# UNDERSTANDING THE PUBLISHING PROCESS

## HOW TO PUBLISH IN SCIENTIFIC AND MEDICAL JOURNALS

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## CONTENTS

# I am going to write a manuscript… or am I?

For you, the researcher, getting published may seem a good way to support your promotion, PhD degree, or application for research funding. But that's not how readers or journal editors look at things. So before you start, ask yourself these simple questions:

- Do I have a story to tell?
- Do I have an audience to tell it to?

If the answer to either of these questions is 'no', it's probably best if you don't start writing.

## Do I have a story to tell?

Editors and reviewers are looking for original and innovative research that will add to their field of study, or immediately impact patient care. Your conclusions must be sound, based upon sufficient, robust data. If your study is part of a larger research project, consider publishing just one article on the entire project.

## Do I have an audience to tell it to?

Who will want to read about your research? The more original and innovative your research, the more people will be interested. You should also consider whether your article is of interest to a local or an international audience before embarking on the question of which journal to send your manuscript to.

Identifying your audience is a major factor in the choice of an appropriate journal. Read more on this on page 4.

# I am definitely going to write a manuscript

Congratulations! Now all you need to do is write your manuscript, according to the guidelines of the journal you've chosen and the general guidelines that apply to scientific writing. You can read about those in the next section.

## One more thing though…

For the purposes of this booklet, we've assumed that you are planning to publish a full article. However, there are other types of article. For example, letters and rapid or short communications are intended for the quick and early communication of significant and original advances, without including too much data or detail. Review papers summarize recent developments on a specific topic, without introducing new data. If you are not sure if a full article is for you, discuss your options with your supervisors or colleagues.

## WORD OF CAUTION: PLAGIARISM

Always make sure you are publishing your own research, and describing it in your own words. You're doing great research – share it with the world!

Don't plagiarize. It sounds obvious, and it would be nice if everyone followed the rules. But some don't: they run the risk of jeopardizing their careers, and being unfair to the people they are stealing work from. The online tool CrossCheck, endorsed and used by publishers worldwide, can identify plagiarism by comparing the text you submit with a database of millions of articles.



If an article that includes plagiarised content has been published, we have to retract it. However, the article will still be shown on ScienceDirect, along with the reason for retraction. This way, the plagiarism and the researchers responsible are highlighted – a risk you'd be taking if you plagiarised someone else's work.

# The writing process
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www.elsevier.com/trainingwebcasts

### Choosing the right journal

Before you start writing, you need to acquaint yourself with the guidelines of the journal of your choice. That, of course, means choosing the journal first. Here are some tips for choosing a journal:

- Don't know where to submit? Go to www.elsevier.com/authors and use the Journal Finder tool to find an appropriate journal.
- Visit the journal homepage which includes the journal's Aims & Scope, Impact Factor, Guide for Authors, Editorial Board listings, and Open Access options-where applicable
- Check that your article would fit with the Aims & Scope of the journal
- Check whether the journal is invitation only – some journals only publish invited articles
- Check that the publication options of the journal meet your needs
- Check if the journal meets the article deposition requirements of your funding body or institution
- Submit only to one journal at a time. International ethics standards prohibit multiple or simultaneous submissions, and editors do find out!
- Check the Guide for Authors for information on the types of article published, prior or duplicate publication policy, conflict of interest, clinical trials registration, editorial team contacts, graphics specification, acceptable language and article length
- Read the abstracts of recent publications to find current hot topics: www.sciencedirect.com
- Ask help from your supervisor or colleagues. Your supervisor (who is often a co-author) has co-responsibility for your work
- Articles in your References section may also lead to the right journal – see if the journals they are published in are appropriate for your work

## Writing your manuscript: structure

Scientific writing follows a rigid structure – a format developed over hundreds of years, which is considered to be the best way for communicating scientific findings to the broader research community. Most disciplines use the format outlined in the grid below. Though the headings are standard for most journals, there is some variation, so it is essential to read the Guide for Authors of the journal you intend to submit your manuscript to before you start writing.

| Section | Purpose |
| --- | --- |
| Title | Reflects content, entices reader |
| Author | Ensures recognition of the researcher(s) |
| Abstract | Summarizes the research and the conclusions |
| Keywords | Ensures the article is correctly identified in abstracting and indexing services |
| **Body text** | |
| *Introduction* | Puts the work into context |
| *Methods* | Explains how the data were collected |
| *Results* | Describes what was discovered |
| *Discussion & Conclusions* | Explores the implications of the findings |
| Acknowledgements | Ensures those who helped with the research are recognized |
| References | Ensures previously published work is recognized |
| Supplementary material | Provides online additions to the article, such as raw data, video and audio |

