جامعة محمد خيضر بسكرة
كلية العلوم الدقيقة و علوم الطبيعة و الحياة

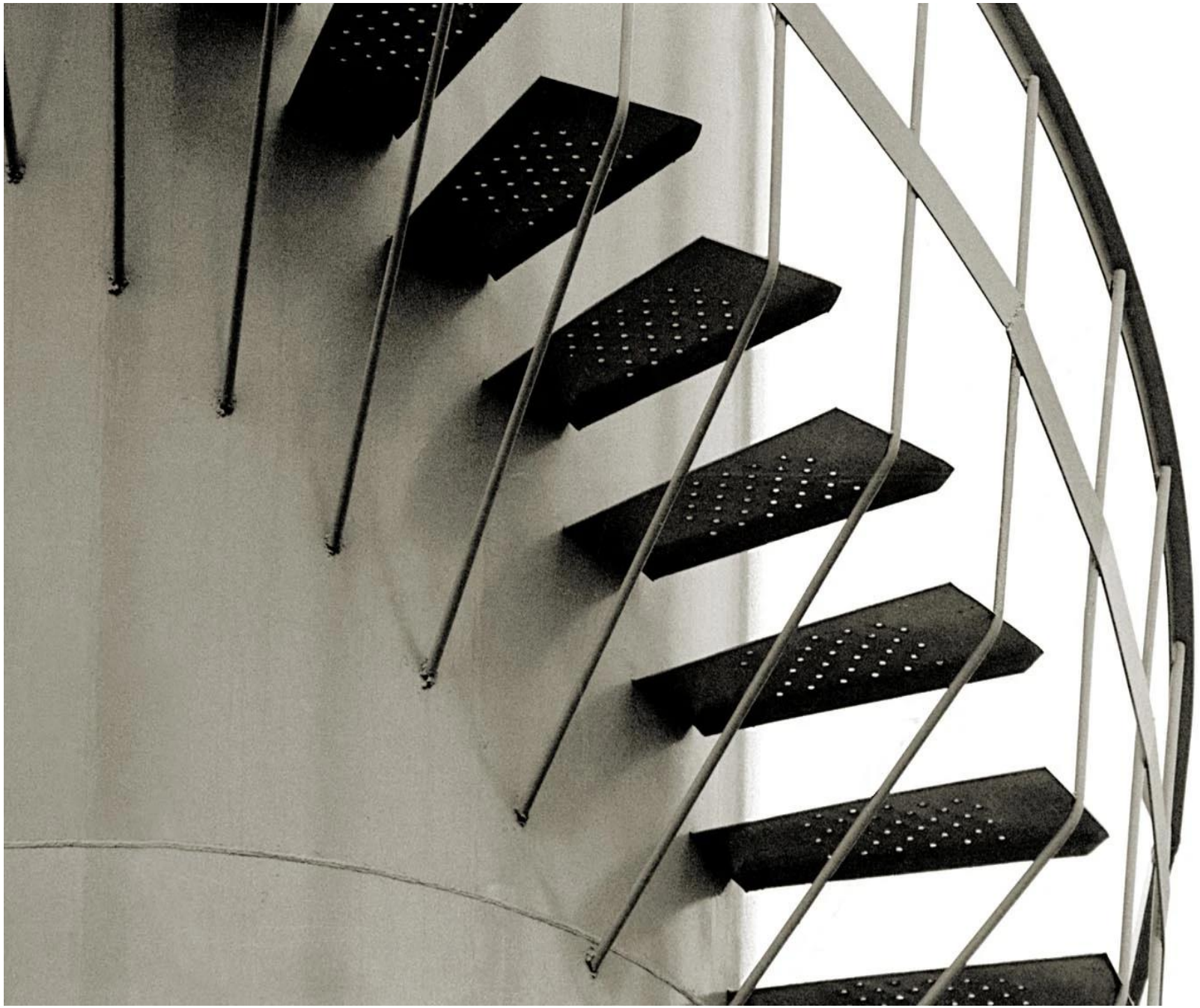
11 steps to structuring a science paper editors will take seriously

Pr, Laid KAHLOUL

LINFI Laboratory, Biskra Univeristy

(from the article of By Angel Borja, PhD)

https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously



11 steps to structuring a science paper editors will take seriously

Before starting !

- **Editor's note:** This **2014** post conveys the **advice of a researcher** sharing his experience and does not represent Elsevier's policy.

