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**bsas**

british society of animal science



**Guidelines for Structuring a  
Scientific Paper**

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## Guidelines for Structuring a Scientific Paper

### Length of the manuscript

All journals will have their own guidelines to which you must adhere, but manuscripts are generally 25 to 40 pages in length, double spaced, and include only essential data.

Below 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)

### Compiling your manuscript

1. Prepare the figures and tables
2. Write the Methods
3. Write 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 the References

### 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!

#### When should you present data as tables or figures?

Depending on your objectives, you can show your data either as a table if you wish to stress numbers, or as a figure if you wish to compare gradients. A comparison is given in Figure 1. Note: never include vertical lines in a table.

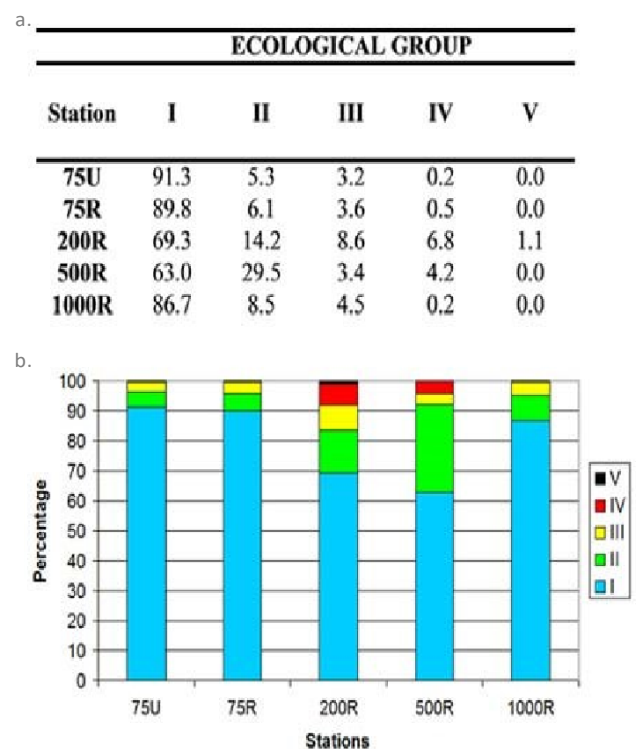


Figure 1. An example of the same data presented as a table (a) or as a figure (b).

Whatever your choice, no illustrations should duplicate the information described elsewhere in the manuscript.

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Another important factor to remember is that figure and table titles must be self-explanatory (Figure 2).

**For positioning titles remember  
'tables at the top, figures at the foot'**

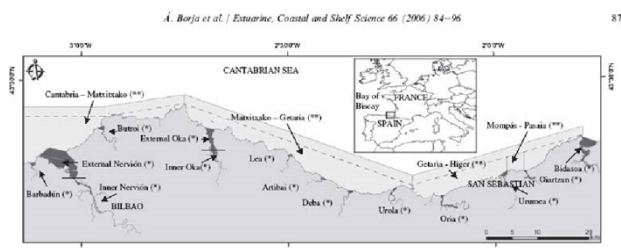


Figure 2. Location of each estuarine (\*, black) and coastal (\*\*, grey) water bodies, within the Basque Country. Note: dotted line shows the Basque coastal baseline. Inner and external parts of the Nervión and Oka estuaries are separated by a straight line.

