How to write a good article for a scientific journal – and get it published

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Scientific publishing

In the following I will talk about something that is actually obvious or even trivial. And insofar, I have to apologize.

Nevertheless, for some of you, it may be useful to have a summary of what should be kept in mind when writing a scientific paper.

Of course, a good paper relies on new and interesting results. My subject is just the proper presentation.

Outline

(1) Scientific publishing

Among scientists there is a pressure to publish („or to perish"). This often leads to high submission rates and low quality.

However:

Editors and reviewers are the most precious resource of a journal!

- Editors and reviewers are practicing scientists, sometimes leaders in their fields. They are not professional journal staff – they do journal work on top of their own research, writing and teaching.
- They are busy people who work for journals to contribute to science.
- Editors may receive a small payment, but reviewers are UNPAID.
- Every manuscript takes up their precious time!

An international editor says…

"The following problems appear much too frequently"

- Submission of papers which are clearly out of scope
- Failure to format the paper according to the Guide for Authors
- Inappropriate (or no) suggested reviewers
- Inadequate response to reviewers
- Inadequate standard of English
- Resubmission of rejected manuscripts without revision

– Paul Haddad, Editor, *Journal of Chromatography A*

Journal publishers and editors want to bring down the number of uncited articles as much as possible

Editors now regularly analyze citations per article.

"The statistics that 27% of our papers were not cited in 5 years was disconcerting. It certainly indicates that it is important to maintain high standards when accepting papers... nothing would have been lost except the CV's of those authors would have been shorter…"

– Marv Bauer, Editor, *Remote Sensing of Environment*

Outline

(1) Scientific publishing: Situation and problems
(2) Personal incentive and goals
(3) Documentation of research
(4) Choice of the journal
(5) Preparation of the manuscript
(6) Construction of the article
(7) Details of writing
(8) Submission
(9) Revision
(10) Ethical issues

(2) Personal incentives and goals

- A scientific paper is the main product of your work. In applied sciences it may also be a patent.
- A paper introduces or establishes you in the scientific community
- A paper may help you to earn a degree, to get funding or to get promoted.
- However, most importantly, you will feel the ambition and the satisfaction to contribute significantly to the advancement of your field.

Selling your product to the community

Your paper is worthless unless it is used and cited

Hence:

- It should find other scientists' interest
- It should be clear and allow others to use and reproduce your results
- It should be presented as simply as possible
- It should be published - if possible - in a journal with a high prestige in the community

Decision on the type of manuscript

This has to do with the scientific content and with your goal

- Letters/Rapid Communications
  published for the early communication of significant and original advances. They carry a higher prestige and sometimes are counted for a promotion. (high rejection rates and high impact factors)
- Full Articles
  are the basic and most important papers, sometimes they are follow-up papers supplementing Letters.
- Brief Reports
  usually supplement a preceding full paper for a similar case (carry less prestige and are easier to get accepted)
- Review Articles
  summarize recent developments in a field (including your own contributions). Mostly upon invitation. Often required or helpful for earning a higher degree (Habilitation).

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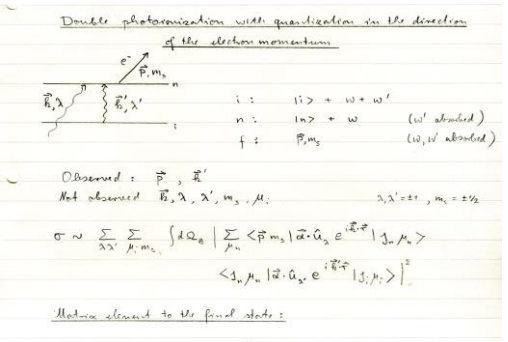
(3) Documentation of research

Important: Keep always track of your measurements/calculations

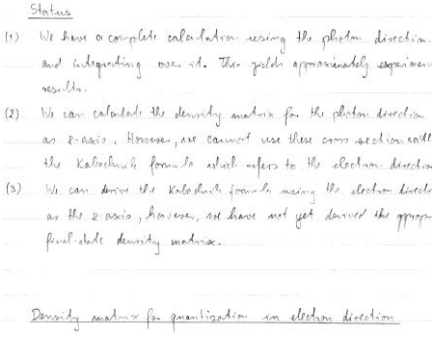
- Keep a diary with numbered pages, so that you can always refer to a specific result (or failure).
- Specify as clearly as possible your starting point and assumptions
- From time to time summarize in writing what you have found so far and what will be the next steps. Refer to the pages where the results are stated.
- From the outset, write your personal notes in English. This establishes the contact with the previously published literature and is a pre-stage of the final paper.
- Try to think in English (within science) thus avoiding a translation into English when you write the paper.

Language

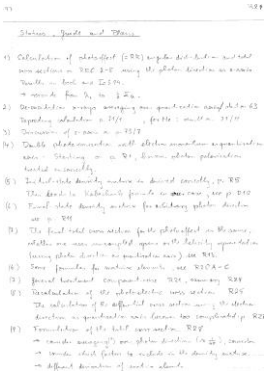
Starting point and assumptions



Intermediate Summary



Summary of the present status, a guide to results and a list of the next steps



Intermediate steps to a paper

Even if your research is not yet completed, write down the status.

- Specify the starting point.
- Document the main developments (as if writing a paper), leaving out unessential sidelines.
- Design figures and tables.
- Collect references and refer to them in the text.
- Check the consistency and whether the material has enough weight and novelty for a publication.

Things still to do

You critically ask yourself what might be missing.

