Writing a scientific paper

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Lectures

Introduction:

- Brief History of Science and Scientific Writing

Scientific writing:

- Structure and content of a paper

Effective Scientific writing:

- How to write more effectively

Activities

- Read and discuss recent scientific articles
- Write a short article

Presentations and articles will be available at http://stockage.univ-brest.fr/~gula/SE/

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Strategy for Writing and revising

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Scientific writing

1. A strategy for writing

   http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWstrategy.html

2. A strategy for self-revising

   http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWrevisions.html

A strategy for writing

This is the architecture of your paper

- Title
- Abstract (+ keywords)
- Introduction
- Methods
- Results
- Conclusion
- Acknowledgements
- References

But most of the time you won't write the different parts in that order.

A strategy for writing

A. Balanced Review of the Literature:

- in-depth, balanced review of the literature relevant to your study questions prior to designing and carrying out the work.
- This review will help you learn what is known about the topic you are investigating and may let you avoid unnecessarily repeating work done by others.
- Keep notes about the articles you read (ideally a quick summary of the main results)

- *This literature will form the basis of your Introduction and Discussion.*

A strategy for writing

B. Design and Conduct the Experiment:

- Keep careful notes on procedures used during the experiment, on the design and parameters of your model. etc.

A strategy for writing

C. Analyze and Interpret the Results:

- Most scientists lay out their **Tables and Figures** before writing the Results section. *The tables and figures contain the story of your paper. Each table and figure should have a clear point, and together, they should tell the story of your manuscript.*
- Write the **Table and Figure legends.**
- Note the **one or two key results** that each Table or Figure conveys and use this information as a basis for writing the **Results section**.
- Sequence and number the Tables and Figures in the order which best enables the reader to reach your conclusions.

A strategy for writing

D. Write the Results Section:

- Use the text component to *guide the reader through your key results*, i.e., those results which answer the question(s) you investigated.
- Do not simply repeat numbers that are already available in tables and figures
- You need to *summarize* what the data show:
  - Point out simple relationships
  - Describe big picture trends

A strategy for writing

D. Write the Results Section:

- Example: "*over the course of treatment, topiramate was significantly more effective than placebo at improving drinking outcomes on drinks per day, drinks per drinking day, percentage of heavy drinking days, percentage of days abstinent, and log plasma-glutamyl transferase ratio (Table 3.)*"

- The reader can go to the table to see the specific numbers

A strategy for writing

D. Write the Results Section:

- Each Table and Figure must be referenced in the text portion of the results, and you must tell the reader what the key result(s) is that each Table or Figure conveys.

A strategy for writing

E. Write the Introduction:

- Once your questions have been refined based on your results, you can write a first draft of the Introduction to your paper.
- *Focus on the specific hypothesis/aim of your study* = do not make an exhaustive review of your subject !

F. Write the Methods:

- You can write the Materials and Methods section at any time, but after introduction, it is usually a good time.

A strategy for writing

G. Write the Discussion:

- Interpretation of your results includes discussing how your results modify and fit in with what we previously understood about the problem.
- Review the literature again at this time.
  - After completing the experiments you will have much greater insight into the subject, and by going through some of the literature again, information that seemed trivial before, or was overlooked, may tie something together and therefore prove very important to your own interpretation.

A strategy for writing

G. Write the Discussion:

- You can start with your key finding: “We found that…”
- Tell it like a story (use the active voice)
- Don’t travel too far from your data (It's okay to step away from your data and speculate a bit towards the end. But when you're drawing your main conclusions, you need to make sure that you are telling the reader what you actually found, not what you hoped to find.)
- Write about the limitations that matter (anticipate criticisms)

A strategy for writing

H. Write the Abstract and Title:

- The Abstract is always the last section written because it is a concise summary of the entire paper and should include a clear statement of your aims, a brief description of the methods, the key findings, and your interpretation of the key results.
- The Title will probably be written earlier, but is often modified once the final form of the paper is clearly known.

A strategy for writing

I. Self-Revise Your Paper:

- Most authors revise their papers at least 2-3x before giving it out for peer review.
- Go back over your paper and read it carefully; read it aloud if you can.

A strategy for writing

I. Self-Revise Your Paper:

- Most authors revise their papers at least 2-3x before giving it out for peer review.
- Go back over your paper now and read it carefully; read it aloud if you can.
- Begin revising your paper working from a ***global perspective*** (overall organization) to ***paragraph content and organization*** and finally down to ***sentence level line editing***.

