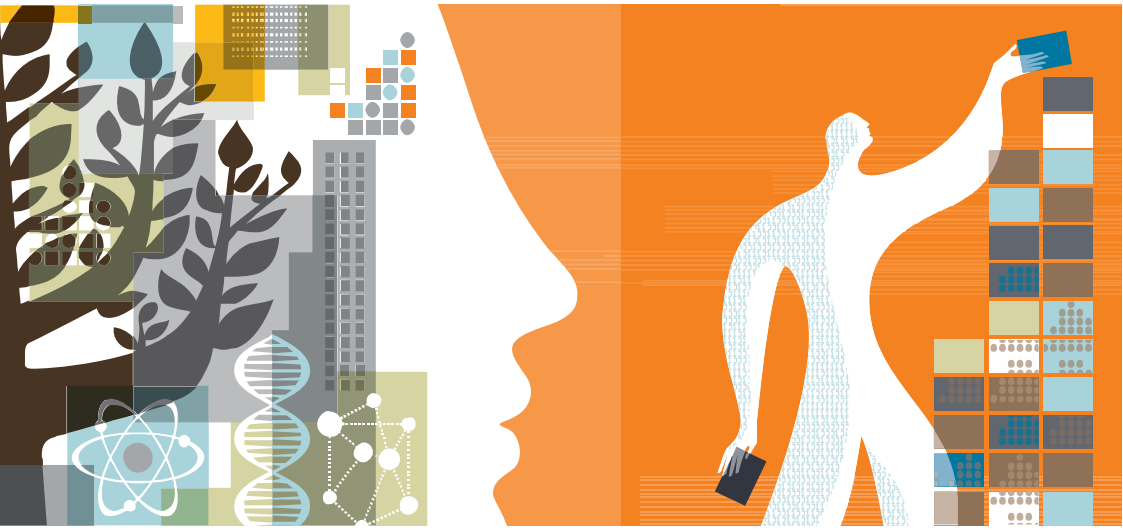
Researcher Academy

Elements of Style for Writing Scientific Journal Articles



Stephen M. Griffies NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA and Associate Editor, *Ocean Modelling*

William A. Perrie Fisheries and Oceans Canada, Bedford Institute of Oceanography, Dartmouth, NS, Canada and Editor-in-Chief, *Ocean Modelling*

Gaëlle Hull Elsevier, Oxford, UK

[December 2013]

ELSEVIER

Contents

About this document

- We offer some rules for writing scientific journal articles.
- We focus less on the structure of an article, and more on styles and practices helping transfer scientific information, ideas, and understanding from the author to reader.
- Some material is borrowed from the classic Elements of Style by Strunk and White (1918, available at http://en.wikisource.org/wiki/The_Elements_of_Style) supplemented by experience from Editors of the journal Ocean Modelling.
- Further material is borrowed from the essay: The Science of Scientific Writing by Gopen and Swan, published in American Scientist in 1990. It is freely available at http://www.americanscientist.org/issues/pub/the-science- of-scientific-writing.

We thank the following people for many useful comments and suggestions on drafts of this document:
Venkatramani Balaji, Maria Benito-Herrero, Carolina Dufour, Blair Greenan, Bill Li, Joe Majkut and Liuqian Yu

The most important rule

Write for the busy reader who is easily distracted.

- Most readers have little time to penetrate the full contents of an article.
- Readers will use almost any excuse to put down the paper, particularly when encountering poor writing that leads to reader fatigue and frustration.
- Make each sentence, paragraph, subsection, section, figure, derivation, etc. coherent and easily digestible nuggets of information.
- Your job as a writer is to communicate information and knowledge in a compelling and well written manner.

INTRODUCTION

Why you cannot ignore manuscript language

Why is language important?

Poor language quality can delay or block publication.
It is important to take seriously the presentation of your manuscript, especially the language you use to communicate results. Clarity in writing reflects on clarity in thought. Science is far more than mere fact recording. Written communication is key to transmitting knowledge and rendering an impact on the field.

Without clear and proper language, readers will not grasp the full message or impact of your work. Even though the findings you report might be cutting edge, poor language quality, including errors in grammar, spelling or language usage, could delay publication or lead to outright rejection of the paper.

Always use proper English.
Use proper English throughout the entire manuscript, and do not forget the captions and headings in figures, charts, graphs, and photos.

Do publishers correct language?

No; it is the author's responsibility... but resources are available.
Often authors assume that the publisher will correct the language of their manuscript after it has been accepted, but this assumption is not correct. It is actually the author's responsibility to make sure a paper is in the best form possible.

Doing so means correcting the rudimentary issues related to grammar and spelling, as well as providing a clear, logical, and connected story-line.

Though publishers do not correct language, they do often provide resources for authors who are less familiar with the conventions of international journals. Please check your publisher's Guide for Authors website for more information.