This format has the advantage that it enables the article to be read on several levels. Some people will just look at the title, others will read only the title and abstract, and those who want a deeper understanding of the research will read most, if not all, of the article

# Your manuscript

## Title

The title should reflect the article's content clearly and precisely, and enable the reader to decide whether they want to read the article. The title is the main advertisement for the article – a great title will entice the audience to read on, whereas a poorly titled article may never reach its target audience. Keep the title simple, catchy and specific. Omit unnecessary words such as 'a study of', 'investigations of', 'observations on,' and avoid using abbreviations and jargon. Abstracting and indexing services depend on the accuracy of the title, extracting from it keywords that are used in crossreferencing.

> Example:
>
> The effect of heating the albumen and vitellus of the Gallus gallus domesticus contained in calcium carbonate in $H_2O$ to 373.15 K ✘
>
> Boiling a chicken egg in water ✓

In short, effective titles

- Identify the main issue of the manuscript
- Begin with the subject of the manuscript
- Are accurate, unambiguous, specific, and complete
- Are as short and as informative as possible
- Are enticing and interesting, making the audience want to read further

## Authors

The listing of authors should only include those who have made an intellectual contribution to the research, who will take public responsibility for the data and conclusions, and who have approved the final version of the manuscript. The order in which the names of the authors appear can vary between disciplines: The corresponding author may not always be the first author.

## Keyword list

Most journals request a list of keywords: A list of important words that reflect the research, in addition to those already used in the title. Choosing the right keywords will increase the likelihood of your article being found by other researchers, as keywords are used by abstracting and indexing services. Many Elsevier journals also require authors to choose a subject classification during the online submission process. This classification helps editors to select appropriate reviewers.

## Abstract

The abstract should summarize the problem or study objective, the method, the results, and the conclusions of your research. The abstract enables you to elaborate on each major section of the article, usually in up to 200 words. The abstract should give sufficient detail that the reader can decide whether or not to read the whole article. Together, the title and the abstract should be able to stand on their own, as they are processed further by indexing services. It is best not to include references, figures or tables in the abstract – you have 200 words to describe your research, so use them wisely. Many authors write the abstract last, so that it accurately reflects the content of the article. While it's a good idea to make the abstract interesting, keep it accurate and relevant: Don't fall into the trap of trying to make your abstract promise more than the article can deliver.

### ORCID, your academic ID

ORCID (the Open Researcher and Contributors ID repository) is a registry that links all your academic research and publishing activities in a unique record. When you register with ORCID (www.orcid.org), you receive a unique 16-digit ID URL, which leads to your personal online record. This record is open and freely accessible to editors, funding agencies, publishers and institutions.

ORCID takes away any concerns over name ambiguity and can be used as a linking identifier throughout the entire chain of the scholarly communication process.

# Body text

## Introduction

The introduction should be brief. It is meant to provide context and background, but should not be a history lesson.

It should state clearly the problem being investigated, the background that puts the problem in context, and the reasons for conducting the research. You should summarize relevant research to provide context, and state the questions you are answering. Explain any findings of others that you are challenging or extending. Briefly and logically lead the reader to your hypothesis(es), research question(s), and general experimental design or method, if relevant.

## Method

*(Also called Materials and Methods or Experimental Methods)* This section provides the readers with enough detail that they can replicate your research. Explain how you studied the problem, identify the procedures you followed, and structure these as logically as possible. If your methods are new, you will need to explain them in detail. If they have been published before, name the method and cite the previously published work; if you have modified the methods, refer to the original work and include your amendments. Identify the equipment and describe materials used and specify the source if there is variation in quality of materials. Include the frequency of observations, what types of data were recorded. Be precise in describing measurements and include strengths and weaknesses of measurement. Name any statistical tests used so that your numerical results can be validated. It is advisable to use the past tense, and avoid using the first person, though this will vary from journal to journal.

See www.icmje.org/manuscript_1prepare.html for details.

If you are writing a manuscript about research that involved human participants, animals, stem cells or other biohazard materials, you will need to include certain information in the ethics statement, such as the patients' consent and permission to publish. You should also outline the criteria used to select the participants, and explain the relevance of your criteria.