- Are there competing measurements/calculations in the literature?
- Should the work be extended, say, to other cases ?
- Should some illustrative examples be given?
- Can you find some application?
- Is there some way to check the validity of approximations in a theoretical development?

Considering all this, will help you to create a solid piece of work.

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(4) Choice of the journal

Before you start writing a paper, you should aim at a specific journal. This requires critically checking the results of your research and identifying your potential readership.

- For any kind of journal, your result has to present something significantly new and interesting, an advancement of the field.
- Is it related to a current hot topic, exciting and compact? ➔ Letter ?
- Is it of broad interest beyond the immediate field? ➔ e.g., Nature?
- Is it an in-depth investigation of an important problem? ➔ Regular Article
- Is it an extension to a new case of your previously published article? However beware of „salami papers"! ➔ Brief Communication

Responsibility: Always keep in mind:

- Editors and reviewers invest time in considering, analyzing, revising and editing your paper.
- Publishers invest time and resources producing, printing and distributing your paper.
- Your institution may spend funds for the publication charge required for some journals.

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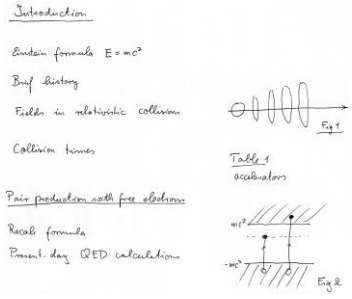
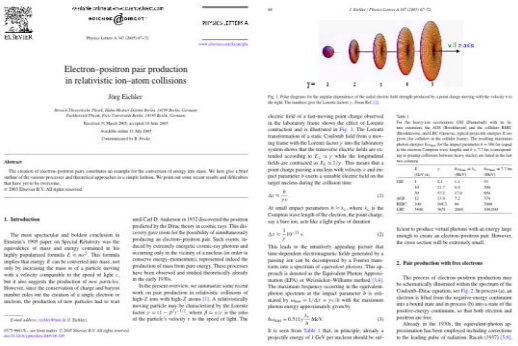
(5) Preparation of the manuscript

- Decide on the type of manuscript.
  Regular papers are usually organized in sections,
  Letters, Rapid Communications mostly do not display their structure, but the structure should exist.
- Read the „Guidelines for Authors" of the target journal
  before writing the first draft (text layout, citations, nomenclature etc.).
- Collect the material you wish to present
  and bring it into some order (formulas, figures, tables etc.).
- Track the latest results relevant to your paper,
  so that you do not miss important citations or competing papers.

Outline: Electron-positron pair production in relativistic ion-atom collisions





Electron–positron pair production in relativistic ion–atom collisions

Jörg Eichler

Abstract

The creation of electron–positron pairs constitutes an example for the conversion of energy into mass. We here give a brief outline of the various processes and theoretical approaches in a simple fashion. We point out some recent results and difficulties that have yet to be overcome.

1. Introduction

The most spectacular and boldest conclusion in Einstein's 1905 paper on Special Relativity was the equivalence of mass and energy contained in his highly popularized formula $E = mc^2$. This formula implies that energy E can be converted into mass, not only by increasing the mass m of a particle moving with a velocity comparable to the speed of light c, but it also suggests the production of *new particles*. However, since the conservation of charge and baryon number rules out the creation of a single electron or nucleon, the production of new particles had to wait until Carl D. Anderson in 1932 discovered the positron predicted by the Dirac theory in cosmic rays. This discovery gave room for the possibility of simultaneously producing an electron–positron pair. Such events, induced by extremely energetic cosmic-ray photons and occurring only in the vicinity of a nucleus (in order to conserve energy–momentum), represented indeed the production of mass from pure energy. These processes have been observed and studied theoretically already by Bethe and Maximon [1].

In this present overview, we summarize some recent work on pair production in relativistic collisions of high-Z ions with high-Z atoms [2]. A relativistically moving particle may be characterized by the Lorentz factor $\gamma = (1 - \beta^2)^{-1/2}$, where $\beta = v/c$ is the ratio of the particle's velocity v to the speed of light. The

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electric field of a fast-moving point charge observed in the laboratory frame shows the effect of Lorentz contraction and is illustrated in Fig. 1. The Lorentz transformation of a static Coulomb field from a moving frame with the Lorentz factor γ into the laboratory system shows that the transverse electric fields are extended according to $E_\perp \propto \gamma$ while the longitudinal fields are contracted as $E_\parallel \propto 1/\gamma$. This means that a point charge passing a nucleus with velocity v and impact parameter b exerts a sizeable electric field on the target nucleus during the collision time

$$\Delta t \approx \frac{b}{\gamma v}. \quad (1)$$

At small impact parameters $b \approx \lambda_c$, where λ_c is the Compton wave length of the electron, the point charge, say a bare ion, acts like a light pulse of duration

$$\Delta t \approx \frac{1}{\gamma} 10^{-20}\ \mathrm{s}. \quad (2)$$

This leads to the intuitively appealing picture that time-dependent electromagnetic fields generated by a passing ion can be decomposed by a Fourier transform into a spectrum of *equivalent photons*. This approach is denoted as the Equivalent Photon Approximation (EPA) or Weizsäcker–Williams method [3,4]. The maximum frequency occurring in the equivalent photon spectrum is $\omega_{\max} = 1/\Delta t \approx \gamma c/b$ with the maximum photon energy approximately given by

$$\hbar\omega_{\max} \approx 0.511\gamma \frac{\lambda_c}{b}\ \mathrm{MeV}. \quad (3)$$

It is seen from Table 1 that, in principle, already a projectile energy of 1 GeV per nucleon should be sufficient to produce virtual photons with an energy large enough to create an electron–positron pair. However, the cross section will be extremely small.

