the reference list

- **Reference list Example:**
- Bessant, J 2001, 'The question of public trust and the schooling system', *Australian Journal of Education*, vol. 45, no. 2, pp. 207-226.
- Bessant, J & Webber, R 2001, 'Policy and the youth sector: youth peaks and why we need them', *Youth Studies Australia*, vol. 20, no. 1, pp. 43-47.

Harvard Reference Style-examples

Works by the same author, published in the same year.

In your reference list, order these works alphabetically according to the title of the work and use the letters a, b, c ... after the publication date to distinguish between them in your citations.

- **Reference list Example:**

Scutt, JA 2003a, 'Future access - discrimination and the Disability Discrimination Act', *Access*, vol. 5, no.3, pp. 6-10.

Scutt, JA 2003b, 'Without precedent: sex/gender discrimination in the High Court', *Alternative Law Journal*, vol. 28, no. 2, pp. 74-77.

- **Citing example:**

Scutt (2003b p. 74) looks at the issues arising from the lack of High Court precedents in sex/gender discrimination law.

Harvard Reference Style-examples

A book with one author

- **Reference list:**

  Kizza, JM 2002, *Computer network security and cyberethics*, McFarland, Jefferson, N.C.

- **Citing example:**

  - Kizza (2002) examines the motives for cybercrime and its cost.
  - Cyber attacks may be categorized according to motive (Kizza 2002).

Harvard Style-examples

A book by two or three authors

- **Reference list:**
- Coates, K & Holroyd c 2003, *Japan and the internet revolution*, Palgrave Macmillan, New York.
- **Citing example:**

➢ Coates and Holroyd (2003) look at national patterns of internet use.

➢ Japan has developed a technology well suited to local conditions (Coates & Holroyd 2003).

Harvard Style-examples

An edited book

- **Reference list**

  Watts, MM (ed.) 2003, *Technology: taking the distance out of learning*, Jossey-Bass, San Francisco.

  Denzin, NK & Lincoln, YS (eds) 2003, *The landscape of qualitative research: theories and issues*, 2nd edn, Sage, Thousand Oaks, CA.

- **Citing example:**

The volume edited by Watts (2003) includes chapters examining the general impact of computer technologies, and their particular application to education.

Harvard Style-examples

A book with no author given

- **Reference list:**

Style manual for authors, editors and printers 1996, 5th edn, Australian Government Publishing Service, Canberra.

- **Citing example:**

Notes, references and bibliographies are dealt with in Chapter nine (*Style manual for authors,* editors and printers 1996).

Harvard Style-examples

A chapter in a book

- **Reference list:**

  Wyn, J & White, R 1997, 'The concept of youth', in *Rethinking youth*, Allen and Unwin, Sydney

- **Citing example:**

  The case for a relational concept of youth is argued by Wyn and White (1997) in their chapter 'The concept of youth'.

Harvard Style-examples

Journal articles

Print version

- **Reference list:**
- Parikh, M & Verma, S 2002, 'Utilizing Internet technologies to support learning: an empirical analysis', *International Journal of Information Management*, vol. 22, no.1, pp. 27-46.
- **Citing example:**

  Parikh and Verma (2002) provide one analysis of the use of the Internet in supporting learning.

Harvard Style-examples

Conference papers

Published paper

- **Reference list**
- Common, M 2001, 'The role of economics in natural heritage decision making', in *Heritage economics: challenges for heritage conservation and sustainable development in the 21st century: proceedings of the International Society for Ecological Economics conference, Canberra, 4 July 2000*, Australian Heritage Commission, Canberra.
- **Citing example:**

  Common (2001) addresses the key theme of the conference.

Harvard Style-examples

Theses

Print version

- **Reference list**

Byrne, M 1996, *Self-talk and test anxiety*, PhD thesis, Monash University, Melbourne.

- **Citing example:**

Byrne (1996) examines the concept of self-talk in relation to test anxiety.

Harvard Style-examples

Theses

Accessed electronically

- **Reference list**

Kurtz, T 2003, *A psychology of environmentally sustainable behavior*, PhD thesis, Murdoch University, Perth, viewed 11 October 2004, <http://wwwlib.murdoch.edu.au/adt/browse/view/adt-MU20040428.152013

- **Citing example:**

Kurz (2003) conducted two field experiments aimed at applying a social-ecological framework to the promotion of water and energy consumption.