## Results

This section should present your findings objectively, and explain what was found, largely in text. This is where you show how your new results contribute to the body of scientific knowledge, so it is important to be clear and set them out in a logical sequence. The sequence should be based on the tables and figures that best present your findings. Raw data are rarely included in a scientific article; instead the data are analyzed and presented in the form of figures, graphs, tables, and descriptions of observations. It is important to identify any significant trends clearly for the reader. Tables and figures must be numbered separately, and should be in the sequence that you refer to them in the text. Figures should have a brief description (a legend), providing the reader with sufficient information to know how the data were produced. It is important not to interpret your results - this should be done in the Discussion & Conclusions section.

## Discussion & Conclusions

This section describes what your results mean, specifically in the context of what was already known about the subject of the investigation. You can present global and specific conclusions here, but be careful not to summarize your manuscript – this is what the abstract is for. You should link this section back to the introduction by referring to the question(s) or hypothesis(es), and indicate how the results relate to your expectations and to the literature cited. Do the results support or contradict previous theories? Most significantly, the discussion should explain how the research has moved the body of scientific knowledge forward. Suggest further experiments and indicate whether they are underway, and indicate uses and extensions if appropriate. Your conclusions should be supported by your results: It is important not to extend your conclusions beyond this, so avoid undue speculation and bold judgments about impact. This is also a good section to suggest practical applications of your results, and to outline what would be the next steps in your research.

## Make sure:

- Your results directly support your conclusions

- You use specific expressions and quantitative descriptions – '12 degrees higher' rather than 'a higher temperature'

- You use already established terms – don't introduce the reader to a whole new vocabulary. Missed an important term? Go back to the introduction and describe it there

- You root all interpretations and speculations in fact, rather than imagination

## Acknowledgments

This section should be brief and include the names of individuals who have helped with your research, such as contributors, and suppliers who provided materials free of charge. Authors should also disclose in their article any financial or other substantive conflict of interest that might be seen to influence the results or interpretation of their research.

## References

New research draws on knowledge obtained through previous research, and the source of this previously published work should be acknowledged. Any information not from your experiment and not 'common knowledge' should be recognized with a citation. The way citations are presented varies considerably, so to make sure your references are in the correct format you should refer to the Guide for Authors for the specific journal you're submitting to. Any quoted text that appears in the article, long or short, should be within quotation marks and should include a reference. The references section at the end of the article includes all references cited in your article. This section is in contrast to a bibliography, common in books, where works read but not necessarily cited in the text are listed. The manner in which references are presented also varies from journal to journal and you should consult the journal's Guide for Authors.

## Supplementary material

If you have additional content like raw data or video footage that you think would be useful for the reader, then you could include it online as supplementary material.

Supplementary material can include raw data tables, audio or video footage, photographs, or complex 3D models. If you have more than one set of material to include, give each a separate number, for example Appendix 1, Appendix 2. For full guidelines on submitting supplementary material, visit www.elsevier.com/artwork

## Presentation

You now know how to set up your manuscript. But there is more to it (you saw that one coming, didn't you?). How well a manuscript is written also depends on style, language, your mastery of English, formatting, the illustrations and graphs you choose… in other words, the presentation of your material.

## Style and language

When writing your manuscript, bear in mind that your chosen journal probably has a specific style. If you can write in that style, your chances of getting accepted will increase. There is also an underlying style for writing a scientific manuscript. The objective is to report your findings and conclusions clearly, and as concisely as possible. Some pointers:

1. Try to avoid embellishment with unnecessary words or phrases – keep it simple.

2. Use the active voice wherever possible. For example, '…carbon dioxide was consumed by the plant...' is in the passive voice. By changing to the active voice it can be shortened to '…the plant consumed carbon dioxide...' – a much snappier sentence.

3. Tenses are important: For known facts and hypotheses, use the present tense. 'The average life expectancy of a honey bee is six weeks.' When you refer to experiments you have conducted, use the past tense. 'All the honey bees were maintained in an environment with a consistent temperature of 23°C.'

When you describe the results of an experiment, use the past tense. 'The average life span of bees in our contained environment was eight weeks.'

# Language quality and editing

How important is the quality of the English language in an article? With ever-increasing standards of excellence in both research and publishing, it's in your interest to make sure your manuscript is in its best possible form when you submit it for publication. One important consideration is the quality of the language used: errors in grammar, spelling or punctuation could delay publication or even lead to rejection of the manuscript, preventing the research from receiving the recognition it deserves. Editors often note that poor quality of language can mask the academic merit of some articles, and they often return manuscripts to authors to make improvements. Finding a reviewer for a manuscript is increasingly difficult, so editors consider it important to provide well-written manuscripts for review.