Some publishers may also perform technical screening prior to peer review. If the quality of the language of your paper does not meet a journal's minimum standards, it can be returned to you for improvement.

SECTION I

Basic rules of manuscript language

Manuscript language: overview

Manuscript language should be:

→ Accurate → Concise → Clear → Objective

Prevent spelling errors by using a spellchecker in English. Additionally, other common language errors involve:

- Tenses
- Grammar
- Sentences
- Paragraphs

You should always read the journal's Guide for Authors to check for any additional language specifications.

Manuscript language: tenses

Take care to use the proper tenses when describing your work and findings. Being consistent and correct in your use of tenses makes your paper easier to understand.

Present tense:
Use the present tense for known facts and hypotheses, for example, "*the average life of a honey bee IS 6 weeks...*"

Past tense:
Use the past tense for describing experiments that have been conducted and the results of these experiments, for example "*The average life span of bees in our contained environment WAS 8 weeks...*"

Remember:
Avoid shifting tenses within a unit of text: paragraph, sub-section or section.

Manuscript language: grammar

Use the active voice to shorten sentences.
The passive voice can be used in the Methods section of a paper but otherwise, the active voice will usually shorten sentences and make them more dynamic and interesting for the reader.

Use the active phrase "*we found that...*" freely, which is a quick signal to the reader that you are describing one of your results. This expression is also much more concise and to the point than writing in the passive voice, as in, for example, "*it has been found that there had been...*"

Avoid abbreviations and acronyms.
Avoid contractions such as "it's", "isn't", or "weren't" which are not often used in professional writing.

- Avoid abbreviations/acronyms except for very well-known ones.
- Avoid acronyms as replacement for citations.
- Avoid acronyms in the abstract and conclusion.

Eliminate redundant words or phrases.

- *due to the fact that* → *because or since*
- *immediately apparent* → *apparent*
- *in the case that* → *in case*
- *and also* → *and*
- *in order to determine* → *to determine*
- *to try and determine* → *to determine*

Double-check unfamiliar words or phrases.

Manuscript language: sentences

To write a successful manuscript, first be aware of the **sentence structure** you use.

Write direct and short sentences.
The average length of sentences in scientific writing is only about 12-17 words.

Include only one piece of information per sentence.
Sentences should be constructed in short, factual bursts. Long and complicated sentences tend to confuse readers.

Avoid making multiple statements in one sentence.
Convey only a single idea per sentence. Link sentences together within a paragraph to provide a clear story-line.

Keep related words together.
Closely place the subject and verb to allow the reader to understand what the subject is doing.

Pay attention to the order in which you write a sentence.
The "stress position" within a sentence contains new information to be emphasized. The "topical position" contains "old" information leading up to the point of emphasis. The topical position comes before the stress position.

Avoid: *"This ocean basin was warmer during 2012 than any period found in the observational database, based on our analysis of recent ship-based measurements."*

Write: *"Based on our analysis of recent ship-based measurements, this ocean basin was warmer during 2012 than any period found in the observational database."*

Put statements in a positive form.

- Positive: "He usually came late."
- Negative: "He is not very often on time."

Manuscript language: paragraphs

- Have one paragraph for each distinct topic.
- Begin a paragraph with a topic sentence, and end in conformity with the beginning.
- Avoid a succession of loose sentences.
- Parallel structures are simpler to parse as a reader. Retain consistent tenses within each paragraph.
- Provide a logical transition from one paragraph to another to render a clear flow, thus guiding the reader from one topic to another.
- Paragraphs are similarly constructed to sentences, bringing the reader from the "familiar" at the start to new ideas towards the end.
- Fill logical holes empathizing with a smart reader who genuinely wants to understand the flow of ideas.

SECTION II

Classic errors to avoid

Avoid using "*this*" unqualified.

Avoid: "*We found this to be the most important facet of the ocean's dynamical response.*"

Write: "*We found this feature of the thermocline to be the most important facet of the ocean's dynamical response.*"

- What does "*this*" refer to? If the reader must guess, then the guess could be wrong.
- Even when it is "obvious" what "*this*", "*that*", "*these*", or "*those*" refer to, the author serves the reader well by clearly qualifying.

Avoid too many successive prepositional phrases.

Avoid: "*We ran a model simulation of the ocean for research into the evolution of the thermocline.*"

Write: "*We ran an ocean model simulation to conduct research into thermocline evolution.*"

- Run-on prepositional phrases are awkward to read.
- They can rapidly lead to reader fatigue.

Avoid subjective or redundant words or phrases that will date the paper.

- "high resolution"
- "new result"
- "latest finding"

Avoid subjective or judgmental adjectives.