- However, in response to your feedback, **we worked with him** to update this post so it reflects our practices.

- For example, since it was published, we have worked extensively with researchers to raise visibility of non-English language research – July 10, 2019
- **April 5, 2021**

Content of a paper: IMRAD

- **I**ntroduction: What did you/others do? Why did you do it?
- **M**ethods: How did you do it?
- **R**esults: What did you find?

And

- **D**iscussion: What does it all mean?

Very important

- Each **publisher** has its own **style guidelines** and **preferences**, so always consult the publisher's Guide for Authors.

But anyway:

- The **topic to be studied should be the first issue** to be solved. Define your **hypothesis and objectives** (These will go in the **Introduction**.)

- **Review the literature** related to the topic and select some papers

Length of the manuscript

Again, look at the journal's Guide for Authors, but an **ideal length for a manuscript is 25 to 40 pages**, double spaced, including essential data only. Here are some general guidelines:

- **Title:** Short and informative
- **Abstract:** 1 paragraph (<250 words)
- **Introduction:** 1.5-2 pages
- **Methods:** 2-3 pages
- **Results:** 6-8 pages
- **Discussion:** 4-6 pages
- **Conclusion:** 1 paragraph
- **Figures:** 6-8 (one per page)
- **Tables:** 1-3 (one per page)
- **References:** 20-50 papers (2-4 pages)

11 steps to follow

- Step 1: Prepare the figures and tables
- Step 2: Write the Methods
- Step 3: Write up the Results
- Step 4: Write the Discussion
- Step 5: Write a clear Conclusion
- **Step 6: Write a compelling Introduction**
- Step 7: Write the Abstract
- Step 8: Compose a concise and descriptive title
- Step 9: Select keywords for indexing
- Step 10: Write the Acknowledgements
- Step 11: Write up the References

Finalize the Results and Discussion **before writing the introduction**. This is because, if the **discussion is insufficient, how can you objectively demonstrate** the scientific significance of your work in the introduction?

Step 1: Prepare the figures and tables

- Remember that "**a figure is worth a thousand words**." Hence, illustrations, including figures and tables, are **the most efficient way to present your results.**

- Your data are the driving force of the paper, so your **illustrations are critical!**

- **Tables or Figures?** : Generally, **tables give the actual experimental results**, while **figures are often used for comparisons** of experimental results with those of previous works, or with calculated/theoretical values (Figure 1).

Step 1: Prepare the figures and tables

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

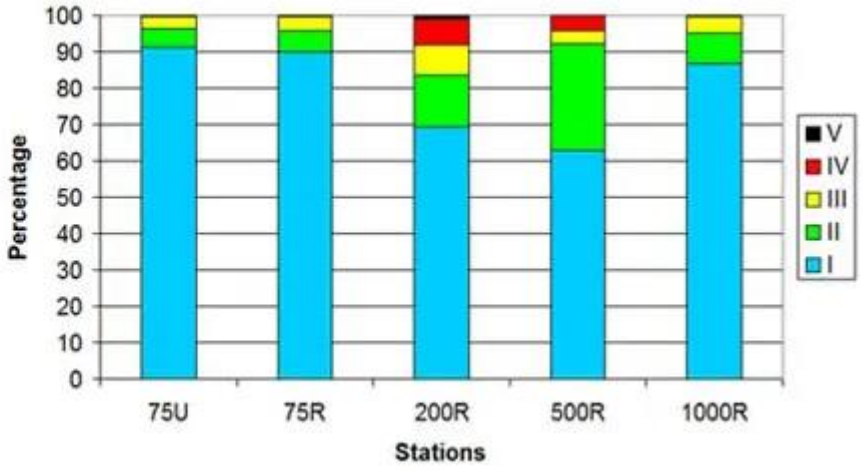
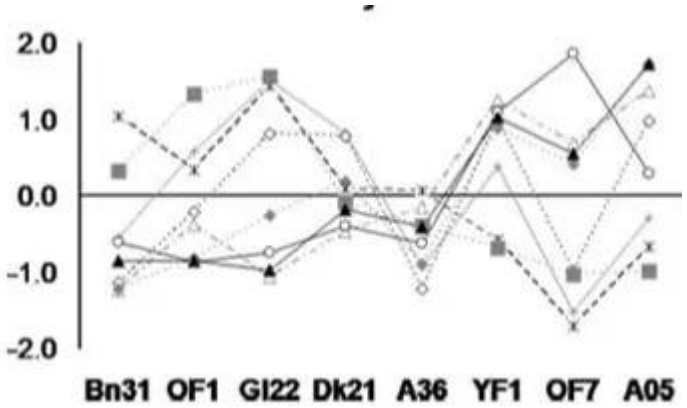