2. Pair production with free electrons

The process of electron–positron production may be schematically illustrated within the spectrum of the Coulomb–Dirac equation, see Fig. 2. In process (a), an electron is lifted from the negative-energy continuum into a bound state and in process (b) into a state of the positive-energy continuum, so that both electron and positron are free.

Already in the 1930s, the equivalent-photon approximation has been employed including corrections to the leading pulse of radiation. Racah (1937) [5,6],

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(6) Construction of the article

- Title
- Authors
- Abstract
- Keywords

Make them easy for indexing and searching! (informative, attractive, effective)

- Main text
  - Introduction
  - Methods
  - Results
  - Discussion (Conclusions)

Journal space is precious. Make your article as brief as possible. If clarity can be achieved in *n* words, never use *n+1*.

- Acknowledgements
- References
- Supplementary material (appendices)

The Title

- Start with a tentative title. The title is your opportunity to attract the reader's attention. Readers are the potential authors who hopefully will cite your article.
- Reviewers will check whether the title is specific and whether it reflects the content of the manuscript.
- So, keep it informative and concise.
- However, avoid big words like "Evidence for xxx ..." unless xxx is something fundamental, e.g. "breakdown of Einstein's $E=mc^2$ formula".
- Keep it simple. Avoid technical jargon and uncommon abbreviations as well as references.
- After completing the manuscript decide on a final title.

Authors

Authorship credit should be based on

- substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content;
- final approval of the version to be published.

Authors should meet all three conditions.

Those who have participated in certain substantive aspects of the research project should be acknowledged or listed as contributors.

Authorship

General principles for the order of authors

- First Author
  - Conducts and/or supervises the data generation and analysis and the proper presentation and interpretation of the results
  - Puts paper together and submits the paper to journal
- Corresponding author
  - The first author or a senior author from the institution
    - Particularly when the first author is a PhD student or postdoc, and may move to another institution soon.

Avoid

Ghost Authorship

– leaving out authors who should be included

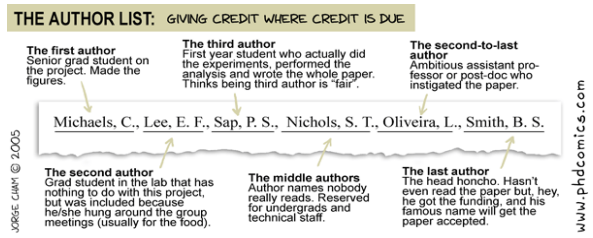
Gift Authorship

– including authors who did not contribute significantly

Improper author contribution

- Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship
- Each author should have *sufficiently participated* in the work to take public responsibilities for appropriate portions of the content
- The corresponding author should ensure that all appropriate co-authors and no inappropriate co-authors are included on the paper
- If there is plagiarism or other ethical problems, the corresponding author cannot hide behind or remain innocent

Authorship: How about this?



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The Abstract

- This is the advertisement of your article. Make it interesting, and easy to be understood without reading the whole article. (Again, avoid using jargon. Uncommon abbreviations must be explained in parentheses.)
- You must be accurate! Use words which reflect the precise meaning
- A clear abstract will strongly influence whether or not the reader goes on and whether the work is further considered by the editor.
- Keep the abstract as brief as possible!

Keywords

- Keywords are used for indexing and searching
- Only abbreviations firmly established in the field are eligible, e.g. DNA or QED.
- Check the Guide for Authors!
  Number, label, definition, thesaurus, range, and other special requests

Introduction I

- The Introduction is a very important section. Start with it but realize that you will wish to revise it at the end.
- In the first paragraph you should sketch the problem, the present situation and the motivation for your work. (But avoid far-fetched popular motivations like astrophysics, nuclear fusion, etc., unless they are really closely related to your work).
- In the second paragraph you should indicate the aim of your work and why it should contribute to the problems outlined before. It should excite the interest of the reader. However, be very cautious with formulations such as "novel", "for the first time", "first ever", "opening a new field" etc.
- In a Letter publication (where the Introduction is not displayed as a section), the first three or four sentences should - in a compact way - show that there is an urgent need for your work and that it represents a real advance of the field.

Introduction II

- The Introduction will give a very brief outline of the history of the problem and of attempts to solve it. Along the way, it offers the possibility to introduce definitions, notions and, maybe, some abbreviations to be used throughout the paper.
- In a similar spirit, you should cite the basic references on which your work is built. Start with the ones which first put forward the approach/method unless it is common knowledge (e.g. Einstein 1905). Include important review papers, also books, recent relevant papers and, of course, those of competing groups.
- Aside from fairness, you should be aware that the reviewer of your paper may be chosen from this group, so avoid offending him from the outset by ignoring papers of his group.
- Irrespective of that, try to limit the number of citations including your own.

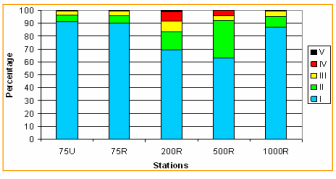
Methods

- The reader/reviewer will not be able to follow all your experimental steps or all the details of your calculations. However, you should be very accurate in stating your starting point (your experimental set-up/theoretical approximations). From there, the reader/reviewer may judge how meaningful your approach is. In principle, the reader should be able to reproduce your experiment or your calculations.
- Do not repeat in detail previously published procedures. A broad summary and citations will be sufficient. Sometimes, such materials can be deferred to appendices.
- The reader will generally believe you that you have carefully carried out the experimental steps or calculations as indicated initially. Therefore, it is inacceptable to introduce additional simplifications or approximations on the way without describing them in detail.

