How To Write a Scientific Paper – A General Guide
Key Topics

• Key elements of publishing (structured abstract)
• Article submission
• Publisher/peer review process
• Author and reader priorities
• Hands on activities
Publish or Perish

‘Publishing is the chief currency in this universe, the main source of validation of one’s research, and often the key indicator of academic success. Promotion and tenure committees value peer-reviewed publications above all;... that is, regrettably, even above clinical performance or community service.’

Overview

• Task of writing a research paper can be daunting

• Even with groundbreaking research, unless the paper is correctly written:
  – at best, publication will be delayed
  – at worse, never published

• Goal is to provide an overview of ‘how to write a well-structured research paper for publication’
Information Life Cycle

- Primary Research/Discovery
- Writing/Submission of Paper
- Peer Review/Acceptance of Paper
- Publishing of Article
- Dissemination/Acceptance of Research
- Secondary Research
Key Elements of Publishing

• Ethical Issues
• Style and language
• Structure of paper
• Components of paper
• Article submission/journal selection
• Publisher’s process/peer review
Ethical Issues

• Disclosure of Conflict of Interest
• Acknowledgment of funding sources
• Image manipulation guidelines
• Online submission - supplemental information (datasets, videos)
• For Health Sciences
  – Submission of a Clinical Trials to a Central Registry
  – Institutional Review Board approval

See: Blackwell Science - Best Practice Guidelines on Publishing Ethics
http://www.blackwellpublishing.com/Publicationethics/
Style and Language

• Refer to the journal’s author guide for notes on style (see Publishing Skills Web-Bibliography for examples)
  – Some authors write their paper with a specific journal in mind
  – Others write the paper and then adapt it to fit the style of a journal they subsequently choose

• Objective is to report your findings and conclusions clearly and concisely as possible
Style and Language

• Complex language not needed; poorly written manuscripts get rejected
• If English is not your first language, find a native English speaker (if possible) to review the content and language of the paper before submitting it
• Regardless of primary language, find a colleague/editor to review the content and language of the paper

See: Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication http://www.icmje.org/
Structure of a Paper

Scientific writing follows a rigid structure – a format developed over hundreds of years.

Consequently, a paper can be read at several levels:

• Some people just will refer to the title
• Others may read only the title and abstract
• Others will read the paper for a deeper understanding

Note: this format also is used for ’structured abstracts’ - invaluable for abstracts and papers for workshops or conferences.
National Library of Medicine – Structured Abstract

# Components of a Paper

<table>
<thead>
<tr>
<th>Section</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Clearly describes contents</td>
</tr>
<tr>
<td>Authors</td>
<td>Ensures recognition for the writer(s)</td>
</tr>
<tr>
<td>Abstract</td>
<td>Describes what was done – 150 words</td>
</tr>
<tr>
<td>Key Words (some journals)</td>
<td>Ensures the article is correctly identified in abstracting and indexing services</td>
</tr>
<tr>
<td>Introduction</td>
<td>Explains the problem</td>
</tr>
<tr>
<td>Methods</td>
<td>Explains how the data were collected</td>
</tr>
<tr>
<td>Results</td>
<td>Describes what was discovered</td>
</tr>
<tr>
<td>Discussion</td>
<td>Discusses the implications of the findings</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>Ensures those who helped in the research are recognised</td>
</tr>
<tr>
<td>References</td>
<td>Ensures previously published work is recognised</td>
</tr>
<tr>
<td>Appendices (some journals)</td>
<td>Provides supplemental data for the expert reader</td>
</tr>
</tbody>
</table>
Authors Listing

• ONLY include those who have made an intellectual contribution to the research

• OR those who will publicly defend the data and conclusions, and who have approved the final version

• Order of the names of the authors can vary from discipline to discipline
  – In some fields, the corresponding author’s name appears first
Title

• Describes the paper’s content clearly and precisely including keywords
• Is the advertisement for the article
• Do not use abbreviations and jargon
• Search engines/indexing databases depend on the accuracy of the title - since they use the keywords to identify relevant articles
Abstract

• Briefly summarize (approximately 150 words) - the problem, the method, the results, and the conclusions so that
  – The reader can decide whether or not to read the whole article
• Together, the title and the abstract should stand on their own
• Most authors write the abstract last so that it accurately reflects the content of the paper
• Use keywords that will attract the readers