**When presenting your tables and figures,  
appearances count!**

To this end, further tips include:

- Avoid crowded plots (Figure 3), using only three or four data sets per figure; use well-selected scales
- Think about appropriate axis label size
- Where symbols are necessary, make sure they are clear and easy to distinguish
- Tables of information that is not directly essential to the methods or results are unnecessary. You can include them as supplementary material if need be

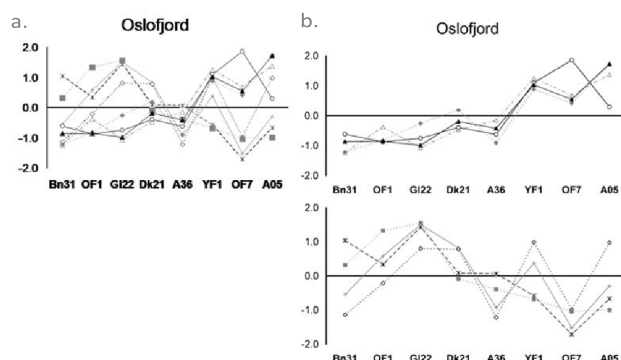


Figure 3. An example of too much data to distinguish clearly in one figure (a), and the same dataset made clearer by separating it into two figures (b).

If you are using photographs, each must have a scale marker, or scale bar, of professional quality in one corner. In photographs and figures, use colour only when necessary for submission to a print publication. If different line styles can clarify the meaning, never use colours 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 colour for the online version of the journal and pdfs, and another in black and white for the hardcopy journal (Figure 4).

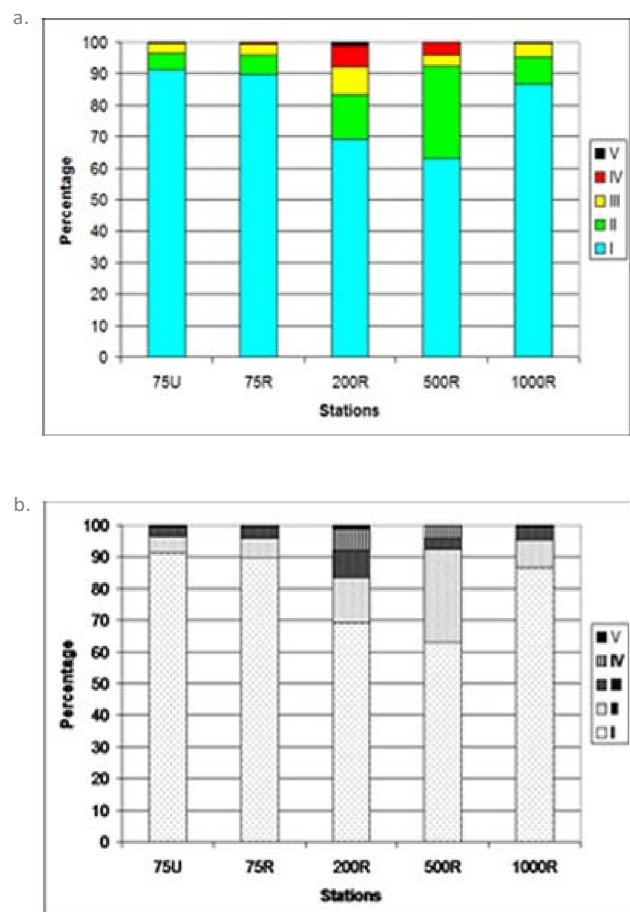


Figure 4. An example of a figure in colour for online versions (a) and black and white for hardcopies (b).

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Another common problem is the misuse of lines and histograms. Lines joining data should only be used when presenting time series or consecutive samples data (e.g. 'hours of sun over time for a given location', Figure 5). However, when there is no connection between samples or no gradient, you must use histograms (Figure 5).

