

## **Introduction to Scientific Literature: Writing Scientific Papers**

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### A. Introduction

### B. Publishing a Scientific Paper: The Big Picture

1. Gathering and analysis of information
  - a. proposing the research (already with publication in mind)
  - b. doing the research (also with publication in mind)
  - c. considering possible target journals
  - d. obtaining a journal's instructions to authors (a resource: "Instructions to Authors in the Health Sciences": <http://mulford.meduohio.edu/instr/>)
2. Preparation of the paper
  - a. drafting the paper (you can draft the sections in any order)
  - b. revising, revising, revising
  - c. getting some feedback and revising some more
3. Evaluation by the journal
  - a. initial screening
  - b. peer review (evaluation by experts in the same field)
  - c. editorial decision
4. Further steps if a paper is accepted
  - a. revision by the author (usually)
  - b. manuscript editing by the journal
  - c. preparation and review of proofs
  - d. publication
  - e. celebration

### C. The Basic Structure of a Scientific Paper: "IMRAD"

<b>I</b> ntr <u>o</u> duction	What was the question?
<b>M</b> eth <u>o</u> ds	How did you try to answer it?
<b>R</b> es <u>u</u> lts	What did you find?
<b>A</b> nd	
<b>D</b> isc <u>u</u> ssion	What does it mean?

## D. Writing a Scientific Paper: A Section-by-Section View

### 1. Title

- a. definition: "the fewest possible words that adequately describe the contents of the paper"
- b. important in literature searching
- c. shouldn't include extra words, such as "a study of"
- d. should be specific enough

### 2. Authors

- a. those with important intellectual contributions to the work
- b. often listed largely from greatest contributions to least
- c. head of lab often listed at end
- d. important to list one's name the same way from paper to paper

### 3. Abstract

- a. summarizes the paper
- b. widely read and therefore important
- c. organized in IMRAD format (may be a structured abstract, with headings corresponding to the various sections)

Required headings—abstract for summer research fellowship:

- Objective
- Animals or Sample Population
- Procedures
- Results
- Conclusions and Clinical Relevance
- Impact for Human Medicine (if appropriate)

- d. content must be consistent with that in the paper
- e. normally should not include figures, tables, references

### 4. Introduction

- a. provides background needed to understand the paper and appreciate its importance
- b. identifies the question the research addressed
- c. should be fairly short
- d. generally should be funnel-shaped, moving from general to specific

### 5. Methods

- a. purposes: to allow others to replicate and to evaluate what you did
- b. should describe the study design

- c. should identify (if applicable):
  - organisms, reagents, equipment, etc used (and sources thereof)
  - approval of animal or human research by an appropriate committee
  - statistical methods
- d. may include tables and figures
- e. an issue: levels of detail in which to describe well-known methods, methods that have been previously described but are not widely known, and methods that you yourself devised
- f. usefulness (as in other sections) of using other papers in the journal as models

## 6. Results

- a. the core of the paper
- b. often includes tables, figures, or both (an issue: how much the information in the text should overlap with that in the tables and figures)
- c. should present results but not comment on them

## 7. Discussion

- a. often should begin with a brief summary of main findings
- b. should answer the question stated in the introduction
- c. commonly should note strengths and limitations of the study
- d. should relate the findings to those of other research
- e. may identify other research needed
- f. typically should move from specific to general (opposite of introduction)

## 8. Acknowledgments

- 1. a place to thank people who helped with the work but did not make contributions deserving authorship
- 2. those listed should be asked first
- 3. often the place where sources of financial support are stated

## 9. References

- 1. functions: to give credit, to provide credibility, to aid readers in finding further information
- 2. importance of accuracy
- 3. existence of various reference formats
- 4. availability of citation management software (for example, EndNote)

## E. Some Pointers on Language (overall message: Write to communicate, not to impress.)

### 1. Write readably.

- a. Use short, common words if possible.
  - demonstrate→
  - fundamental→
  - utilize→

- b. Avoid windy phrases.
    - at this point in time→
    - in the event that→
    - red in color→
  - c. Use verbs rather than nouns made from them.
    - take into consideration→
    - make reference to→
    - provide an explanation→
  - d. Avoid long, convoluted sentences.
  - e. Avoid very long paragraphs.
2. Limit use of abbreviations.
  3. Remember: Many readers might not be native speakers of English.

#### F. Some Additional Resources

*How to Write and Publish a Scientific Paper*, 6th edition, by Robert A. Day and Barbara Gastel. Westport, CT: Greenwood Press, 2006.

*Fundamentals of Writing Biomedical Research Papers*, 2nd edition, by Mimi Zeiger. New York: McGraw-Hill, 2000.

*American Medical Association Manual of Style*, 10th edition.

*Scientific Style and Format* (the Council of Science Editors style manual), 7th edition.

Uniform Requirements for Manuscripts Submitted to Biomedical Journals,  
<http://www.icmje.org>.

AuthorAID, <http://www.authoraid.info>.

#### G. Closing Comments

*Wishing you all the best in your scientific writing!*