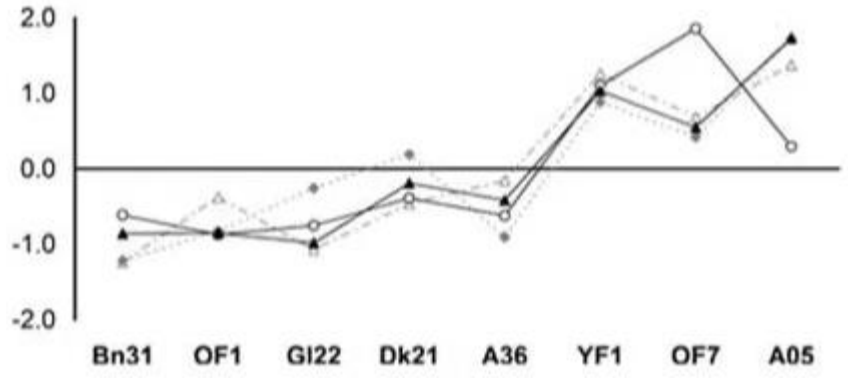
Figure 1. An example of the same data presented as table or as figure. Depending on your objectives, you can show your data either as **table (if you wish to stress numbers)** or as **figure (if you wish to compare gradients)**

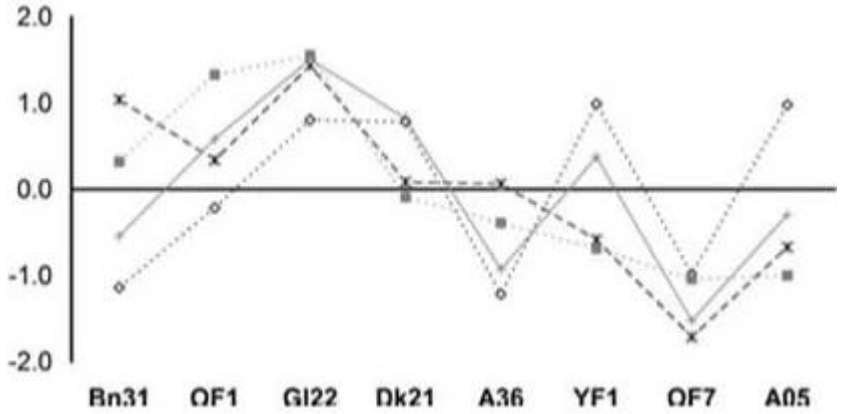
Step 1: Prepare the figures and tables

- When presenting your tables and figures, appearances count! To this end:
- **Avoid crowded plots,** using only three or four data sets per figure; use well-selected scales.
- Think about appropriate **axis label size**
- Include **clear symbols and data sets** that are easy to distinguish.
- **Never include long boring tables,** You can include them as **supplementary material**.

