

Introduction:

Article: a written composition in prose, usually nonfiction, on a specific topic, forming an independent part of a book or other publication, as a newspaper or magazine.

Or :

Grammar. any member of a small class of words, or, as in Swedish or Romanian, affixes, found in certain languages, as English, French, and Arabic, that are linked to nouns and that typically have a grammatical function identifying the noun as a noun rather than describing it.

A Approaching a Writing Project**1 Establishing the Mindset**

- Remember that you are writing to communicate, not to impress.
- Realize that those reading your work want you to do well.
 - Journal editors
 - Peer reviewers
 - Professors

Note: The purpose of their constructive criticism is to help you succeed.

2 Preparing to Write

- Use published items as models.
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- Perhaps consult a style manual—for example:
 - [AMA \(American Medical Association\) Manual of Style](#)
 - [Scientific Style and Format](#)
- While you are gathering content, write down ideas that occur to you.

Note: on Preparing to Write

- Do lots of “prewriting”—for example:
 - Stack papers in the order you plan to cite them.
 - List points you want to make.
 - Perhaps make an outline.
- If you’re having trouble formulating ideas, perhaps do something else for a while.

3 Doing the Writing

- Schedule specific times to write.
- Start with whatever part you find easiest.
- Don’t interrupt your writing to search for small details.
- Realize that often in writing there is no “one right way” but rather a series of problems with more than one solution.

4 Revising Your Work

- Note: Good writing is largely a matter of good revising.
- First revise your writing yourself. Then get feedback from others and revise more.
- Consider having an editor help you.
- Avoid the temptation to keep revising your writing forever.

Questions to Consider in Revising

- Does the manuscript contain everything it should?
- Does it contain anything it shouldn’t?
- Is all the information accurate?
- Is the content consistent throughout?
- Is everything logically organized?
- Is everything clearly worded?

Questions to contents

- Are points stated briefly, simply, and directly? In other words, is everything concise?

- Are grammar, spelling, punctuation, and word use correct throughout?
- Are all figures and tables well designed?
- Does the manuscript comply with the instructions?

B Writing a Scientific Paper:

Section by Section

1 Title

- The fewest possible words that adequately indicate the contents of the paper
- Important in literature searching
- Should not include extra words, such as “A Study of” or “Observations on”
- Should be specific enough
- Generally should not include abbreviations
- (Running title: short version of title—appears at tops of pages)

2 The Abstract

- Briefly summarizes the paper
- Gives editors and peer reviewers their first impression of the paper
- Tends to be widely read
- Should be organized like the paper (for example, in sort of a mini-IMRAD format)
- Some journals have structured abstracts (with standardized headings)

3 Contents

- Depending on the kind of paper and the journal, can be informative (summarizing the content of the paper) or just indicative (stating the topics included)
- Should be carefully revised before the paper is submitted
- Be sure the content is consistent with that in the body of the paper.

Overall Structure of a Paper:

Like an Hourglass

IMRAD

- **I**ntroduction
- **M**ethods
- **R**esults
- **A**nd
- **D**iscussion

1 The Introduction

Purposes of the Introduction

- To provide background
 - In order to help readers understand the paper
 - In order to help readers appreciate the importance of the research
- To identify the question(s) the research addressed
 - Sometimes stated as a hypothesis or hypotheses

Length of Introduction

- Articles in biomedical journals: tend to have short introductions (a few paragraphs or less)
- Articles in some other journals: tend to have long introductions
- How about introductions to articles in your research area?

Gearing the Introduction to the Audience

- Papers in relatively general journals: Introduction must provide basic background information.
- Papers in specialized journals: Introduction can assume that readers have more knowledge about the research topic.

Structure of the Introduction

- Introduction typically should be funnel-shaped, moving from general to specific
- A common structure:

- Information on importance of topic
- Highlights of relevant previous research
- Identification of unanswered question(s)
- Approach you used to seek the answer(s)
- (In some cases, the main findings)

When to Write the Introduction

- Sometimes wise to write the introduction last
 - “Until you know what you’re introducing, you can’t introduce it.”
- Sometimes useful to write it first, to help provide focus
- After writing all the sections of the paper, revise the paper as a whole (typically several times).

Tables

- Use tables only if text will not suffice.
- Design tables to be understandable without the text.
- Organize each table in a logical way.
- If a paper includes a series of tables, use the same format for each.
- Be sure to follow the instructions to authors.

Figures

- Use figures (graphs, diagrams, maps, photographs, etc) only if they will help convey your information.
- Avoid including too much information in one figure.
- Make sure any lettering will be large enough once published.
- Follow the journal’s instructions.

Discussion Question

- If you have data that could be presented in either a table or a figure, how do you decide which one to use?

A General Suggestion

- Look at tables and figures in journal articles presenting research similar to yours
 - In your target journal
 - In other good journals
- Use these tables and figures as models when designing your own tables and figures.