Results I : Figures and Tables

- Mostly, quantitative results will be presented in graphs or tables. Hurried readers who take a first glance at your paper may confine themselves to the Abstract, possibly to the Introduction, but then they look at the figures and tables.
- Therefore, the figures should be - as far as possible – self-explanatory . The captions should be so informative that they can be understood without referring to the text. Nevertheless they should be brief.
- Tables are always used when high precision is needed. Graphs are suitable for results depending on an additional parameter (family of curves) or when one wants to compare with other experimental or theoretical results. They are easier to grasp.
- There should be no duplication of information between tables and figures nor with regard to the text.

Graphics



The figure and table show the same information, but the table is more direct and clear

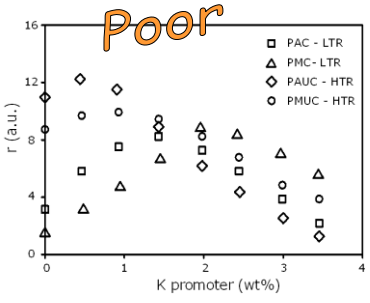
ECOLOGICAL GROUP					
Station	**I**	**II**	**III**	**IV**	**V**
75U	91.3	5.3	3.2	0.2	0.0
75R	89.8	6.1	3.6	0.5	0.0
200R	69.3	14.2	8.6	6.8	1.1
500R	63.0	29.5	3.4	4.2	0.0
1000R	86.7	8.5	4.5	0.2	0.0

Results II: Appearance of figures

- Only representative (but not selected) results should be presented. They should be essential for the discussion and the conclusions.
- If you have a large body of results, organize this section with sub-headings. This will make it easier to read and to refer to.
- Do not attempt to keep some data back in the hope to write another paper. A comprehensive paper is stronger than two "salami-type" papers.

Graphics

Poor



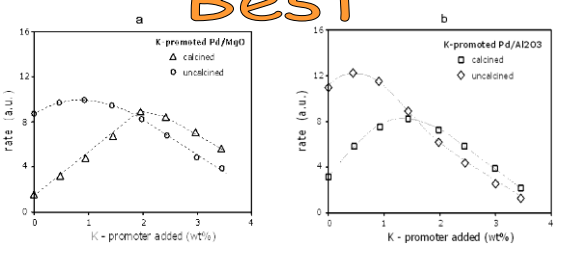
•Legend is poorly defined

•Graph contains too much data

•No trend lines

Graphics

Best

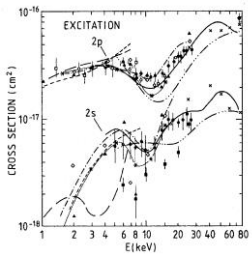


•Legend is clear

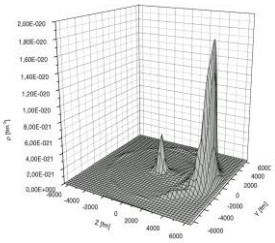
•Data is better organized

•Trend lines are present

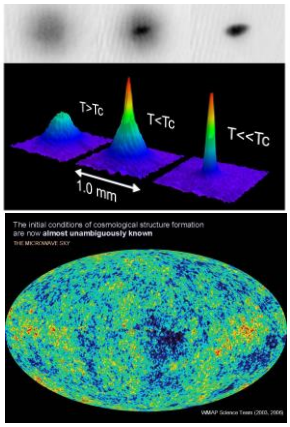
Graphs in black & white



Too crowded



Electron density in 3D-representation



Color to supplement a 3D-graph
(Bose-Einstein condensation)

Color as the only measure for a third dimension
(Cosmic microwave background)

Color

There are journals nowadays that appear only online. In these cases, one should use color figures wherever it is meaningful for clarification.

Most journals, however, offer a printed besides an online version. In these cases, the authors can provide two sets of figures, one in black & white for the print and one in color for the online version.

If color is really needed in print, journals often request an additional charge from the author's institution for pages printed in color. If different styles for lines and symbols can clarify the meaning, do not use color. Keep in mind that color usually does not show up in copies.

Moreover:

•Prefer un-crowded plots with 3 or 4 data sets per figure, well-selected scales and appropriate label size. Lines and symbols must be easily distinguishable.

•Do not include long boring tables unless they are needed to expose the last digits of precisely given numbers (defer to Appendix ?).

•Avoid half-tone figures (grey scales) if possible.

Discussion

- This is the most important section of your paper. Here you have the opportunity to sell your product (but do not try hard-selling like for a washing detergent). Rather a clear-cut and critical logic should convince readers.
- Do not reiterate the results described before.
- You have to compare your results with published results, in particular if they disagree with yours. Give arguments that your results are correct or better.
- Speculations on possible interpretations are allowed, but they should be based on facts rather than on imagination.

Conclusions (and Outlook)

- Summarize very briefly in which respect your work advances the field. Also negative results may be very important. Without a clear conclusion, the reader (and reviewer) may not be able to assess the significance of your work. However beware of exaggeration.
- Do not reiterate the results or repeat the Abstract (or vice versa).
- Point out potential applications and extensions.
- Indicate the limitations of your work caused, maybe, by limited experimental facilities or limited computer power and how the future directions of research should be when better facilities will be available. You may also propose future investigations, both supplementary to yours and of a completely new nature.
- Having reached the Conclusions, reconsider the other sections, in particular Abstract and Introduction.

