

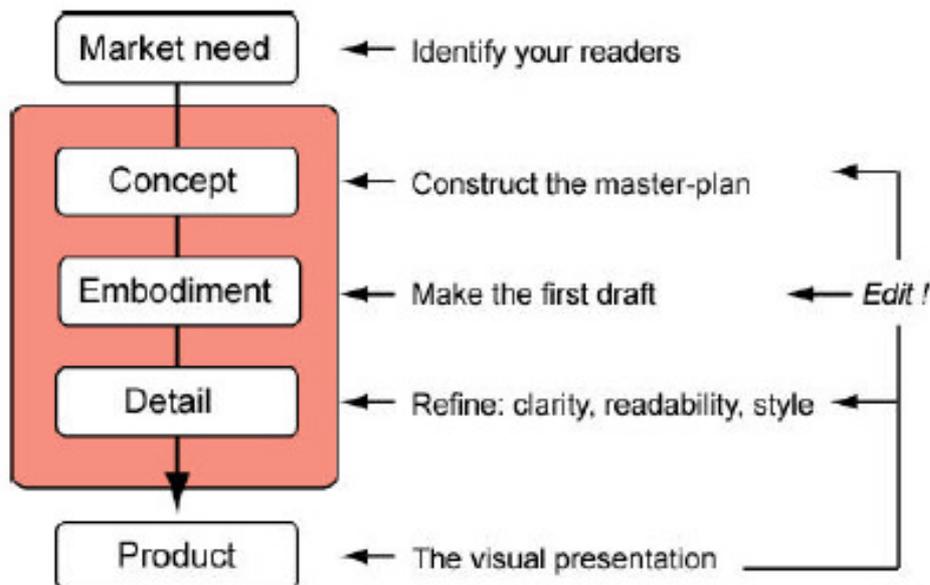
Scientific Paper Writing

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Reference: *Mike Ashby (2004) "How to Write a Paper"*

Process (continued)



Process

- **The Market Need.** What is the purpose of the document? Who will read it? How will the reader use it? The answers help you decide the length, the level of detail, the style.
- **The Concept.** Develop a plan on what the paper presents.
- **The Embodiment.** The embodiment is the first draft. Get the facts down on paper without worrying about style; make drafts of each section; develop the calculations; sketch the figures; assemble references.
- **Detail.** Now comes the crafting: clarity, balance, readability; in a word – *style*.
- **The End-Product.** Appearance *is* important: good layout, clear headings, well-designed figures. Almost in all cases you are asked to follow a given template.

Markets

What writing ?	Who are the readers ?	How will they use it ?
Thesis	Examiners	To judge and rank your work
Paper	Referees Scientifically-literate public	To check originality, quality, suitability To extract information
Research proposal	The funding body and ... Its referees	To judge if your aims match the priorities of the funding body To judge quality and promise of the work
Popular article	Intelligent but un-informed public	To be introduced to a new field To be entertained

General Structure

Title and Attributions

Abstract

Introuction

Methods

Results, and

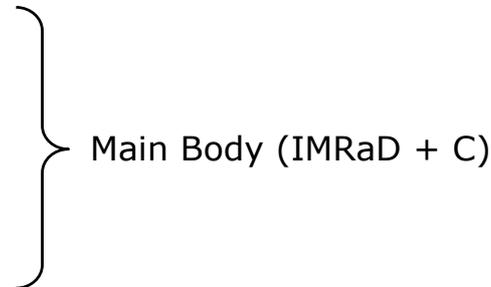
Discussion of results

Conclusions

Acknowledgement

References

Appendices (less common)



Abstract

- This is one of the most difficult part of a paper to write. It should give your reader a brief but complete summary or overview of the entire paper from aims to conclusions
- Tell the whole story in one paragraph of 100 to 200 words: *motive, method, key results, conclusions.*
- Should be straight to the point; not too descriptive but fully informative.
- The abstract does not have to be an entire summary of the paper, but rather a concise summary of the scope and results of the paper.
- From the abstract alone, your reader should know what you have done and found out
- The first section to be read, therefore important.
- It is the last thing that you write

Introduction

- This Sets the scene for the paper, by introducing & explaining information needed to understand the rest of the paper.
- Brief background to the paper – why the issue is important.
- Review the latest development and state-of-art
 - This is the section where you will bring in any reading & cite the work you've read.
 - Use summary or paraphrase of the source materials through proper referencing.
 - Avoid direct quotation and copying. Copying a paragraph verbatim from a source without any acknowledgement is plagiarism.
- Explain your aims clearly
- Introduce how you will address these
- Explain briefly how the paper is structured

Paraphrasing

- When paraphrasing or summarising other people's work, always acknowledge the source. You can do this in 2 ways:
- Paraphrase the idea, then give the surname of the author + year of publication in brackets or reference number
 - e.g. Non-contact adhesion method can be achieved ... [Chen 2002] or [2].
 - This method emphasises the study.
- Begin the sentence with the author's surname + year of publication in brackets.
 - e.g. Chen [2007] or [2] has demonstrated that non-contact adhesion method can be achieved
 - This method emphasises the author you are citing.