2 The Methods

Purposes of the Methods Section

- To allow others to replicate what you did
 - In order to test it
 - In order to do further research
- To allow others to evaluate what you did
 - To determine whether the conclusions seem valid
 - To determine whether the findings seem applicable to other situations

Methods: Basic Information to Include

- In most cases, overview of study design
- Identification of (if applicable)
 - Equipment, reagents, organisms, etc used (and sources)
 - Approval of human or animal research by an appropriate committee
 - Statistical methods

Methods: Amount of Detail to Use

- For well-known methods: name of method, citation of reference
- For methods previously described but not well known: brief description of method, citation of reference
- For methods that you yourself devise: relatively detailed description

Methods: The Words and More

- Should be written in past tense
- In some journals, may include subheads
- May include tables and figures—for example:
 - Flowcharts
 - Diagrams of apparatus
 - Tables of experimental conditions

3 The Results

- The core of the paper
- Often includes tables, figures, or both
- Should summarize findings rather than providing data in great detail
- Should present results but not comment on them
- (Note: Some journals, however, combine the Results and the Discussion.)

Note: Verb Tense for the Results Section: Past Tense

Examples:

- A total of 417 samples were analyzed
- _____ increased, but _____ decreased.
- The median duration was _____.
- The difference was not statistically significant.
- During the year after the workshop, 8 participants introduced new techniques into their veterinary teaching.

Results Sections of Papers

with Tables or Figures

- How much should the information in the text overlap that in the tables and figures?
 - Not extensive overlap
 - In general, text should present only the main points from the tables and figures
 - Perhaps also include a few of the most important data
- Remember to mention each table or figure. Do so as soon as readers might want to see it.

Mentioning Tables and Figures:

Some Writing Advice

- In citing tables and figures, emphasize the finding, not the table or figure.
 - *Not so good*: Table 3 shows that researchers who attended the workshop published twice as many papers per year.
 - *Better*: Researchers who attended the workshop published twice as many papers per year (Table 3).

4 The Discussion Section

Discussion:

- One of the more difficult parts to write, because have more choice of what to say
- Often should begin with a brief summary of the main findings
- Should answer the question(s) stated in the introduction (or address the hypothesis or hypotheses stated in the introduction).

Some Possible Content

- Strengths of the study
 - For example, superior methods, extensive data
- Limitations of the study
 - For example: small sample size, short follow-up, incomplete data, possible sources of bias, problems with experimental procedures
 - Better to mention limitations than for peer reviewers and readers to think that you're unaware of them
 - If the limitations seem unlikely to affect the conclusions, can explain why

Relationship to findings of other research—for example:

- Similarities to previous findings (your own, others', or both)
- Differences from previous findings
- Possible reasons for similarities and differences

Applications and implications—for example:

- Possible uses of the findings (in health care, policy, industry, etc)
- Relationship of the findings to theories or models:
 - Do the findings support them?
 - Do they refute them?
 - Do they suggest modifications?

Other research needed—for example:

- To address questions still unanswered
- To address new questions raised by the findings

Other Discussion (cont)

- Typically should move from specific to general, rather like an inverted funnel (opposite of introduction)
- In some journals, may be followed by a conclusions section
- In some short papers, is called “Comment” rather than “Discussion”

The Discussion: A Suggestion

- Look at the discussion sections of some papers in your target journal.
- Notice items such as the following:
 - Length
 - Types of content
 - Organization
 - Phrases commonly used
 - Citation of references
- Use these discussion sections as models.

Citing References

Functions of References

- To give credit to others for their work
- To add credibility to your work by showing that you used valid information sources
- To help show how your work is related to previous work
- To help readers find further information

References:

Importance of Accuracy

- Studies show that many references are inaccurate.
- For references to fulfill their functions, they must be accurate.

Therefore

- Make sure that you accurately state what the cited material says.
- Make sure that all information in the citation (for example, author list, article title, journal title, volume, year, pages) is accurate.

Formats

- Various formats exist for citation in text—for example:
 - Accuracy of references is important (Day and Gastel, 2011).
 - Accuracy of references is important.³
- Various formats exist for items in reference lists—for example:
 - Pineda D. 2003. Communication of science in Colombia. Sci. Ed. 26:91-92.
 - Pineda D. Communication of science in Colombia. Sci Ed 2003;26:91-2.

Citation Management Software

- Examples: EndNote, Reference Manager, RefWorks, Zotero
- Allows you to keep a database of references
- In many cases, provides the citations and references in the proper format for your target journal

Placement of Citations

- Ambiguous:
 - This compound has been found in humans, dogs, rabbits, and squirrels (Tuda and Gastel, 1997; Xie and Lozano, 2008; Omran, 2013).
 - This compound has been found in humans, dogs, rabbits, and squirrels.^{1,4,7}
- Clear:
 - This compound has been found in humans (Tuda and Gastel, 1997), dogs (Xie and Lozano, 2008), and rabbits and squirrels (Omran, 2013).

This compound has been found in humans,¹ dogs,⁴ rabbits,⁷ and squirrels.⁷

Other Advice on References

- If you haven't read an item, don't cite it.
 - Discussion question: If an article isn't freely accessible online, how might you obtain it?
- Check each reference against the original source.
- Carefully follow the journal's instructions to authors.
- Use other articles in the same journal as models.