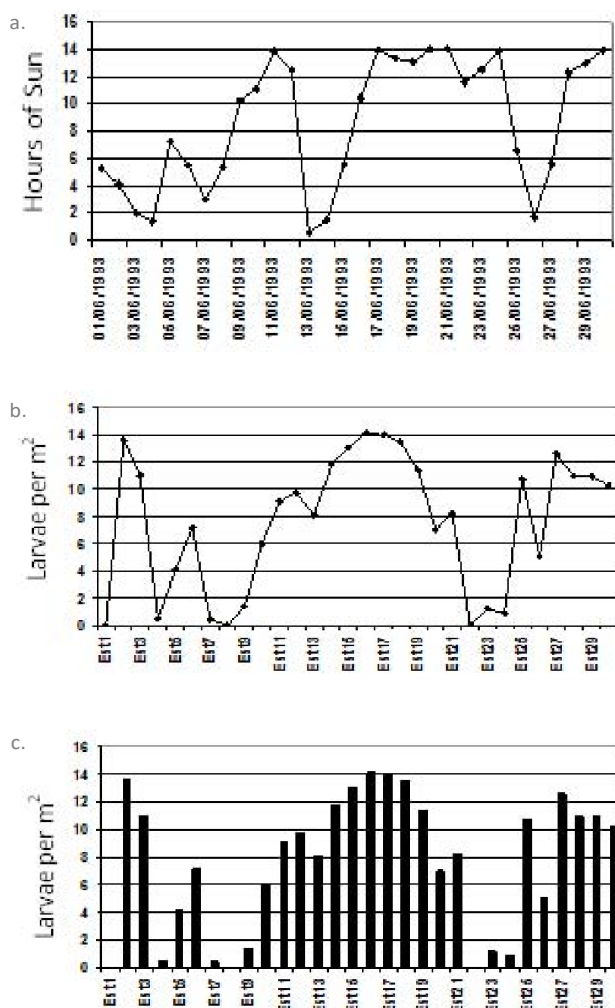


Figure 5. Appropriate use of a line connecting points in relation to a time series (a), inappropriate use of a line connecting points for count data (b), and an alternative for figure b using a bar chart (c) however this data would be better presented as a table.

Sometimes, fonts are too small for the journal. You must take this into account, or they may be illegible to readers (Figure 6).

**Figures are not eye charts, make them large enough to read!**

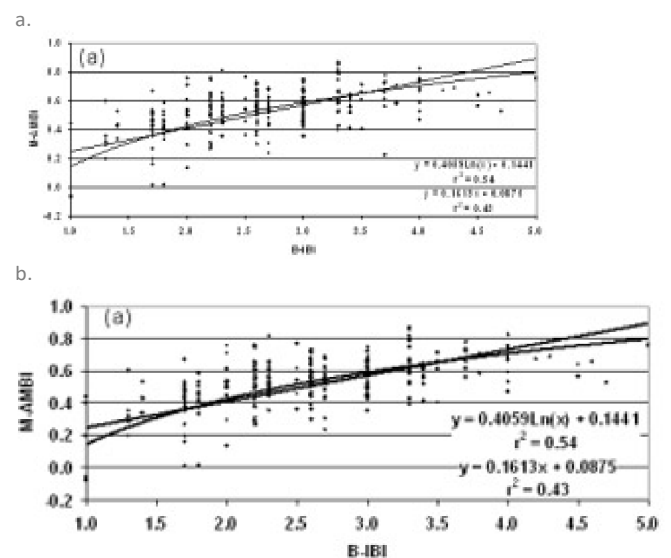


Figure 6. Inadequate use of lines, number of decimals, decimal separators (use always dots, not commas) and position of units (a) and its adequate use for a clearer table (b).

Finally, you must pay attention to the use of decimals, lines, etc. (Table 1). Check the journal's requirements if they are different.

Table 1. Inadequate use of lines, number of decimals, decimal separators (use always dots, not commas) and position of units (a) and its adequate use for a clearer table (b).

a.

Depth	Gravel	Sand	Mud
5 m	3,42%	81.41%	15,17%
50 m	2,5%	58.42%	39.08%
100 m	0,0%	32.5%	67.5%

b.

Water depth (m)	Gravel (%)	Sand (%)	Mud (%)
5	3.4	81.4	15.2
50	2.5	58.4	39.1
100	0.0	32.5	67.5

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## Guidelines for Structuring a Scientific Paper

### Step 2: Write the Methods

This section responds to the question of how the problem was studied. If your paper is proposing a new method, you need to include detailed information so a knowledgeable reader can reproduce the experiment.

