How to Write and Submit a Scientific Paper

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Why Do We Publish: Altruism and Self-Interest

What Makes a Paper

- A paper is an organized description of hypotheses, data and conclusion. It doesn't necessarily reflect the order in which you did or thought about the work

- If your research does not generate papers, it might just as well not have been done. "Interesting and unpublished" is equivalent to "non-existent"

- Purpose of a paper:
  - to present information so that it is easy to retrieve
  - to present enough information that the reader can duplicate the scientific study

Manuscript Workflow

- New concept/idea
- Pilot data
- Detailed research plan
- Complete data set
- Finalize figures
- Manuscript draft
- Many rounds of writing/re-writing
- Input from co-authors
- PI finalization and submission

11 Steps to Structuring a Scientific Paper

- Prepare the figures and tables
- Write the Methods
- Write up the Results
- Write the Discussion. Finalize the Results and Discussion before writing the introduction…
- Write a clear Conclusion
- Write a compelling introduction
- Write the Abstract
- Compose a concise and descriptive Title
- Select Keywords for indexing
- Write the Acknowledgements
- Write up the References

Reasons Why Papers are Rejected

- Poor research design
- Poor methods section
- Author's hypothesis untested
- Unsupported conclusions
- Unoriginal research
- Poor attention to validation
- Failure to collect key variables especially confounders
- Poor writing
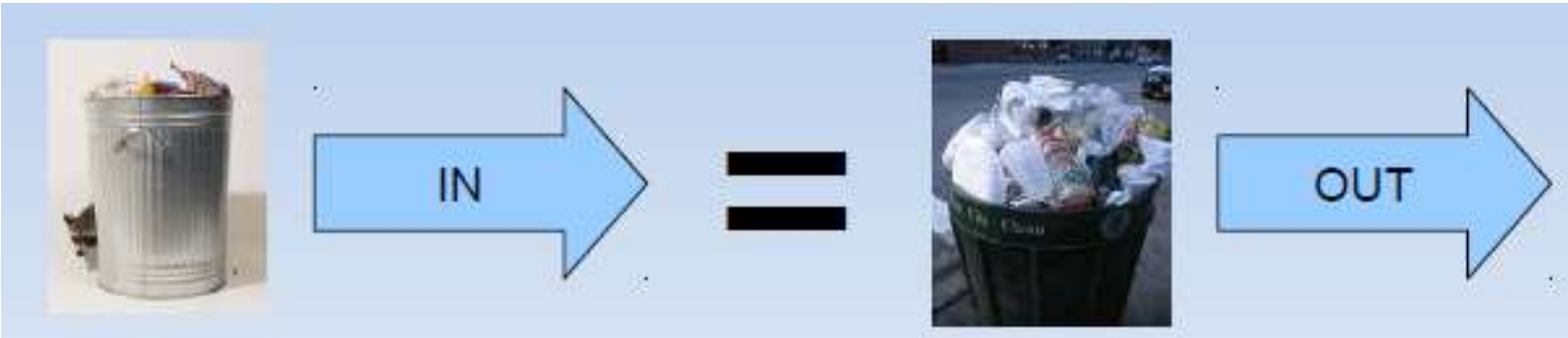
Trash in = Trash out

Outline Before Writing

- Why did I do this work?

- What hypothesis did I mean to test?

- What hypotheses did I actually test?

- What are the results?

- Did the work yield something new?

Science is not about proving a hypothesis, but proving it wrong

Title

- Make your title specific enough to describe the contents of the paper, but not so technical that only specialists will understand. The title should be appropriate for the intended audience.

- The title usually describes the subject matter of the article:

COVID-19-associated Non-Occlusive Fibrin Microthrombi in the Heart

- Sometimes a title that summarizes the results is more effective:

Circular RNA CircMAP3K5 Acts as a MicroRNA-22-3p Sponge to Promote Resolution of Intimal Hyperplasia via TET2-Mediated SMC Differentiation

Authorship

- Authorship confers credit and has important academic, social, and financial implications. Authorship also implies responsibility and accountability for published work

- The corresponding author is the one individual who takes primary responsibility for communication with the journal during the manuscript submission, peer review, and publication process, and typically ensures that all the journal's administrative requirements are properly completed.

Abstract

- Your abstract should summarize the purpose, methods, results and conclusions of the paper.

- It is not easy to include all this information in just a few words. Start by writing a summary that includes whatever you think is important, and then gradually prune it down to size by removing unnecessary words, while still retaining the necessary concepts.

- Don't use abbreviations or citations in the abstract. It should be able to stand alone without any footnotes.

Introduction

- What question did you ask in your experiment? Why is it interesting?