Avoid: "*We use a simple model of the ocean's thermocline to describe the dynamical response.*"

Write: "*We use an idealized model of the ocean's thermocline based on approximating the continuous stratification with two immiscible fluid layers to describe the dynamical response.*"

- "*Simple*" has meaning to the reader only when the authors explain the opposite "complex" or "realistic" or "complete".
- Readers should not be asked to read the mind of the authors, nor to share the authors' opinion.

Avoid expressions of belief.

Avoid: "*We believe this model result to be true.*"

Write: "*We show through our analysis that this model result is consistent with the empirical evidence.*"

- Communication of science is not about conveying belief.
- Rather, it is about logically developing lines of evidence that lead one to a hypothesis, theory, or conclusion based on the evidence.

Avoid loose statements and back to back adverbs.

Avoid: "*The ocean model simulation ran quickly and cheaply.*"

Write: "*The ocean model simulation required 1200 hours using 100 computer processors.*"

- What is "*quickly*" and "*cheaply*"?

SECTION III

Always remember your reader

Abstract: the key points

- The abstract provides a concise summary of the key aims and results.
- If it is not clear and interesting, readers often will read no further.

What am I about to read?

The introduction

- The introduction should lay the ground-work for why the paper is worth reading, and describe where the work fits within the existing literature.
- Introduce the novel elements of the paper in the introduction, thus providing motivation for the reader to penetrate the main text.
- Do not over-burden the reader by making the introduction too long. Get to the key parts of the paper sooner rather than later.

What did I just read?

The discussion and conclusion

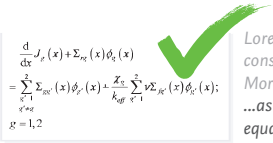
- Readers need to know what they have read and why it was significant.
- Remind the reader why this paper was worth reading and publishing.
- Concluding sections also provide a venue to set the stage for future research directions.

SECTION IV

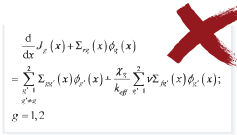
Cross-references and figure captions

Thorough cross-referencing

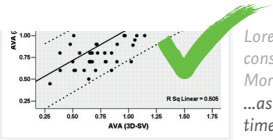
- Cross-reference equations, figures, and sections both by their number and by their name.



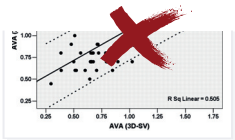
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi varius porttitor metus ...as seen in the continuity equation (12)...



Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi varius porttitor metus ...as seen in equation (12)...



Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi varius porttitor metus ...as shown in the transport time series in Fig. 13.



Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi varius porttitor metus ...as shown in Fig. 13.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Pellentesque ut feugiat eros, at mollis ex. Donec porttitor mattis varius ...as discussed in the methods Section 2. Pellentesque ultricies aliquet felis vitae feugiat.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Pellentesque ut feugiat eros, at mollis ex. Donec porttitor mattis varius ...as discussed in Section 2. Pellentesque ultricies aliquet felis vitae feugiat.

- Asking the reader to page back in the text intensifies reader fatigue.
- Put your head in the reader's head to determine when it is useful to provide "hand-holding" in a discussion or a derivation, whereby you identify useful cross-referencing.

Figures and captions

Figures can be the most important part of a paper. Produce clear and high quality figures along with thorough captions.

- Avoid excessive numbers of figures: judiciously select those figures that clearly support the presentation.
- Allow the reader to digest a figure's main points without reading the text.
- Produce high quality figures, even on the first submission!

When available, embed figures within main text of the submitted manuscript to avoid reviewers needing to page back/forth, which in turn breaks the reading.

SECTION V

Writing & rewriting - playing the peer-review "game"

Extensive fine-tuning

Write science as E. Hemingway wrote his literature. Scientists are storytellers too!

> *"My aim is to put down on paper what I see and what I feel in the best and simplest way."*
>
> E. Hemingway

- Can you identify the beginning, middle, and end?
- What is the "take home message" or "iconic figure" of your paper?
- Be aware of each word forming a sentence; each sentence forming a paragraph, each paragraph forming a section…

Edit → Read → Edit → Read → Edit → etc.

- Consider the manuscript from a different perspective between each Edit → Read cycle: e.g., read in a different location; read it as an interested and smart non-expert. Patience will reduce time with reviewers/editors, and will enhance the paper's readability and impact.
- Solicit "friendly" reviewer comments from colleagues, and be sure co-authors have read the manuscript. Ask readers to comment on the "style" of the manuscript as well as the substance.
- Writing rules can be selectively broken without sacrificing clarity. But it is important to know and to respect the rules so to understand when they are usefully broken.

Honestly deal with mistakes.

There are times when the reviewer (or the author!) identifies a significant problem/mistake during the review process.

- Mistakes are embarrassing. But they are far more embarrassing if published! So be thankful the mistake was found during review.
- If the basis for the paper is undermined by a mistake, then do not try to justify publishing. There may be another path towards a publishable story.
- Avoid publishing an incomplete or half-baked story. Readers will be reticent to read your next paper.
- Quality over quantity is the ideal.