However, do not repeat the details of established methods; use References and Supporting Materials to indicate the previously published procedures. Broad summaries or key references are sufficient.

Experiments and statistics should be presented. It is critical that the Methods section is reproducible. Therefore, incomplete or inaccurate Methods may lead to rejection of the manuscript.

Ensure all chemicals and sequences etc. are identified. Do not use proprietary, unidentifiable compounds.

To this end, it's important to use standard systems for numbers and nomenclature.

For example:

- For chemicals, use the conventions of the International Union of Pure and Applied Chemistry and the official recommendations of the IUPAC–IUB Combined Commission on Biochemical Nomenclature.
- For species, use accepted taxonomical nomenclature (WoRMS: World Register of Marine Species, ERMS: European Register of Marine Species) and always write them in italics.
- For units of measurement, follow the International Systems of Units (SI).

Avoid giving comments, results or discussion in the Methods section. Simply state what you did, when and how you analysed the results.

List the methods in a logical, chronological order and ensure this is reflected in the Results section.

For example:

- Description of the site
- Description of the surveys or experiments done, giving information on dates, etc. Description of laboratory methods, including separation or treatment of samples, analytical methods, following the order of waters, sediments and biomonitors.
- If you have worked with different biodiversity components start from the simplest (i.e. microbes) to the more complex (i.e. mammals)
- Description of the statistical methods used (including confidence levels, etc.)

### Step 3: Write the Results

This section responds to the question “What have you found?” Hence, only results from your research should be presented. The results should be essential for discussion.

However, remember that most journals offer the possibility of adding Supporting Materials, so use them freely for data of secondary importance. In this way, do not attempt to “hide” data in the hope of saving it for a later paper. You may lose evidence to reinforce your conclusion. If data are too abundant, you can use those supplementary materials.

Use sub-headings to keep results of the same type together, which is easier to review and read. Number these sub-sections for the convenience of internal cross-referencing but always taking into account the publisher's Guide for Authors.

For the data, decide on a logical order that tells a clear story and makes it and easy to understand. Generally, this will be in the same order as presented in the Methods section.

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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, it is because you are discussing your results, and this must be included in the Discussion section.

Statistical rules:

- Indicate the statistical tests used with all relevant parameters: e.g., mean and standard deviation (SD): 44% ( $\pm 3$ ); 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

Here you must interpret what the results mean. Probably the hardest section to get right. This is because it is the most important section of your article. Here you can show how you have correctly interpreted the data and correctly compared it with other studies, as well as being able to highlight differences between methodologies across studies that may affect result. Take into account that a huge numbers of manuscripts are rejected because the Discussion is weak.

You need to make the Discussion correspond to the Results, but do not reiterate the results.

Here you need to compare published results with yours, using some of the references included in the Introduction. If appropriate, highlight that there are studies that confirm your outcomes and studies that disagree. You have to discuss why this might be the case.

Avoid statements that go beyond what your results can support.

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

Avoid sudden introduction of new terms or ideas; you must present everything in the introduction.

Speculations on possible interpretations are allowed, but these should be rooted in fact, rather than imagination. 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

Revision of Results and Discussion is not just paper work. You may do further experiments, derivations, or simulations. Sometimes you cannot clarify your idea in words because some critical items have not been studied substantially.

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### Step 5: Write a clear Conclusion

This section shows 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. Whatever the case, without a clear conclusion section, reviewers and readers will find it difficult to judge your work and whether it merits publication in the journal.

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.

You should provide a clear scientific justification for your work and indicate uses and extensions if appropriate. Moreover, you can suggest future experiments and point out those that are underway.

### Step 6: Write a compelling Introduction

This is your opportunity to convince readers that you clearly know why your work is useful.

A good introduction should answer the following questions:

- What is the problem to be solved?
- Are there any existing solutions?
- Which is currently the best?
- What is its main limitation?
- What do you hope to achieve?