Harvard Style-examples

Websites

- **Reference list**
- Therapeutic Goods Administration 2004, Department of Health and Ageing, Canberra, viewed 13 October, 2004,
- <http://www.tga.gov.au/recalls/index.htm>.
- **Citing example:**

  Details of drug recalls and alerts can be viewed at the Therapeutic Goods Administration website at <http://www.tga.gov.au/recalls/index.htm>.

Harvard Style-examples

Website documents

- **Reference list**
- Department of Education, Science and Training 2003, *The national report on higher education in Australia (2001)*, Department of Education, Science and Training, Canberra, viewed 13 October, 2004, <http://www.dest.gov.au/highered/otherpub/national_report/default.htm>.
- **Citing example:**

  Chapter 5 of the report (DEST 2003) outlines developments in the internationalisation of Australian higher education.

Abbreviations

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“Abbreviations”

- Abbreviations have been standardized recently according to the “American National Standard for Abbreviations of Titles of Periodicals”.
- Some of the rules of abbreviations are:
- All “ology” words are abbreviated at the “l”,

  Bacteriology ⟹ Bacteriol.,

  Physiology ⟹ Physiol.
- One-word titles are never abbreviated, e.g. Science, Biochemistry.
- Most familiar words are abbreviated as follows:

“Most familiar abbreviations”

The student
&
the supervisor

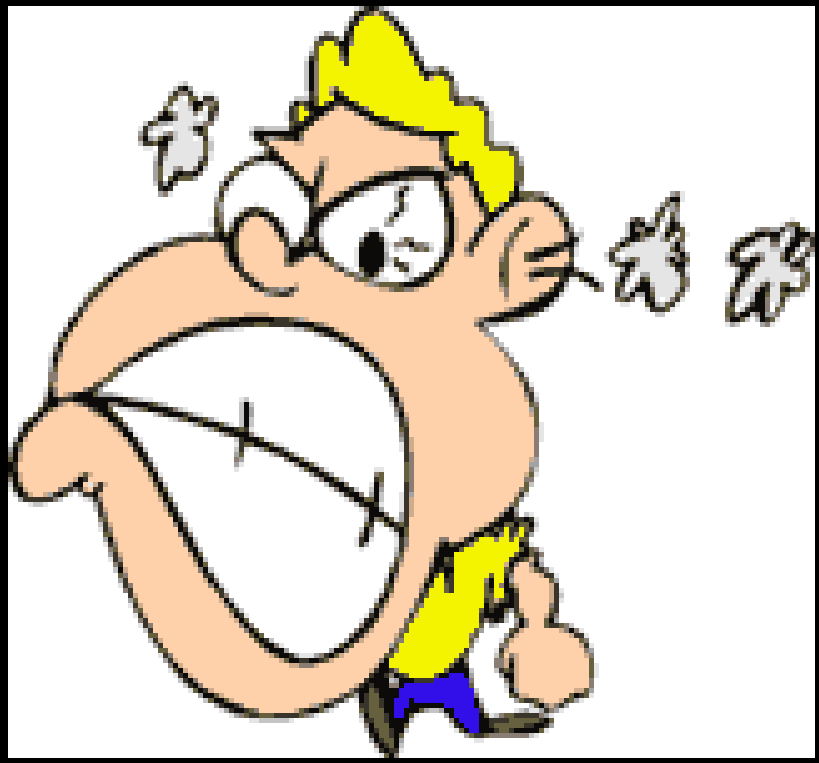
Prof. Abdelwahab A. Ibrahim

What to expect from your advisor?

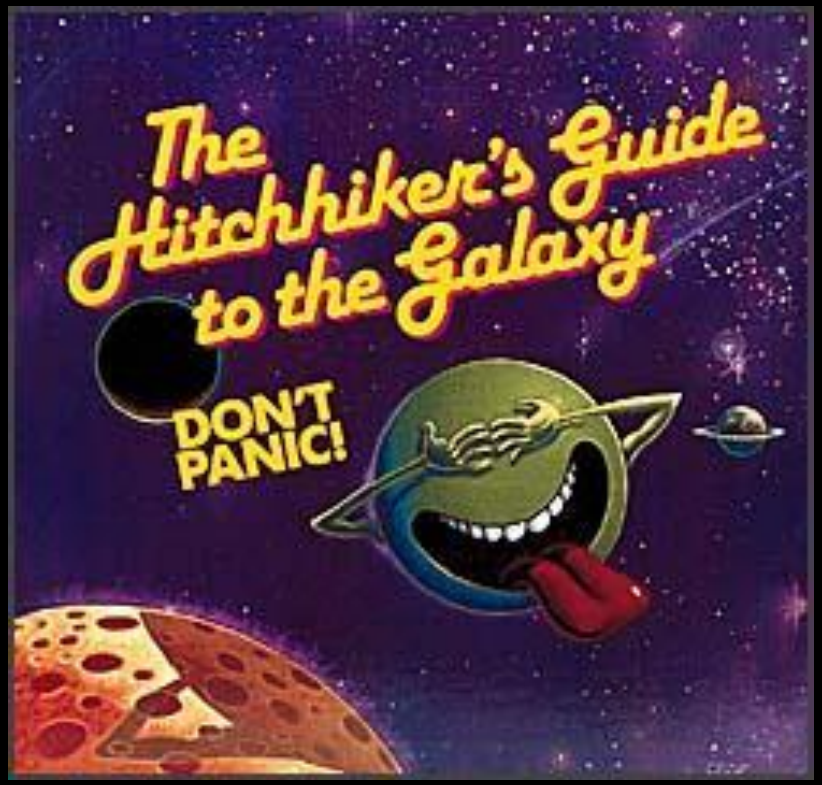
- Intellectual support
  - Quality assurance
  - What standard a thesis should reach
  - Indication of when to stop
- Emotional support
  - Encouragement
  - Constructive atmosphere

