

# Some Elements for Scientific Writing

## Scientific Methodology Workshop : AISSE Option

{Jean-Marc Vincent<sup>1</sup>, Nadine Mandran<sup>2</sup> }@imag.fr

### LIG Laboratory

<sup>1</sup>Université Joseph Fourier  
Équipe-Projet Polaris

<sup>2</sup>CNRS  
Marvelig

2016



# SOME ELEMENTS FOR SCIENTIFIC WRITING

- 1 **ANALYSIS : reading practices**
- 2 INTRODUCTION : why writings
- 3 WRITING PROCESS
- 4 WRITING HINTS
- 5 SYNTHESIS

# ANALYSIS OF AN ARTICLE

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result?

# ANALYSIS OF AN ARTICLE

## The content

- ① What is the main result ?
- ② How this result is obtained ?

# ANALYSIS OF AN ARTICLE

## The content

- ① What is the main result ?
- ② How this result is obtained ?
- ③ How this result is validated ?

# ANALYSIS OF AN ARTICLE

## The content

- ① What is the main result ?
- ② How this result is obtained ?
- ③ How this result is validated ?
- ④ What is the increasing of knowledge ?

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?



# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links
- 4 Tables and Figures

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links
- 4 Tables and Figures
- 5 Algorithms, Mathematics

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links
- 4 Tables and Figures
- 5 Algorithms, Mathematics
- 6 Conclusion

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links
- 4 Tables and Figures
- 5 Algorithms, Mathematics
- 6 Conclusion
- 7 References

# ANALYSIS OF AN ARTICLE

## The content

- 1 What is the main result ?
- 2 How this result is obtained ?
- 3 How this result is validated ?
- 4 What is the increasing of knowledge ?
- 5 What are the open problems ?

## The form

- 1 The title
- 2 The summary
- 3 The body of the article :
  - ▶ structure
  - ▶ style
  - ▶ links
- 4 Tables and Figures
- 5 Algorithms, Mathematics
- 6 Conclusion
- 7 References
- 8 Appendix



# HOW TO READ AN ARTICLE

# SOME ELEMENTS FOR SCIENTIFIC WRITING

- 1 ANALYSIS : reading practices
- 2 **INTRODUCTION : why writings**
- 3 WRITING PROCESS
- 4 WRITING HINTS
- 5 SYNTHESIS

# WHY WRITTEN COMMUNICATIONS ?

## Goal of the lecture :

- 1 Emphasize the writing activity in the scientific works
- 2 Some principles for a *good* scientific writing
- 3 Some good questions and tips

## Scientific Work

Science is a systematically organized body of knowledge

- ▶ control on its methodology
- ▶ precise validation criteria
- ▶ expandable area of knowledge.

## Minimal rules of scientificness

- 1 Verifiable facts, falsifiability
- 2 methodological approach ;
- 3 objectivity
- 4 critical attitude

**The scientific method is characterized by the intellectual risk :  
a scientific hypothesis could be refuted**

# VALIDATION OF SCIENTIFIC RESULTS

Example : publication in a scientific journal known to be scientific (agreement from a large number of scientists)

- 1 submission of a manuscript by the author(s);
- 2 choice by the editor of a group of experts (independent);
- 3 evaluation of the of the manuscript by the experts ; modification requirements ;
- 4 manuscript revision by the author
- 5 evaluation by the experts
- 6 decision by the editorial committee
- 7 publication.

Average processing time for a good journal : **2 years**

## Validation of the work :

⇒ Publication list (number and ranking), impact factor

**Publish or perish**

# COMMUNICATION

- ▶ Article in a scientific journal, specialized or generalist, national or international ;
- ▶ Oral presentation (talk or poster) at a conference, congress, workshop,...
- ▶ Academic work : Master's thesis, PhD,...
- ▶ Technical reports, scientific reports
- ▶ Technical notes, reports, manuals,
- ▶ .....