References I: General

Citations are often problematic and may cause difficulties with editors and reviewers.

- Cite the main scientific publications on which your work is based including the most recent ones as well as the historical, (possibly) outdated ones which first started this branch of research.
- Avoid as much as possible citing preprints, internal notes and private communications. Always prefer published articles.
- Do not over-inflate your manuscript with too many references. However, for a review-type article, one needs a rather complete list of references.
- Keep self-references to a justifiable and reasonable level.
- In a reference, cite all authors if space permits it. Only if space is very limited (e.g., Letters) you might use, for example: F. Smith et al.

References II: Competing groups

It is well known that sometimes there exist competing groups or "schools" **A** and **B** that have not a very high opinion of each other and hence only cite within the group but not each other.

If you belong to **A** and do not cite **B**, the reviewer may notice and criticize it (in particular if he belongs to **B**). Therefore, if you think **B** is wrong or even sheer nonsense, you have the following options:

- Simply ignore **B**-papers. (This is not fair, except in extreme cases, and may lead to problems with the referee.)
- Refer to **B** and show that it is wrong. (This is not always worth the effort.)
- Cite **B** but mention it at most superficially and do not discuss it all. (This is not unfair, and a reviewer can hardly object.)

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Outline

(7) Details of writing

General points to keep in mind:

- Is the length of the manuscript appropriate? Is the density of information neither too high nor too low (i.e. too many words, figures etc. in comparison to the content)? Can you defer lengthy details into an appendix?
  An ideal length for a regular article is usually 25 to 30 pages.
- Is the language simple? Use short sentences and avoid imprecise expressions.
- Is the text layout pleasing? (Some journals require almost ready-to-print manuscripts with figures and tables embedded, even in two columns.)
- Is the English acceptable? Always write in English from the outset (starting with your own notes). Do not translate! Use a spell-checking software. Ask an English expert for proof-reading. Do you use US or UK spelling consistently?

Technical details to keep in mind:

- Are your abbreviations all explained? It may be a good idea to explain even standard abbreviations (QED, DNA etc.) once. For long papers, e.g., reviews, one may add a list of abbreviations at the end. Don´t introduce abbreviations of terms that are used only once or twice, better spell them out in full length.
- Do your citations consistently follow the usage of the journal? If citations are by number, then check the ordering.
- Starting with your first publication, use a consistent style of writing your name (full name, initials etc.), even when co-authors use a different style. This is important for indexing and searching. Otherwise, computers will share the citations of your papers between two or more different names, i.e. persons. This may influence your „Hirsch factor" and hence your job opportunities.

Revision before submission – *checklist*

Reasons for early rejection: content (aims and scope)	What should you check?
• Paper is of limited interest or covers local issues only (sample type, geography, specific product, etc.).	• Does your work have any interest for an international audience? Is it necessary to let the international readers know the results?
• Paper is a routine application of well-known methods	• Have you added any significant results using an existing method or explored remarkable extensions of its application?
• Paper presents an incremental advance or is limited in scope	• Did you provide a perspective consistent with the nature of journal? Are the right conclusions drawn from the results?
• Novelty and significance are not immediately evident or sufficiently well-justified	• Does your work add to the existing body of knowledge? – Just because it has not been done before is no justification for doing it now.

Revision before submission – *checklist*

Reasons for early rejection: Preparation:	What should you check?
• Failure to meet submission requirements	• Read the Guide for Authors again! Check your manuscript point by point. Make sure every aspect of the manuscript is in accordance with the guidelines. (Word count, layout of the text and illustrations, format of the references and in-text citations, etc.)
• Incomplete coverage of literature	• Are there too many self-citations, or references that are difficult for the international reader to access?
• Unacceptably poor English	• Did the first readers of your manuscript easily grasp the essence? Correct all the grammatical and spelling mistakes.

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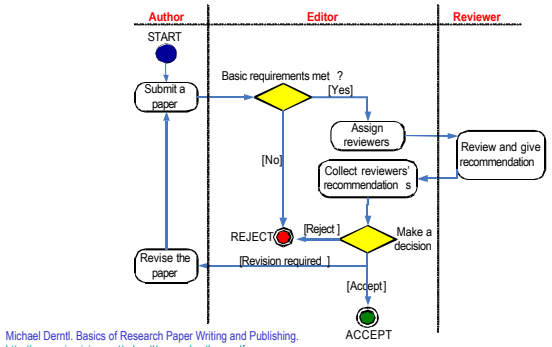
(8) Submission

The Cover letter

- Do not summarize your manuscript, or repeat the abstract, but mention what makes it special to the journal. Maybe not needed.
- Mention if you do not wish your manuscript to be reviewed by certain reviewers. It is by no way certain that editors will follow this.
- Sometimes, editors appreciate if you propose 3 to 4 potential reviewers (including email addresses). However, be critical: Editors will usually notice, if they are from the same lab or might be your friends.

The process following submission



Michael Derntl. Basics of Research Paper Writing and Publishing.
http://www.pri.univie.ac.at/~derntl/papers/meth-se.pdf

Many journals adopt the system of initial editorial review. Editors may reject a manuscript without sending it to a referee.

Why?

- The peer-review system is grossly overloaded and editors wish to use reviewers only for those papers that promise a good probability of acceptance.
- It is a disservice to ask reviewers to spend time on work that has clearly evident deficiencies.
- On the other hand, sometimes editors wish to have a solid scientific argument for a rejection, not just a formal one. In this case, they usually know to whom to send it in order to get a very critical review. (But I cannot prove this.)