What impact does language quality have on the peer-review process? Once a manuscript enters the peer-review process, it will be evaluated by reviewers and editors on its academic content and merit. It is the author's responsibility to provide a well-written manuscript, structured according to the Guide for Authors – editors and reviewers are not responsible for making language corrections. Well-structured manuscripts with correct language usage help ensure that the peer-review process runs smoothly by enabling editors and reviewers to focus on academic merit, and not be distracted by language errors. Ultimately, providing a well-written and properly structured manuscript could result in your research being published faster.

## What if English isn't your first language?

If you think the standard of writing in your manuscript could be improved, you might consider using a language editing service to optimize the quality of your manuscript. A number of language editing companies provide their services to authors at competitive rates. Another option is having your manuscript translated by a specialist translation agency. Elsevier provides language editing via a team to ensure your manuscript is written in the highest standard of English. Translation services are also available for papers from or into Chinese, Portuguese or Spanish- details can be found at
webshop.elsevier.com/languageservices

## Format your article

In addition to being well written, your article should be properly formatted.

- Most word processing formats are accepted (rtf, doc, docx or LaTeX are preferred)

- Most formatting codes are removed or replaced when your article is processed, so there is no need for you to use excessive layout styling. It's best to avoid formatting like automatic word breaking, justified layout, double columns or automatic paragraph numbering (especially for numbered references)

- You can use bold, italic, subscript, superscript, etc., as appropriate

- If you are using a table grid when preparing tables, you should use only one grid for each separate table and not a grid for each row. If no grid is used, use tabs instead of spaces to align columns

## Illustrations

Submitting your illustrations, pictures, tables and other artwork such as multimedia and supplementary files in an electronic format helps the publisher produce your work to the best possible standard, ensuring accuracy, clarity and a high level of detail. For more information on artwork requirements, visit
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Before | After
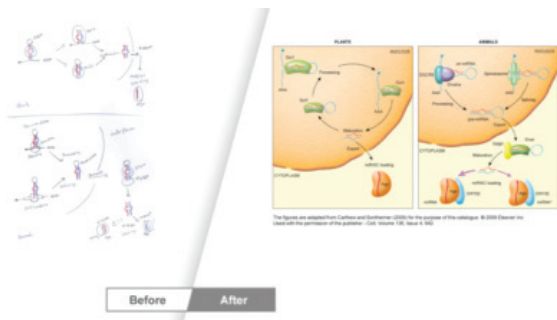
## Write your cover letter

All submissions must be accompanied by a cover letter outlining what you are submitting and explaining why you are submitting your manuscript to the journal.

You should provide:

- The name of the author to whom the publisher should address their correspondence. (In the event of multiple authors, a single corresponding author must be named)

- E-mail address, contact address and telephone and fax numbers. (Corresponding authors receive PDF proofs by e-mail)

- Any information that will support your submission (for example original data, relevance or topicality). Relevant details of work with humans, animals, stem cells or other biohazard materials

- Details of any conflict of interest in producing the research (for example, funding resources)

Your cover letter should not be used to provide information that is or should be part of the manuscript. For instance, if you are submitting a manuscript to a medical journal, you will need to make clear in your manuscript that you have acquired the consent and permission of any patients involved to publish.

## Further reading

Davis, M. (2005) *Scientific Papers and Presentations*, 2nd Edition, Academic Press

Grossman, M. (2004) *Writing and Presenting Scientific Papers*, 2nd Edition, Nottingham University Press

Clare, J. and Hamilton, H. (2003) *Writing Research Transforming Data into Text*, Churchill Livingston

Lagendijk, A. (2008) *Survival Guide for Scientists; Writing – Presentation,* Amsterdam University Press

## Training Webcasts

Elsevier provides a series of free, bite-sized training webcasts containing some useful tips and tricks on how to get published:

- The "How to Get Published" series
- The "Introduction to Scholarly Publishing" series
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## Toolkit Video on Ethics

Insights about research and publishing ethics, data manipulation, plagiarism, publication duplication, and the consequences of scientific misconduct.

See: www.elsevier.com/ethics

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- Makes the article available as an article in press (and later the final article) online on ScienceDirect
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- Sends the final copy to the printer
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After the proofreading corrections have been carried out, your article will be published online on ScienceDirect as an article in press and allocated a Digital Object Identifier (DOI). The DOI means articles can receive citations immediately (more on this at www.doi.org). Articles in press will be assigned to an issue at a later date. You can track the status of your article throughout the publication process by visiting authors.elsevier.com/trackpaper.html

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## So you think you're ready?

