Specialised scientific communication

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Overview

1. The purpose
2. The research article
3. The audience
4. Parts of the manuscript
5. How to write a paper
6. Publishing
1. The purpose

- Communication of good ideas medium through which science progresses

Why do we write?

- To communicate an idea to people
An idea can be:

- a new way of looking at objects (a “model”)
- a new way of manipulating objects (a “technique”)
- or new facts concerning objects ( “results”)
2. The research article

The key to good papers:

- Full awareness of the role of papers
- Full awareness of the audience
- Precision, clarity and economy
Steps to good papers:

- Identify the key ideas
  - Can you describe the study in 1 or 2 minutes?

- Identify the relevant community
  - Experts working in the area
  - Current and future researchers, graduate students

- Present these ideas to the relevant community
  Writing, style and level appropriate:
  - To the audience (conventions of a field)
  - To the journal (instructions for authors)
3. The reader

Readers’ needs vs. writer’s desires:

- The “Checklist” Phenomenon
- Obscure Generality
- Meaningful special case first
- Avoid Idiosyncrasies
- Lack of Hierarchy/Structure
- Discussion of possible criticism comes last
How to serve the reader’s needs

- To present **clearly** the new ideas in each level of the writing process:
  - Overall structure of the paper
  - Single paragraphs
  - Sentences
  - Choice of phrases
  - Terms
  - Notation
Some concrete suggestions:

- Apply good principles to the concrete dilemmas
- Special attention to order and organization
- Flexibility on the application of judgment
- Not to follow a canonical example or structure
4. Parts of a manuscript

a) - title
b) - list of authors
c) - abstract
d) - introduction
e) - main part (methods, results, discussion)
f) - acknowledgements (optional)
g) - references
h) - appendices (optional)
<table>
<thead>
<tr>
<th>Section of Paper</th>
<th>Experimental process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>What did I do in a nutshell?</td>
</tr>
<tr>
<td>Introduction</td>
<td>What is the problem?</td>
</tr>
<tr>
<td>Methods</td>
<td>How did I solve the problem?</td>
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<tr>
<td>Results</td>
<td>What did I find out?</td>
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<tr>
<td>Discussion</td>
<td>What does it mean?</td>
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<tr>
<td>Acknowledgements</td>
<td>Who helped me out?</td>
</tr>
<tr>
<td>References</td>
<td>Whose work did I refer to?</td>
</tr>
<tr>
<td>Appendices</td>
<td>Extra Information</td>
</tr>
</tbody>
</table>
**“Specialised scientific communication”**

### Write in what order?

<table>
<thead>
<tr>
<th>Write:</th>
<th>Present:</th>
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<tbody>
<tr>
<td>Title</td>
<td>Title</td>
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<tr>
<td>Methods</td>
<td>Abstract</td>
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<td>Results</td>
<td>Introduction</td>
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</table>
a) Title

**Will determine whether paper gets read**

- Use descriptive words for content (electronic searches)
- As informative as possible
- If possible, give the key result of the study
- Not too cumbersome or too long (see journal rules)
- Avoid abbreviations
- Will probably be written earlier, but is often modified
b) List of authors and affiliations

- Alphabetical order
- Contributions to the work
- Researchers rank
Abstract (I)

- Last section written
- Critical part of paper
- As informative as possible
- Not too cumbersome or too long - not exceed 200 words
- Concise summary of the entire paper
c) Abstract (II)

- State main **objective**
- Brief description of the **methods**
- Summarize most important **results**
- State major conclusions and **significance**
- Should be **self-contained**
c) Abstract (III)

- Need not motivate the model
- Need not list and/or recall the contents of prior work
- Need not provide an accurate description of the results
- Should not contain references
- Should not contain any sort of illustration
- Avoid acronyms
Bear in mind:

- helps readers decide whether they want to read the paper
- useful to someone who may want to reference your work
- the abstract is all that may be available to some readers

This format allows the paper to be read at several different levels
Strategie:

To begin composing your Abstract, take whole sentences or key phrases from each section and put them in a sequence which summarizes the paper.

Write and rewrite until flawless.
d) **Introduction (I)**

- **Purpose** – hypothesis, question or problem
- **Clear description of the work**
- **Rationale** – good motivation - not from scratch
- **Comparison to prior works** – review of the published literature
- **Clear description of the contents**
- **Clear statement of the main results**
- **High-level description of the techniques**
d) Introduction (II)

- Highlight important new ideas
- Important conclusions may also be stated
- Inverted triangle structure

The introduction must answer the question:

- What was I studying?
- Why was it an important question?
- What did we know about it before I did this study?
- How will this study advance our knowledge?
e) Main part

- **Materials and methods**
  - To provide insightful discussions of the definitional choices
  - Best to begin writing when experiments still in progress
  - Should be detailed enough so results can be repeated by others
  - Reference published methods where appropriate
  - Use descriptive subheadings
  - Methods section is not a step-by-step, directive protocol
  - Statistical software used
Results (I)

