



# SciWrite 5.x

## The original manuscript

- recommended order for writing a original manuscript
  1. Tables and Figures
  2. Results
  3. Methods
  4. Introduction
  5. Discussion
  6. Abstract

## 5.1: Tables and Figures

→ are the foundation of your story

- should stand alone and tell a complete story
- reader should not need to refer back to the main text
- tips
  - use the fewest figures and tables needed to tell the story
  - do not present the same data as a table and a figure

## Tables

- tables
  - give precise values
  - display many values/variables
- table title

- identify the specific topic or point of the table
- use the same key terms in the table title, the column headings and the text of the paper
- keep it brief!
- table footnotes
  - use superscript symbols to identify footnotes, according to journal guidelines
  - use footnotes to explain statistically significant differences
  - use footnotes to explain experimental details or abbreviations
- table formats
  - model your tables from already published tables! don't re-invent the wheel
  - most journals use three horizontal lines: one above the column headings, one below the column headings and one below the data
  - follow journal guidelines RE
  - tips:
    - don't use grid lines
    - make sure everything lines up
    - reasonable number of significant figures
    - give units
    - omit unnecessary columns

## Figures

- figures
  - visual impact
  - show trends and patterns
  - tell a quick story

- tell the whole story
- highlight a particular result
- types of figures
  1. primary evidence
    - indicates data quality
  2. Graphs
  3. Drawings and diagrams
    - illustrate an experimental set-up or work-flow
    - indicate flow of participants
    - illustrate cause and effect relationships or cycles
    - give a hypothetical model
    - represent microscopic particles or microorganisms as cartoons
- figure legends

→ allows the figure to stand alone

- may contain
  - brief title
  - essential experimental details
  - definitions of symbols or line/bar patterns
  - explanation of panels
  - statistical information

## Graphs

- line graphs, scatter plots, bar graphs, individual-value bar graphs, histograms, box plots, survival curves
- line graphs
  - used to show trends over time, age or dose (can display group means or individuals)

- bar graphs
  - used to compare groups at one time point
  - tells a quick visual story
- scatter plots
  - used to show relationships between two variables (particularly linear correlation)
  - allows reader to see individual data points = more information!
  - be careful with drawn lines since they can be misleading
- tips:
  - tell a quick visual story
  - keep it simple
  - make it easy to distinguish groups
  - if it's too complex, maybe it belongs in a table

## 5.2: Results

- results section should:
  - **summarize** what the data show
    - point out simple relationships
    - describe big-picture trends
    - cite figures or tables that present supporting data
  - avoid simply repeating the numbers that are already available in tables and figures
- break into subsections, with headings (if needed)
- complement the information that is already in tables and figures
  - give precise values that are not available in the figure
  - report the percent change or percent difference if absolute values are given in the table

- repeat/highlight only the most important numbers
- don't forget to talk about negative and control results
- reserve the term "significant" for statistically significant
- reserve information about what you did for the methods section
  - in particular, do not discuss the rationale for statistical analyses within the Results section
- reserve comments on the meaning of your results for the discussion section
- **What verb tense to use**
  - use past tense for completed actions
    - We **found** that...
    - Women **were** more likely to...
    - Men **smoked** more cigarettes than...
  - use the present tense for assertions that continue to be true, such as what the tables show, what you believe and what the data suggest
    - Figure 1 **shows**...
    - The findings **confirm**...
    - The data **suggest**...
- **use the active voice**
  - more lively
  - since you can talk about the subjects of your experiments, "we" can be used sparingly while maintaining the active voice

## 5.3 Methods and Materials

- give a clear overview of what was done
  - content
    - materials
    - participants/subjects

- experimental protocol/study design
- measurements
- analyses
- guide to writing the methods section
  - who, what, when, where, how, why

