Workshop for New Authors and Referees: A Guide to Best Practices in Writing and Reviewing Scientific Papers

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Physics in Medicine & Biology
Goals of the Workshop

• Aimed at junior scientists

• Provide information to help answer common questions such as:
  • What are common pitfalls in writing a manuscript?
  • To which journal should I submit my work?
  • Why was my manuscript rejected?
  • How do I review a manuscript?
  • What does the impact factor mean?
  • What does the h-index mean?
  • Should I submit to an open access journal?
  • Can I put a PDF of my paper on my website?
Outline

• **Best practices in writing a manuscript** (Steven Meikle)
  • Is my work ready to publish?
  • Writing advice and common pitfalls
  • Selecting an appropriate journal
  • Open access and sponsor requirements

• **Best practices in reviewing a manuscript** (Simon Cherry)
  • The review process
  • Peer review models
  • Do and Don’ts of reviewing

• **Other important topics** (Simon Cherry)
  • Bibliometrics (Impact factor, h-index etc...)
  • “Fair’ uses of published work

• Questions and Discussion
Writing a paper – best practices and choosing the right journal

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Physics in Medicine & Biology
Why publish in journals?

- Make an impact in your field of research
- Meet your PhD requirements
- Build track record for funding
- Get cited
- Get your work known internationally
- Advance your career
- Peer review gives your research authority
Outline

• Is my work ready to publish?
• Getting started
  • Planning
  • Where do I start?
  • How to prepare good figures
  • Traps for young players
• Choosing the right journal
  • Who is the audience?
  • Journal scope
  • Open access or subscription?
Is my work ready to publish?

- Did you address an important problem?
- Has anyone else addressed this problem?
- Is your solution novel?
- Are your results valid?
- Are your results conclusive?
- Will your results have impact on the field?
- Will your results have impact on another field?
Is my work ready to publish?

Significance:
• Did you address an important problem?

Novelty:
• Has anyone else addressed this problem?
• Is your solution novel?

Validity:
• Are your results valid?
• Are your results conclusive?

Impact:
• Will your results have impact on the field?
• Will your results have impact on another field?
Writing the paper
Planning

The most important step is PLANNING
Planning

Start from basics

- Block out time to think about what you want to include in the article – what data, tables etc.

Develop an outline

- A roadmap to help organise and develop the article

Think about which journal you want to submit to

- Are there specific journal instructions / requirements?
- Do you need specific permissions for figures?
Where do I start?

A: Wherever you like… the results are a good place to start; they are the core of your article

- Title and Abstract
- Introduction
- Methods
- Results
- Discussion
- Conclusions
- Acknowledgments
- References/ bibliography
Introduction

The introduction should:

- Define the problem (broadly) and provide context
- Describe previous work
  - What have others done to address the problem or establish the foundations for your study?
  - Confine to relevant research (it’s not a literature review)
  - Cite primary sources where possible and recent reviews
  - Take care to accurately report key findings
- Identify the gap in knowledge, i.e. the specific problem your paper addresses
- State the hypothesis (where appropriate) and specific aims
- Be concise (it’s not a novel)
Warning

• Be careful to avoid plagiarism or self-plagiarism. No sentence or paragraph can be repeated verbatim from previous publications, even from your own work.

• Ideas can be paraphrased but not copied and must be cited

• Don’t quote other authors – while it is not plagiarism, it is not good practice either
Methods

- Should be concise but with sufficient detail for someone in your field to repeat the study
- Describe:
  - Instruments (model, key specifications)
  - Materials (key properties, dimensions)
  - Subjects (species/strain, gender, number, disease etc, as appropriate)
- Methods
- Cite published methods as appropriate
Results

- Should be very concise; describe them in sufficient detail to be clearly understood
- Refer to every table and figure
- Describe key features/trends
- Keep figure captions brief, just enough detail to understand what is presented in the figure
- Represent data in an organised way and ensure that tables, figures and references are in order
  - e.g. table 5 should not be referenced before table 4
Discussion and Conclusions

- Highlight the significance of your results
- Show how your results and interpretations compare and/or contrast with previously published work
- Discuss the theoretical implications of your work as well as any practical applications
- Briefly discuss the limitations (not flaws) of your study and future avenues for research
- Summarise the main conclusions
  - These must be supported by your results
  - Link them to your stated aims
Title and Abstract

The title and abstract will be the most visible part of your article

Title:
Should be short, accurate and give a good idea of the main result or conclusion of the article.