Introduction vs. Abstract

- INTRODUCTION is NOT an elaborated version of the ABSTRACT!
- INTRODUCTION is general and descriptive, while ABSTRACT is specific to-the-point.
- INTRODUCTION introduces readers to the main part, ABSTRACT is a summary of the most important results of the whole paper, etc.
- INTRODUCTION does not include results, ABSTRACT emphasize the main results.
- ABSTRACT is brief, INTRODUCTION is usually longer.

Methods

- Now detail the methods you used to address the aims you introduced in the introduction. Depending on your study, the methods may describe:
 - software or hardware design
 - a model or simulation
 - research you have undertaken
- The aim of this section is to enable another researcher to repeat your methods so you need to explain to the reader
 - How you designed the control system
 - Reasons for choices made etc.
 - Certain software functions you have used
- This section should also demonstrate that you are using standard technical procedure
- Discuss the methods in detail. Explain what is especially different about your method.
- Type of papers
 - Review paper: analysis of past developments and state-of-art
 - Experimental paper: equipment, materials, method
 - Modelling paper: assumptions, mathematical tools, method
 - Computational paper: inputs, computational tools, method
 - Mixed

Results

- Presents the data or results i.e. data from the simulation/ model or experiment. There is little analysis here, unless combined with discussion.
- Do not just include figures & tables, ensure that the text provides a commentary guiding the reader through the figures & tables with proper references to all of these. Remember the reader will look at the figures & tables only if directed to do so in the text.

Discussion

- Extract principles, relationships, generalizations.
- Present analysis, model or theory.
- Show relationship between the results and analysis, model or theory.
- If there are any limitations of your study, state them.
- Have a critical reflection on lessons you have learned.

Note: Methods, results and discussion are often combined, and modularised according to technical aspects of the paper.

Conclusions

- State what your major conclusions are, referring back to your original aims. Have you achieved these aims?
- Conclusions must conclude! They must give some overall insight into the value of your work in general and inform the reader of what the major impact is, together with any caveats which the reader should be aware of.
- A popular 'cop-out' is to fill the conclusions section with a summary of what's in the technical section of the paper. This concludes nothing!
- It may be helpful to flag items on a list, which are appropriate for the conclusions section, while writing the technical chapters. The key to your conclusions is then provided by the list.
- Emphasize the insights you gained.
- You may also want to include a Further Work or Recommendations section.

References (continued...)

- Cite significant previous work.
- Cite sources of theories, data, or anything else you have taken from elsewhere.
- References must be complete: name, initials, year, title, journal, volume, start-page and finish-page.

References



- There are two main methods.
 - Listing references in alphabetical order i.e. sorted by surname (Harvard). Examples:
 - o Wofsy, S.C. and J. W. Munger (2003). Forest and Atmospheric Measurements. <http://www-as.harvard.edu/data/nigec-data.html> (accessed on June 23, 2003)
 - o Li, H.Z. et. al. (2003), "A Novel Chatter Stability Criterion for Modelling and Simulation of the Dynamic Milling Process in Time Domain". The International Journal of Advanced Manufacturing Technology. 22: 619-625.
 - Listing references in numerical ordering of appearance in the body of the dissertation/thesis. Example:
 - o [1] Li H Z, Li X P, Chen X Q, "A Novel Chatter Stability Criterion for Modelling and Simulation of the Dynamic Milling Process in Time Domain". The International Journal of Advanced Manufacturing Technology. 22: 619-625 (2003).
- However, different publishers and journals do vary in style.

Acknowledgements



- Thank people who have helped you with ideas, technical assistance.
- Resources (research grants).

Tips –develop an effective first draft



- Record and consolidate all the information. All data, references, drafts of tables and figures, etc.
- Target a journal.
- Outline / Headings - what technical contents are to be included
- Start writing. Try to find a time and place where you can think and write without distractions.
- Write quickly. Don't worry about words, spelling or punctuation at all at this stage, just ideas.
- Write the paper in parts. Don't attempt to write the whole manuscript at once, instead, treat each section as a mini essay.
- Revise for clarity and readability.

Tips - Style



- Write in technical English.
 - A lot of applications → many applications
 - Enormous potential → great potential
- You need to write in the third person, i.e. not using the words "I", "You", "We" or "They". If you do need to use the first person, use "We" instead of "I".
- Every figure and table must be explained or referred in the main text.
- Figures and tables must be numbered and have captions.
- Avoid geographical referencing, such "shown in the figure blow".
- All references listed must be referred in the main text.
- Use short sentences, and plain English. Most sentences should be about 15-20 words.
- Paragraph. For a scientific article, paragraphs of about 150 words in length are considered optimal. Avoid using unnecessary words.

Tips - Grammar

- Completeness of a sentence
- Parallelism
- Active and passive forms
- Singular and plural forms
- Clarity
- Do NOT use short forms like it's, can't, we've, etc
- Articles: a/an, the
- Spelling checks
- Proof-reading