What not to expect from your advisor?

- Smiles
  - If draft chapters contain simple spelling mistakes and typos
- Mind-reading skills
  - Motivation dipping
  - Absence = illness



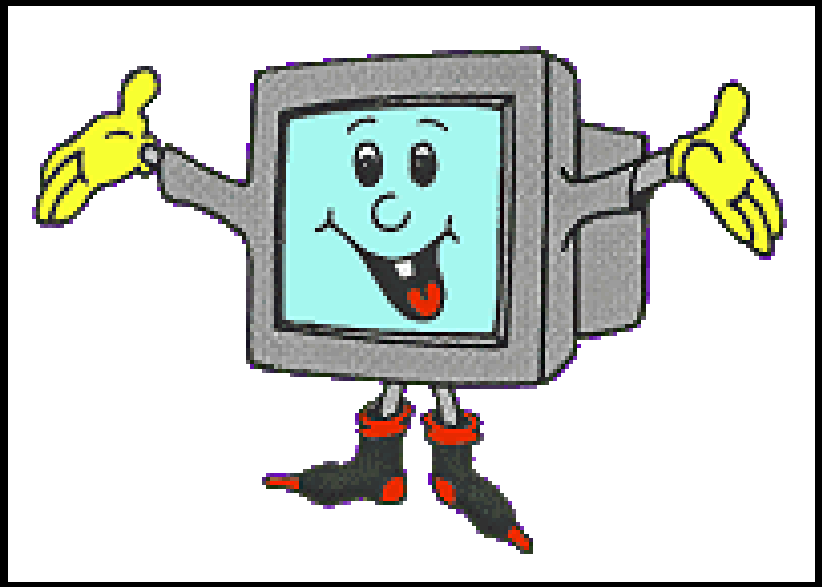
Defending your thesis



- Don’t panic
  - You’re probably the world’s expert on this topic by now!
- Your examiners are human
  - They’ve sat in your seat
  - They will help you find what changes (if any) are needed to make this the required quality

Defending your thesis

- Enjoy it
  - You've the world's experts in the room
  - They want to talk about *your work*
  - How often will that happen in the future?
- If you want, have a practice
  - Get your supervisor to set up a "dummy" jury
  - Prepare your opening statement



What are examiners looking for?

- Review of literature
  - Is the literature relevant?
  - Is the review critical or just descriptive?
  - Is it comprehensive?
  - Does it link to the methodology in the thesis?
  - Does it summarize the essential aspects?
- Methodology
  - Is there a clear hypothesis?
  - Are precautions taken against bias?
  - Are the limitations identified?
  - Is the data collected appropriately?
  - Is the methodology justified?

What are examiners looking for?

- Presentation of results
  - Have the hypotheses in fact been tested?
  - Are the results shown to support the hypothesis?
  - Is the data properly analysed?
  - Are the results presented clearly?
  - Are patterns identified and summarized?
- Discussion and Conclusions
  - Are the limits of the research identified?
  - Are the main points to emerge identified?
  - Are links made to the literature?
  - Is there theoretical development?
  - Are the speculations well grounded?

It’s all over

- You’ve finished writing & defending your thesis
- What do you do next?

It's all over

- You've finished writing & defending your thesis
- What do you do next?
  - Turn it into a book
  - Publish some journal articles around it
  - Make copies for your parents, …
  - Make a copy for yourself
    - Or end up like me!

Good Luck!