The American Physical Society

Certificate of Recognition

Jörg Eichler

selected as an

Outstanding Referee

for the journals
of the American Physical Society

this 15th day of February, 2009

APS physics

Gene D. Sprouse, *Editor In Chief*

Joseph W. Serene, *Publisher and Treasurer*

To avoid early rejection, please make every effort to make the manuscript as good as possible.

- No one gets it right at the first time!
  - Write, write, and re-write
- Suggestions:
  - Take several days of rest. Refresh your brain with different things.
  - Try to look at the paper with the eyes of a very critical person who is not at all interested into the subject.
  - Ask your colleagues and supervisor to review your manuscript first.

Outline

(1) Scientific publishing: Situation and problems
(2) Personal incentive and goals
(3) Documentation of research
(4) Choice of the journal
(5) Preparation of the manuscript
(6) Construction of the article
(7) Details of writing
(8) Submission
(9) Revision
(10) Ethical issues

Referee Response Form (Physical Review)

1. Please summarize the assessment of the paper: (yes, maybe, no)

- Does the paper contain enough significant new physics to warrant publication in Physical Review? () () ()
- Is the paper scientifically sound and not misleading? () () ()
- Is the paper well organized and clearly written? () () ()
- Are the subject matter and style of presentation appropriate for Physical Review? () () ()
- Is the length appropriate? () () ()

2. Please evaluate quality of research and presentation:

- () Excellent ()
- () Good ()
- () Average ()
- () Marginal ()
- () Poor ()

3. Recommendation by the reviewer:

- ( ) Publish without change (Please give reasons in report).
- ( ) Publish after authors have considered the optional revisions mentioned in the report.
- ( ) Publish after the authors have made the revisions mentioned in the report. (I do not need to see the manuscript again.)
- ( ) Revisions are necessary. Return to me after resubmittal.
- ( ) Revisions are necessary. On resubmittal send to ....
- ( ) Manuscript is more appropriate for another journal (specify) or section (specify).
- ( ) Do not publish, see report.
- ( ) Other, see report.

(9) Revision after submission

Carefully study the comments and prepare a detailed letter of response.

Consider reviewing as a procedure that several peers discuss your work. Learn their comments, and join the discussion.

- Nearly every article requires revision.
- Bear in mind that editors and reviewers mean to help you improve your article
  - Do not take offence.
- Minor revisions do NOT guarantee acceptance after revision.
  - Do not count on acceptance before you carefully study the comments.
- Revise the whole manuscript
  - not just the parts the reviewers point out

A further review of the revised manuscript is common.

- Please prepare a detailed letter of response.
- Cut and paste each comment by the reviewer (or at least refer to the number if the comments are numbered). Answer it directly below. Do not miss any point. State specifically what changes (if any) you have made to the manuscript. Identify the page and line number.
- *A typical problem – Discussion is provided but it is not clear what changes have been made.*
- Provide a scientific response to the comment you accept; or a convincing, solid and polite rebuttal to the point you think the reviewer is wrong.
- Write in a way that your responses can be given to the reviewer.

Be very self-critical when you submit a paper rejected after review!

Everyone has papers rejected – do not take rejection personally.

- Try to understand why the paper was rejected.
- Note that you have received the benefit of the editors and reviewers' time; take their advice serious!
- Re-evaluate your work and decide whether it is appropriate to submit the paper elsewhere.
- If so, begin as if you are going to write a new article. Read the Guide for Authors of the new journal, again and again.

Never treat publication as a lottery by resubmitting a rejected manuscript directly to another journal without any significant revision!!! It will not save any of your time and energy…

- The original reviewers (even editors) may eventually find it, which can lead to animosity towards the author.
- A suggested strategy:
  - In your cover letter, declare that the paper was rejected and name the journal.
  - Include the referees' reports and a detailed letter of response, showing how each comment has been addressed.
  - Explain why you are resubmitting the paper to this journal, e.g., this journal is a more appropriate journal; the manuscript has been improved as a result of its previous review; etc.

Outline

An Epedemic of False Claims

J.P.A. Ionnidis, Stanford (Scientific American, June 2011)

"False positives and exaggerated results ... are particularly egregious in bio-medicine."

- "Much research is conducted for reasons other than the pursuit of truth. Conflicts of interest abound, and they influence outcomes ... large financial stake in the results"
- "Results are only selectively reported, emphasizing the most exciting of them."
- "The <dominance> of high-impact journals also has a distorting effect on funding, academic careers and market shares."
- We must routinely demand robust and extensive external validation. ... there is a need for replication.
- Authors should state the limitations of their data or inherent flaws in their study designs. Scientists and sponsors should disclose all potential conflicts of interest.

Thank you for your attention!

I will be happy to answer questions

And I wish you to write good scientific papers

(10) Ethical Issues

Publish *AND* Perish! – if you break ethical rules

- International scientific ethics have evolved over centuries and are commonly held throughout the world.
- Scientific ethics are not considered to have national variants or characteristics – there is a *single ethical standard* for science.
- Ethics problems with scientific articles are on the rise *globally*.

Ethics Issues in Publishing

Publication misconduct

- Plagiarism
  - Different forms / severities
- Duplicate submission
- Duplicate publication
- Inappropriate acknowledgement of prior research and researchers
- Inappropriate identification of all co-authors
- Conflict of interest
- Data fabrication and falsification

Plagiarism: Tempting short-cut with long-term consequences

- Plagiarism is considered a *serious offense* by your institute, by journal editors and by the scientific community.
- Plagiarism may result in *academic charges*, but will certainly cause rejection of your paper.
- Plagiarism will *hurt your reputation* in the scientific community.