And finally: Do not give up if you believe in your work.

Reviewers are generally not as knowledgeable on the subject of the manuscript as the author.

- Some influential papers that break new scientific ground may be rejected merely because reviewers do not appreciate the results. Be patient and persistent.
- Nonetheless, reviewer comments are almost always useful, even if they are wrong!
- Some critical or wrong reviewer comments result from poor writing that leads to reviewer misunderstanding and reviewer frustration. Rethink your writing.
- Let comments sit, especially negative or harsh comments. A poorly written rebuttal can lead to needless (and sometimes emotional) correspondence with the editor and reviewer.

How to Turn Your Thesis into an Article

8 Tips for Converting Your Terminal Degree for Journal Publication

Adolfo G. Cuevas, PhD, and Cecily Betz, PhD, RN, FAAN, Panelists

Dawn Nahlen, Moderator

Participants

Adolfo G. Cuevas, PhD, Panelist

Assistant Professor, Department of Community Health

Director, Psychosocial Determinants of Health Laboratory

Tufts University

Cecily Betz, PhD, RN, FAAN, Panelist

Professor of Clinical Pediatrics, Department of Pediatrics USC Keck School of Medicine

Director of Research/Director of Nursing Training, USC Center of Excellence for Developmental Disabilities at Children's Hospital Los Angeles

Editor-in-Chief, Journal of Pediatric Nursing

Dawn Nahlen, Moderator

Associate Publisher, Health and Medical Science Journals, Elsevier

Converting your terminal document into a journal article does not have to be a stressful experience

Presentation points

Topics that will be discussed today

- Differences between a thesis and a journal article
- Identifying the appropriate target journal
- Shortening the thesis
- Changing introductions into abstracts
- Modifying the introduction
- Tightening the methods section
- Reporting main findings in results
- Ensuring discussion is clear and concise
- Limiting number of references
- Determining authorship, copyright, and publishing model

Different audience, different standards

Dissertation committees assess whether a student's work has fulfilled program outcomes and requirements, not whether it's ready for publication or even widespread release. Dissertation review certifies the student's capabilities within the context of the discipline and the institution. (Hawkins AR, et al, The Journal of Academic Librarianship)

Editors and reviewers of peer-reviewed journals are experts in their fields and well versed in scholarly communication. Their task is to assess whether papers and projects further the knowledge and thus should be published.

Differences between thesis and article

Thesis

- Meets academic requirements
- Reviewed by select committee members
- Chapters
- Lengthy, no word limits
- Table of contents
- Lengthy research of literature
- IRB approval described in detail
- Description and copies of tools used
- All findings presented
- Verb tenses **vary**

Article

- Meets journalistic standards
- Reviewed by panel of blind reviewers
- Sections
- Word limits
- Manuscript format
- Succinct research of literature
- IRB described in 1 to 3 sentences
- Essential and succinct tool information
- Selected findings presented

Tip 1: Identify the appropriate target journal

- Read the aims and scope of the journal
- Most journals' websites provide information about the recommended structure and reference style for articles
  - Typical structure:
    - Title page
    - Abstract
    - Keywords
    - Main text introduction
    - Materials and methods
    - Results
    - Discussion
    - Acknowledgments
    - Declaration of interest statement
    - References
    - Appendices
    - Table(s) and figure(s)

Tip 1: Identify the appropriate target journal (cont'd)

Other alternatives

- Journal/Author Name Estimator (JANE) is a good resource.

- Ask colleagues to read abstract and provide recommendations.

- Review journal website for
  - Impact Factor
  - Cite Score
  - Information for authors
  - Journal metrics
  - Journal announcements
  - Special issues
  - Examples of articles previously published
  - Review process

A word on predatory journals

International Academy of Nursing Editors
https://nursingeditors.com/?s=predatory&submit=Search

Authors Beware: Open Access Predatory Journals
www.pediatricnursing.org/article/S0882-5963(16)00052-X/fulltext

Standardized journal guides for specific types of papers

- Systematic Reviews and Meta-Analyses
  PRISMA guidelines
- Case Studies
  CARE guidelines
- Randomized Controlled Trials
  CONSORT guidelines
- Quality Improvement Projects
  SQUIRE guidelines

http://www.equator-network.org

Check the **targeted** journal's **information** for authors to see if any of these guidelines are required.