Abstract:
• Summarises the paper in a single paragraph
• Should follow outline of the paper
  • aim(s), key methods, key results, main conclusion(s)
• Should be self contained
Authorship

- Only individuals that have contributed *scientifically* to the project should be listed as authors
  - Avoid gratuitous authorship
  - OK for technical staff to be listed as co-authors IF they contributed scientifically

- Some journals now require an explicit description of what each author’s contribution to the manuscript was.
Authorship contd…

- International Committee of Medical Journal Editors recommendations
  - http://www.icmje.org

- Criteria for authorship:
  - Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work
  - Drafting the work or revising it critically for important intellectual content
  - Final approval of the version to be published
  - Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved
Order of Authors

- Order of authors:
  - Typically, the first author is the person who did the majority of the work.
  - The last author, often referred to as the senior author, is commonly the laboratory director who provided intellectual guidance and scientific oversight to the project.
  - Middle authors may be listed by their contributions, alphabetically, or using some other process.

- Some journals now require an explicit description of what each author’s contribution to the manuscript was.
References

- Cite the **right** references
  - List only significant published references
  - Check all references for accuracy against original source
  - Follow reference style
    - Name and year
    - Order numerically as they are cited in the paper

- Ensure that all references in the list are used in the text and vice versa

- Acknowledgements
  - Make sure you acknowledge appropriate sources, e.g. funding, expertise, equipment
Figures and tables

- Most journals require .eps files (check the author instructions for the journal)
- Lines must be dark enough to be seen when reduced to fit into the journal format, e.g. dual column format
- Consider online and print
  - how will figures look if produced in colour online but greyscale in print
  - take care when using symbols or dashed or dotted lines to make the figures meaningful in print as well as online
- Styles vary between journals
A poorly presented figure

![Graph showing detector response vs. time. The x-axis represents time in units of 10,000, starting from 0 to 100,000. The y-axis represents the detector response, ranging from 0 to 0.00003. The graph includes multiple lines with different markers and line styles, indicating various data sets.](image-url)
M Maruyama et al 2013 Imaging of tau pathology in a tauopathy mouse model and in Alzheimer patients compared to normal controls Neuron 79 1094
Traps for young players

- Describing methodology in the Results section
  - The Results section is for **results**
- Making the article too long
  - Introduction too long
  - Trying to include too many results
  - Writing style too verbose
- Not clearly defining the problem
- Not making the novel contribution(s) clear
- Conclusions too broad
  - Conclusions must be supported by results
- Getting the tense wrong or mixed up
Tense – past, present or future?

- General rule of thumb:
  - When describing established knowledge: use present tense
    - e.g. “PET imaging of small animals enables longitudinal studies of the disease process (Phelps 2000)”
  - When describing unpublished work (e.g. your methods) or previous studies: use past tense
    - e.g. “The phantom was placed in the field of view”,
    - or “A dual-ended readout scheme for DOI estimation was reported by Yang et al [1] ”
Is my article ready for submission?

Your article is ready for submission when:

- It has no flaws or omissions
  - it is not the task of reviewers to find your flaws!
- All co-authors have read the manuscript and have no further suggestions for improvement
- All co-authors approve it for submission
  - Some journals and some institutions require a signed statement by all authors
- It has been proof read by at least one native english speaker
- It is in the required format for your chosen journal
Ethics in writing a scientific paper

- The article should not be under consideration by another journal
- Get permission to reproduce other material that has been published elsewhere
- Many journals now have an ethical policy
- Plagiarism and fraud can lead to serious consequences
PMB Author Guide

http://cms.iopscience.org/3205ba4f-d278-11e1-9b7a-4d5160a0f0b4/index.html
Submitting the paper
Selecting the right journal