Plagiarism

"Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, including those obtained through confidential review of others' research proposals and manuscripts."

Federal Office of Science and Technology Policy, 1999

"Presenting the data or interpretations of others without crediting them, and thereby gaining for yourself the rewards earned by others, is *theft*, and it eliminates the motivation of working scientists to generate new data and interpretations."

Professor Bruce Railsback
Department of Geology, University of Georgia

What leads to acceptance ?

- **A**ttention to details
- **C**heck and double check your work
- **C**onsider the reviewers' comments
- **E**nglish must be as good as possible
- **P**resentation is important
- **T**ake your time with revision
- **A**cknowledge those who have helped you
- **N**ew, original and previously unpublished
- **C**ritically evaluate your own manuscript
- **E**thical rules must be obeyed

– Nigel John Cook
Editor-in-Chief, *Ore Geology Reviews*

One of the most common forms of plagiarism is inappropriate, or inadequate paraphrasing

- Paraphrasing is restating someone else's ideas while not copying verbatim
- Unacceptable paraphrasing includes any of the following:
  - using phrases from the original source without enclosing them in quotation marks
  - emulating sentence structure even when using different wording
  - emulating paragraph organization even when using different wording or sentence structure
- Unacceptable paraphrasing --even with correct citation-- is considered plagiarism.

– *Statement on Plagiarism*
Department of Biology, Davidson College.
http://www.bio.davidson.edu/dept/plagiarism.html

Plagiarism: Serious problems

- What is the shortest sequence of words n>1 which will be identified as plagiarism? Computers can easily find such sequences if one looks for them.
- In science, there are many standard situations, whose discussion will necessarily be standard in one way or another. Modifications are possible, but there is not an infinite number of adequate formulations. Is this plagiarism?
- The allegation of plagiarism by an opponent is a powerful weapon which may terminate a scientific carrier.

We all know what is really meant, but one has to be very cautious.

Duplicate Publication

- Two or more papers, without full cross reference, share the same hypotheses, data, discussion points, or conclusions
- An author should not submit for consideration in another journal a previously published paper.
  - Published studies do not need to be repeated unless further confirmation is required.
  - Previous publication of an abstract during the proceedings of conferences does not preclude subsequent submission for publication, but full disclosure should be made at the time of submission.
  - Re-publication of a paper in another language is acceptable, provided that there is full and prominent disclosure of its original source at the time of submission.
  - At the time of submission, authors should disclose details of related papers, even if in a different language, and similar papers in press.
  - This includes translations

Multiple submissions: sending a manuscript to more than one journal at the same time

- Multiple submissions save your time but waste editor's time
- The editorial process of your manuscripts will be completely stopped if the duplicated submissions are discovered.

"It is considered to be unethical…We have thrown out a paper when an author was caught doing this. I believe that the other journal did the same thing. "

James C. Hower
Editor, *the International Journal of Coal Geology*

- You should not send your manuscripts to a second journal UNTIL you receive the final decision of the first journal

Data fabrication and falsification I

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

Select data to fit a preconceived hypothesis: "…an experiment (or data from an experiment) is not included because it 'did not work', or we show *'representative' images* that do not reflect the total data set or, more seriously, data that do not fit are simply shelved."

Richard Hawkes

"The most dangerous of all falsehoods is a slightly distorted truth."

G.C.Lichtenberg (1742-1799)

Data fabrication and falsification II

Fabrication is making up data or results, and recording or reporting them.

"… the fabrication of research data … *hits at the heart of our responsibility to society*, the reputation of our institution, the trust between the public and the biomedical research community, and our personal credibility and that of our mentors, colleagues…"

"It can *waste the time of others*, trying to replicate false data or designing experiments based on false premises, and can lead to therapeutic errors. It can never be tolerated."

Professor Richard Hawkes
Department of Cell Biology and Anatomy, University of Calgary

A most spectacular example

Jan Hendrik Schön scandal

Zhiping Yin
05-25-07

Main Source:

1. Report of Bell Lab Inquiry: REPORT OF THE INVESTIGATION COMMITTEE ON THE POSSIBILITY OF SCIENTIFIC MISCONDUCT IN THE WORK OF HENDRIK SCHÖN AND COAUTHORS http://www.alcatel-lucent.com/wps/DocumentStreamerServlet?LMSG_CABINET=Docs_and_Resource_Ctr&LMSG_CONTENT_FILE=Corp_Governance_Docs/researchreview.pdf
2. Wikipedia: http://en.wikipedia.org/wiki/Jan_Hendrik_Sch%C3%B6n
3. Physics today, eg: http://www.aip.org/pt/vol-55/iss-11/p15.html
4. Big trouble in the world of "Big Physics" by Leonard Cassuto: http://dir.salon.com/story/tech/feature/2002/09/16/physics/index.html?pn=1

Before the scandal

- For more than two years, condensed matter physicists were enthralled by results coming out of Bell Labs, Lucent Technologies, where researchers had developed a technique to make organic materials behave in amazing new ways: as superconductors, as lasers, as Josephson junctions, and as single-molecule transistors. (Physics Today ran news stories on some of these topics in May 2000, page 23; September 2000, page 17; January 2001, page 15; and October 2001, page 19.) Increasingly, however, enthusiasm gave way to frustration, as research groups were unable to reproduce the results. Was the technique exceedingly difficult to master, or was something else amiss?
- In 2001 Schön announced in Nature that he had produced a transistor on the molecular scale. Schön claimed to have used a thin layer of organic dye molecules to assemble an electric circuit that, when acted on by an electric current, behaved as a transistor. The implications of his work were significant. It would have been the beginning of a move away from silicon-based electronics and towards organic electronics. It would have allowed chips to continue shrinking past the point at which silicon breaks down, and therefore continue Moore's Law for much longer than is currently predicted. It also would have drastically reduced the cost of electronics.

