

Checklist for research papers

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Your story. Clearly told.

Introduction

Most researchers know the basics of writing a good research paper but sometimes miss key aspects due to time constraints. This checklist will help you write a well-structured research paper and avoid some basic mistakes in English. Remember, most research papers are rejected due to a poor structure or because the writer failed to make the purpose and added value of the research clear enough.

What is the added value of your research paper?

How will your field and science in general benefit from the research results you intend to publish? If this added value is not clear, then is your research paper worth publishing (see Appendix 1 to this checklist)?

Have you chosen the right journal?

Which journal is most appropriate for your research? Which audience do you want to reach and why? Know that a journal editor spends just one or two minutes reading a research paper before accepting or rejecting it. So you must ensure that your research paper's Title, Abstract and Introduction immediately grab the editor's attention.

Does your research paper have a clear structure?

A brief and easy-to-understand description of what a research paper should contain is given at: <http://www.columbia.edu/cu/biology/ug/research/paper.html>

Consider drafting your research paper in the following order:

1. Results: What did you observe?
2. Method: How can your results be reproduced?
3. Conclusion: What have you learned?
4. Introduction: How did your research questions emerge? Which knowledge gap do they fill?
5. Discussion: Why are your results important for science and society, and what needs to be done next?
6. Abstract: Summary of the most essential information in your research paper.
7. Title: Pitch your research paper in a few words.

A few tips:

- A good research paper presents a lucid narrative/story. Ask a non-specialist to read your research paper. Can they understand the main points of your research?
- The purpose of your research should be clear from the title of your research paper. Words in the title should be used again in the abstract and as keywords for your research paper.
- The abstract is your elevator pitch: grab the reader's attention with the essential information from your research paper.

- Check the structure of your story by reading the first sentence from each paragraph in your research paper. The information in these topic sentences alone should clearly state the story of your research, i.e. each paragraph should be about a main topic.

Have you followed the instructions for authors?

Be careful! Each journal has its own instructions for authors and these vary considerably. Some are very brief and have few requirements, but other submission guidelines virtually tell you how to write a research paper. Double check you have done everything the journal requires!

A few tips:

- Always take advice on word counts seriously.
- Structure your research paper as the journal requires.
- Read the journal's instructions for reviewers, so you know what to pay particular attention to in your research paper.
- Avoid using abbreviations in the Title and Abstract (most journals discourage this) and keep the use of abbreviations in the research paper to a minimum.
- If you really need to use abbreviations, define these when they occur for the first time in the text and use them consistently throughout the text (with the possible exception of headings).
- Most journals prefer abbreviations used in the figures and tables to be defined in the legends too.
- Check your list of references carefully. Serious mistakes are often made here (e.g. authors' names are misspelt, or the wrong volume or page numbers are given).
- Ensure all listed references have been cited in the text.
- Pay particular attention to the requirements for figures and tables.
- Check that all the figures and tables have been cited in the text and are numbered consecutively according to the order they are cited in.

Is your English clear enough?

- Put important new information at the end of a sentence, as that is where it has the greatest impact in English.
- Aim for an average sentence length of 15–20 words but vary the length of your sentences.
- Be careful with punctuation. Poor punctuation can make good science unclear or hard to understand: see the research paper in Radiology entitled 'Grammar and Punctuation in Scientific Writing' (<http://radiology.rsna.org/content/218/1/8.full>).
- Keep it simple! Avoid jargon and abbreviations where possible. Write in clear and straightforward English but do not be informal (e.g. do not use contractions like don't).
- Remember, English uses the decimal point and not the comma. So $p = 0.05$ and not $p = 0,05$.
- Writing is editing! Keep your writing to the point by deleting as many words as possible from your research paper without losing essential information or meaning (see Appendix 2 at the end of this checklist).

Have you been consistent?

Ensure consistency throughout your research paper with regard to:

- Style of headings (e.g. first-order headings all in boldface);
- UK or US spelling (e.g. behaviour or behavior, but not both!);
- Spaces around symbols (e.g. $n=10$ or $n = 10$).