Decide as early as possible on your first choice journal

- **Journal audience and scope**
  - You can find it in the printed version or on the Web
  - Contact the Publisher or Editor if in doubt
  - Browse the back issues to understand the journal’s style and scope
- **Reputation (Impact Factor, discipline ranking)**
- **Visibility and relevance**
- **Speed of publication**
- **Open access, subscription or hybrid?**

- Select the journal that will provide the **most recognition** for your work
Impact Factor

SJR Impact Factor

Nature Biotechnology
Biomaterials
Acta Biomaterialia
IEEE Transactions on Medical Imaging
Tissue Engineering - Part B: Reviews
IEEE Transactions on Biomedical Engineering - Part A
Biophysics, Geophysics, Geosystems
Annals of Biomedical Engineering
Critical Reviews in Biomedical Engineering
Recent Patents on Biomedical Engineering and Applications
Critical Reviews in Biomedical Engineering and Applications
Pacing and Clinical Electrophysiology
Journal of Biomedical Science and Technology
Frontiers in Biomedical Engineering
IEEE Transactions on Biomedical Engineering
Journal of Biomechanical Engineering
International Journal for Numerical Methods in Engineering
Cartilage
Journal of Biomechanical Engineering
Journal Scope

Physics in Medicine and Biology
- radiotherapy physics
- radiation dosimetry
- biomedical imaging
- image reconstruction and kinetic modelling
- image analysis and CAD
- biomedical optics
- other radiation medicine applications
- therapies
- radiation protection
- radiobiology

IEEE Transactions on Medical Imaging
- ultrasound
- X-rays (including CT)
- MRI
- radionuclide imaging
- microwave imaging
- optical imaging
- medical image processing
- image analysis
- visualization
- pattern recognition
Open Access

Gold (open access journal)

- *gratis* or *libre* to reader
- processing fee usually charged to author ($2,000-5,000)

Green (self archived)

- author places article in institutional or public repository, e.g. PubMed Central
- embargo period of 6-12 months often imposed by publisher
- publication cost charged to reader or institution (subscription)
Before submitting your article

- Check that you have approval from all co-authors
- Are there any internal procedures that you need to follow that are specific to your institute or group?
- Have you obtained all of the permissions you need for figures you may have used that are from others’ work?
- Have you agreed the funding to pay for colour, pages, open access (where appropriate)?
행운을 빌어 요
幸運
好運
Good luck
bonne chance
buona fortuna
buena suerte
veel succes
καλή τύχη
Удачи
lycka till
The review process - what to expect, how to respond and best practices in reviewing

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Editor in Chief
Physics in Medicine & Biology
The review process – what to expect
Why do Journals use a Peer Review process?

- As a service to authors—peer review should improve the paper:
  - Eliminate errors (ideally)
  - Ensure sufficient detail is provided
  - Improve clarity

- To ensure that the paper is suitable for the journal based on:
  - Scope
  - Quality
  - Originality
  - Importance
What happens after submission?

- Journal acknowledges your paper

- Preliminary decision to send to referees or not
  - In scope of the journal?
  - Is the manuscript complete?
  - Is the quality of writing acceptable?

- Editor, Associate Editor or journal staff select referees for the paper
  - Independent experts
  - Knowledge of the field
  - Previous record of fair and constructive refereeing
  - Are available and have the time
The review process

- Normally require two referee reports (can be one to three referees)
- Referees send their reports back to the Editor
- Typically ‘single blind’ referee process is used:
  - Referee knows who the author is
  - Authors are not informed who the referee is
- Editor or Associate Editor makes decision based on referee reports
- Adjudicator or additional reviewers may be selected if the reports are conflicting
Models for Peer Review

- Single Blind (Traditional)
- Double Blind
  - All identifying information is removed from the manuscript prior to review
  - The authors and reviewers are blinded to each other (to the extent possible)
- Open (unblinded) review
  - Identity of reviewers and authors are known to each other
  - In some cases the whole community may be allowed to comment on a manuscript before it is published
The initial editorial decision

- You will get an email from the editorial office:
  - Immediate accept – unusual but does happen
  - Modify / revise
    - Comments and suggestions from referees
    - Requested revisions may be classed as “minor” (may not go back to reviewers) or “major” (will go back to reviewers)
  - Reject
    - Not unusual! Many good journals have rejection rates of over 50%
    - May happen quickly after initial assessment by journal team/Editorial Board.
Responding to referees’ comments

