

Writing for science

This study guide offers you some strategies for making your scientific writing more effective, helping you to write with accuracy and clarity.

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Introduction

Writing is a very important part of science; it is used to document and communicate ideas, activities and findings to others. Scientific writing can take many forms from a lab notebook to a project report, and from a paper in an academic journal to an article in a scientific magazine. This guide focuses on scientific writing for academic course work, much of which is devoted to describing and explaining.

Characteristics of good scientific writing

Good scientific writing is:

- **clear** - it avoids unnecessary detail;
- **simple** - it uses direct language, avoiding vague or complicated sentences. Technical terms and jargon are used only when they are necessary for accuracy;
- **impartial** - it avoids making assumptions (*Everyone knows that ...*) and unproven statements (*It can never be proved that ...*). It presents how and where data were collected and supports its conclusions with evidence;
- **structured logically** - ideas and processes are expressed in a logical order. The text is divided into sections with clear headings;
- **accurate** - it avoids vague and ambiguous language such as *about, approximately, almost*;
- **objective** - statements and ideas are supported by appropriate evidence that demonstrates how conclusions have been drawn as well as acknowledging the work of others.

Developing good scientific writing

To reflect the characteristics of good scientific writing in your own work, you need to think about the way that you write and the language that you use. A good scientific author will have given consideration to the following choices in writing, making decisions that improve the **effectiveness** of the writing.

Choosing the words

To make your writing clear, accurate and concise you should consider carefully the words that you use, and the ways in which you use them.

Technical terms

In most scientific writing you will need to use some scientific or technical terms in order to be clear and unambiguous. However, use such terms only when you need to do so and do not try to impress the reader by using unnecessary technical jargon or lengthy words.

Abbreviations

Abbreviations can be a very useful way of saving time and avoiding repetition, but they can be confusing and might not be understood by everyone. Use standard abbreviations where these exist, and reduce your use of abbreviations to an absolute minimum; they are rarely essential.

Use objective rather than subjective language

Objective language is language that is impartial and states a fact or process; subjective language is open to question or interpretation as it implies personal thought or belief. For example:

objective *The car travelled at 38 kilometres per hour*

is a clear, objective statement of fact. However:

subjective *The contents of the test tube turned a beautiful blue colour*

uses beautiful in a way that is subjective because it cannot be measured or accurately explained to the reader. Always use language that is concrete and specific rather than vague and personal.

Choosing a 'voice'

Scientific writers have a tendency to use *passive* rather than *active* expressions; stating that *a* was affected by *b* uses the passive voice while stating that *b* did something to *a* uses the active voice. The following example shows a sentence written in both the passive and active voices.

passive *The experiment was designed by the research officer.*

active *The research officer designed the experiment.*

The passive voice is particularly useful when:

- you wish your writing to be formal and depersonalised:

passive *It was agreed that the experiment should be...*

active *We agreed that the experiment should be...;*

- information about the agent is obvious or unimportant:

passive *Extra solvent was added to the flask*

active *The technician added extra solvent to the flask;*

- you do not know the identity of the agent:

passive *The water pipe was broken in three places*

active *Something/someone had broken the water pipe in three places.*

However, the use of the passive voice can lead to clumsy and overcomplicated sentences.

passive *Difficulty was experienced in obtaining the product in a high state of purity*

is rather convoluted way of saying

active *The product was difficult to purify*

which is a much clearer and more straightforward statement.

In general, the active voice is clearer, more direct and easier to read, but the passive voice can be more appropriate in particular circumstances. What is most important is for you to be aware of how you are writing, and how the voice that you choose affects the tone and the meaning of your words.

Personal or impersonal?

Scientific writers often try to avoid the use of personal expressions or statements in order to make their writing seem more impartial and formal. The following sentence has been written with both personal and impersonal expressions to highlight the contrast between the two writing styles.

impersonal *The explanation for this phenomenon may be found in...*

personal *We/I believe that the explanation for this phenomenon may be found in...*

However, used indiscriminately, writing impersonally can result in clumsy statements through an excessive use of the passive voice. This can lead to ambiguity or inaccuracy in your written work, for example:

impersonal and passive

It was decided that the temperature should be raised gives no information about the identify of the people who made the decision.

personal and active

We decided that the temperature should be raised avoids ambiguity and makes the sentence sound more direct, but uses the personal and rather informal *we*.

impersonal and active

The research team decided that the temperature should be raised is clear and direct.

Think carefully about your use of impersonal and personal expressions, taking care to ensure that your writing is always clear and unambiguous.

Using tenses

Scientific writing frequently uses the past tense, particularly when the main focus of the writing is to describe experiments or observations that took place prior to the time of writing, for example:

The data were analysed./ The solution was decanted./ The temperature was recorded.

However, the past tense, may not be appropriate for everything that you write and sometimes you will need to combine different tenses in the same piece of writing. For example, the use of different tenses can help to clarify what happened or

what you did in the past (past tense), what you conclude (present tense) and what will be an issue for the future (future tense). The following sentences show how different tenses can be used to achieve clarity in your written work.

The experiment was carried out in a sterile environment (past tense for a statement of what happened). *It is particularly important to avoid contamination (present tense for a statement that is a general 'truth').* *It will be necessary to ensure that the same conditions are replicated in future experiments (future tense for a recommendation for the future).*

An appropriate use of past, present and future tenses can contribute to a clear and unambiguous writing style.

Sentence length

Sentences that are too short and poorly connected can be irritating to read. Conversely, sentences that are too long and rambling are difficult to follow and are likely to be confusing. Use a sentence length that allows your thoughts to flow clearly. As a general rule there should be no more than 20-25 words in any one sentence. You may be able to reduce your sentence length by:

- cutting out unnecessary words

like might replace *along the lines of*

now may be just as appropriate as *at the present time*

we can now turn our attention to could perhaps be cut out entirely;

- dividing complex sentences into separate phrases or sentences.

If a breakdown occurs it is important that alternative supplies are available and the way that this is done is for the power stations to be linked through the high voltage transmission lines so that all of them contribute to the total supply of energy and an unexpectedly large demand can be handled.

can be re-written thus:

If a breakdown occurs it is important that alternative supplies are available; this is done by linking power stations through the high voltage transmission lines. All of them thus contribute to the total supply of energy and an unexpectedly large demand can be handled.

Summary

Writing well requires as much care and thought as the experiments or research that are written about. This study guide has defined a number of characteristics of good writing, and has highlighted some of the key choices that scientific authors must make if they are to write with accuracy and clarity. If you require further help in the development of your writing, you can contact Student Learning Development.

This study guide is one of a series produced by Student Learning Development at the University of Leicester. As part of our services we provide a range of resources for students wishing to develop their academic and transferable skills.

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