# SOME ELEMENTS FOR SCIENTIFIC WRITING

- 1 ANALYSIS : reading practices
- 2 INTRODUCTION : why writings
- 3 **WRITING PROCESS**
- 4 WRITING HINTS
- 5 SYNTHESIS

# HOW TO PREPARE A COMMUNICATION

- 1 Identification of the audience/the readers ;
  - ▶ specialists of the domain
  - ▶ "large audience" ;
  - ▶ managers
  - ▶ heterogeneous audience
  - ▶ Scientists (jury) ;
- 2 Subject and goal regarding the audience ;
  - ▶ What is the knowledge of the audience ?
  - ▶ What are the knowledge requirements ?
  - ▶ Why will the audience read the document (will come to my presentation) ?  
présentation) ?
  - ▶ What will the audience do with the information ?
- 3 Always keep a scientific attitude

## Methodology

- 1 Think ;
- 2 Debate (reformulation) ;
- 3 Free writing, lists, diagrams ;
- 4 Outline of the Plan, (structuration of the ideas) ;
- 5 Writing of the summary (main objective and main result) ;
- 6 Writing of the body ;
- 7 Writing of the introduction and conclusion

# ORGANIZATION OF A SCIENTIFIC ARTICLE

## A standardized structure

Title - Authors - Date - Abstract

I ntroduction ;

M ethod ;

R esults and analysis ;

D iscussion ;

Bibliography - Table of contents - Indexes - ...



# SOME ELEMENTS FOR SCIENTIFIC WRITING

- 1 ANALYSIS : reading practices
- 2 INTRODUCTION : why writings
- 3 WRITING PROCESS
- 4 WRITING HINTS**
- 5 SYNTHESIS

# THE BEGINNING

## Title

- ▶ **Important** first selection criteria
- ▶ Minimal number of words giving the main result
- ▶ After writing the body
- ▶ Clear and understandable...

## Abstract

- ▶ **Important** : second selection criteria
- ▶ Should contain
  - ▶ Goal and impact of the article
  - ▶ Methodology
  - ▶ Summary of the results
  - ▶ Main conclusion
- ▶ Summarize the content of the article
- ▶ Keywords : to help indexing

# THE BEGINNING

## Title

- ▶ **Important** first selection criteria
- ▶ Minimal number of words giving the main result
- ▶ After writing the body
- ▶ Clear and understandable...

## Abstract

- ▶ **Important** : second selection criteria
- ▶ Should contain
  - ▶ Goal and impact of the article
  - ▶ Methodology
  - ▶ Summary of the results
  - ▶ Main conclusion
- ▶ Summarize the content of the article
- ▶ Keywords : to help indexing

## Introduction

- ➊ Presentation of the domain and the specific problem
- ➋ Justify the focus on this problem
- ➌ Describe the methodology
- ➍ Justify the methodology (relatively to previous works)
- ➎ Establish the main results
- ➏ Give the structure of the document

## Remarks

- ▶ Attract the reader
- ▶ Put the requirements
- ▶ Border the domain to avoid critics
- ▶ No negative critics
- ▶ Reader's guide
- ▶ Adapted to the publication context

# BODY OF THE DOCUMENT

## Structure- structure - structure - structure

- ▶ Use several levels (not much)
- ▶ Parts / Chapters / Sections / sub-sections
- ▶ Paragraphs :
  - ▶ **One main idea per paragraph**
  - ▶ Ideas and arguments
  - ▶ Examples, facts and references
  - ▶ Links between arguments
  - ▶ Links between arguments and the main idea
- ▶ Define precisely all the concepts (avoid ambiguity)

# FIGURES AND TABLES

## Highly important because of the first impression :

- ▶ Help the understanding but do not demonstrate
- ▶ Explanations and referencing in the text
- ▶ Put a clear legend
- ▶ Identify precisely what should be shown by the figure.

## Problem : provide nice pictures to help the content

- ▶ **increase the quality of the report**
- ▶ Show the quality of your research
- ▶ Images/figures/diagrams are the support for discussions
- ▶ and provide new problems

## Typical errors

- ▶ **Semantic of graphical objects**
- ▶ conventions for the representations...
- ▶ checklist for good graphics

# FIGURES AND TABLES

## Highly important because of the first impression :

- ▶ Help the understanding but do not demonstrate
- ▶ Explanations and referencing in the text
- ▶ Put a clear legend
- ▶ Identify precisely what should be shown by the figure.