- The introduction summarizes the relevant literature so that the reader will understand why you were interested in the question you asked

- One to four paragraphs should be enough. End with a sentence explaining the specific question you asked in this experiment.

What? So What?
- Establish a territory
- Establish a niche
- Occupy the niche

Materials and Methods

- How did you answer this question? There should be enough information here to allow another scientist to repeat your experiment.

- If you had a complicated protocol, it may be helpful to include a diagram, table or flowchart to explain the methods you used.

- Do not put results in this section. You may, however, include preliminary results that were used to design the main experiment that you are reporting on.

- Mention relevant ethical considerations. If you used human subjects, did they consent to participate? If you used animals, what measures did you take to minimize pain?

Results

- This is where you present the results you've gotten. Use graphs and tables if appropriate, but also summarize your main findings in the text. Do NOT discuss the results or speculate as to why something happened; that goes in the Discussion.

- You don't necessarily have to include all the data you've gotten during the experiments. This isn't a diary.

- Use appropriate methods of showing data. Don't try to manipulate the data to make it look like you did more than you actually did.

Tables and Graphs

- If you present your data in a table or graph, include a title describing what's in the table ("Enzyme activity at various temperatures", not "My results".) For graphs, you should also label the x and y axes.

- Don't use a table or graph just to be "fancy". If you can summarize the information in one sentence, then a table or graph is not necessary.

Figures

- Figures should clarify and augment the text. The selection of sharp, high quality figures is of paramount importance.

- Figures should be either single-column format, mid-size format, or double-column format.

- If a figure has more than one part, describe each part clearly. Any letter designations or arrows appearing on the figures should be identified and described fully. Abbreviations used in each figure should be defined in the legend in alphabetical order.

Discussion

- Highlight the most significant results, but don't just repeat what you've written in the Results section.
  - How do these results relate to the original question? Do the data support your hypothesis?
  - Are your results consistent with what other investigators have reported?
  - If your results were unexpected, try to explain why.
  - Is there another way to interpret your results?
  - What further research would be necessary to answer the questions raised by your results?
  - How do your results fit into the big picture?

Conclusions

- The Conclusions section provides a brief summary of the results and discussion, but it should be more than a summary. The goal here is to provide the most general claims that can be supported by the evidence. This section should be reader-focused, avoiding a list of all the things that "I" or "we" have accomplished.

- Provide a future perspective on the work. This could be recommendations to the audience or a roadmap for future work. A small amount of speculation can be appropriate here, as long as it is relevant and clearly labeled as speculative.

A conclusion should be more than just a summary

References

- Although simple in concept, citations in a scientific paper serve many goals:
  - Provide sufficient context of the work to allow for critical analysis of the work by others and thus to enable the readers to determine whether the author's conclusions are justified;
  - Give the reader sources of background and related material so that the current work can be understood by the target audience;
  - Establish credibility with the reader (e.g., the authors knows the field, have done their homework, etc.) and/or inform the reader that the paper belongs within a specific school of thought;
  - Provide examples of alternate ideas, data, or conclusions to compare and contrast with this work;
  - Acknowledge and give credit to sources relied upon for this work (i.e., acknowledge the use of another's ideas or data), thus upholding intellectual honesty.

What Is Research Misconduct?

- **Fabrication**--making up data or results and recording or reporting them

- **Falsification**--manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record

- **Plagiarism**--the appropriation of another person's ideas, processes, results, or words without giving appropriate credit

Some Causes of Research Misconduct

- Time pressures, leading to improper shortcuts (e.g., not doing all reported replications, not completing all measurements)
- A desire to produce supportive results or to please PI
- Frustration with experiments that the scientist "knows" should work, but don't
- Sloppy procedures and inadequate record keeping, leading to inaccuracies--or worse--when preparing manuscripts
- Sloppy citation practices, leading to plagiarism

Chances of Being Caught Are Too High to Take the Risk

- Other labs will attempt to replicate published results.

- Reagents, biological materials developed at public expense must be made available to other labs.

- New forensic tools can detect "tweaked" data and images
- New software can find plagiarism (e.g., iThenticate)
- Some groups are dedicated to fight against fraud (Xinyusi, PubPeer)

iThenticate

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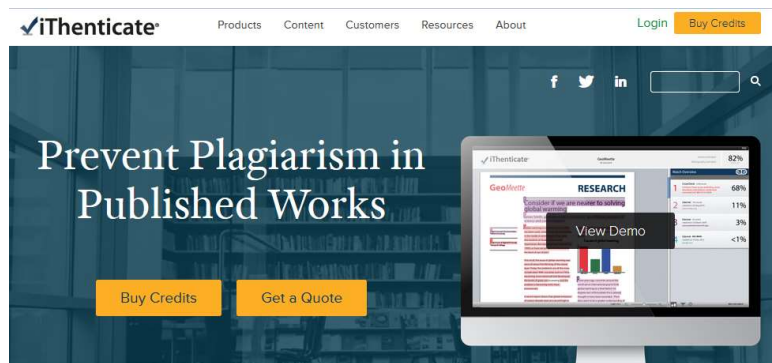
Verify Originality