Step 1: Prepare the figures and tables



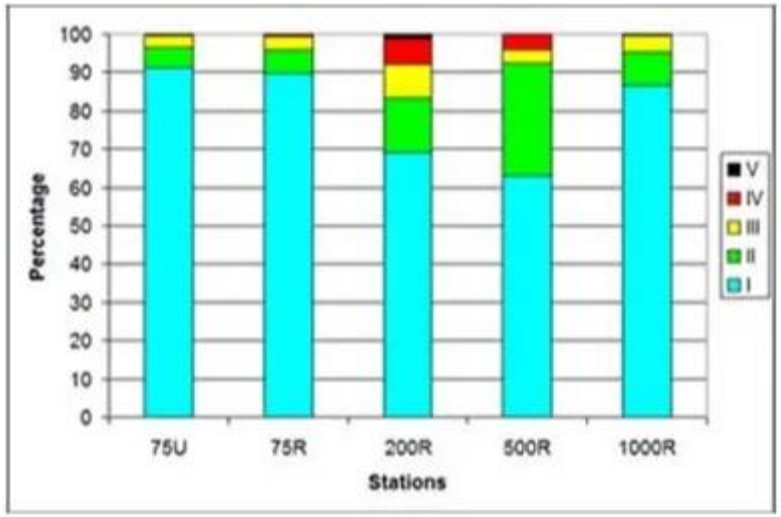


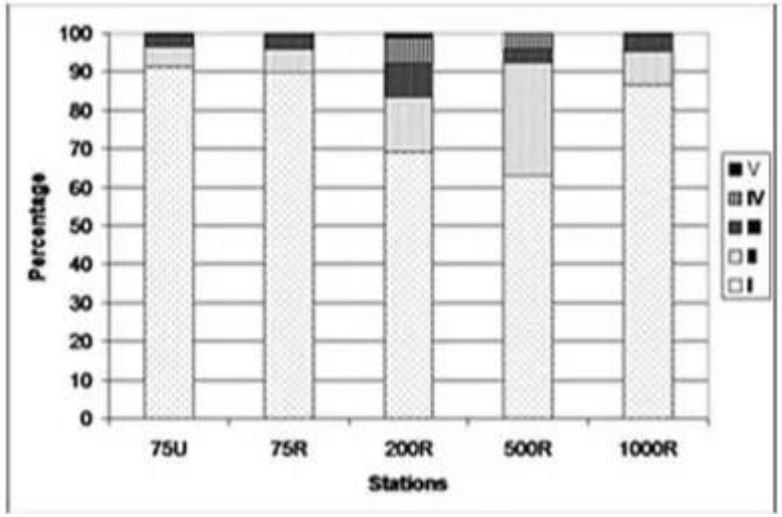


Step 1: Prepare the figures and tables

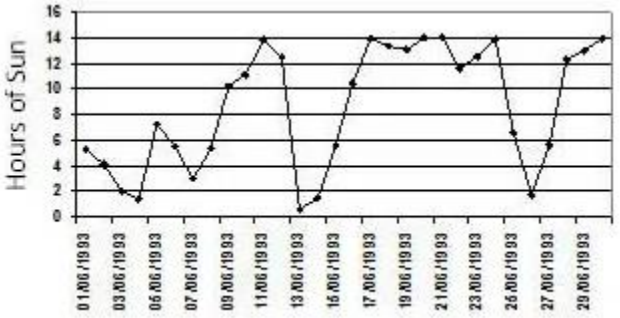
- Use **color only when necessary** when submitting to a print publication.
- If different line styles can clarify the meaning, never use colors or other thrilling effects or **you will be charged with expensive fees**. Of course, this does not apply to online journals.
- For many journals, **you can submit duplicate figures**: one in color for the online version of the journal and pdfs, and another in black and white for the hardcopy journal (Figure 4).

