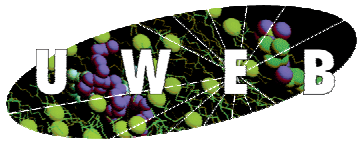
# 2004 UWEB REU Communications Workshop

Writing a Scientific Research Article

Jennifer Patterson

July 21, 2004

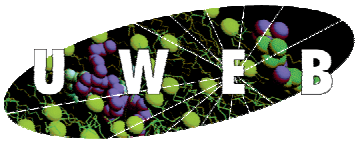


# Paper Assignments

- Final paper
  - Due August 21
- Draft of introduction and methods sections
  - See handout
  - Due August 3 or 4

# The Scientific Paper

- Research articles
  - Most common type of publication
  - New discovery (focused study)
- Review paper
  - Summary of multiple works (key findings)
  - Intended to broadly educate/introduce to field
- Technical communications
  - Detailed description of novel methods
  - Generally lack scientific question



# Objectives and Significance

- Dissemination of knowledge
- Transmit message to a broad audience
- Clarity, conciseness, accuracy
- Your contribution to your field
  - Establish your area of expertise
- Establish your reputation
  - Graduate school acceptance
  - Increased likelihood of funding
  - Tenure/job promotion

# General Rules

- Only publish new material once
- Do not break up a single study into 2 papers
- Do not plagiarize
- Do not falsify data
- Use active rather than passive voice
- Use correct verb tense
  - Past tense for completed work
  - Present tense OK for introduction and discussion

# Stages of Writing

- Getting in the mood
- Writing a first draft
- Revising, revising, revising
- Sending it out

# Writing Strategy

- List the main ideas
- Outline the paper
  - Use subheadings in sections
- Fill in the information
  - Start with the easiest section first
  - Details of protocols and results
- Fine tune the writing
  - Grammar, spelling, etc.
- Smooth out the sections
  - Good transitions

# Paper versus Presentation

**Paper**

- Title
- Abstract
- Introduction
- Materials & Methods
- Results
- Discussion (& Conclusion)
- Acknowledgments

**Presentation**

- Title
- Introduction
- Methods (& Materials)
- Results & Discussion
- Conclusion
- Future Work
- Acknowledgments

# Ordering of Sections

**Order of Appearance**

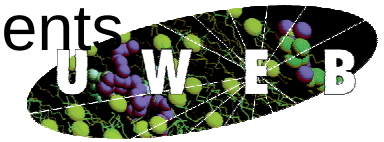
- Title
- Abstract
- Introduction
- Materials & Methods
- Results
- Discussion & Conclusion
- Acknowledgments

**Actual Writing**

- Materials & Methods
- Results
- Discussion & Conclusion
- Introduction
- Acknowledgements
- Title
- Abstract

# Main Components of Paper

- Introduction
  - Start general and narrow to focus
  - Present relevant background material
  - State hypothesis and objectives of study
- Main body
  - Include methods and results
  - Clearly explain the data
  - Present the data and relate the main findings
- Ending
  - Repeat the main findings and relate to hypothesis
  - Discuss implications of work and future directions
  - End with conclusion and acknowledgments



# Title

- Succinct and powerful
  - Delete unnecessary words
- Broad yet specific
  - Do not overstate but make it interesting
- Use keywords or buzzwords
  - Attracts interest
  - Comes up in database searches
- No abbreviations
  - Exception - very common words like DNA

# Abstract

- Summary of complete study
- Relatively short
  - 150-300 words
- Length and format dependent on journal
- Should stand alone
  - No references or figures
- Limit description of methods
  - 1-2 sentences
- Most important section
  - Most widely read, after title
  - Attracts audience

# Introduction

- Background
  - General field, what has been done, rationale
- Objectives
  - Relevance of your project, hypothesis (purpose), what you have done
- Comparable to discussion
- Try to capture reader's attention
  - But don't give everything away
- Judicious choice of references
  - Primary papers, not reviews
  - Most important work in field

# Materials and Methods

- All elements of research used to produce results
  - So it can be repeated by others
  - Includes specific information
    - Model numbers for equipment
    - Vendor and location for materials
- Cite previously described methods
  - Include brief description
  - Reference the original appearance of method
- Include more details than for presentation
- Some journals have on-line supplements

# Results

- Presentation of the data
  - Keep concise and clear
- Include data supporting hypothesis and aims
  - Most relevant information
- Include data to support everything mentioned in the discussion
- Present in logical order
  - Not necessarily chronological order
  - Order materials and methods the same way
  - Go back and characterize big discovery

# Results Continued

- Results reported as both figures and text
- Specific mention of figures and tables
  - In order that they are referenced in text
  - Describe data in text and reference figure
    - “…….. (Figure 1)”
- Judicious choice and arrangement of data
  - Limited space
- Present only analyzed data
- Do not provide interpretation in results section
  - Unless combined with discussion section

# Discussion

- Interpretation of the results
  - Larger meaning of the work within context of study and previously published research
- Data are never “good” or “bad”
  - “Expected” or “unexpected”
  - Mention conflicting or negative results
- Use literature to broaden discussion
  - Compare results and conclusions
  - Be tactful

# Discussion Continued

- Show your intelligence
  - Propose explanations for results
  - Display analytical skills
  - Show understanding of your project
- Be creative and imaginative
  - Potential implications of the results
  - Possible future work or directions
- Include conclusions within discussion section
  - Sub-section

# Acknowledgments

- List those who helped
  - Helpful discussions
  - Technical assistance
  - Donated reagents
- Do not acknowledge other authors
- Include facilities used
  - UWEB, NESAC/BIO, etc.
- Funding sources
  - May be individual for some authors
  - Use NIH or NSF grant numbers