How to prepare a scientific paper

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With lots of help from online resources

Chronological order of article preparation

- Learn about the general topic (1 – 6 months)
- Learn about the governing equations (1 – 6 months)
- Learn about the methods to solve them (1 – 6 months)
- Implement a solver (1– 6 months)
- Determine a specific/novel problem to solve (1 – 6 months)
- Obtain results (1 – 6 months)

Today, we focus on what happens from this point to publication

Note: all timelines are *very* variable

Ethical considerations

- Who is an author? Who gets acknowledged?
- What is the order of authors?
- How much can you reuse from your own earlier work (proceedings, presentations)?
- How much can you use from other authors?
- Can you build on someone else's idea if they don't?
- What if your collaborator is slow/not doing much?

Address this early!

Get permissions!

Communicate with them
There are no secrets for long in academia.

Be clear in your intentions

Finished product structure

- **Title, Abstract and Keywords**: Attractive summary
- **Introduction**: What has been done before? Why was it done?
- **Methods/Equations**: How is the problem setup and solved?
- **Results**: What did you find?
- **Discussion**: What do your findings mean?
- **Conclusion**: Findings summary, future steps
- Acknowledgements, References and Supporting Materials.

Based on online material from Elsevier

Suggested (Elsevier) order for paper preparation

1. Prepare the **Figures and Tables**.
2. Write the **Methods**.
3. Write up the **Results**.
4. Write the **Discussion**.
5. Write a clear **Conclusion**.
6. Write a compelling **introduction**.
7. Write the **Abstract**.
8. Compose a concise and descriptive **Title**.
9. Select **Keywords** for indexing.
10. Write the **Acknowledgements**.
11. Write up the **References**.

More realistic order for writing a paper

1. Write up the **Methods** you understand so far.
2. Prepare some **Figures and Tables.**
3. Write up the corresponding **Results**.
4. Iterate 1, 2, and 3.

Eventually…

5. Select an appropriate journal
5. Edit and re-order your write-up
6. Redo your figures to better showcase results
7. Redo your figures so they look better
8. Edit your write-up, pick a good, uniform notation
9. Present your results at some informal seminar
10. Prepare a “Discussion” section

Try to write as you go!

Track references as you read them.

Generate more results than less and save them.

Interpret your results as best you can.

Correct the non-sense you wrote earlier, now that you *really* get it.

Talk about your results to many people, so you get better at explaining them.

Stay optimistic, the big picture eventually comes together

You are now ready for the bigger picture

- Write a discussion of your results
- Write a conclusion, including what these results lead to
- Think of how to sell your work
- Write an introduction that gives context to your work
- Edit, edit, edit: clarity is key!
- Pick a good title, write a letter to the editor
- Suggest appropriate reviewers
  (people who will think this valuable)
- Submit
- Wait
- Resubmit

Consider adding results?

Give credit where it is due,
and to potential reviewers

Think of how to make this attractive

Think of maximizing your return
on your work

Review process

- Journals usually get 2 or 3 reviewer reports
- Editors make a decision as to how to proceed
  - You may appeal a bad decision, if you have cause
- Most often, you will need to modify your paper and respond to reviewer criticism
- Reviewers have lots of power, but you can also stand your ground and try to convince the editor directly that you are right.
- You are responsible to verify that production is satisfactory.