

Scientific Writing

1. Structure

A scientific text like a research report needs a clear structure. The following parts are commonly used.

a. Date

You have to mention the date when the experiment took place

b. Title

Give the title of the experiment

c. Author

Give the names of everyone who participated in the research project

d. Aim

The aim describes why the experiment is being performed, i.e. it is the part where you mention what you are trying to prove

e. Abstract

An abstract is a brief summary of the experiment. Here you describe the goal of the experiment, how the experiment was performed, the main results, why these results are important for this research and the main conclusion(s). An abstract is generally not longer than a single paragraph (about 150 words).

Questions to answer:

- What did you do?
- How did you do it?
- What were the results?
- What were the conclusions?

f. Introduction

The introduction is a short description of the topic. It summarizes relevant previous studies and describes the research question and hypothesis. This is also the section where you include a summary and justification of the experimental method. If written properly, the introduction explains thoroughly which questions will be dealt with in the report. Make sure you use references from the literature that you studied and cite them correctly.

Questions to answer:

- What knowledge already exists about this subject?
- What is the hypothesis that you have come up with?
- How will you perform the experiment?
- What is the specific purpose of the experiment?

**g. Materials & Method**

This part explains how the research was carried out. For the reliability of a research project it is important that it is possible to repeat it, so a proper description of the method is of great importance. Start with a list of the materials, i.e. everything needed to complete your experiment. Follow it up with a step-by-step description of the experimental procedure. Be detailed to the point where anyone could read it and duplicate your experiment. Here you can also read about the number of measurements that were performed, the control and experimental groups and what the research area looks like. The answers to these questions can help decide how reliable the conclusions are.

h. Results

Give a description of the most important results of your research. You do not explain the results in any way; this is part of the discussion. It is important to distinguish between (a) the raw measurements from the lab or field and (b) the outcome of the calculations on your data. Most of the time, tables and graphs are the clearest way to present the data. However, the most relevant results should be mentioned separately in the text. Most results have units, and should have these units clearly labelled (for example, did you measure length in centimeters (cm) or in meters (m)?). It is most efficient to put the units in the legend on top of the table, e.g. volume (mL), rather than to follow every number with a symbol.

i. Discussion

In the discussion, the most important findings of your research are put forward in the first paragraph. Next, the reliability of these findings is discussed; this is where questions are answered such as: how do these findings correspond with the findings of other researchers, is your hypothesis accepted or rejected and in which situations are these findings still reliable. Afterwards, researchers mention the mistakes they made during the experiment and what the possible effect may be on the results. It also is useful to describe how the experiment may be improved. Keep in mind that results that do not correspond with the theory are still results and are definitely worth mentioning.

j. Conclusion

In the conclusion, the research question is answered as far as possible. Sometimes the possibilities for future research are mentioned here. The conclusion can be to the point, it certainly does not contain any information that was not previously discussed in the report.

k. References

If your research is based on someone else's work or if you cited facts that require documentation, then you should list these as references.

Example of reference in text:

Doing research means analyzing a problem or situation according to a certain step-by-step plan (Verhoeven, 2011).

Example of reference in literature list:

Verhoeven, N. (2011). What is research?

1. Appendices

This is where the rough data can be added, for example tables with measurements and large calculations.

2. Numbers and amounts

For the description of an experiment, it is often tempting to use words such as “many”, “hot” or “fast”: words that indicate a number or amount. However, the interpretation of these words depends on the reader or context, so it is best to be as accurate as possible. Saying “the reaction happened in less than a millisecond” is always better than “the reaction happened fast”.

3. Tables and illustrations

A table or illustration can help clarify certain parts of the text. However, important information should not be omitted from the text. Tables and illustrations should have a heading that explains what data they represent. An illustration can be useful, for example when showing an experimental setup: a picture can explain this at a glance. The illustration is only useful when it is informative. A table should have a logical structure and it is preferred to add a legend in which you explain how to interpret the table. Consider the ordering of your data carefully. By playing with the order in which you represent data, you can emphasize data that you think is more important.

Example of ordering your data in a table

For an ecological study, body length of four chimpanzees is measured yearly. The data is ordered in tables in two different ways.

Table 1. Body length in cm, individuals sorted alphabetically according to name.

Individual	Arabella	Leonardo	Pepe	Sofia
Age				
4	77	94	95	89
5	84	100	105	95
6	90	106	108	100

Table 2. Body length in cm, individuals sorted according to sex.

Sex	Female		Male	
Individual	Arabella	Sofia	Leonardo	Pepe
Age				
4	77	79	94	95
5	84	85	100	105
6	90	92	106	108

If you want to compare body length between female and male chimpanzees, it is hard to do so in the first table when individuals are sorted alphabetically. When you sort the individuals according to sex, it is much easier to compare body length between sexes since females are in columns next to each other and males as well. In that case, it is more apparent that in this group female chimpanzees on average have a smaller body length than male chimpanzees.

Refer to illustrations and tables in your text, that way the reader knows how they relate to your study. Explain in a short description above the table or below the illustration what data is shown which helps readers to understand your table/illustration without having to read the whole text. Make sure your tables/illustrations add something to the text; in other words, they should show useful information.

4. Logbook with data

For describing your research, it is important to use a logbook to keep track of each step. It may seem easy to remember a few measurements. In reality, after a busy week, this may not be as easy as you think. Use the logbook often to make note of any unexpected changes or simple mistakes. The better you document the research, the better the research can be repeated not only by yourself but also by anyone who wants to replicate your research. Make sure that for each new entry in your logbook you note down the following:

- Date, time
- Duration of measurements
- Observer
- Description of the environment (abiotic factors)
 - Temperature
 - Wind
 - Humidity
 - Sun/shade

Keep the entries brief and make sure that others reading your logbook can make sense of it.