Allegation and investigation (I)

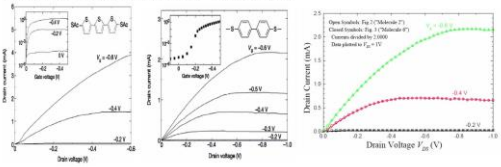
- Physicists from inside and outside Bell Labs called management's attention to several sets of figures, published in different papers, that bore suspiciously strong similarities to one another (see Physics Today, July 2002, page 15). Much of the suspicion focused on Jan Hendrik Schön, a key participant in the research and the one author common to all the papers in question. With a few exceptions, Schön had applied crucial aluminum oxide insulating layers to the devices, had made the physical measurements, and had written the papers. Moreover, the sputtering machine that Schön used to apply the Al_2O_3 films was located, not at Bell Labs, but in his former PhD lab at the University of Konstanz in Germany.
- In particular, scientists found the data seemed overly precise, and that some of it contradicted the prevailing understanding of physics. Professor Lydia Sohn, of the University of California, Berkeley, noticed that two experiments carried out at very different temperatures had identical noise. When the editors of Nature pointed this out to Schön, he claimed to have accidentally submitted the same graph twice. Professor Paul McEuen of Cornell University then found the same noise in a paper describing a third experiment. More research by McEuen, Sohn, and other physicists uncovered a number of examples of duplicate data in Schön's work. In total, 25 papers by Schön and 20 coauthors were considered suspect.

Detective work

- The committee sent questionnaires to all of Schön's coauthors, and interviewed his three principal coauthors (Zhenan Bao, Bertram Batlogg, and Christian Kloc). They examined electronic drafts of the disputed papers, which included processed numeric data. They requested copies of raw data but found that Schön had kept no laboratory notebooks. His raw data files had been erased from his computer. According to Schön, the files were erased because his computer had limited hard drive space. In addition, all of his experimental samples had been discarded or damaged beyond repair. Even the sputtering machine at Konstanz was no longer producing films with the required high breakdown strengths. Nevertheless, Bell Labs provided the committee with some data files that had been embedded in early electronic drafts of papers or in presentation files.
- The committee classified each allegation as one of three types:
  substitution of data: substitution of whole figures, single curves and partial curves in different or the same paper to represent different materials, devices or conditions;
  unrealistic precision: precision beyond that expected in a real experiment or requiring unreasonable statistical probability;
  contradictory physics: behavior inconsistent with stated device parameters and prevailing physical understanding, so as to suggest possible misrepresentation of data;

Examples of Misconduct (I)

- Data substitution: Triode characteristics--data falsification



Left: Triode data from "SAMFET" Paper (XII), Fig. 3: "molecule 6"; The figure has been compressed laterally for comparison.

Middle:Triode data from "SAMFET" Paper (XII), Fig. 2: "molecule 2"

Right: Original plotting data from middle and left figure ,replotted to illustrate that the data present in both are exactly the same, after dividing the latter by 2. All but a few of the solid symbols are within the open symbols, and agree with each other to five significant figures, although they represent distinct data sets.

Very similar data (transistor triode curves), including detailed "noise," appear in two different figures in the same paper, represented as two different molecules making up the Self-Assembled Monolayer Field Effect Transistor (SAMFET). The vertical scale differs by a factor of two, and some curves are present in only one figure.

How to avoid scientific misconduct? (I)

How to catch misdeed at an early stage? What should be done?

1. Coauthors:
   exercised appropriate professional responsibility in ensuring the validity of data and physical claims. By virtue of their coauthorship, coauthors implicitly endorse the validity of the work. It is a matter of how to validate. There should be some trust between coauthors.
2. Senior coauthor/mentor/advisor/supervisor:
   - "Part of the reason the work was accepted," says Greene, was because Schön's coauthor and one-time supervisor Bertram Batlogg put his imprimatur (and that of Bell Labs) on it. Batlogg has been a respected superconductivity physicist for more than two decades. (http://dir.salon.com/story/tech/feature/2002/09/16/physics/index.html)
   - Batlogg recruited Schön while Schön was still a graduate student. He brought Schön into his lab. He sponsored Schön's experiments. And rather than formally withdraw any papers he might have considered suspicious, he gave many well-received talks at elite international conferences on the results. However, he simply made excess.
   - Batlogg: "If I'm a passenger in a car that drives through a red light, then it's not my fault."
   - Princeton's Sohn: "He's a collaborator, not a casual passenger. He's been benefitting all along, riding the public wave. If a young driver has a learner's permit, then who's responsible for him? Batlogg was the licensed driver, and Schön was the student driver."
   - Rice University's Douglas Natelson: "If my student came to me with earth-shattering data, you wouldn't be able to pry me out of the lab. I'd be in there turning the knobs myself." Heath echoes this sentiment: "I'd sit down there to see how this is being done. I'd demand to see it several times."
   - Sohn: "I am responsible for what my students publish. If my name is going to be on a paper, I want to make sure it's right."
   - Nobel laureate Horst Stormer: "My goal may be to win a prize, but my duty is to report what I have observed in the most objective way that I can. I say this in the strongest terms. This is what I expect from my colleagues, from my graduate students, at all levels of the field."

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