

# Introduction to Journal-Style Scientific Writing

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## Overview

A critical aspect of the scientific process is the reporting of new results in scientific journals in order to disseminate that information to the larger community of scientists. Communication of your results contributes to the pool of knowledge within your discipline (and others!) and very often provides information that helps others interpret their own experimental results. Most journals accept papers for publication only after peer review by a small group of scientists who work in the same field and who recommend the paper be published (usually with some revision).

The [format and structure](#) presented here is a general one; the various scientific journals, and oftentimes specific disciplines, utilize slightly different formats and/or writing styles. Mastery of the format presented here will enable you to adapt easily to most journal- or discipline-specific formats. While this guide (a others like it) is a *necessary* tool of learning the scientific writing style and format, it is not *sufficient*, by itself, to make you an accomplished writer. This guide will not teach you how to write in the English language, i.e., it is not a grammar book. You, the writer, must **practice writing and thinking** within this structure, **and**, learn by example from the writings of others; learning the nuances of this style and format will be enhanced as you **read the scientific literature - pay attention to how professional scientists write about their work**. You *will* see improvement in your own scientific writing skills by repeatedly practicing reading, writing, and critiquing of other's writing.

## The guide addresses four major aspects of writing journal-style scientific papers:

**(1)** Fundamental style considerations; **(2)** a suggested strategy for efficiently writing up research results; **(3)** the nuts and bolts of format and content of each section of a paper (part of learning to write a scientific paper is learning how to follow instructions precisely), and, **(4)** basic information regarding peer critiques of scientific writing. ALL journals have a set of instructions for authors which explicitly state how their paper should be formatted for submission. Consider this guide to be your instructions when writing lab reports for the Biology core courses. We encourage you to follow the directions carefully and to make full use of this guide and the writing support system (TWAs, instructors, and Writing Workshop staff tutors) as you prepare your papers. Please ask for help if you have questions about format, style, or content. Above all, remember to write with **precision, clarity, and economy**.

## Getting Started

The first task to accomplish as you begin the process of writing is to order and organize the information you wish to present. Some people work well from an outline, others do not. Some people write first to discover the points, then rearrange them using an after-the-fact outline. Whatever process you may use, be aware that scientific writing requires special attention to order and organization. Because the paper will be divided into sections, you need to know what information will go into each. If you don't normally work from an outline, this may be an occasion when you'll at least want to develop a list of the major points to be included in each section, before you begin to write. If the paper has multiple authors, then this is a good time to work (and negotiate!) with your collaborators to insure that all the points the group wants to make get listed.

**Audience:** Who will be reading your paper? Usually you will be writing to your peers. Simple advice: address your paper to another interested biology student, or lab group, in this course or major, and assume they have *at least* the same knowledge and expertise base as you. Knowing your audience helps you to decide what information to include--you would write a very different article for a narrow, highly technical, disciplinary journal vs. one that went out to a broad range of disciplines. Similarly, you would write a paper for an audience of other biology majors very differently than one you would write for a cross section of the college. **Do not** write your paper specifically for your instructor.

## Prose

***Your writing should be in complete sentences and easily understood.*** It should conform to the conventions of standard written English (sentence form, grammar, spelling, etc.). Your ideas will have little impact, no matter how good the research, if they are not communicated well. Remember always that scientific terminology very often has precise meaning. Be certain you choose your words correctly and wisely.

***It is important to write clearly and concisely. Make sure that every paragraph has a clear topic sentence and that the paragraph content supports the topic.*** The goal is to report your findings and conclusions clearly, and with as few words as necessary. Your [audience](#) (other scientists usually) are not interested in flowery prose, they want to know your findings. **Remember:** Writing and thinking are closely linked enterprises - many people have noted that, "*fuzzy writing reflects fuzzy thinking.*" When people have difficulty translating their ideas into words, they generally do not know the material as well as they think.