Does your final research paper tick all of the boxes?

Use these questions to check the presentation of your research paper:

- Title: Does it accurately reflect what your research is about in a few words? And will it grab the reader's attention?
- Abstract: Does it contain the essential information of the research paper? Is it complete? Is it suitable for inclusion by itself in an abstracting service and indexing databases?
- Main Text: Does your Introduction provide the relevant background setting for your research and clearly state its purpose? Can your research be reproduced using the information provided in the Methods? Have you presented your Results clearly and comprehensively with an appropriate use of figures and tables? Does the Discussion succinctly state the relevance, strengths and weaknesses of your research? Are your key findings briefly stated in your Conclusion?
- Diagrams, figures, tables and captions: Are they essential and clear?

Have you performed these last two checks?

- Do not forget to check the spelling and grammar but remember: a spelling and grammar check does not pick up everything (e.g. the correct use of two, to or too)!
- Read your research paper 'backwards', starting at the last page and reading paragraph for paragraph back to the title. This will help you track down most mistakes.

Appendix 1 Is your research worth publishing?

Technical

- Scientific merit: Is the research scientifically rigorous, accurate and correct?
- Appropriateness: Is the research material appropriate for the journal you want to publish it in?
- Clarity: Have you expressed your ideas clearly and concisely? Are the concepts understandable? Is the discussion easy to read and understand?
- Referencing: Have you referenced the most recent and appropriate research about your topic?
- Balance: Do you think the overall balance and structure of the research paper is good? Or do you need to concentrate more on a specific part of the paper? Are there any sections that could be shortened or left out?

Quality

- Originality: Is your research relevant and novel? A reviewer will also assess your work on originality and ask whether it is likely that your research paper will be cited in future.
- Motivation: Does the problem considered have a sound motivation? All research papers should clearly demonstrate the scientific interest of the results. Research papers should not rely solely on previous literature or novelty to motivate publication.
- Repetition: Have significant parts of your manuscript already been published? Keep in mind that serial publications are not encouraged, and follow-up research papers must contain significant additional new material.
- Length: A research paper should use the minimum number of words needed to share all useful and relevant information.

Appendix 2 Tips for using fewer words

Omit phrases such as:

As already stated
It has been found that
It has long been known that
It is interesting to note that
It is worth mentioning at this point
It may be said that
It was demonstrated that

Omit excess words.

| <i>Instead of</i> | <i>Use</i> |
|---|--------------------------------|
| It is a procedure that is often used. | This procedure is often used. |
| There are seven steps that must be completed. | Seven steps must be completed. |
| This is a problem that is... | This problem is... |
| These results are preliminary in nature. | These results are preliminary. |

Use single words instead of phrases.

| <i>Instead of</i> | <i>Use</i> |
|-----------------------------|-------------------------|
| a number of | many, several |
| a small number of | a few |
| are in agreement | agree |
| are found to be | are |
| are known to be | are |
| at present | now |
| at the present time | now |
| based on the fact that | because |
| by means of | by |
| despite the fact that | although |
| due to the fact that | because |
| during that time | while |
| fewer in number | fewer |
| for the reason that | because |
| has been shown to be | is |
| if it is assumed that | if |
| in consequence of this fact | therefore, consequently |
| in length | long |

| | |
|----------------------------|---------------|
| in order to | to |
| in spite of the fact that | although |
| in the case of... | in..., for... |
| in the near future | soon |
| in view of the fact that | because |
| is known to be | is |
| it appears that | apparently |
| it is clear that | clearly |
| it is likely that | likely |
| it is possible that | possibly |
| it would appear that | apparently |
| of great importance | important |
| on the order of | about |
| owing to the fact that | because |
| prior to | before |
| reported in the literature | reported |
| subsequent to | after |

Source: The ACS Style Guide:

<http://www.oup.com/us/samplechapters/0841234620/?view=usa>