

# The Structure of a Scientific Paper

*Generic Academic Skills*  
*Jochem Marotzke*

Laura Suárez Gutiérrez

Max-Planck-Institut für Meteorologie  
IMPRS-ESM  
Hamburg  
17.10.2016



*“The paper should be as short as possible, but on the other hand, it must contain all the essential information that has led to the new results described in the paper.”*

W. Alpers, *How to write a scientific paper*

# The Structure of a Scientific Paper

1. Title
2. Abstract
3. Introduction
4. Main Text
5. Final Section
6. Figures

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
8. References
9. Acknowledgments

# The Structure of a Scientific Paper

## 1. Title

- Keywords/Key-points

## 2. Abstract

## 3. Introduction

- Literature Synthesis

## 4. Main Text

- Data and Methods
- Results

## 5. Final Section

- Discussion
- Summary and Conclusions

## 6. Figures

## 7. Appendices

## 8. References

## 9. Acknowledgments



# Title

- **Informative**
- **Accurate**
- **Clear**
- **Concise**
- **Attention commanding**

# Title

- **Informative:** specific, without unnecessary details
- **Accurate**
- **Clear**
- **Concise**
- **Attention commanding**

# Title

- **Informative:** specific, without unnecessary details
- **Accurate:** truthful to the content
- **Clear**
- **Concise**
- **Attention commanding**



# Title

- **Informative:** specific, without unnecessary details
- **Accurate:** truthful to the content
- **Clear:** easy to understand and interpret
- **Concise**
- **Attention commanding**

# Title

- **Informative:** specific, without unnecessary details
- **Accurate:** truthful to the content
- **Clear:** easy to understand and interpret
- **Concise:** each word contributes to the message
- **Attention commanding**

# Title

- **Informative:** specific, without unnecessary details
- **Accurate:** truthful to the content
- **Clear:** easy to understand and interpret
- **Concise:** each word contributes to the message
- **Attention commanding:** able to draw the interest of the reader

# Keywords or Key-points

Specific and relevant information about the paper that is not already in the title.

# Keywords or Key-points

Specific and relevant information about the paper that is not already in the title.

*What would I search on google  
to find this paper?*

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. **Abstract**
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
8. References
9. Acknowledgments



# Abstract

Autonomous and precise synopsis of the paper, must contain:

- Principal objectives and scope of the investigation
- Methods employed
- Summary of the results
- Principal conclusions

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
- 3. Introduction**
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
8. References
9. Acknowledgments





# Introduction

- **Why** have you written this paper?
- **For what** and for whom are your results relevant?
- On which **previous papers** is your research based?
- **What is new**, or “better”, about your paper?

# Literature Synthesis

Give a comprehensive overview, summary and objective critic of previously published work.

Explicitly compare and contrast your research to the existent literature when and where is needed.

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
- 4. Main Text**
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
8. References
9. Acknowledgments



# Data and Methods

Include, with detail and precision, all necessary information to evaluate and replicate your study, e.g.:

- Dataset details
- Model configurations
- Instrument descriptions
- Theoretical approximations

# Results

A selective but comprehensive presentation of your findings, in which each element contributes to advance the story in a logical progression.

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
- 5. Final Section**
  - Discussion
  - Summary and Conclusions
6. Tables and Figures
7. Appendices
8. References
9. Acknowledgments



# Discussion

Critical elaboration and discussion of your findings, e.g.:

- Explore alternative interpretations
- Discuss unresolved issues
- Integrate, extend, and extrapolate your results
- Identify the limitations of your research  
(approximations, constraints, exceptions, etc. )

# Summary and Conclusions

- What is the essence of your findings?
- How and why do your results differ from previous research?
- How significant are your results?
- How large are the uncertainties?
- Under which approximations and assumptions is your research framed?



# Summary and Conclusions

- What is the essence of your findings?
- How and why do your results differ from previous research?
- How significant are your results?
- How large are the uncertainties?
- Under which approximations and assumptions is your research framed?

*Where does this work leave us and  
where does it lead us?*

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
- 6. Figures**
7. Appendices
8. References
9. Acknowledgments



# Figures

A well devised selection of the minimum number of figures that allows to tell your story.

Your figures must:

- Easily convey the essence of your findings at a glance
- Include readable, understandable, and consistent symbols, axes and figure captions

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
- 7. Appendices**
8. References
9. Acknowledgments



# Appendices

Self-contained sections with tangential information, that supplements your paper but is too complicated or unsuitable for the main text, e.g.:

- Lists
- Tables
- Explanations of a theory

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
- 8. References**
9. Acknowledgments



# References

List of all cited papers on a consistent format and order, usually prescribed by the target journal.

Special care must be taken in including the correct years, the names of all authors, etc.

Aim at referencing publications of easy access.

# The Structure of a Scientific Paper

1. Title
  - Keywords/Key-points
2. Abstract
3. Introduction
  - Literature Synthesis
4. Main Text
  - Data and Methods
  - Results
5. Final Section
  - Discussion
  - Summary and Conclusions
6. Figures
7. Appendices
8. References
- 9. Acknowledgments**





# Acknowledgments

Statement including all people that have significantly contributed to your paper, and all organizations and institutions which have financed your research and have provided data.

*“The paper should be  
as short as possible, but on the other  
hand, it must contain **all the essential  
information** that has led to the new  
results described in the paper.”*

W. Alpers, *How to write a scientific paper*

*“The paper should be  
as short as possible, but on the other  
hand, it must contain **all the essential  
information** that has led to the new  
results described in the paper.”*

W. Alpers, *How to write a scientific paper*

**Thank you!**