Tip 2: Shorten length of thesis

- Journal articles are much shorter than theses/dissertations/capstones
  - Require tighter framework and more compact style
  - It is not a matter of copying and pasting
    - Treat your thesis as a separate work
    - Paraphrase and express the same i**deas** in a different way
    - Select and repurpose
    - Highlight the key points you want the readers to understand

Tip 3: Reformat the introduction as an abstract

- Abstracts in journal articles are typically shorter (100-250 words)
- Some journals require structured abstracts, others do not

Before

Mistrust in healthcare is associated with lower use of healthcare services and lower adherence to treatment among patients who are African Americans. Past experiences of discrimination may help explain why African Americans may mistrust healthcare and healthcare providers. However, some African Americans may be more vulnerable to perceptions of discrimination than others. Research is needed to understand the predictors of healthcare related mistrust among African Americans. Perceived discrimination may be more strongly related to mistrust toward healthcare and providers for African Americans who identify strongly with their own racial group (racial centrality) and feel that others viewed their group negatively (unfavorable public regard). The proposed study sought to address this issue. Upon conducting a primary cross-sectional, survey data collection with local African American community members (N=210), I tested the moderated effect of racial identity (i.e., racial centrality and public regard) on perceived discrimination and mistrust (i.e., medical mistrust and physician mistrust). Perceived discrimination was also positively associated with medical mistrust and physician mistrust. While racial centrality and unfavorable public regard were not significant moderators, they were positively associated with medical mistrust. Results suggest that effects of racial identity may be context-specific in healthcare. Racial identity may be salient during general healthcare experiences, but may not play a significant role in the doctor's office. Further, perceived racial discrimination in healthcare may influence an individual's self-concept of race, which may lead them to mistrust the overall healthcare system. Psychosocial interventions aimed at reducing dis-crimination-related stress might help to reduce the negative health consequences of

After

Journal of Health Psychology
1–9

DOI: 10.1177/1359105317715092
journals.sagepub.com/home/hpq

Racial centrality may be linked to mistrust in healthcare institutions for African Americans

Adolfo G Cuevas[1,2] and Kerth O'Brien[1]

Abstract
Evidence suggests that racial identity is an important component to African Americans' self-concepts and therefore may be relevant to patients' trust in healthcare, yet little is known as to how racial identity may influence trust or mistrust. African American adults ($N = 220$) in the greater Portland, Oregon, area provided survey reports of healthcare-related attitudes and experiences. Those who reported higher racial centrality had lower trust in healthcare institutions. Based on these findings, clinicians employing patient-centered care approaches should recognize racial identity as an important component to patients' experiences when they seek to deliver equitable care to African American patients.

Keywords
African American, healthcare disparities, medical mistrust, patient-centered care, patient–provider relationship, perceived discrimination, physician mistrust, racial identity

Tip 4: Modify the introduction

- Be concise!
  - Unless otherwise suggested, keep the introduction short and straight to the point.
  - Use previously published papers (at least three) from the target journal as templates
  - Your thesis may have more than one research question or hypothesis
    - Combine research questions or **focus on one for** the article

Tip 5: Tighten the methods section

- No extensive discussion needed about your research approach
- Keep the method section succinct
- Use previously published papers (at least three) from the target journal as templates
  - Formatting may differ
  - Some sections are emphasized more than others

Tip 6: Report main findings in results

- Present the findings relevant to the research question(s)

- If you conducted exploratory analyses, provide **concise** statements of the findings.

Results

Univariate and Bivariate Findings

Sample Characteristics

Tip 7: Ensure discussion is clear and concise

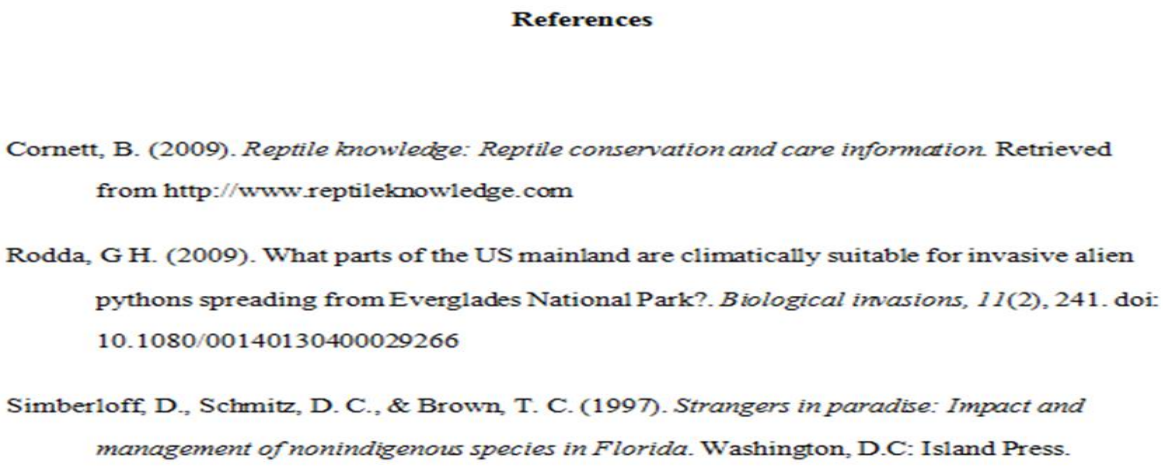
- Begin by providing an interpretation of your results
  - What is it that we have learned from your research?