Grammar questions or concerns? Try: **Ask Betty** <http://depts.washington.edu/engl/askbetty/>  
(Univ. of Washington)

## Style Considerations

**Be clear and concise:** Write briefly and to the point. Say what you mean **clearly** and avoid embellishment with unnecessary words or phrases. **Brevity** is very important. Use of the active voice alone shortens sentence length considerably.

**Precise word use is critical:** Scientific terminology carries specific meaning - learn to use it *appropriately* and use it *consistently*. A critical function of technical terminology is to say a lot with a few words, i.e., **economy**. This applies as well to appropriate *acronyms* (e.g., PCR) and *abbreviations*. Direct your paper toward the average reader in your intended [audience](#). If writing for a highly technical journal, you will necessarily use the technical jargon. If writing for a general science audience you would limit the jargon.

### Some things to avoid:

- You do not have to try to impress people by using words most people have never heard of. Many published articles are like this, and they are poor papers on account of it.
- *Do not* use colloquial speech, slang, or "childish" words or phrases.
- *Do not* use contractions: **for example**, "don't" must be "do not" and "isn't" must be "is not" etc.

**Abbreviations:** Do not use abbreviations in the text *except* for units of measure. Always abbreviate these when using them with data (2 mm; 10 min.). Except for temperature units (F,C, K) never abbreviate units of measure when using them in a non-data context (e.g., "we measured length in millimeters"; "time was recorded in minutes"; "temperature was measured in F (or C)"; "100 years have passed since Mendel did..."). A list of common [abbreviations and conversions](#) is provided.

**Use Past Tense:** Research papers reflect work that has been completed, therefore use the past tense throughout your paper (including the Introduction) when referring to the *actual work* that you did, including statements about your expectations or hypotheses. Use the past tense, as well, when referring to the work of others that you may cite.

**First vs. Third Person:** If there is one stylistic area where scientific disciplines and journals vary widely, it is the use of first vs. third person constructions. Some disciplines and their journals (e.g., organismal biology and ecology) have moved away from a very strict adherence to the third person construction, and permit limited use of the first person in published papers. Other disciplines, especially the biomedical fields, still prefer the third person construction. Limit your use of first person construction (i.e., "I (or we) undertook this study ...."): usually it is most acceptable in the Introduction and Discussion sections, and then only to a limited extent. Use first person in the methods *sparingly* if at all, and avoid its use in the results.

**Use Active Verbs:** Use active verbs whenever possible; writing that overly uses passive verbs (is, was, has, have, had) is deadly to read and almost always results in more words than necessary to say the same thing.

ACTIVE: "*the mouse consumed oxygen at a higher rate...*"  
PASSIVE: "*oxygen was consumed by the mouse at a higher rate..*"

The clarity and effectiveness of your writing will improve dramatically as you increase the use of the active voice.

Other specific comments on style are also included for each section of the paper. **Remember:** precise word use, past tense, active voice, brevity.

**References** [References](#) to the research findings of others are an integral component of any research paper. The usual practice is to summarize the finding or other information in your own words and then cite the source. Any ideas or other information that are not your own must be substantiated by a [reference that is cited in the text](#). **As a rule, in research papers, direct quotation and footnoting are not practiced - simply restate the author's ideas or findings in your own words and provide a citation.**

#### Ladd Library links:

<http://abacus.bates.edu/Library/resources/reference/citation.shtml>

**Plagiarism** (use of others words, ideas, images, etc. without citation) is not to be tolerated and can be easily avoided by adequately referencing any and all information you use from other sources. In the strictest sense, plagiarism is representation of the work of others as being *your* work. Paraphrasing other's words too closely may be construed as plagiarism in some circumstances. In journal style papers there is virtually no circumstance in which the findings of someone else cannot be expressed in your own words with a proper citation of the source. Refer to: [The Bates College Statement On Plagiarism and a Guide to Source Acknowledgment](#).) If you are unclear about what constitutes plagiarism, please confer with your instructor.