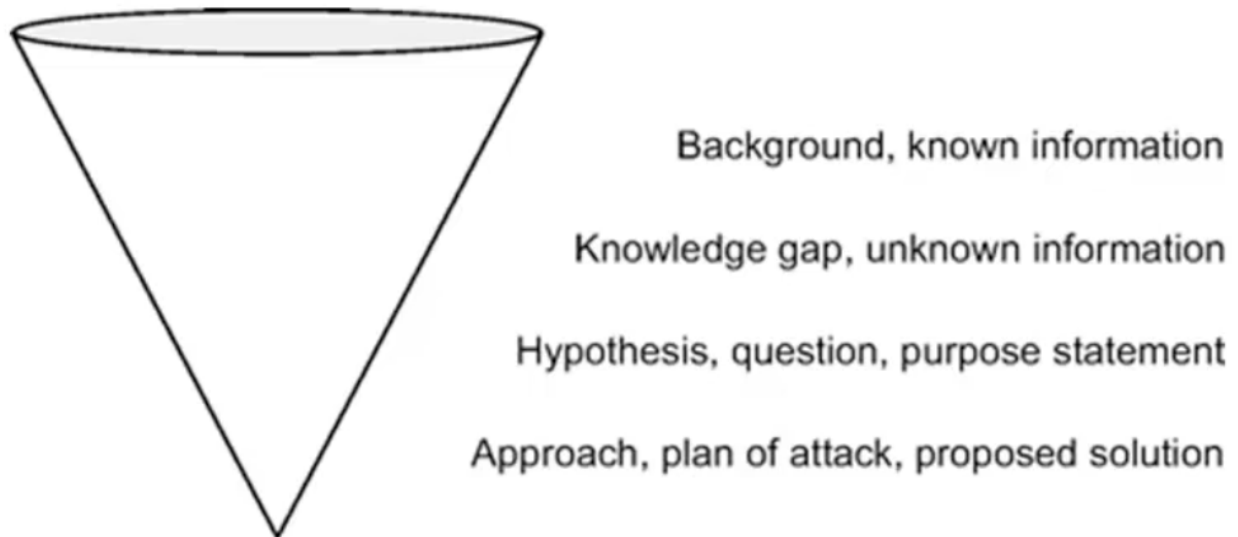
|   |
|---|
| <b>Who</b>  |
| Who maintained the records? Who reviewed the data? Who collected the specimens? Who enrolled the study participants? Who supplied the reagents? Who made the primary diagnosis? Who did the statistical analyses? Who reviewed the protocol for ethics approval? Who provided the funding?  |
| <b>What</b>   |
| What reagents, methods, and instruments were used? What type of study was it? What were the inclusion and exclusion criteria for enrolling study participants? What protocol was followed? What treatments were given? What endpoints were measured? What data transformation was performed? What statistical software package was used? What was the cutoff for statistical significance? What control studies were performed? What validation experiments were performed? |
| <b>When</b>   |
| When were specimens collected? When were the analyses performed? When was the study initiated? When was the study terminated? When were the diagnoses made?   |
| <b>Where</b>  |
| Where were the records kept? Where were the specimens analyzed? Where were the study participants enrolled? Where was the study performed?  |
| <b>How</b>  |
| How were samples collected, processed, and stored? How many replicates were performed? How was the data reported? How were the study participants selected? How were patients recruited? How was the sample size determined? How were study participants assigned to groups? How was response measured? How were endpoints measured? How were control and disease groups defined?   |
| <b>Why</b>  |
| Why was a species chosen (mice vs rats)? Why was a selected analytical method chosen? Why was a selected experiment performed? Why were experiments done in a certain order?  |

- give enough information to replicate the study (recipe)
- be complete, but make life easy for your reader
  1. Break into smaller sections with subheadings
  2. Cite a reference for commonly used methods
  3. Display a flow diagram or table where possible
- you may use jargon and the passive voice more liberally
  - verb tense
    - report methods in past tense
    - but use present tense to describe how data are presented in the paper
  - passive: emphasizes the method or variable
  - active: more lively, but fails to emphasize the material/method/variable.

- "we purified with", "were aligned with", "were synthesized by", "were coupled to"

## 5.4: Introduction

- good news: the introduction is easier to write than you may realize!
- follows a fairly standard format
- typically 3 paragraphs long (recommended: 2-5)
- it is not an exhaustive review of your general topic
  - should focus on the specific hypothesis/aim of your study