- Has both text and illustrative materials (tables and figures)
- Each Table and Figure must be referenced in the text
- Numbering technical elements
- Tables and figures must be straightforward and concise
- Present main findings referring to tables/figures
Results (II)

- Do not speculate or over discuss results
- Highlights the answers to the questions/hypotheses
- Important negative results should be reported too
- Do not interpret data here
- A statistical analysis is not the scientific result but a methodological tool
Discussion

- First answer question posed in introduction
- Do not introduce new results in the Discussion
- High-level material that better fits after the main part
- Explain what is new without exaggerating
- Discuss weaknesses and discrepancies
Conclusion

- Do not repeat results
- Relate your conclusion to existing knowledge
- Conclusion/summary, perspectives, implications
- Suggestions for further work
f) Acknowledgments

- Each person with whom the author had a relevant discussion
- Authors usually acknowledge outside reviewers
- Are always brief and never flowery
- Placed between the Discussion and the References
g) References

• Do not label this section "Bibliography"

• Alphabetical listing by first author's last name of the references cited in the body of the paper

• Relevant and recent

• Be highly selective

• Use correct style for journal
Appendices

- Optional
- Contains information that is non-essential
- Each Appendix should be identified by a Roman numeral in sequence
- Material: specialized computer programs, full names of abbreviations
5. How to write a paper

- Use stylebooks
- manuals of accepted rules
- how to create a draft
- focused on rewriting
- Avoid writing mistakes
Common writing mistakes

- Cumbersome notations and terms
- Sentences with complex logical structure
- A labyrinth of implicit pointers: “it” and “this”
- Mixture of mathematical symbols and text
- Abuse of words where fewer will do
- Abuse of 'the’
Do not do the following

- Do not use colloquial speech, slang, or "childish" words
- Do not use contractions - "don't" must be "do not"
- Do not use footnotes
- Do not use direct quotes
- Watch out for wordy phrases
Writing suggestions:

Writing and thinking are closely linked

"fuzzy writing reflects fuzzy thinking"

- Use an outline to organize your ideas and writing
  - figuring out what you want to say
  - planning the order and logic of your arguments
6. Publishing

Why write and publish research

- Ideally
  - to share research findings and discoveries with the hope of improving scientific progress

- Practically
  - to get funding
  - to get promoted
  - to get a job
  - to keep your job!
“Scientists are rated by what they finish, not by what they attempt”

- ‘Publish or perish’ (what to publish)
- Impact factor (where to publish)
- The ‘Matthew Effect’ (with whom to publish)
Getting a paper published

- Competition for space in journals is intense
- Cost of publication
- Rejection rates vary
  - Science, Nature = 90%
Major reasons for rejection:

- Confirmatory (not novel)
- Poor experimental design
  - Poor controls
  - Hypothesis not adequately tested
- Inappropriate for journal
- Poorly written
Tips:

- Know the journal, its editors, and why you submitted the paper there
- Make sure references are comprehensive and accurate
- Read and conform to “Instructions for Authors”
“Specialised scientific communication”

Publish and perish

- Data manipulation, falsification
- Duplicate manuscripts
- Redundant publication
- Plagiarism
- Author conflicts of interest
What constitutes redundant publication?

- Data in conference abstract? **No**
- Same data, different journal? **Yes**
- Data on website? **Maybe**
- Data included in review article? **Ok, if later**
What makes a good research paper?

- Good science
- Good writing
- Good journals
What constitutes good science?

- **Novel** – new and not resembling something formerly known or used

- **Mechanistic** – testing a hypothesis - determining the fundamental processes involved in or responsible for an action, reaction, or other natural phenomenon

- **Descriptive** – describes how things are but does not test how things work – hypotheses are not tested
What constitutes a good journal?

- Impact factor – (JCR)
  - average number of times published papers are cited up to two years after publication

- Scimago journal Rank – (SJR)
  - based on the transfer of prestige from a journal to another, as expressed in citations a journal gives to other journals and to itself
Help in choosing the journal

- read references
- get insight into possible reviewers
- study “instructions to authors”
- check the SJR and Impact Factor

http://www.scimagojr.com/
Submission

- Read instructions carefully
- Fill out all necessary forms
  - Copyright transfer
  - Conflict of interest
Responding to reviewers

- Carefully prepare your responses
  - Be enthusiastic
  - Each comment should be addressed
  - Each change should be stated

- Reviewer may be wrong
- Be tactful – thank the reviewers
- Do not respond to reviewers while upset
- Never call the editor
- Get help from other authors
Remember:

Strive for simplicity whenever possible

“Those who have the most to say usually say it with the fewest words”
Bibliography

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http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtoc.html

4 - Steve Hillier. Why do we write scientific papers? The University of Edinburgh. Editor-in-Chief MHR. Journal course for authors, Barcelona 2008

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“There is no way to get experience except through experience”