Editors like to see that you have provided a perspective consistent with the nature of the journal. You need to introduce the main scientific publications on which your work is based, citing a couple of original and important works, which may include recent review articles.

However, editors dislike improper citations of too many references irrelevant to the work, or inappropriate judgments on your own achievements.

*"If I come to an impasse, it usually means that I don't thoroughly understand what I'm writing about"*  
– Dr. Richard Rotunno, National Center for Atmospheric Research

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.

You may be keen to present your data but don't forget to first present the whole picture.

The Introduction must be organised from the global down to the more localised point of view, guiding readers to your objectives.

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.

Hypotheses and objectives must be clearly stated at the end of the Introduction.

### Step 7: Write the Abstract

The abstract tells prospective readers what you did and what the important findings in your research were.

*In an Abstract the two 'whats' are essential*

Together with the title, it's the advertisement of your article. Make it interesting and easily understood without reading the whole article. Avoid using jargon, uncommon abbreviations and do not include references.

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You must be accurate, using the words that convey the precise meaning of your research. The abstract provides a short description of the perspective and purpose of your paper. It gives key results but minimises experimental details. It is very important to remember that the abstract offers a short description of the interpretation/conclusion in the last sentence.

A clear abstract will strongly influence whether or not your work is further considered. However, the abstracts must be kept as brief as possible. Just check the Guide for authors of the journal, but normally they are fewer than 250 words.

### Step 8: Compose a concise and descriptive title

The title must explain what the paper is broadly about. It is your first (and probably only) opportunity to attract the reader's attention. To this end, remember that the first readers are the Editor and the referees. Also, readers are the potential authors who will cite your article, so first impressions count.

There is a plethora of publications and readers have limited time. They 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 dislike titles that make no sense or fail to represent the subject matter adequately. Hence, it is important to keep the title informative and concise (clear, descriptive, and not too long). To attract as large a readership as possible, avoid using technical jargon and abbreviations where appropriate.

Dedicate some time to think about the title and discuss it with your co-authors.

Example 1:

**Original title:** Preliminary observations on the effect of salinity on benthic community distribution within an estuarine system, in the North Sea

**Revised title:** Effect of salinity on benthic distribution within the Scheldt estuary (North Sea)

**Comments:** Long title distracts readers. Remove all redundancies such as "studies on," "the nature of," etc. Never use expressions such as "preliminary." Be precise.

Example 2:

**Original title:** Action of antibiotics on bacteria

**Revised title:** Inhibition of growth of *Mycobacterium tuberculosis* by streptomycin

**Comments:** Titles should be specific. Think about "how will I search for this piece of information" when you design the title.

Example 3:

**Original title:** Fabrication of carbon/CdS coaxial nanofibers displaying optical and electrical properties via electrospinning carbon

**Revised title:** Electrospinning of carbon/CdS coaxial nanofibers with optical and electrical properties

**Comments:** "English needs help. The title is nonsense. All materials have properties of all varieties. You could examine my hair for its electrical and optical properties! You MUST be specific. I haven't read the paper but I suspect there is something special about these properties, otherwise why would you be reporting them?" – the Editor-in-Chief.



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### Step 9: Select keywords for indexing

Keywords are used for indexing your paper. They are the label of your manuscript. While they are probably less important than they used to be as you can now search whole texts, you must ensure the keywords are specific to, and reflect, the study. It's also good to avoid words that are in the title so you have a greater chance of your article coming up in a search.

Some journals require that keywords should not include those that appear in the title of the journal. For example, the journal *Soil Biology & Biochemistry* requires that the word "soil" not be selected as a keyword.

Abbreviations may be used as keywords but only those that are firmly established in the field.

You must always ensure you adhere to the journal's Guide for Authors for the number of keywords permitted.