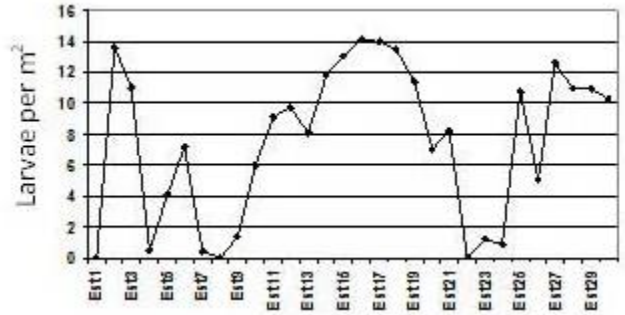
Step 1: Prepare the figures and tables

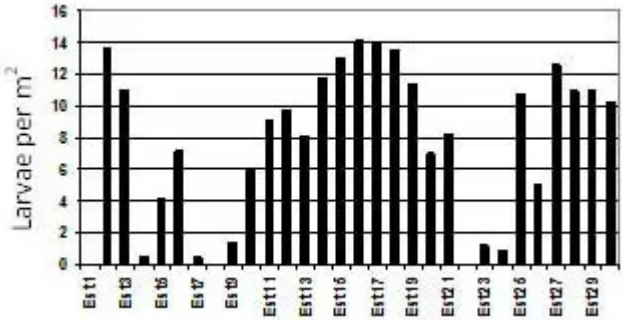




Step 1: Prepare the figures and tables



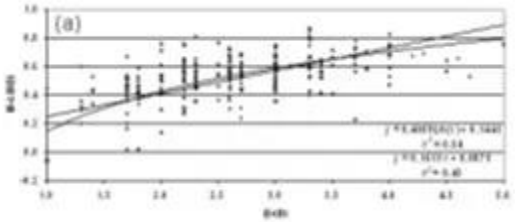


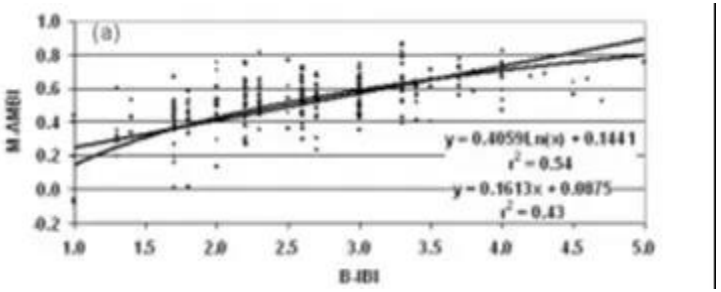


Lines joining data only can be used when presenting time series or consecutive samples data

Step 1: Prepare the figures and tables

- Sometimes, **fonts are too small** for the journal. You must take this into account, or they may **be illegible to readers**.





Step 2: Write the Methods

- **How** the problem was studied?
- You need to **include detailed information** so a knowledgeable **reader can reproduce the experiment**.
- **do not repeat the details of established methods**; use References and Supporting Materials to indicate the previously published procedures.
- **Reviewers will criticize incomplete or incorrect methods descriptions** and may recommend **rejection**, because this section is critical in the process of reproducing your investigation.

Step 3: Write up the Results

- "**What have you found**?«
- Only **representative results** from your research should be presented.
- The results should be **essential** for discussion.
- most journals offer the possibility of adding **Supporting Materials**, so use them freely for data of secondary importance.
- do **not attempt to "hide" data** in the hope of saving it for a later paper. You may lose evidence to reinforce your conclusion.
- Use **sub-headings to keep results of the same type together**, which is easier to review and read.

Step 3: Write up the Results

- An important issue is that **you must not include references** in this section; **you are presenting *your* results**, so you cannot refer to others here.

- If you refer to others, is because you are *discussing* your results, and this **must be included in the Discussion section**.

Step 3: Write up the Results: Statistical rules

- Indicate the **statistical tests used** with all relevant parameters: e.g., **mean** and standard deviation (SD): 44% (±3); **median** and interpercentile range: 7 years (4.5 to 9.5 years).
- Use mean and standard deviation to report normally distributed data.
- Use median and interpercentile range to report skewed data.
- For numbers, **use two significant digits unless more precision** is necessary (2.08, not 2.07856444).
- **Never use percentages for very small samples** e.g., "one out of two" should not be replaced by 50%.

Step 4: Write the Discussion

- the **most important section** of your article: to **sell your data**
- respond to **what the results mean**.
- the **easiest section to write**, but **the hardest section to get right**.
- A **huge numbers of manuscripts** are **rejected** because the **Discussion is weak**.
- need to make the **Discussion corresponding** to the **Results**,
- **Compare** the **published results** by **your colleagues** with **yours** (using some of the **references** included in the **Introduction**).

Step 4: Write the Discussion

- **Never ignore** work in **disagreement with yours**, in turn, you must confront it and convince the reader that **you are correct or better**.

- **Avoid unspecific expressions** such as "higher temperature", "at a lower rate", "**highly significant**". **Quantitative** descriptions are always **preferred** (35ºC, 0.5%, $p<0.001$, respectively).

- **Avoid sudden introduction of new terms or ideas;** you must present everything in the introduction, to be confronted with your results here.

Step 4: Write the Discussion

To achieve good interpretations think about:

- How do these **results relate** to the **original question** or **objectives** outlined in the Introduction section?
- Do the **data support** your **hypothesis**?
- Are your **results consistent** with what other investigators have reported?
- Discuss **weaknesses and discrepancies**. If your results were unexpected, try to explain why
- Is there another way to interpret your results?
- What **further research would be necessary to answer** the questions raised by your results?
- Explain what is new **without exaggerating**

Step 5: Write a clear Conclusion

- Show **how the work advances** the **field** from the present state of knowledge.
- In some journals, it's **a separate section**; in others, it's the **last paragraph of the Discussion section**.
- **without a clear conclusion** section, reviewers and readers will find it **difficult to judge your work** and whether it merits publication in the journal.
- **Be careful**: A common error in this section is **repeating the abstract**, or just **listing experimental results**. Trivial statements of your results are unacceptable in this section.

Step 5: Write a clear Conclusion

- Provide a clear **scientific justification** for your **work** in this section, and indicate uses and extensions if appropriate.