- Do not repeat results
  - Situate the findings to the literature
  - How does your findings expand our perspective
  - Briefly present ways in which future studies can build upon your work and address limitations in your study

Tip 8: Limit number of references

- Journals limit the number of citations
  - Choose the most relevant (and recent) citations

- Make sure the citations are formatted correctly



References

Cornett, B. (2009). *Reptile knowledge: Reptile conservation and care information.* Retrieved from http://www.reptileknowledge.com

Rodda, G H. (2009). What parts of the US mainland are climatically suitable for invasive alien pythons spreading from Everglades National Park?. *Biological invasions, 11*(2), 241. doi: 10.1080/00140130400029266

Simberloff, D., Schmitz, D. C., & Brown, T. C. (1997). *Strangers in paradise: Impact and management of nonindigenous species in Florida.* Washington, D.C: Island Press.

- Consider using a reference manager system (e.g., Mendeley)

Questions to answer before submitting the paper

Authorship

Copyright

Publishing model

Authorship

- Decide at the outset who will be listed as authors of any journal articles that come from degree papers (committee chair, members, academic mentors)

- Ensure complete understanding of roles/responsibilities for manuscript development and submission

- Follow the guidelines developed by the International Committee of Medical Journal Editors (ICMJE) to meet the ethical standards of authorship, including these criteria:
  - Substantial contributions to the conception or design or the acquisition, analysis, or interpretation of data
  - Drafting the work or revising it critically for important intellectual content
  - Final approval of the version to be published
  - Commitment to be accountable for all aspects of the work in ensuring that any questions related to accuracy or integrity are appropriately investigated and resolved

Copyright

Determine for certain who holds the copyright to the dissertation or capstone and whether it is all inclusive—the author, the institution, the funding body? Text, graphics, datasets, methods, or a combination thereof?

Publishers will expect authors to sign copyright forms for journal articles, unless the work is set to open access, so authors must know what rights they have the authority to assign, if any.

Publishing models

Traditional publishing

- Authors publish free of charge
- Institutions and individuals pay for content by subscribing to journals

Open access publishing

- Author (or institution/funding agency) pays a publication fee and retains copyright
- Article is made freely available to all online
- Some journals publish exclusively open access
- Most subscription journals offer open access options

Gold open access

- After submission and peer review, an article publishing charge (APC) is due.
- Upon publication anyone can immediately and permanently access the article online.

Green open access

- After submission and peer review in a subscription journal, article is published online.
- Subscribers have immediate access and the article is made open access either through author self-archiving, publisher deposit or linking.

Golden rules

- Keep in mind the interest and expertise of the *journal readers*, not necessarily colleagues or the institutions at which the doctoral work was done
- Follow a journal's guide for authors closely on format, word count, references, etc.
- Consult an experienced *author* before submitting to a journal; do not rely on faculty mentors who have not published something themselves
- Ask someone who speaks the language in which the journal is published to review the submission, or consider using a professional language service

Golden rules continued

- Present content that is current, clear, practical, and meaningful
- Emphasize what is new in order to justify publication—answer the "so what?" question
- Ensure that the text for the aims, most of the literature review, and all of the findings and discussion sections are different for each manuscript submitted for publication
- Use language that is interpretable from a scientific perspective and free of bias

Elsevier resources

researcheracademy.elsevier.com
elsevier.com/authors
elsevier.com/reviewers
elsevier.com/editors
researcheracademy.elsevier.com/publication-process/ethics/authorship
researcheracademy.elsevier.com/publication-process/ethics/content-ownership
researcheracademy.elsevier.com/publication-process/open-science/open-access-navigating-journal-landscape

Other resources

- http://www.grammarly.com
- http://www.phrasebank.manchester.ac.uk/introducing-work/
- https://writingcenter.fas.harvard.edu/pages/resources
- https://jamanetwork.com/journals/jama/fullarticle/2667044

Thank you.

Successful grant writing

Getting it right

Critical stages of grant applications...

...and what to consider along the way

Generate an idea

- Why is this interesting and who cares?
- Who will benefit if the work is successful?
- How novel is this idea?
- Why am I the best person to do this?
- Can I realistically achieve what I claim?

Find a matching funding opportunity

- Look at who funds similar research.
- Be aware: different agencies support different types of projects.
- Scan for available calls.
- Be willing to cast a wider net.
- Think outside of the box. Keep your mind open.

Background research

- Understand the different agencies and their styles.
- Talk to the Program Manager – they are used to cold calls!
- Do the literature search, it can save you weeks of writing!
- Assume the panel members know nothing about your work, but everything about your competitors.
- But don't expect the panel members to be experts in your field, put your idea into context.