- Read referees’ reports and put away for a day!
- Read comments again!
- Respond to each and every comment specifically
- Keep a list of your changes
- Where you disagree, explain why
- If a referee misses a point it is not necessarily his/her fault; you may not have explained it as clearly as you think
- Prepare a detailed covering letter with your response
- Be polite!
If your paper is rejected

- Do not despair: treat referees’ comments as free expert advice

- You can re-write your article taking into account the suggestions of the referees and re-submit it (to another journal)

- If you think the review was unfair, appeal to the journal by sending a letter and explaining why you think your work did not receive a fair treatment
If your paper is accepted

- Great!

- The journal will expect you to check your proofs rapidly and carefully
  - Nominate another person if you are unavailable
  - Give one copy of proofs to somebody else to read
  - Reply to editor’s queries
Reviewing an article
Why review papers for journals?

- To keep up to date on progress in a field
- To see new research before it is published
- To keep the literature free of misleading errors
- For career advancement – reviewing activities typically expected and seen as evidence of standing in field
- Duty? Can’t reasonably expect others to spend time reviewing your papers if you won’t review theirs!
Before you undertake a review, ask yourself

- Do you have the necessary expertise?
- Do you have a potential conflict of interest?
- Can you report within the requested deadline?
- Will you be able to review a revised version if necessary?
Is the work understandable and correct?

- Is it clear what the authors are trying to achieve?
- Are there sufficient references to provide background and put the work in context?
- Are the results backed up with evidence?
- Are there any unsupported claims?
- Is the work correct? Are there any errors, flaws or mistakes in the manuscript?
- Are the mathematics or statistics correct?
- Do you understand the work?
Is the work novel and interesting?

- Are the results interesting?
- Is the research important? Do the authors explain why it is important or how it advances our understanding of the field?
- Is the work original? Does it contain new material? Have any parts of the manuscript been published before?
- How relevant is this work to researchers in your field? Would it be beneficial to get an opinion from a researcher in another field?
- Is this only an incremental advance over previous work?
Is the work well presented?

- Does the title reflect the contents of the article?
- Does the abstract contain the essential information of the article?
- Are the figures and tables correct, legible and informative? Are there too many, or too few?
- Does the conclusion summarize what has been learned and why it is interesting and useful?
- Is it clear?
- Is the manuscript an appropriate length?
Do

- Begin by summarizing the paper’s findings briefly
- Consider the paper’s target audience
- Include general comments on the paper’s originality, soundness and significance
- Include specific comments on each section
- Cite references where appropriate
- Number your comments
- Be constructive and respectful - approach the reviewing task as an advocate/advisor
Do

- Send your report on or before the agreed deadline
- Keep the journal informed about the progress of the report
- Follow the instructions sent from the journal
- Contact the journal if you have any questions
- Give examples to make your meaning clear
- If similar work already published, provide specific citation
- Comment on what is interesting, important, novel or significant about the work (if anything)
- Be unbiased and objective
Do not

- Redesign the authors’ experiments

- Request changes just to satisfy personal preference

- Do nothing! If you are unable or unwilling to referee the paper tell the journal.

- Agree to report but then fail to send it. Instead ask for more time or let the journal know you can no longer report.
Do not

- Contact the authors under any circumstances. If you have a question for the authors, ask the journal to forward it.
- Give numerical scores that are inconsistent with your written evaluation.
- Make statements/claims about the work without providing an explanation and evidence.
- Personally criticize any of the authors.
- Spend excessive time correcting English; be sure to focus on quality/originality of research.
- Recommend accepting or rejecting the paper without giving reasons.
Interested in being a referee?

- PMB is always looking for new referees. The following minimum qualifications are required:
  
  Ph.D. in physics, biomedical engineering or related field
  
  Research expertise within the scope of the journal
  
  Record of first author publication(s)

- If interested, or if you have any other questions, please contact us at pmb@iop.org
Guide for Reviewers

- Available at http://referees.iop.org - Introduction to refereeing
Other Important Topics
Other Relevant Topics in Scientific Publishing

- Bibliometrics
  - Impact Factor
  - h-index

- “Fair” use of Published Material
  - Educational use
  - Website use
Impact Factor

- In a given year, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years.