See: The Structured Abstract: An Essential Tool for Research
research.mlanet.org/structured_abstract.html
Writing Abstracts; Gastel Barbara, Authoraid

Introduction

• Clearly state the:
  – Problem being investigated
  – Background that explains the problem
  – Reasons for conducting the research
• Summarize relevant research to provide context
• State how your work differs from published work
• Identify the questions you are answering
• Explain what other findings, if any, you are challenging or extending
• Briefly describe the experiment, hypothesis(es), research question(s); general experimental design or method
Methods

• Provide the reader enough details so they can understand and replicate your research
• Explain how you studied the problem, identify the procedures you followed, and order these chronologically where possible
• Explain new methodology in detail; otherwise name the method and cite the previously published work
• Include the frequency of observations, what types of data were recorded, etc.
• Be precise in describing measurements and include errors of measurement or research design limits
Results

• Objectively present your findings, and explain what was found
• Show that your new results are contributing to the body of scientific knowledge
• Follow a logical sequence based on the tables and figures presenting the findings to answer the question or hypothesis
• Figures should have a brief description (a legend), providing the reader sufficient information to know how the data were produced
Discussion/Conclusion

• Describe what your results mean in context of what was already known about the subject
• Indicate how the results relate to expectations and to the literature previously cited
• Explain how the research has moved the body of scientific knowledge forward
• Do not extend your conclusions beyond what is directly supported by your results - avoid undue speculation
• Outline the next steps for further study
References

• Whenever you draw upon previously published work, you must acknowledge the source
• Any information not from your experiment and not ‘common knowledge’ should be recognized by a citation
• How references are presented varies considerably - refer to notes for authors for the specific journal
• Avoid references that are difficult to find
• Avoid listing related references that were not important to the study

Components of a Research Paper. Center for Innovative Research and Teaching. Grand Canyon University
https://cirt.gcu.edu/research/developmentresources/tutorials/researchpaper
(Accessed 16 Aug 2015)
Harvard Reference Style

Uses the author's name and date of publication in the body of the text, and the bibliography is given alphabetically by author

Vancouver Reference Style

Uses a number series to indicate references; bibliographies list these in numerical order as they appear in the text


Reference Management Software Tools

• Tools such as Mendeley, Zotero or EndNote can be used to create the footnote and reference format required by a specific publisher

• See the Reference Management Software Tools modules – to learn how to access, download and use these options

www.research4life.org/training/reference-management-tools/
Article Submission

• Select your journal carefully
• Read the aims and scope of several journals – who reads them and what has been published
• Think about your target audience and the level of your work – do you have a realistic chance of being accepted?
• Follow the guidelines in the notes for authors and include everything they ask – it makes the editor’s job easier…
• Articles should not be submitted to more than one journal at a time

See: Instructions to Authors in Health Sciences mulford.utoledo.edu/instr/
Broad/generalist vs. Specialist Scope

- **Broad journal:**
  - Considers a broad range of topics/thresholds
  - May recommend a transfer to a more suitable subject specific journal

- **Specialist journal:**
  - Considers a narrow range of topics/thresholds
  - Rejection in pre-review for ‘out of scope’
  - May recommend transfer to another subject specific journal or to a broader scope journal
Open Access vs. Subscription

• Similar quality and standards:
  – Peer review, editors, editorial boards, indexing, permanent/electronic access

• Distribution is different:
  – For Open Access, no subscription barriers, universal access and openly licensed to allow reuse; authors pay publication fee
  – For Commercial Publications, subscription fee is paid, publisher owns the license agreement; authors do not pay publication fee
Online Submission

- Many publishers now offer a completely electronic submission process
- Article is submitted online and all of the review procedure also happens online
- Speeds up the editorial process
- Is invaluable for authors in low-income countries
After Submission

• Most journal editors will make an initial decision on a paper - to review or to reject
• Most editors appoint two referees
• Refereeing speed varies tremendously between journals
• Authors should receive a decision of Accept, Accept with Revision (Minor or Major), or Reject
• If a paper is rejected, most editors will write to you explaining their decision
• After rejection, authors have the option of submitting the paper to another journal - editor’s suggestions should be addressed
Overview of Peer Review Process