Your manuscript is written. You've followed the guidelines of your chosen journal. You've set up the article according to the scientific article structure. The manuscript is well-written, in clear and concise English, and you've included several relevant illustrations, figures and tables. The cover letter is in place. So… surely, you're ready to send in your manuscript?

### Not quite yet.

You still need to check the manuscript carefully on all important points: structure, language and choice of journal. Be sure to consult the Guide for Authors once more. Only after this first round of revision can you submit your manuscript: After all, once the manuscript is received by Elsevier, it is considered to be in its final form.

## Revision before submission — checklist

### Science: what should you check?

- Is your work of interest to the journal's audience?
- Does the work add significant value to an existing method?
- Is the perspective consistent with the journal?
- Are the conclusions drawn from the results justified?
- Does your work add to the existing body of knowledge?

Why: to make sure your manuscript fits in the journal.

Your manuscript could be rejected if:

- It is of limited interest or covers local issues only (sample type, geography, specific product)
- It is a routine application of well-known methods
- It presents an incremental advance or is limited in scope
- Its novelty and significance are not immediately evident or sufficiently justified

### Presentation: what should you check?

- Read the Guide for Authors again! Check your manuscript point by point. Make sure every aspect of the manuscript is

in accordance with the journal's guidelines (including word count, layout of the text and illustrations, format of the references and in-text citations)

- Did you structure your article according to the grid (page 5)
- Are there too many self-citations, or references that are difficult for the international reader to access?
- Did the first readers of your manuscript grasp the essence easily? Correct all grammatical and spelling mistakes

Why: to make sure your manuscript is well written

Your manuscript could be rejected because of:

- Failure to meet submission requirements
- Incomplete coverage of literature
- Unacceptably poor English

## Journal Finder Tool

The Journal Finder tool locates Elsevier journals that most closely match your abstracts. An Elsevier journal will be recommended if it has published articles which have a high similarity with your new article.

A list of potential journals will be created and the tool will allow filtering on your preferred criteria, such as open access options, Impact Factor, review time, acceptance rate and production time. www.elsevier.com/journal-authors/home

## All done?

Once you've checked (and possibly re-checked) your manuscript, you are ready to submit it to the journal editor via the Elsevier Editorial System.

### The Elsevier Editorial System

The Elsevier Editorial System (EES) provides a fully online workflow for getting your manuscript published. Submission is simple: just go to www.elsevier.com/ees to get started. Register as a user to benefit from increased review and publication speed, article tracking and email alerts.

# Peer review

After submission, your manuscript will be peer reviewed. Articles in Elsevier's research journals are peer reviewed and independently edited by acknowledged experts in their fields. Reviewers are appointed by the journal editor. Some journal editors ask authors to provide the names of potential reviewers, but the selection is the editor's responsibility.

The editor can decide not to send the manuscript for external review, and instead to handle the manuscript themselves.

## Peer review has two key functions:

- To act as a filter by ensuring only good research is published: reviewers determine the validity, significance and originality of the work

- To improve the quality of research submitted for publication: reviewers can suggest improvements to the manuscript and the research

## Different types of peer review

| Type of review | Description |
| --- | --- |
| Single blind (most common) | Reviewer identity hidden from author; reviewer knows identity of authors |
| Double blind | Both reviewer and author remain anonymous to each other |
| Open | Reviewer and author are known to each other |

## What does the peer reviewer do?

Reviewers will make a recommendation to the editor to accept, accept with revisions or reject the manuscript. In order to make a good judgment, the peer reviewers have a checklist of their own (which looks a lot like the checklist on the previous page!), to help them evaluate the content for scientific value and originality, to see if you've adhered to the general scientific structure as well as the journal's specific guidelines, and to check if you've referenced correctly. The peer reviewer will look closely at your methodology and consider your ethical approach. They then recommend changes you can make to your manuscript before it can be published.

See www.elsevier.com/reviewers/home for more details.

# Innovation

## Article of the Future

Through the Article of the future project, Elsevier is developing a number of publishing innovations which can be relevant to you. Depending on the journal, a number of innovative features are available. For instance, authors can now add their own discipline-specific and rich content such as interactive plots, chemical compounds, AudioSlides or interactive maps. Furthermore, new possibilities such as graphical abstracts and highlights enable users to more efficiently skim articles.