- For example, if a journal has an impact factor of 3 in 2013, then its papers published in 2011 and 2012 received 3 citations each on average in 2013.
Impact Factor - Example

- \( A \) = number of times that articles published in that journal in 2011 and 2012, were cited by articles in indexed journals during 2013
- \( B \) = the total number of "citable items" published by that journal in 2011 and 2012.
  - "Citable items" are usually articles, reviews, proceedings, or notes; not editorials or letters to the editor.
- 2013 impact factor = \( A/B \)
  - 2013 impact factors will be published in 2014; they cannot be calculated until all 2013 publications have been processed by the indexing agency.
Interpreting Impact Factors

- **Strongly field dependent**
  - Broad journals tend to have higher IFs
  - Clinical journals tend to have higher IFs
  - In biomedical physics/engineering fields top journals tend to have IFs in range 2 – 4

- **Can be manipulated** (deliberately or accidentally)
  - Journals that publish only review articles or lots of review articles have higher IFs
  - Unscrupulous journals may ask reviewers to ensure manuscript cites papers from that journal
  - Various circumstances can lead to anomalous spikes in IF
5-year Impact Factor

• In a given year, the 5-year impact factor of a journal is the average number of citations received per paper published in that journal during the five preceding years.

• For example, if a journal has an impact factor of 3 in 2013, then its papers published in 2008 to 2012 received 3 citations each on average in 2013.
h-Index

• An index that attempts to measure both the productivity and impact of the published work of a scientist.

• Based on the set of the scientist's most cited papers and the number of citations that they have received.

• Index can also be applied to the productivity and impact of a group of scientists, such as a department or university or country, as well as a scholarly journal.
h-Index

- A scientist with an index of $h$ has published $h$ papers each of which has been cited in other papers at least $h$ times.
Interpreting the h-Index

• only for comparing scientists working in the same field
  • *different traditions for number of citations*
• does not account for the number of authors of a paper
  • *tends to favor fields with larger groups (e.g. experimental over theoretical)*
• discards information contained in author placement in the authors' list,
• the h-index is bounded by the total number of publications.
  • *scientists with a short career are at an inherent disadvantage, regardless of importance of their discoveries*
Interpreting the h-Index contd...

- does not consider context of citations
  - *negative citations, general citations in introduction*
- does not account for gratuitous authorship
- favorable bias for review articles
- can be manipulated by excessive self-citation
- different databases yield substantially different results
  - *E.g. Google scholar gives high numbers – broadest coverage of documents – but possibly less accurate*
h-Index – Typical values in our field

- Senior Full Professors: 25-50
- Mid-Career Professors: 15-30
- Junior Professors: 10-20
- Postdocs: <6

- Hirsch’s threshold values (after 20 years):
  - Successful (h>20)
  - Outstanding (h>40)
  - Exceptional (h>60)
The **impact factor** and **h-index** can be useful metrics, but only when applied and interpreted appropriately!
Fair use of Published Material

• Journal holds copyright on paper
• Each journal has its own policies
  • If in doubt about using material, contact the journal
• Distribution
  • Personal use
  • Institutional or other repositories
  • Distribution to colleagues
• Educational Use
  • Theses
  • Classroom use
Distribution - Examples

• Personal Use
  ❌ Post final type-set journal PDF on your website, institutional repository or scientific social networks*
  ✔ Post your version of final manuscript after embargo
  ✔ Reuse your own figures without permission – but still need to cite/link to source

• Distribution to Colleagues
  ✔ Send journal PDF to a colleague who requests one
  ❌ Mass email journal PDF to all your contacts*

*OK if paper published open access
Educational Use - Examples

- **Theses**
  - ✔ Use your own published text/figures in your thesis without permission
  - ✗ Use other copyrighted material in thesis without permission

- **Classroom Use**
  - ✔ Reproduce/distribute journal PDFs for classroom use
Thank You!

Questions?

Feedback:
Please email us at: pmb@iop.org