## Problem : provide nice pictures to help the content

- ▶ **increase the quality of the report**
- ▶ Show the quality of your research
- ▶ Images/figures/diagrams are the support for discussions
- ▶ and provide new problems

## Typical errors

- ▶ **Semantic of graphical objects**
- ▶ conventions for the representations...
- ▶ checklist for good graphics

## Mathematics

- ▶ Choose standard notations
- ▶ Introduce a formalism only if it supports the main idea
- ▶ Use conventions, if necessary remind them
- ▶ Write theorems in a closed form (all the hypothesis included)

# END OF THE DOCUMENT

## Conclusion

- 1 Summarize the results
- 2 Give perspectives
- 3 Propose open problems, challenges
- 4 Rely the problem with big open questions
- 5 Think about thanking

## Bibliography

- ▶ Always cite all your references ;
- ▶ Never cite an article that haven't been already read
- ▶ Cover the domain of the study
- ▶ Cite recognized references
- ▶ Cite precisely the works

# SOME ELEMENTS FOR SCIENTIFIC WRITING

- 1 ANALYSIS : reading practices
- 2 INTRODUCTION : why writings
- 3 WRITING PROCESS
- 4 WRITING HINTS
- 5 **SYNTHESIS**



# PLAGIARISM

<http://www.plagiarism.org/citing-sources/cite-sources>

## What is plagiarism

- use in the the text a Wikipedia image (under creative commons) ?
- use a part of a free code (GPL) ?
- put the references at the end of the report ?
- share a paragraph with other colleagues ?
- ...

## TIPS FOR GOOD WRITING

After writing your article, you should read it, read it and read it again.

- ▶ Wait few days before reading it again
- ▶ Find a specialist to help you on the content
- ▶ Find a non-specialist to help you on the style
- ▶ Read your work aloud and check the sequencing
- ▶ Identify bugs in red and check them in green
- ▶ Use spell, grammatical, style checkers
- ▶ Take care of the layout

# SOME REFERENCES

## Books and monographs

- 1 Martha Davis. *Scientific Papers and Presentations*. Academic Press, 1997.
- 2 Robert A. Day. *How to Write and Publish a Scientific Paper*. Cambridge University Press, 1989.
- 3 Jacques Grevost. *Construire et organiser ses écrits*. Chambre de Commerce et de l'Industrie de Grenoble, Octobre 1995.
- 4 Raj Jain. *The art of Computer Performance Analysis : Techniques for Experimental Design, Measurement, Simulation and Modelling*. Wiley, 1991.
- 5 Patrice Quinton. *Ecrire et publier un article scientifique*. Conférence DEA 7/12/93.
- 6 Jean-Claude Rouveyran. *Mémoires et Thèses, L'art et les méthodes*. Maisonneuve et Larose, 1989.

## Web references

Among others

[http://icalwww.epfl.ch/PS\\_files/paper.htm](http://icalwww.epfl.ch/PS_files/paper.htm)

<http://www.cs.columbia.edu/~hgs/etc/writing-bugs.html>

<http://duda.imag.fr/writing.pdf>

# HOW TO GET YOUR PAPER REJECTED

[http://www.jmlg.org/how\\_to\\_get\\_your\\_paper\\_rejected.htm](http://www.jmlg.org/how_to_get_your_paper_rejected.htm)

- 1 Send an email to the conference chair stating that any competent reviewer (program chair) would have accepted the paper. Follow up with a phone call if necessary.
- 2 If the conference allows an author rebuttal, then you should make the most of the opportunity to abuse and attack the reviewers, their students, their advisors, and all the people who work on the same continent. If your tirade does not fit in the word limit, just paste in a URL to your web page where the full 17 page reply resides.
- 3 Put the paper at your webpage explaining that it was rejected from the conference and derive the conclusion that the whole conference is crap.
- 4 Quote to all your friends how Gödel had only 12 papers published in his lifetime to make yourself feel better.
- 5 Present the paper at the accompanying workshops.
- 6 Constantly refer to your unpublished paper in all your future work.
- 7 Split the paper into two separate papers and submit them to lower quality conferences. Do not worry that there might not exist lower quality conferences; they will spring into existence to fulfil the demand created by this rule as need.

# HOW TO GET YOUR PAPER REJECTED

[http://www.jmlg.org/how\\_to\\_get\\_your\\_paper\\_rejected.htm](http://www.jmlg.org/how_to_get_your_paper_rejected.htm)

- 8 Re-submit a paper without any changes [helps, if there is a large overlap of program committee members].
- 9 Write a book on the paper.
- 10 Complain to big-shots at the next conference.
- 11 Organize your own workshop on the topic.
- 12 Change the title, abstract and some notation. Include a new graph. Resubmit.
- 13 Change the list of authors (preferably including a big shot). Resubmit.
- 14 Attend the conference anyway and hand out copies of the rejected paper.
- 15 Actually read the reviewers comments and take them into account. Abandon the paper if it has serious flaws.