Write technical portion

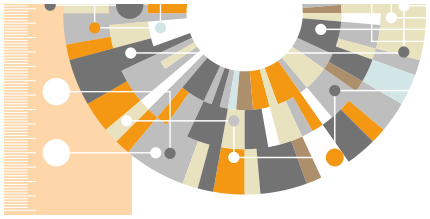
- What problem are you addressing?
- Why hasn't it been solved yet?
- Why do you think you will succeed? What is your hypothesis?
- What is your work plan and milestones?
- How will you measure success?

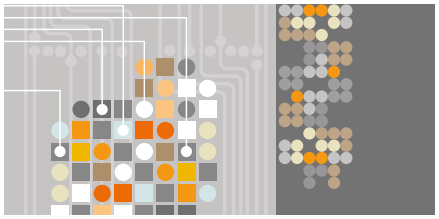
Check administrative parts

- Read the call – again and again and again...
- Calls are usually specific about the formats they require.
- Terms like "required" and "must include" should be adhered to.
- Work on your budgets and other documents in advance – be prepared.
- If you need external letters, give people enough time to get them to you.

Submit and forget

- Allow enough time to upload the files and check pdfs for readability and errors.
- Many agencies systems get very busy during submission times – accept and prepare for this.
- Once submitted, forget about the proposal until you hear from the review panel.
- Make sure that the agency communications don't get filtered into your spam folder.
- Many agencies will return detailed reviews. Use the review to revise and resubmit your grant.





Top tips and tricks

Time keeping: Be realistic about the time it takes to write the grant - grants are like an ideal gas, they fill all the space available to them.

Check your style: Do not use tiny fonts - 11 point is probably as low as you can go. Leave ample margins (3/4 in is pushing it). Avoid passive voice and tell a story.

Know your audience: Find out more about your funding agency and use it to your advantage e.g. emphasize basic science for NSF, healthcare for NIH or technology for DARPA etc.

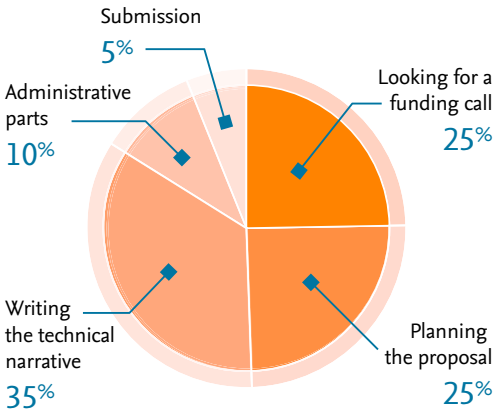
Connect and network: Grant calls include the contact information for a reason. Call the Program Manager as they can seldom answer all their emails. Prepare all your questions in advance.

Recycle but be warned: If you reuse parts of older grants (everybody does it) watch for the items specific to older grants in those texts - nothing reveals a quick hack job better.

Size matters: When it comes to budget be frugal but realistic. The average size of the award specified in the call is a good indication of the scope of work the Program Manager has in mind.

Be original! Try to be original and propose ideas that make sense, not just the "boilerplate". Reviewers have read the "boilerplate" many times before. But don't forget to explain things that look unusual.

Time and effort for a typical grant



And remember...

- Always assume any problems were your fault, not the reviewer's.
- If the reviewer has misunderstood something, then you did not explain it clearly enough.
- Make sure you invest considerable work and effort in any revision - Reviewers will likely do the same.

...and finally – good luck!

Content produced by: Aleksandr Noy, Lawrence Livermore National Laboratory Member of Editorial Advisory Panel, Materials Today & Natasha Noy from Stanford University, USA. In association with Elsevier & Materials Today

Research Grant Proposal Review Criteria

...understanding the rules of the grantsmanship game

Eight key questions that funders ask reviewers to consider when they evaluate your research grant proposals, and the associated review criteria terms used across various funding agencies:

Why does the research matter?
- Significance
- Importance

How is the research new?
- Innovation
- Novelty
- Creativity

How will the research be conducted?
- Approach
- Plan
- Methodology
- Objectives
- Aims

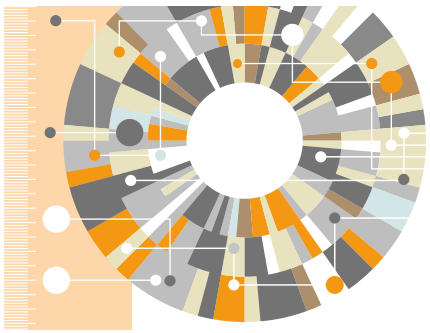
In what context will the research be done?
- Environment
- Resources
- Populations
- Facilities

Who's involved in the research and what's special about those people?
- Investigators
- Organization
- People
- Researchers
- Personnel
- Partners
- Collaborators
- Staff

What is the return on investment?
- Impact
- Value
- Relevance
- Return on investment (ROI)

How will success be determined?
- Evaluation
- Assessment

How effectively will the financial resources be managed?
- Budget



Top tips and tricks

Understand the funder: It's important that your research aligns with the funder's goals. Read the funder's mission statement to consider synergies between its goals and your research program.