新语丝·【立此存照 - - 打击学术、新闻、网络腐败】

学术必须诚实，新闻必须真实，网络必须踏实。他们都应该与虚假无缘。
如果有人不遵守游戏规则，不管地位多高，名气多大，我们都要揭露他。

方舟子信箱 (愿为揭发者保密，但不接受匿名信，也不相信流言)

PUBPEER
The online Journal club

Choose the Right Journal for Submission

- Select the suitable journal from the references used for the paper. It is the best way to select the appropriate journals

- Do you prefer to find just a journal that will publish your research or you prefer to choose the best option that corresponds to your needs (IF, potential # and type of readers, potential # of citations, future collaborators, the quality of the reviewers and editor support etc.)

- In most cases we choose to publish in journals that we read and respect … if we are able to respond to their requirements

Submission – Cover Letter

- All manuscripts should be accompanied by a cover letter from the author responsible for correspondence about the manuscript.

- A good cover letter is a crucial part of the manuscript submission package. It is an opportunity to convey many important pieces of information about a paper to the editors.

- Providing context for the paper in a cover letter not only can help the editors reach a quicker decision but also can sometimes tip the balance in favor of sending a borderline paper out for peer review.

Review/Decisions

- Submitted manuscripts are reviewed for originality, significance, adequacy of documentation, composition, and adherence to journal guidelines.

- Editorial decisions are based not only on the technical merits of the work but also on factors such as priority for publication and relevance to the general readership of the journal. All manuscripts are judged in relation to other submissions currently under consideration.

- Manuscripts that are judged to be of insufficient quality or unlikely to be competitive enough for publication will be rejected during initial screening.

- The remaining manuscripts go through a peer review process with two or more reviewers. Manuscripts with significant results are typically reviewed and published at the highest priority.

How Does Editor Select Competent Reviewers When Peer Reviewing?

- A large number of submissions are declined directly by editors after being submitted
- Peer-reviewers are usually professors that have published in the area
- Submitted potential reviewers may be considered by the editors, but not always
- Editors take into consideration the CVs of the reviewers, their interest in participating in the process, and also their publications
- Individual journal quality is mostly down to individual editors - rather than a universal system

How to Write a Point-by-point Response

- Appreciate the efforts spent by the editor and the reviewers
- Acknowledge a misunderstanding may be due to poor presentation on your part, not lack of expertise on the reviewers'
- Reply to every concern raised by each reviewer immediately after each point in a concise manner. If you cannot address a point at all, explain why not
- Include relevant citations and pertinent new data
- Remember that each reviewer sees all comments and your replies so be equally respectful to all

Major Problems with Responses

- Don't vent or accuse the reviewers of bias or incompetence. They serve no productive purpose and instead potentially bias all referees, even the positive ones, against the work.

- Don't plead that for personal or monetary reasons critically important experiments can't be performed. While we hear the plight of underfunded labs we don't make exceptions for these reasons.

- Don't ignore specific requests by referees without comment and selectively only answer a few queries.

- Don't rephrase a referees' point to give it a slightly different meaning that you can more easily address.

Appeal Letter?

- There are outright rejections (which represent the vast majority), and then there are those rejections where the editor indicates that a manuscript could be reconsidered if the authors can address specific shortcomings.

- Do consider whether you have a good case for appealing that is worth investing time in the process. Unless your case is very strong, it will save you precious time by accepting the editorial decision and submitting the manuscript elsewhere.

What I Need to Do and Know About Publishing in High Impact Journals

- Select a real challenging problem whose solution/amendment significantly impacts on the domain

- Formulate the problem nicely and let peers/reviewers see the significance of the problem.

- Propose a solution with high degree of novelty

- Throughout the research try to follow the conventions of research in your domain in the highest possible level

- Avoid silly mistakes. If you make small obvious mistakes, how can reviewers ensure the rest of your work is error-free?

- Show high level of confidence in understanding and expertise over the domain

Take Home Messages

- Publish or perish holds true in most research environments, but a single publication in a high-tier journal can make a huge impact on one's academic career path.

- High quality contents
  - Novelty and conceptual advancement
  - Broad readership

- Style
  - Present your work nicely. Avoid English errors
  - Use professional drawing tools to draw high quality figures, draw nice tables, use proper sizing for objects in the paper, not too big, not to small.

- Read your article at least **FIVE** times before submission