- Moreover, you can **suggest future experiments** and point out those that are underway.

- You can propose present global and specific **conclusions**, in **relation** to the **objectives** included in the introduction

Step 6: Write a compelling Introduction

- This is your opportunity to **convince** readers that you clearly know why your **work is useful**.
- **What** is the **problem** to be solved?
- Are there any **existing solutions**?
- Which is **the best**?
- What is **its main limitation**?
- What do **you hope to achieve**?

Step 6: Write a compelling Introduction

- You need to **introduce the main scientific publications** on which your work is based,
- **citing a couple of original and important works**, including recent review articles.
- editors **hate improper citations** of **too many references** irrelevant to the work, or **inappropriate judgments** on your own achievements.

Step 6: Write a compelling Introduction

Here are some additional tips for the introduction:

- **Never use more words than necessary** (be concise and to-the-point). Don't make this section into a history lesson. Long introductions put readers off.
- We all know that you are keen to present your new data. But do not forget that **you need to give the whole picture** at first.
- The introduction must be **organized from the global to the particular point of view**, guiding the readers to your objectives when writing this paper.
- State the purpose of the paper and research strategy adopted to answer the question, but **do not mix introduction with results**, discussion and conclusion. Always keep them separate to ensure that the manuscript flows logically from one section to the next.
- **Hypothesis and objectives** must be clearly remarked at the **end of the introduction**.
- Expressions such as **"novel," "first time," "first ever," and "paradigm-changing" are not preferred**. Use them sparingly.

Step 7: Write the Abstract

- what you did and what the **important findings** in your research were.
- **Make it interesting** and **easily understood** without reading the whole article
- **void using jargon**, uncommon **abbreviations** and **references**.
- The abstract provides a **short description** of the perspective and **purpose** of your paper.
- **key results** but minimizes **experimental details**.
- offers a **short description** of the **interpretation**/conclusion in the **last sentence.**

Step 7: Write the Abstract

- A **clear abstract** will strongly **influence** whether or not your **work** is further **considered**.
- However, the abstracts must be keep **as brief as possible**. Just check the 'Guide for authors' of the journal, but normally they have less than **250 words**
- the **two *whats*** a re essential. **What has been done? What are the main findings?**

Step 8: Compose a concise and descriptive title

- The title must **explain what** the **paper** is broadly **about**.
- **Attract** the reader's **attention**.
- Readers must be **selective**, and this **selection** often **comes** from the **title**.
- **Reviewers** will check **whether** the title is specific and whether it **reflects the content** of the manuscript
- **Editors** hate titles that make no sense or fail to represent the subject matter adequately.
- keep the title informative and concise (clear, descriptive, and not too long).

Step 8: Compose a concise and descriptive title

- keep the title informative and concise (**clear**, **descriptive**, and **not too long**).
- **Avoid technical jargon** and **abbreviations**, if possible.
- **Attract** a readership as large as possible

Step 9: Select keywords for indexing

- They are **the label** of your manuscript.
- **avoid words** with a **broad meaning** and words already **included in the title.**
- Only **abbreviations** firmly **established** in the field are eligible, avoiding those which are not broadly used

Step 10: Write the Acknowledgements

- Here, you can **thank people** who have contributed to the manuscript but not to the extent where that would justify authorship.

- For example, here you can **include technical help** and assistance with writing and proofreading. Probably, the most important thing is to **thank your funding agency** or the agency giving you a grant or fellowship.

- In the case of European projects, do not forget to include the grant number or reference. Also, some institutes include the number of publications of the organization, e.g., "This is publication number 657 from AZTI-Tecnalia."

Step 11: Write up the References

- In the text, **you must cite all the scientific publications** on which your work is based.
- But do not over-inflate the manuscript with too many references – it doesn't make a better manuscript!
- **Avoid excessive self-citations** and excessive citations of publications from the same region.

Finally, check the following:

- **Spelling** of author names
- **Year** of publications
- Usages of ***"et al."***
- **Punctuation**
- Whether **all references are included**

References

- Write a scientific paper:

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- Write a paper in Math:

https://web.mit.edu/jrickert/www/mathadvice.html

- Write a paper in computer science:

https://www.academia.edu/14950813/How_to_Write_a_Research_Paper_in_Computer_Science

https://globaljournals.org/journals/tips-for-writing-a-good-quality-computer-science-research-paper

https://faculty.ksu.edu.sa/sites/default/files/howtowrite8pages.pdf