A strategy for writing

I. Self-Revise Your Paper:

- **Global perspective:**
  - Does it say what you wanted it to say?
  - Do any ideas, experiments, or interpretations need to be moved around within the text to enhance the logical flow of your arguments?
  - check the sequence of ideas/background/content in each section for logical progression
  - check for a strong relationship of ideas between the Introduction (*what we knew before our study*) and the Discussion (*how our study changes or supports our previous understanding*).

A strategy for writing

I. Self-Revise Your Paper:

- **Paragraph content:**
  - check that each paragraph has a **coherent topic sentence**, most often as the lead sentence.
  - in each paragraph do the **other sentences support the topic sentence**?
  - check the **transitions between paragraphs** to ensure they are *logical* and *smooth.*

A strategy for writing

I. Self-Revise Your Paper:

- **Line editing:**
  - check for *consistent* and *correct* use of **terminology.**
  - can you change a passive verb construction to an **active verb**?
  - eliminate **superfluous lead phrases** (*Once that was done,* ..).
  - check for **redundancy** (i.e., places where you repeat what you have said elsewhere).
  - read each sentence closely for **clarity** and **brevity. Can you say the same thing with fewer words?**
  - **READ THE PAPER ALOUD** to find those quirky sentences that you wrote while still half asleep - if doesn't sound correct when spoken aloud, it will read even more oddly.

A strategy for writing

I. Self-Revise Your Paper:

- **Miscellaneous:**
  - Do the Tables and Figures have sufficient information to stand alone outside the context of the paper?
  - check that all of your **sources are cited correctly** in the text.
    - *Make sure that you have read and verified every article or document that you plan to use as a reference. You must verify that the article (a) indeed contains the information you are citing and (b) is the original source of this information.*
  - check the **Literature Cited** for completeness and correct format

A strategy for writing

I. Self-Revise Your Paper:

- **Miscellaneous:**

  - check the **numbering sequence of your tables and figures.**.
  - Use your dictionary to correct spelling and your spell checker to catch typos.

A strategy for writing

J. Review by others:

- Send it to co-authors and/or knowledgeable colleagues.

H. Prepare the Final Draft:

- Carefully proof-read your final draft to make sure its as well done as possible. Double check that you've properly cited all your sources in the text and in the Literature Cited.

Tips for writing

1. Talk about your research before writing about it

- *A really good tip before you sit down to write about your research is try to talk it out with somebody, a friend who is not necessarily in your discipline. Oftentimes, when we talk about our research, we do it in a more conversational tone, we talk in more simple terms. We actually present our ideas better than when we sit down to write, so talking it out first can really help.*

Tips for writing

1. **Talk about your research before writing about it**
2. **Stop waiting for inspiration**

- *You don't need any special muse or inspiration to be able to write. So just get over this notion that you have to be inspired in, and get yourself to sit down and write.*

Tips for writing

1. **Talk about your research before writing about it**
2. **Stop waiting for inspiration**
3. **Accept that writing is hard for everyone**

- *Another thing that I think is really important to realize is that writing is hard for everyone, even professional writers. So don't be anxious about it.*

Tips for writing

1. **Talk about your research before writing about it**
2. **Stop waiting for inspiration**
3. **Accept that writing is hard for everyone**
4. **Revise. Nobody gets it perfect on the first try**

- *Let's consider the actual writing process—you write a sentence, realize you need a reference, search around for it, re-read the sentence, decide it's not perfect, edit it, and wonder if you'll ever finish at this speed.*

Tips for writing

1. **Talk about your research before writing about it**
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3. **Accept that writing is hard for everyone**
4. **Revise. Nobody gets it perfect on the first try**

- *One thing to keep in mind: writing and editing are separate processes*
- *An effective writing method is to actively think about the content, write an entire paragraph or two—or three, or four—and then edit for perfection. This approach ensures a logical flow of sentences, as you're following your own train of thought at a decent pace.*

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Further readings

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Further readings

- https://www.aacc.org/publications/clinical-chemistry/clinical-chemistry%C2%A0guide-to-scientific-writing
- Use of Figures and tables:
  - Part 7. Put Your Best Figure Forward: Line Graphs and Scattergrams
  - Part 8. Bars and Pies Make Better Desserts than Figures
  - Part 9. Bring Your Best to the Table
- Authorship:
  - Part 14. Passing the Paternité Test
  - https://www.nature.com/articles/ngeo2949

Further readings

- Advices for french writers
  - http://stockage.univ-brest.fr/~gula/SE/Material/Decalogue.pdf