### Step 10: Write the Acknowledgments

Here, you can thank people who have contributed to the manuscript but not to the extent where it would justify authorship. For example, here you can include technical help and assistance with writing and proofreading. It is very important to thank any funders involved in your study.

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 organisations, e.g. "This is publication number 657 from AZTI-Tecnalia".

### Step 11: Write up the References

Typically, there are more mistakes in the references than in any other part of the manuscript. There are many tools available to help with accuracy when putting references together such as EndNote or Mendeley. Most journals now provide files that allow you to adapt your referencing automatically to the required format. Also, Elsevier's Your Paper Your Way programme waves strict formatting requirements for the initial submission of a manuscript as long as it contains all the essential elements being presented here.

In the text, you must cite all the scientific publications on which your work is based. Be careful not to 'over-cite' - the aim is not to show how many papers you have read! Avoid excessive self-citations and excessive citations of publications from the same region or group.

Always refer to the journal's Guide for Authors to ensure you cite and reference as required. In general, you should minimise personal communications and be mindful as to how you include unpublished observations. These will be necessary for some disciplines but consider whether they strengthen or weaken your paper.

You might also consider articles published on research networks prior to publication, but give thought to balancing these citations with citations of peer-reviewed research. When citing research in languages other than English, be aware of the possibility that not everyone in the review process will speak the language of the cited paper and that it may be helpful to find a translated version where possible.

Finally, check the following:

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

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### Ethics topics to consider when publishing:

- Authorship of the paper: Authorship should be limited to those who have made a significant contribution to the conception, design, execution, or interpretation of the reported study. Transparency about the contributions of authors is encouraged, for example in the form of a **CRedit author statement**.
- Originality and plagiarism: The authors should ensure that they have written entirely original works, and if the authors have used the work and/or words of others, that this has been appropriately cited or quoted.
- Data access and retention: Authors may be asked to provide the raw data in connection with a paper for editorial review, and should be prepared to provide public access to such data.
- Multiple, redundant or concurrent publication: An author should not in general publish manuscripts describing essentially the same research in more than one journal or primary publication.
- Acknowledgement of sources: Proper acknowledgment of the work of others must always be given.
- Disclosure and conflicts of interest: All submissions must include disclosure of all relationships that could be viewed as presenting a potential conflict of interest.
- Fundamental errors in published works: When an author discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the journal editor or publisher and cooperate with the editor to retract or correct the paper.
- Reporting standards: Authors of reports of original research should present an accurate account of the work performed as well as an objective discussion of its significance.
- Hazards and human or animal subjects: Statements of compliance are required if the work involves chemicals, procedures or equipment that have any unusual hazards inherent in their use, or if it involves the use of animal or human subjects.
- Use of patient images or case details: Studies on patients or volunteers require ethics committee approval and informed consent, which should be documented in the paper.

Further information is available [here](#)

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### Expert advice

*“Often people run out of gas before they write the Summary & Conclusions. This part of the paper, or talk, is what will remain uppermost in the reader’s/ listener’s mind. I want to know where this work leaves us (i.e. the summary) and where does it lead us (i.e. what are the questions raised by this work, i.e. the conclusions.)”*

*– Prof. Emeritus Gil Leppelmeier, Finnish Meteorological Institute*

*“As I get infinitely busy, I am infinitely interested in SKIMMABILITY. Topic words, leading topic sentences, leading topic paragraphs, of well labeled sections, down a predictable logical path that the title telegraphed. No suspense.”*

*– Prof. Brian Mapes, University of Miami*

*“Make sure the abstract, introduction, and conclusions touch all the same points. There should be a one-to-one correspondence between the points made in each. One useful idea is to use a highlighter to mark the points made in the abstract, intro, and conclusions to make sure there is closure.”*

*– Prof. Robert Houze, University of Washington*

For further information:

<https://www.elsevier.com/authors>

<https://www.elsevier.com/connect/authors-update/in-the-eye-of-the-beholder>