The context element offers authors opportunities to add a range of valuable connections to the published article, for example related research data sets, author information and research groups. Commonly used entities in the article can also be tagged and linked to databases, e.g. Genbank and Protein Data Bank, and context can also be pulled from these databases into the articles. While many of the new content and context features will apply to all journals, others will be domain-specific.

## Further reading:

www.elsevier.com/about/content-innovation

# Getting your manuscript accepted

## Submission

### If at first you don't succeed…

If your manuscript is rejected, don't give up — everybody has articles rejected. The best thing to do is to learn from the editor's and reviewer's comments and try again. You had free consultancy from the reviewer, so if you want to re-submit the same manuscript, don't just rewrite it. Start afresh. Take another look at everything, from the research to the cover letter. Use the reviewer's report to understand why your article wasn't accepted.

Between 40 and 90% of all manuscripts submitted are rejected before or after external peer review. In some cases, the journal you've chosen is simply not the right one. Still, there's no reason to despair.

## Acceptance

Congratulations! Your manuscript is accepted for publication! It's almost time to start celebrating – just a few more things to do. Here is how it goes.

During the time between your manuscript's acceptance and its final publication and printing, Elsevier will ask you to:

1. Complete a Journal Publishing Agreement.
2. Complete an offprint order form, if you want to order offprints.
3. Review a proof copy of your article to check for errors and answer queries.

# Revision

The revision process is an important step towards publication. There is a possibility that you will be asked to revise, following comments and recommendations from the reviewers.

Your manuscript may be in need of minor or major revisions. This is an excellent opportunity for you to improve your work through dialogue with some of the leading scientists in your field.

Read the reviewer's comments carefully, and discuss them with your collaborators. Take a step back and look at your work through their eyes. Can you make small adjustments to the text to make your point more clearly? Are there further experiments you can carry out to support your results? However objective you think your manuscript is, words can always be interpreted differently. If you're unsure, ask people to read parts of your manuscript and tell you what they think you mean.

Prepare a well-written response to the reviewer's report: address each comment scientifically and objectively. Remember: editors can count, so don't leave out the difficult questions! Make sure you write your responses so that the editor can forward them directly to the reviewer; always remain respectful and polite.

# Re-submission

You can win half the battle by choosing the right journal: Your manuscript may be just fine but not quite within the scope of the journal. Increasingly, Elsevier journals offer authors the option to have their manuscript automatically submitted to another journal.

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# Publishing ethics

Understanding the ethics in scientific research and publishing is a key step in making sure your work gets off to the best start.

The Ethics in Research & Publication program is the collaboration of an independent panel of experts in research and publishing ethics and Elsevier. The materials on the website have been developed to provide resources and tools so you can proceed confidently. Please see www.elsevier.com/ethics for factsheets in English, Chinese and Spanish, a webinar, a quiz, and several other resources that will help you to present your work with the intellectual integrity that the scientific community expects.

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## GLOBALEVENTSLIST

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For more information visit www.elsevier.com/access

# Impact Factor and other impact measures

## Impact Factor

The Impact Factor is the most widely referenced quality measure for academic publications. It is defined as the ratio between citations and recent citable articles published in a journal; the average number of citations received per published article.

## Calculation Method

The official Impact Factor that appears in the Journal Citation Reports (JCR) is calculated as:

Citations in year X to content published in a journal in the preceding two years (X-1 and X-2), divided by the number of source items published in that journal in those preceding two years (X-1 and X-2).

For example, the 2013 Impact Factor is the number of citations made in 2013 to all articles published in a journal in 2011 and 2012, divided by the number of source items published in that journal in 2011 and 2012.

Impact Factors vary greatly by subject discipline and comparison is only meaningful within the same subject category or group.

## h-index

The *h*-index rates a scientist's performance based on his or her career publications, as measured by the lifetime number of citations each article receives. The measurement is dependent on both quantity (number of publications) and quality (number of citations) of an academic's publications.

If you list all of a scientist's publications in descending order of the number of citations received to date, their *h*-index is the highest number of their articles, *h*, that have each received at least h citations. So, their *h*-index is 10 if 10 articles have each received at least 10 citations; their *h*-index is 81 if 81 articles have each received at least 81 citations. Their *h*-index is 1 if all of their articles have each received 1 citation, but also if only 1 of all their articles has received any citations.

## How is the *h*-index different from the Impact Factor?

The main difference is that the h-index refers to the performance of an individual scientist.