1. Paper Submitted
2. Confirmation of Receipt
3. Initial Decision by Editor
   - Rejection
   - Decide to Review
     - Assign Reviewers
       - Reviewers Accept Invite
         - Reviews Completed
           - Revise
           - Accept
           - Reject
4. Notification to Author
   - Revise
   - Accept
   - Revision Received
   - Revision Checked
   - Paper sent to Publisher
Keys for Editor

• Does the work fit the journal’s scope?
• The clarity of the English language used?
• Is the science sound?
• Targeted to the journal’s audience?
• Is it new/interesting?
• Is it a big enough advance for this field and this journal?
What do peer reviewers look for?

- Quality
  - Soundness of research
  - Suitability of methods and analyses
  - Soundness of analysis/appropriateness of conclusions
  - Reporting/clarity of the message
  - Language/presentation
- Contribution to the literature
  - Novelty
  - Importance/interest
- May also comment on
  - Suitability to the journal’s scope
  - Research and publication ethics
Models of Peer Review

- Closed peer review
  - Single blind – the reviewers know who the authors are, but the authors don’t know who the reviewers are
  - Double blind – the reviewers don’t know who the authors are and the authors don’t know who the reviewers are

- Open peer review
  - The reviewers know who the authors are, and the authors know who the reviewers are
  - Reviews published online if the manuscript is accepted
After Peer Review

• Editor makes a decision
• Peer reviewers often disagree with each other
• Editors may seek further advice
• Editors may overrule reviewers
• Editors, not reviewers ultimately decide what is published
Lipid metabolism enzyme ACSVL3 supports glioblastoma stem cell maintenance and tumorigenicity

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The electronic version of this article is the complete one and can be found online at: http://www.biomedcentral.com/1471-2407/14/401
Pre-publication history versions of article and reviewers’ reports

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Pre-publication versions of this article and reviewers’ reports

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<td>Justin Lathia</td>
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<td>Xing Fan</td>
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<tr>
<td>Resubmission - Version 3</td>
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<td>21 May 2014</td>
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<td>Published</td>
<td></td>
<td>04 Jun 2014</td>
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Publishing Tips

• Editors and reviewers are looking for original and innovative research that will add to the field of study.
• For research-based papers, ensure that you have enough numbers to justify sound statistical conclusions.
• For a larger study, it may be better to produce one important research paper, rather than a number of average incremental papers.

See:
• www.elsevier.com/connect/8-reasons-i-accepted-your-article
• www.elsevier.com/connect/8-reasons-i-rejected-your-article
The Bottom Line: You Will Get Published if…

- You picked an important research question.
- You used the right method to answer it.
- You wrote a short, clear account of the study that followed a tight structure and used effective writing to convey your message clearly.

blogs.plos.org/speakingofmedicine/2014/04/10/writing-workshop/
Some words of caution – when selecting a journal

- With the development of Open Access publishing, some unscrupulous publishers take advantage of authors.
- Examples are stand-alone (one title) publishers, the publisher is the editor, no formal editorial/review board, lack of transparency of publishing operations, no policy for digital preservation, name of journal is inflated or incongruent with journal’s mission, false claim of indexing, poor journal standards or practices, excessively broad titles, etc.
- For further info, go to: scholarlyoa.com/ or libguides.wits.ac.za/openaccess_a2k_scholarly_communication/Predatory_Publishers.
Some words of caution

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• Examples are stand-alone (one title) publishers, the publisher is the editor, no formal editorial/review board, lack of transparency of publishing operations, no policy for digital preservation, name of journal is inflated or incongruent with journal’s mission, false claim of indexing, poor journal standards or practices, excessively broad titles, etc.
Useful resources

- For further info, go to: Scholarly Open Access [scholarlyoa.com/](http://scholarlyoa.com/) or Beall’s List of Potential, Possible or Probably Predatory Scholarly Open-access) [scholarlyoa.com/publishers/](http://scholarlyoa.com/publishers/)

- University of Witwatersand’s Open Access, A2K & Scholarly Communication: Predatory Publishers Libguide [libguides.wits.ac.za/openaccess_a2k_scholarly_communication/Predatory_Publishers](http://libguides.wits.ac.za/openaccess_a2k_scholarly_communication/Predatory_Publishers)

- Or check if the journal is listed in the Open Access Scholarly Publishers Association [oaspa.org/](http://oaspa.org/) or Directory of Open Access Journals [https://doaj.org/](https://doaj.org/)
This is a cautionary note. **Retraction Watch** is a website that tracks the retraction of peer-reviewed papers due to fabrication, faulty research and/or statistics. All types of journal publishers (open access and commercial) must deal with these issues.