Recognize that funders share the same goal when evaluating research proposals: Funders that offer research grants want to support research that fits within their mission (relevant) and will bring a strong return on their financial investment (impactful).

Know that it's really all the same review: Despite the use of funder-specific jargon to describe review criteria, reviewers are asked to evaluate proposals based on a common set of fundamental review questions—the eight key questions listed to the left.

Use the review criteria as your roadmap: The funder's review criteria directly inform how the proposal content should be presented and how much space should be afforded for each section of the proposal.

Use the key questions as a guide: If a funder does not provide transparent information about its review criteria in its proposal guidance, reach out to the program officer to ask about the eight key questions and which might best apply to the particular opportunity to which you're applying.

Use Review Criteria to Guide Proposal Development

A funder's goals are to identify research that is:

1) Relevant – fits the funder's mission
2) Impactful – high return on investment

Proposal Review Criteria
Based on 8 Key Questions

Use as a Guide to Develop your Research Grant Proposal

And remember...

- To succeed in the highly competitive landscape of research grant funding, you should consider diversifying your funding portfolio.
- Understanding that different agencies use a similar set of review criteria will help you develop proposals for a wide range of funders.

Content produced by: Holly J. Falk-Krzesinski, PhD, Elsevier Global Academic Relations and Northwestern University School of Professional Studies, and Stacey C. Tobin, PhD, Principal, The Tobin Touch, Inc. Material originally reported in: Falk-Krzesinski, Holly J, and Stacey C Tobin. 2015. "How Do I Review Thee ? Let Me Count the Ways : A Comparison of Research Grant Proposal Review Criteria Across US Federal Funding Agencies." Journal of Research Administration 46 (2). 79–94.

How to Turn Your Thesis into an Article

8 Tips for Converting Your Terminal Degree for Journal Publication

The main differences between a thesis and an article:

THESIS	JOURNAL ARTICLE
• Meets academic requirements	• Meets journalistic standards
• Reviewed by select committee members	• Reviewed by panel of blind reviewers
• Chapters	• Sections
• Lengthy, no word limits	• Word limits
• Table of contents	• Manuscript format
• Lengthy research of literature	• Succinct research of literature
• IRB approval described in detail	• IRB described in 1 to 3 sentences
• Description and copies of tools used	• Essential and succinct tool information
• All findings presented	• Selected findings presented
• Verb tenses	• Verb tenses are fairly consistent

Tip ❶: Identify the appropriate target journal

- Read the aims and scope of the journal and make sure that your paper is in the journal's scope. If your research falls outside of the aims and scope, look for a more suitable home for your paper.*
- Check the journals' recommended structure and reference style for articles on its website typically found in information for authors' section to ensure that your paper is not desk rejected.

** For a quick check of where to submit your article, use platforms such as the Elsevier Journal Finder.*

Tip ❷: Shorten the length of your thesis

- Journal articles are much shorter than theses/dissertations/capstones, so be sure to use a tighter frame work and a more compact style:
  1. Treat your thesis as a separate work.
  2. Paraphrase and express the same ideas in different ways.
  3. Select and repurpose parts of your thesis.
  4. Highlight the key points you want the readers to understand.

Tip ❸: Reformat the introduction as an abstract

- Abstracts in journal articles are typically shorter (100-250 words) and likely formatted differently, but should contain all the key elements to hold the reader's attention.
- Using your introduction and discussion as bases for the abstract can be a good starting point.

Tip 4: Modify the introduction

- Your thesis may have more than one research question or hypothesis, which are not all relevant for your paper. Consider combining research questions or focusing on one for the article.
- Unless otherwise suggested, keep the introduction short and straight to the point.
- Use previously published papers (at least three) from the target journal as examples.

Tip 5: Tighten the methods section

- Keep the method section succinct, there is no need for an extensive discussion about your research approach.
- Use previously published papers (at least three) from the target journal as examples.

Tip 6: Report main findings in results

- Present the findings relevant to the research question(s) in the results section.
- If you conducted exploratory analyses, provide concise statements of the findings.

Tip 7: Ensure discussion is clear and concise

- Begin by providing an interpretation of your results: What is it that we have learned from your research?
- Do not repeat your results in the discussion section:
  1. Situate the findings to the literature.
  2. Discuss how your findings expand our perspective.
  3. Briefly present ways in which future studies can build upon your work and address limitations in your study.

Tip 8: Limit number of references

- Journals limit the number of citations, so make sure:
  1. To choose the most relevant (and recent) citations.
  2. That the citations are formatted correctly.
- Consider using a reference manager system (e.g. Mendeley) to make your life easier.