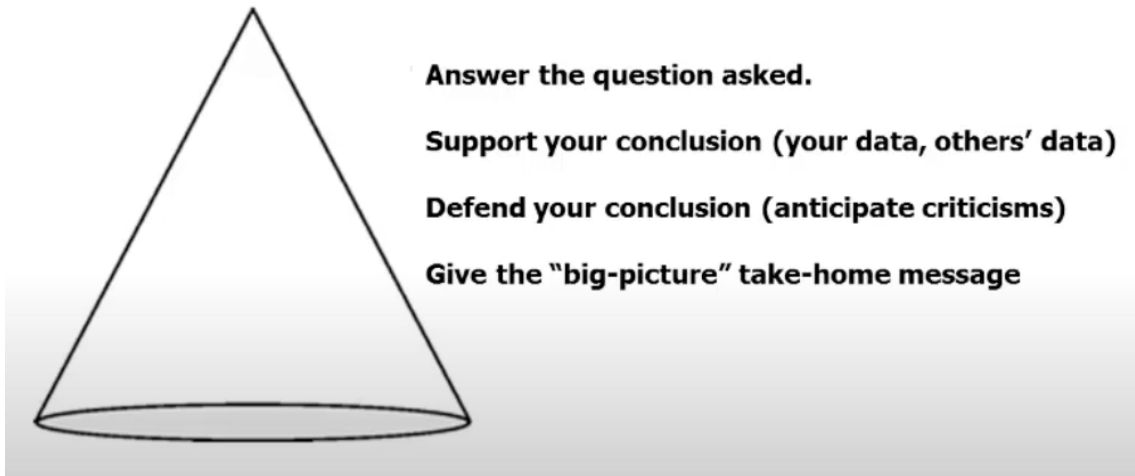
- structure
  1. What's known
  2. What's unknown
    - limitations and gaps in previous studies
  3. Your burning question/hypothesis/aim
  4. Your experimental approach
  5. Why your experimental approach is new and different and important (fill in the gaps)

- paragraph 1: 1.
- paragraph 2: 2.
- paragraph 3: 3., 4., 5.
- tips
  - keep paragraphs short
  - write for a general audience
    - clear, concise, non-technical
  - take the reader step by step from what is known to what is unknown. End with your specific question
    - known → unknown → question/hypothesis
  - emphasize how your study fills the gaps (the unknown)
  - explicitly state your research question/aim/hypothesis: "We asked whether", "Our hypothesis was", "We tested the hypothesis that"
  - do not answer the research question (no results or implications)
  - summarize at high level. Leave detailed descriptions, speculations and criticisms of particular studies for the discussion

## **5.5: Discussion**

- gives you the most freedom
- gives you the most chance to put good writing on display
- is the most challenging to write





- → what do my results mean and why should anyone care?
- overview:

|   |   |
|---|---|
| Key finding (answer to the question(s) asked in Intro.) | <ul style="list-style-type: none"> <li>• Start with: "WE FOUND THAT..." (or something similar)</li> <li>• Explain what the data mean (big-picture!)</li> <li>• State if the findings are novel</li> </ul>                   |
| Key secondary findings                                  |   |
| Context   | <ul style="list-style-type: none"> <li>• Give possible mechanisms or pathways</li> <li>• Compare your results with other people's results</li> <li>• Discuss how your findings support or challenge the paradigm</li> </ul> |
| Strengths and limitations                               | <ul style="list-style-type: none"> <li>• Anticipate readers' questions/criticisms</li> <li>• Explain why your results are robust</li> </ul>   |
| What's next   | <ul style="list-style-type: none"> <li>• Recommended confirmatory studies ("needs to be confirmed")</li> <li>• Point out unanswered questions and future directions</li> </ul>  |
| The "so what?": implicate, speculate, recommend         | <ul style="list-style-type: none"> <li>• Give the big-picture (human) implications of basic science findings</li> <li>• Tell readers why they should care</li> </ul>  |
| Strong conclusion                                       | <ul style="list-style-type: none"> <li>• Restate your main finding.</li> <li>• Give a final take-home message.</li> </ul>   |

- tips
  - showcase good writing

- use the active voice
- tell it like a story
- start and end with the main finding
  - "We found that"
- don't travel too far from your data
  - focus on what your data do prove, not what you had hoped your data would prove
- focus on the limitations that matter, not generic limitations
- make sure your take-home message is clear and consistent
- what not to do
  - do not start with the limitations
  - verb tense:
    - active
    - past, when referring to study details, results, analyses and background research
    - present, when talking about what the data suggests

## 5.5: Abstract

- abstracts: "to pull out"
- overview of the main story
- gives highlights from each section of the paper
- limited length (100-300 words)
- stands on its own
- used, with title, for electronic search engines
- most often, the only part people read
- overview
  1. Background

2. Question/aim/hypothesis

- "we asked whether", "we hypothesized that"

3. Experiment(s)

- quick summary of key materials and methods

4. Results

- key results found
- minimal raw data (prefer summaries)

5. Conclusion: the answer to the question asked/take-home message

6. Implication, speculation or recommendation

- abstracts may be structured (with subheadings) or free-form
- some write abstract first early
  - do not use that latter after writing the thesis!