- The *h*-index is based on lifetime citations received by a scientist's articles. The Impact Factor is based on only two years' worth of citations

- Both rankings measure the average performance of an individual scientist or a journal. Some articles will receive many more citations, and some fewer, than the ranking figure

## Category aggregate Impact Factor (2012)
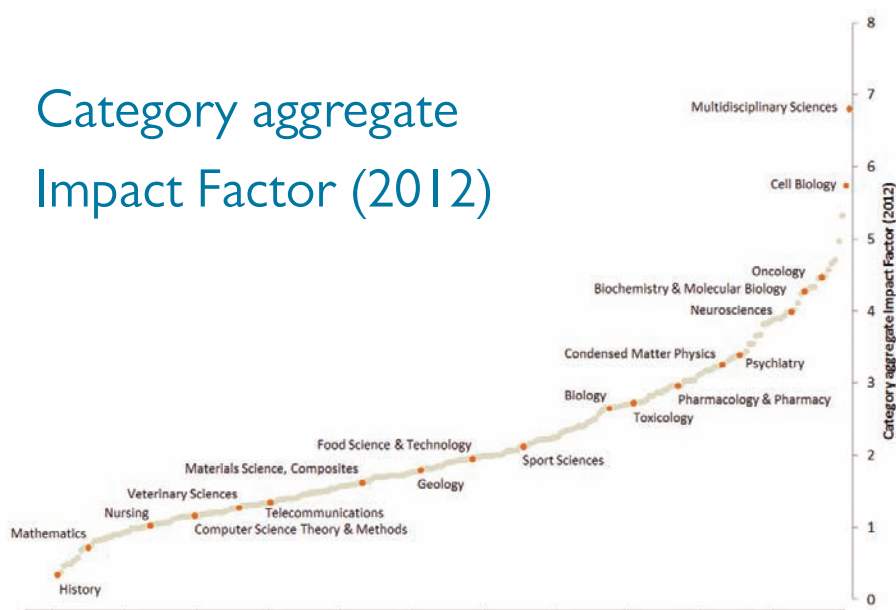
## The SNIP and SJR metrics

A variety of metrics provides a more complete picture, and both SNIP and SJR have some unique features which help shed a different light on a journal.

SNIP, or Source-Normalized Impact per Paper, is defined as the ratio of a journal's citation count per paper by the citation potential in its subject field. SNIP takes into account the field in which a journal operates, smoothing differences between field-specific properties such as the number of citations per paper, the amount of indexed literature, and the speed of the publication process. It aims to enable direct comparison of titles in different subject areas.

SNIP corrects for differences in citation potential, and uses a normalization factor that results in a SNIP average score for all journals in Scopus to approximately equal one. All empirical results are derived from the Scopus abstracting and indexing database once a year, and SNIP's strengths and limitations are open to critical debate.

SJR, or SCImago Journal Rank, is a prestige metric based on the idea that 'all citations are not created equal'. SJR takes into account the prestige of the citing journal: citations are weighted depending on whether they come from a journal with a high or low SJR. With SJR, the subject field, quality, and reputation of the journal have a direct effect on the value of a citation.

SJR is a measure of scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from. It is a variant of the Eigenfactor centrality measure used in network theory. The SJR indicator, which is inspired by the PageRank algorithm and uses the principle of iterative calculation, was developed for extremely large and heterogeneous journal citation networks. It is a size-independent indicator that ranks journals by their 'average prestige per article' and can be used for journal comparisons in science evaluation processes. Its scoring scale is intuitive, with an average of one.

## Why use a variety of metrics, including SNIP and SJR?

SNIP and SJR add other dimensions to journal evaluation; they help you validate the high quality and impact of your research outputs to your peers. Is the journal you intend to publish in really one of the top three journals in your field? Is this the best journal to publish in, taking several bibliometrics aspects into account? SNIP and SJR help you get a clear picture on how to measure the scientific impact of a journal from various angles.

## When are SJR and SNIP preferred for journal analysis?

- When subject field differences may affect ranking, and not only quality
- When comparing basic and applied journals
- When investigating multidisciplinary fields such as nanotechnology
- When analyzing titles in social sciences & humanities, mathematics, and engineering, for which non-journal content is important

For more information on SNIP and SJR:
www.journalmetrics.com

# Journal Insights

The homepages of all journals participating in the Journal Insights project feature a new section, 'Journal Insights'. Authors clicking on this link arrive at a landing page where they can select data visualizations of three key groups of metrics for a maximum of five years in a row, developed to aid their decision making. If data available it will display:

**Impact** – Graphs displaying the Impact Factor, five-year Impact Factor, Article Influence and Eigenfactor, SNIP and SJR.

