

Writing Research Papers

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- Style
- Organization

Scientist should not be content to write badly

- ❑ "No tale is so good that it can't be spoiled in the telling"
- ❑ Ambiguity leads to misunderstanding
- ❑ Obscurity makes readers struggle to reconstruct the authors' intention
- ❑ Effort used to understand the structure of a paper or the syntax of its sentences is effort not used to understand its content
- ❑ Poorly presented material carries a strong subconscious message
- ❑ Therefore, the ability to write well is key skill of science

Good Style

- ❑ Writing could be verbose or cryptic, flowery or plain, poetic or literal.
- ❑ Style is about how well you communicate with likely readers
- ❑ Science writing must by its nature be prosaic
- ❑ Economy: Text should be taut
 - Every sentence should be necessary
 - Frequent revisions are required
 - Remember that it is the readers you need to please not yourself
 - Be careful not to condense too far

Good Style

- Tone: Writing should be objective and accurate. The goal is to inform not to entertain
 - Use a direct simple style
 - Have one idea per sentence or paragraph and one topic per section
 - Have a simple and logic organization
 - Use short words
 - Keep paragraphs short
 - Avoid buzzwords, clichés
 - Avoid excess, in length or style
 - Omit any unnecessary material
 - Be specific, not vague or abstract

Good Style

- Use direct statements "we" or "I" - the active voice to make reading more pleasant and to help distinguish new results from old.
- Examples: Use an example whenever it adds clarification. A small example often means the difference between communication and confusion

Good Style

- ❑ Motivation: The logic of the structure should be communicated to the reader
 - Explain the structure in introduction
 - Each section has a clear story to tell
 - The connection between one paragraph and the next should be obvious
 - ❑ Tell the reader what you are going to say, then say it, and then tell the reader that you have said it

Good Style

- ❑ Balance: each topic should be discussed to a similar depth.
- ❑ Obfuscation: is the making of statements in ambiguous or convoluted terms, with the intention of hiding meaning, or of appearing to say much while actually saying little.
- ❑ Reference and citations
 - Help demonstrate that the work is new
 - Demonstrate your knowledge of the research area
 - They are pointers to background reading.

More details about Style

- ❑ Titles and heading - concise and informative, specific rather general terms
- ❑ The opening paragraphs - set the reader's attitude to the whole paper. Take the most care with the opening.
- ❑ The abstract should be written especially well.
- ❑ Paragraph - discussion on a single topic or issue
 - The outline in the first sentence
 - Every sentence should be on the topic announced in the opening
 - The last sentence has higher impact

More details about Style

- ❑ Sentences should have simple structure - one or two lines
 - Don't say too much all at once
- ❑ Definitions: Terminology, variables, acronyms should be defined or explained the first time they are used
- ❑ Choice of words: use short, direct rather than long. Choose specific and familiar words.
- ❑ Qualifiers: Don't pile qualifiers on top of one another.

More details about Style

- ❑ Padding: use of pedantic phrases such as “the fact that” or “in general.”
 - “Of course” could be patronizing even insulting

Graphs

- ❑ Are usually the best way to present numerical results
- ❑ Each graph should convey interesting new results
- ❑ Graphs should be simple, with no more than a few plotted lines and minimum of clutter
- ❑ Plotted lines of discrete data should always have points marked
- ❑ Captions and labels should be informative. The caption should fully describe the figure's major elements.

Editing Check List

- Are the titles and heading consistent with the content?
- Have all terms been defined?
- Is the style of definition consistent?
- Are abbreviations and acronyms stated in full when first used?
- Are any abbreviation used less than, say four times?
- Is tense used correctly?
- Have units been used logically?
- Are the graphs all the same size?
- Are tables in the same format?
- In references, has each field been formatted consistently?
- ...

Writing

- A good principle is to begin early
- Define the scope of the paper
- Organization
 - Title and author, key words
 - Abstract
 - Introduction
 - Body
 - Literature review
 - Conclusions
 - Bibliography
 - Appendices

Abstract

- ❑ A single paragraph 200-500 words
- ❑ Allow the reader to judge whether or not the paper is relevant
- ❑ No space for unnecessary words
- ❑ Specific

Introduction

- ❑ An expanded version of abstract
- ❑ It should describe the paper's topic,
 - the problem,
 - references to key papers,
 - the approach to the solutions,
 - the scope and limitations of the solutions
and
 - the outcome

Introduction

- ❑ 1) A general statement introducing the broad research area of particular topic being investigated
- ❑ 2) An explanation of the specific problem, difficulty, challenge, to be solved
- ❑ 3) A brief review of existing standard solutions to this problem and their limitations
- ❑ 4) An outline of the proposed solution
- ❑ 5) A summary of how the solutions was evaluated and what the outcomes of the evaluations were.

Body

- ❑ Should present the results
- ❑ Provide the necessary background and terminology
- ❑ Explain the chain of reasoning
- ❑ The body should be reasonably independent of the other parts

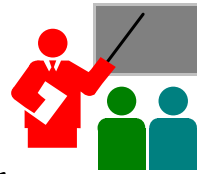
Literature Review

- ❑ Compare the new results to similar previously published
- ❑ A survey can help a reader who is not expert

Conclusions

- ❑ Draw together the topics discussed in the paper
- ❑ A concise statement of the paper's important results and explanation of their significance

Summary



- ❑ Writing skills are critical for researchers
- ❑ Good paper = Good Science + Style + Organization + many Revisions
- ❑ Homework: Apply these rules to this class paper

- ❑ May all your publication endeavors be successful !