01 November 2016
A major publisher of scholarly medical and science articles has retracted 43 papers because of “fabricated” peer reviews amid signs of a broader fake peer review racket affecting many more publications.

The publisher is BioMed Central, based in the United Kingdom, which puts out 277 peer-reviewed journals. A partial list of the retracted articles suggests most of them were written by scholars at universities in China, including China Medical University, Sichuan University, Shandong University and Jiaotong University Medical School. But Jigisha Patel, associate editorial director for research integrity at BioMed Central, said it’s not “a China problem. We get a lot of robust research of China. We see this as a broader problem of how scientists are judged.”

Meanwhile, the Committee on Publication Ethics, a multidisciplinary group that includes more than 9,000 journal editors, issued a statement suggesting a much broader potential problem. The committee, it said, “has become aware of systematic, inappropriate attempts to manipulate the peer review processes of several journals across different publishers.” Those journals are now reviewing manuscripts to determine how many may need to be retracted, it said.
The national affiliations of authors and reasons for retraction of papers accessible through PubMed that were published from 2008 to 2012 and subsequently retracted were determined in order to identify countries with the largest numbers and highest rates of retraction due to plagiarism and duplicate publication. Authors from more than fifty countries retracted papers. While the United States retracted the most papers, China retracted the most papers for plagiarism and duplicate publication. Rates of plagiarism and duplicate publication were highest in Italy and Finland, respectively. Unethical publishing practices cut across nations.'

Background: Author’s Perspective

Motivation to publish:
- Dissemination (54% 1st choice)
- Career prospects (20% 1st choice)
- Improved funding (11% 1st choice)
- Ego (8% 1st choice)
- Patent protection (4% 1st choice)
- Other (3% 1st choice)

Bryan Coles (ed.) The STM Information System in the UK, BL Report 6123, Royal Society, BL, ALPSP, 1993
Author Publishing Priorities

• Quality and speed
  – Top items were
    • Refereeing speed
    • Refereeing standard
    • Journal reputation

• Editor/board, physical quality and publication services
Reader’s priorities

- Authoritative quality articles
- Ease of access
- Rapid delivery
- Convenient format
- Linking of information - clustering
- Low or no cost
- Up-to-date information
Author versus Reader Behaviour

• **Author behaviour**
  - Want to publish more
  - Peer review essential
  - Other journal functions crucial
  - Wider dissemination

• **Reader behaviour**
  - Want integrated system
  - Browsing is crucial
  - Quality information important
  - Want to read less

Elsevier study of 36,000 authors (1999-2002) presented by Michael Mabe at ALPSP Seminar on “Learning from users” 2003; www.alpsp.org
Differences: Authors and Readers

- Authors are journal focused
- Readers are article focused
- Publish more/read less dichotomy
Priorities for Readers in Low-Income Countries (discussion)

Rank on a Scale of 5:1 -

5 (very useful), 4 (somewhat useful), 3 (average),
2 (somewhat not useful), 1 (not useful)

- Authoritative quality articles
- Ease of access
- Rapid delivery
- Convenient format
- Linking of information - clustering
- Low or no cost (Open Access or HINARI publisher)
- Up-to-date information
- Other
Additional Resources


• Research4Life Authorship Skills Web-bibliography www.research4life.org/training/authorship-skills/
Presentation Sources

• Significant portions were adapted from a 2005 ‘How to Publish a Scientific Paper’ Elsevier Presentation

• Additional material
  – adapted from ‘Journal Development’ – Authors’ workshop material: INASP June 2005
  – added from BioMed Central Author Workshop: Walking in the Editor’s Shoes; Liz Hoffman/Springer 2014
Hands On Activities

Any Questions?

We now will proceed to the ‘Hands On Activities’ for ‘How to Write a Scientific Paper’
– Structured Abstract
– Bibliographic citations

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