**Speed** – Graphical representations of both the average review speed for the journal over a five-year period and the online article publication time (also known as production speed).

**Authors** – A detailed world map allows viewers to swiftly identify the geographical distribution of (corresponding) authors who have published in the journal within the past five years.
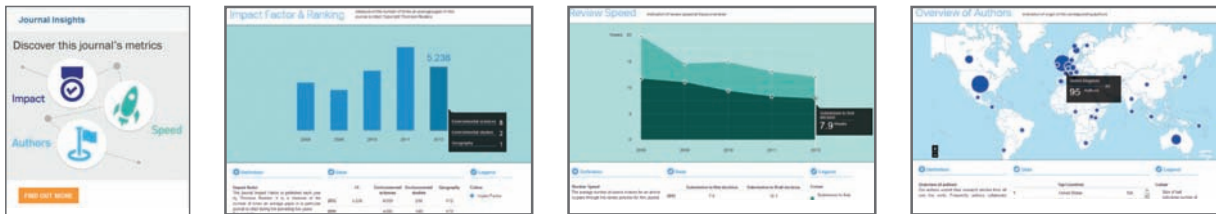


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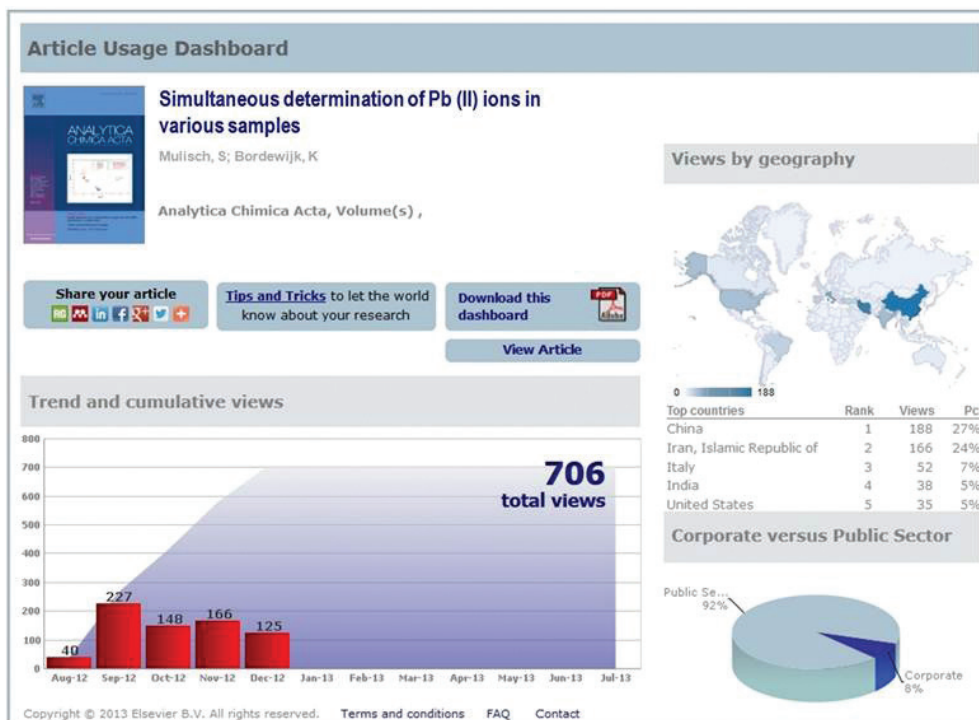
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## Useful websites

### Authors' Update

An Elsevier's quarterly e-newsletter for authors. Our aim is to provide you with relevant information and useful tools to help you during the publishing process. We support and help authors as they are the key element in the dissemination of scientific knowledge.

www.elsevier.com/authors/authors-update

### Ethics in Research & Publication

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## External sites

### Digital Object Identifier (DOI)

To learn more about how the DOI system identifies content in the digital environment please visit www.DOI.org

### ISI Web of Knowledge

Impact Factors are measured by Thomson Reuters using the Web of Science database. More information on Impact Factor measurements can be found at

http://wokinfo.com

### MEDLINE and PubMed

MEDLINE is an online database of 11 million citations and abstracts from health and medical journals and other news sources. MEDLINE is searchable via PubMed, a service of the US National Library of Medicine that includes over 18 million citations from MEDLINE and other life science journals for biomedical articles.

www.pubmed.gov

### Sense About Science

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